

DISSERTATION

DIGITIZATION, INNOVATION, AND PARTICIPATION:
DIGITAL CONVIVIALITY OF THE GOOGLE CULTURAL INSTITUTE

Submitted by

Leah Stone

Department of Journalism and Media Communication

In partial fulfillment of the requirements

For the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Summer 2018

Doctoral Committee:

Advisor: Joseph Champ

Pete Seel

Jamie Switzer

Timothy Amidon

Keith Guzik

Copyright by Leah Stone 2018
All Rights Reserved

ABSTRACT

DIGITIZATION, INNOVATION, AND PARTICIPATION: DIGITAL CONVIVIALITY OF THE GOOGLE CULTURAL INSTITUTE

The Frightful Five—Amazon, Apple, Facebook, Microsoft and Alphabet, the parent company of Google—shape the way data are generated and distributed across digital space (Manjoo, 2017). Through their technologies and increase in scope and scale, these titans provide new ways for people to create, find, and share information online. And, with such control, they have continued as well as expanded their reign over information commerce, changing the way that people and technology interact. In this way, tech giants act as gatekeepers over data, as well as serve as all-mighty-creators over technologies that arguably *act on* humans.

To explain, debates over whether or not technologies are employing “computational agency” (Tufekci, 2015, p. 207) have developed. One of these disputes is commonly referred to as the Great Artificial Intelligence (AI) Debate, and is currently being publicly argued between two of the most prominent tech titans: Elon Musk, founder of Tesla and SpaceX, and Mark Zuckerberg, founder of Facebook (Narkar, 2017). On one side of the AI argument, sits tech mogul Musk, who is crying for regulatory restrictions over AI and painting doomsday pictures of robots killing humans. Conversely, on the other side of the dispute, sits tech giant Zuckerberg, who claims AI will enhance society as it makes the world a better place.

This great AI debate underscores what Illich (1973) described as organizations that practice in convivial versus non-convivial ways. In other words, as tech titans are continuing to advance technology, it can be argued that they are operating in convivial ways as they enhance

society through their participatory tools that work *with* humans to complete a task. Alternatively, it can be debated that technology organizations may be functioning in non-convivial ways as they manipulate society for the sake of their technologies. And, while these technologies may be *participating with* humans (convivial) to complete a task, they may actually be *working for* and/or *acting on* humans (non-convivial) to do an activity.

The purpose of this dissertation was to establish a unique approach to studying the conviviality of technology titans and how they organize digital space, a concept the researcher coined as digital conviviality. *Digital conviviality* is when a technology company operates in digital convivial ways such that it: (a) builds tools for digital communication; (b) has a value proposition that, while aimed at generating a profit, is also focused on using its technology to enhance society, instead of manipulating society for the sake of its technologies; and (c) designs technological tools that *work with* humans, instead of tools that *work for* humans or tools that *act on* humans, to accomplish a task. To further understand this conception of digital conviviality, an investigation was piloted into a tech titan that arguably claims to promote digital conviviality at its core: Google.

Using Illich's (1973) notion of conviviality as a guide, an exploration into Google's approach to convivial technologies was conducted. This study sought to understand Google's ability to shape information in the arts and culture space. Through its Google Cultural Institute (GCI) and Google Arts & Culture (GAC) initiatives, Google focused on "democratizing access to the world's culture" (Google CI Chromecast, 2014, 00:44). In this way, the study aimed to answer the overarching question: in what ways is the GCI considered a digital convivial company, and conversely, in what ways is it not? Based on this, an explication of the concept of digital conviviality and a framework for studying such things were developed.

Drawing from several disciplines, methodologies, and theoretical frameworks (e.g., science and technology, posthumanism, actor-network theory, design science in information systems, business models, digital methods, and convivial studies), a body of theory was gathered together, synthesized, and enhanced. Next, the collected information was used to assemble and create a new methodological strategy called digital convivial tracking with a design science (DS) approach and actor-network theory (ANT) mindset. Digital convivial tracking employs traditional qualitative methods, as well as innovative digital methods, to trace important objects throughout a digital ecosystem. Because the GCI digitizes the world's arts and culture, the iconic *The Starry Night* painting by Vincent van Gogh (1889d) was selected as the object to track across the institute's ecosystem. This process helped identify the GCI's complex and entangled business model, as well as its technological innovations. Further, and to add more context to the findings, two semi-structured in-depth interviews of critical participatory actors (i.e., a visiting scholar and a lead technical engineer of the GCI) were conducted.

Analysis was completed using ANT's relational material associations (Law, 2009; Latour, 2005) to create actor-network diagrams (Potts, 2014). These diagrams were placed within each segment of a digital convivial business model canvas (DCBMC), a business analysis tool based on Osterwalder and Pigneur's (2010/2013) business model canvas (BMC) but expanded upon by the researcher. Further, materiality concepts (Gries, 2015) were used to analyze the composition, production, transformation, distribution, circulation, collectivity, and consequentiality of *The Starry Night*. Additionally, the concept of participatory culture was analyzed using the mnemonic *CULTURE*, which was designed by the researcher and was built on the scholarship of Jenkins's (2009, 2012) evaluations of digital participatory culture and Graves's (2005) steps necessary for culture to remain vital and participatory. Digitality concepts

were analyzed using the digitality process, which was also designed by the researcher, but based on Potts's (2014) transformation of data and the GCI's ingestion-to-scale concept (Seales et al., 2013).

From this analysis, four organizational business model themes emerged: (1) Materiality and Value Propositions; (2) Customers and Participation; (3) Business Infrastructure, Leadership, and Digitality; and (4) Financial and Technological Gain. Within each of these themes, digital conviviality was assessed using Illich's (1973) conceptions of conviviality. Drawing from the translations formed through interviews and the analyses of digital convivial tracking of *The Starry Night*, notions of conviviality (Illich, 1973) were found to be present in how the GCI innovates participatory tools that *work with* humans, as well as how Google uses those tools to enhance society. Conversely, notions of non-conviviality (Illich, 1973) were also located in how the institute uses cultural data to enhance technologies that may be acting with "computational agency" (Tufecki, 2015, p. 207) on society (i.e., non-participatory tools that *act on* or *work for* humans). Based on this, and in response to the overarching research question, it appears that Google and its GCI, as a digital convivial company, is perhaps best located somewhere in between—its goal is neither entirely non-participatory or manipulative driven (non-convivial) nor is it entirely participatory focused (convivial).

Findings from this study challenge us to think about digital conviviality with regard to technology titans. Additionally, these findings encourage us to develop creative methodologies to help account for the connected and innovative dimensions found within a technology organization's business model. In this context, while heeding Illich's (1973) definition of conviviality, the practices and technologies of tech organization must be investigated to discover those institutions that not only claim to promote conviviality but are actually doing so. Further,

examinations into how technology companies enhance their digital tools are also crucial to determine whether manipulation of society (i.e., users) for the sake of their tools (i.e., user data employed to improve technological innovations) is taking place. In this way, once convivial organizations are identified, people can participate with these participatory institutions and their technologies, just as, when non-convivial organizations are recognized, people can ignore those non-participatory institutions and their tools.

Building on this call for examinations into technology titans and what it means to be a digital convivial company, it is also beneficial to think of the future of tech. While Geisler (2011) stated that digital spaces (such as the GCI) “provide more opportunities for readers and writers to become immersed in a virtual experience beyond what is familiar to them— not, however, to escape their embodied reality but to extend it” (p. 253), it may be necessary to ponder whether or not technologies will be extending reality in ways more unimaginable than self-driving cars, biotech implants, robots, and so forth. We must ask questions such as: “If art is what makes us human, how come Google’s bots can do it too?” (Brueck, 2016, para. 1) to investigate technology titans and the tools they create. Based on this, if technology will potentially be capable of things that are arguably reserved for innately human capabilities (i.e., consciousness, and creativity, as well as the qualities of love, empathy, sympathy, intuition, morality, sensory, feeling, arousal, and so forth), *what will technology titans and their tools be able to do next and how will these innovations impact society?*

ACKNOWLEDGMENTS

I would like to thank my family, friends, and mentors who helped and encouraged me throughout this arduous and, at times, quite emotional process.

Violette—We have been at this together since you came into the world. As I graduate, and you begin kindergarten, I pass the learning torch onto you, while hoping you understand that the love and hunger for education is life-long and truly magnificent. Rest assured, darling; no, you do not have to *write two dissertations before kindergarten!*

Paul—This degree has been a long time coming and I appreciate your help so that I could realize this goal. Thank you for picking up the slack while I buried my nose in my computer. Most outstandingly, thank you for seeing me in a light that makes me believe that anything is possible.

Mom and Dad—thank you for teaching me the importance of perseverance, hard work, and the joy that comes from education.

Emily, Chelsea, and Randell—While every girl needs a friend who really gets what she is going through, or at least tries really hard to understand, I am lucky to have each of you. Emily, you are my partner in crime, and I sincerely thank you for your friendship and magical editing wand.

Chelsea, your southern charm has stolen my heart and I am honored to have been your colleague and friend throughout this journey. Randell, thank you for being my voice of motherhood and championing me to inspire little girls to pursue their dreams.

My participants—I hope to one day meet you in Paris. I sincerely thank you for sharing your insight into the Google Cultural Institute *imaginarium*.

Dr. Jamie Switzer—Your confidence, compassion, and cheerleading have kept me grounded throughout this challenging process. Thank you for reminding me to see myself as not only a student but as a person with my facets (mother, wife, friend, artist, teacher, and scholar).

Dr. Pete Seel—Every doctoral student needs someone who can herd and, at times, push them through the dissertating process. Thank you for being my wrangler.

Dr. Timothy Amidon—Thank you for introducing me to new ways of thinking about *things*. Our chats, and your constant support, were instrumental to shaping my researcher persona. I look forward to all that is to come from your magical mind and influential role.

Dr. Keith Guzik—I am grateful that Joe and I met you in Copenhagen and that you were willing to serve on my committee. Thank you for all of the notes on my proposal; it was your wisdom and insight that truly helped to shape this dissertation.

Dr. Joseph Champ (Joe)—Most importantly, I want to thank my advisor, friend, and fellow ANT. Thank you for being, as Latour would state, a “workaholic, trail-sniffing, and collective traveler.” While every teacher hopes that his/her work matters, I hope you know that you, my friend, and the wisdom and care that you bring to teaching, matter in a kaleidoscope of ways.

PREFACE: WHY THIS STUDY

I was 14-years-old when I first saw Leonardo da Vinci's *Mona Lisa* in real-life. While traveling with my French class to Paris, over the summer between my ninth and 10th-grade year, I experienced enlightenment of art, culture, love, and self. While this trip encompassed several life lessons and moments of firsts (i.e., my first international adventure without my parents, first European journey, and first pain au chocolate), as well as several other monumental experiences, I will never forget my first Louvre moment. This dramatic experience, which led to my discovery of a museum so famously exquisite, will forever be etched in my mind.

The Louvre, a maze of prominent artwork after prominent artwork, afforded me an adventure of discovery, for it was here that I examined art pieces previously only seen in art history books. This tremendous aesthetic experience was so exhilarating that at the pinnacle moment I was finally standing in front of the *Mona Lisa*, I was both awe-inspired, and frankly, disappointed. I was not aware that the *Mona Lisa* painting was only 21-inches wide by 30-inches tall. I imagined she would be more grandiose in size, something more comparable to her fame. Somehow, I felt that the infamous quality of the *Mona Lisa* did not justify her small dimensions. I was also not aware that she was entombed in thick glass, which prevented me from viewing da Vinci's brush strokes in the way I had hoped. And, while some aspects of this experience left me disheartened, when I stood in front of the *Mona Lisa*, I felt connected to da Vinci's genius. Somehow, I felt that my presence before her symbolically marked my arrival into *high art*.

Since this experience, I have formed an odd affection toward objects, recognizing their highly influential role in my journey. In this way, I have granted them leading character roles in my life-story. For instance, one such personal object fascination centers around things that I

consider to be artistic or creative, including historical and cultural artifacts that are situated inside, around, and within beautifully designed interior spaces. Part of this intrigue includes a penchant for an object's historical and influential life; specifically, its birth, life, death, and rebirth, in addition to how it affects relationships with other humans and objects. Lastly, I am weirdly passionate about all things French, which is neither here nor there, but another oddity influenced by the power of *things*.

I was not always intrigued by the objects of antiquity. In fact, history was my least favorite subject in grade-school. I found that while I sat in a multitude of lectures encompassing historical narratives of early civilization, war, and culture, I barely retained significant knowledge about these chronicles. For instance, details of the Civil War, World War II, and the Civil Rights Movement were discussed, yet, somehow, I never grasped anything more than a few minor details about these substantial historical events. And, while I never connected to these stories in a way that fixed them in my mind, my superb memorization skills allowed me to score well on exams of historical facts. My great memory did not equate to excellent retention, however, and these specifics were quickly forgotten post exam. My disconnected learning led to personal embarrassment when people talked about ancient times, as I was terrified to participate in historical repartee due to my lack of knowledge.

Conversely, my frustration with my history education drastically changed during my senior year of high school. Building on my excitement for museums, art, culture, and Frenchness, I decided to drop calculus and sign-up for art history. At the time, I was not aware how this seemingly small decision would change the trajectory of my future education. Metaphorically speaking, my eccentric art history teacher, Mr. Bill Larsen, who was lovingly referred to by his students as Mr. Bill, installed a light bulb in my head upon entering his

classroom. He illuminated my mind with stories and pictures rich with meaning and passion. In his class, I discovered a new learning experience that allowed me to explore historic narratives in relation to art. With a brief familiarity, I felt I was hearing some stories for the first time. Finally, the chasms in my mind, where facts and comprehension spanned, were connected with pictures. These beautifully vibrant images quickly established compelling visual representations about stories of the past.

Following this experience, I learned several things about myself. First, I realized that I love learning about history and objects from the past, resulting in a personal hunger for ancient stories about love and loss, culture and heritage, and family and belonging. Second, I discovered that I mentally process information in the form of images. And third, I noticed that I am not the only one who imagines in pictures, learns via visual representation, and enhances personal knowledge through creative experiences. Over time, this collection of small self-discoveries and life experiences have led to my fervent belief: *all citizens, especially those who learn from and are inspired by creative works, should be granted opportunities to participate in arts experiences that may surprise and inspire.*

Given that technology has made vast leaps and bounds during my lifetime (i.e., the Internet was not established during my childhood, but evolved during my teens), I have developed a desire to understand how technology has helped to bridge culture online. Based on this, I am curious if there is a way to investigate and visually describe these techno-cultural intersections. Now, many years since my days in Mr. Bill's class, I am equipped with various academic degrees (e.g., B.A. in business and music, M.A. in arts management, and pursuing a Ph.D. in media and technology) and entrepreneurial efforts (i.e., owning different creative media and technology enterprises). Using my education, experiences, and acumen as a foundation, I am

asking broader social questions and attempting to make sense of how objects, such as historical and cultural artifacts and technology, may have a profound impact on the lives of others. In this way, these intrigues have sparked my curiosity surrounding my passion toward objects and their historical-rhetorical life. Therefore, I want to investigate what factors (i.e., social, cultural, political, rhetorical, technological, and so forth) influence the innovation, technology, culture, and collective participation of objects.

Based on this desire, it is not surprising that when it came time to conduct research for my dissertation, I found myself drawn to the weaved object collective that encompasses how humans create, collect, share, and view art and culture both online and with the use of technology. I wanted to understand how art and culture, as well as technology and digital space, influence these complex aspects of human experience, including the creating and sharing of information and culture. **In this way, the purpose of this dissertation was to establish an innovative way of studying what Ivan Illich (1973) named the “conviviality” (p. 18), or participatory culture, of technology titans and how they organize digital space. Specifically, how the structure of such tech giants affects how humans and objects reciprocally participate with one another.**

In the subsequent pages, readers will notice my bricolage approach of interweaving a broad range of theories, philosophies, and research approaches. First, this linking style helped me to discuss how the organizational structure of leading technology corporations is shaping how information is participated with and circulated across digital space. Second, this approach assisted my argument surrounding why objects are vital to the collective information sharing process. Third, this practice allowed me to examine how research can be conducted to capture information that is digitized, as well as that which is natively or born digital. And, fourth, this

collective process introduced a new research method to discover the organizational structure of digital space and the business models of technology corporations that design such tools.

This study has been shaped by several prominent scholars, including the following. Walter Benjamin (1936/1969) and John Berger's (1972) scholarship involving the mechanical reproduction of art. Ivan Illich's (1973) work with convivial technologies. Jean Baudrillard's (1983) research with objects and simulacra. Michel Callon (1986), Bruno Latour (1988), and John Law's (1986) investigations into actor-network theory (ANT). Jane Bennett (2010, 2012), Ian Bogost (2009, 2012), Levi Bryant (2008, 2009), and Graham Harman's (2010) work with speculative realism and object-oriented ontology (OOO), as well as Timothy Morton's (2015) examinations with OOO and art. Clay Spinuzzi's (2008, 2011) work with activity theory, actor-network theory, and runaway objects. Laurie Gries's (2015) study with new materialism and visual rhetoric. Liza Potts's (2009, 2014) investigations into participatory digital spaces. This study is also equally influenced by scholarship more specifically focused on technology corporations and how these organizations affect information sharing, as well as the business models of these tech titans. This scholarship includes the following: Richard Rogers's (2013) research with natively digital objects and studying the organizational structure of digital space; Siva Vaidhyanathan's (2011) exploration of Googlization; and Osterwalder and Pigneur's (2010/2013) scholarship involving business models and the business model canvas (BMC).

Dissertation Structure

This dissertation moves through four segments—from theory to methodological process to practice to description. In Chapters 1-4 of this dissertation, I explore various theoretical perspectives to describe the methodological principles that ground this digital methods study. The first principles of conviviality, participation, and digitality, relate to matters I believe are

essential for exploring the organizational structure of digital space, specific to how technology titans are shaping information and designing participatory digital systems. The next principles, materiality and agency, reflect on why objects are vital to these sociotechnical networks. And the last principle, collectivity, discusses the interweaved network of digital systems. These principles can be worthwhile for sociotechnical, as well as for organizational structure and business studies.

An example of such applicability may be in how researchers can use such tools to explore technology titans and the ways their organizational structure and business models, as well as their sociotechnical systems, approach data and information sharing. This conversation is quite timely, given the magnifying-glass on Facebook and Mark Zuckerberg (CEO of Facebook). On April 10-11, 2018, Zuckerberg went before the United States (US) Congress for a two-day congressional-hearing surrounding Facebook's handling of data, privacy, transparency, accountability, manipulation, trust, politics, and so forth. This is just one example of the variety of instances where such principles could be beneficial in examining digital space. Given that, I discuss these principles broadly in an attempt that "they can resonate with scholars interested in studying a variety of things" (Gries, 2015, Preface, para. 7).

In Chapter 5 and 6, I describe how these six main principles (e.g., conviviality, participation, digitality, materiality, agency, and collectivity) can be used to develop and/or enhance research methods that explore the organizational structure of digital space. Chapter 5 expresses how these principles can encourage researchers and technologists to study the organizational structure of digital space in a networked way. I discuss how the research actions of following actor abstractions, tracing and examining digital objects, embracing uncertainty, and describing associations, can help to discover the dynamic actors of digital convivial systems. Chapter 6 introduces the method of digital convivial tracking with a design science (DS)

approach and an actor-network theory (ANT) mindset to discuss how researchers can employ this technique in practice. And, while these chapters build upon the theoretical discussion, their purpose is to introduce and describe a new method for conducting digital convivial research.

In Chapters 7-10, I move toward applying this method in practice, as I provide research findings from a four-part case study that employs digital convivial tracking to account for the conviviality of the Google Cultural Institute (GCI) ecosystem. Using Vincent van Gogh's (1889d) *The Starry Night* painting as my guide, I discuss the organizational structure of the GCI, including its mission and business model, as well as how this structure influences Google's technologies. By investigating how *The Starry Night* flows across the institute's network, I observed how the GCI digitizes artifacts, circulates information, affords participation, and collectively associates with other actor-networks. In this section, I adhered to Bruno Latour's (2005) advice concerning translation and try not to over-explain the organizational structure and experience architecture of the institute, but instead, deeply describe such interactions. I also subscribed to Latour's (2005) discussion on "matters of concern" (p. 114) and remained vigilant in recognizing how my researcher presence influenced this translated account.

At the end of each case-study chapter, I discuss what *The Starry Night* uncovered and how these findings can help scholars think about the digital conviviality of technology ecosystems. Further, and to remain faithful to ANT, I tried to not provide a God-like point-of-view regarding research findings. In this way, I merely presented enough empirical evidence and data visualizations for readers to realize the potential of ANT and digital convivial tracking for sociotechnical and organizational studies at large. This section aims at both discussing the organizational structure of the GCI ecosystem, as well as demonstrating the potentialities of the sociotechnical, digital, convivial, and business theories and methods offered in this dissertation.

Lastly, in Chapter 11, I shift toward description to discuss techno-cultural collectives and the relationship between technology, art, culture, business models, and future innovation. In this chapter, I answer the research questions that guided this study, as well as conclude with a summary of this dissertation and how digital convivial tracking with a DS approach and ANT mindset can be used in a variety of fields. For instance, in studies such as mine that explore the organizational structure of digital space, I describe how the business models of technology titans affect innovation through recursive human-object interaction. I also point toward the futurity of technology and how this study can be conceived of in broad terms, as well as discuss future research and projects that can be conducted to test the method introduced herein.

Dissertation Intent

The method of digital convivial tracking with a DS approach and ANT mindset described in this dissertation is innovative. It provides a way to explore the digital conviviality, including the organizational structure, technologies, and experience architecture of a technology organization. As I introduce this new digital research methodology, my dissertation may broadly contribute to posthumanist studies, such as object-oriented ontology (OOO; Harman, 2010), new materialism (Gries, 2015), and ANT (Callon, 1986; Latour, 1988; & Law, 1986). These studies, in addition to my own, are interested in nonhuman objects and the ways they associate with and make contributions to collective networks. This approach may help readers grasp how digital objects, whether digitized paintings or natively digital algorithms, can take on a life of their own as they “play multiple, active roles in shaping collective existence” (Gries, 2015, Preface, para. 10). Based on this, objects, such as *The Starry Night* painting, “deserve to be studied as the complex and full-fledged rhetorical actors they become as they circulate with time and space” (Preface, para. 10).

DEDICATION

*Looking at the stars always makes me dream.
I dream of painting and then I paint my dream.*

*If you hear a voice within you say 'you cannot paint,'
then by all means paint, and that voice will be silenced.*

What would life be if we had no courage to attempt anything?

—Vincent van Gogh

For my sweet Violette,

May you always look to the stars and dream of possibilities that seem just beyond your reach. Then, my darling girl, may you have the courage to paint those dreams into reality. For it is in those small, yet brave steps where wonderment is created and magic takes flight.

I put my heart and soul into my work, and have lost my mind in the process.

—Vincent van Gogh

Paul,

Thank you for your patience, love, and unwavering faith in me. I will forever cherish our walks together, as your *wisdom* continually led me to trailblazing “*aha moments*,” while (debatably) helping me discover my mind once again.

TABLE OF CONTENTS

ABSTRACT.....	ii
ACKNOWLEDGMENTS	vii
PREFACE. WHY THIS STUDY	ix
Dissertation Structure.....	xiii
Dissertation Intent.....	xvi
DEDICATION	xvii
LIST OF FIGURES	xxiv
DEFINITION OF TERMS	xxviii
Art and Culture Terms	xxviii
Technology Terms	xxix
Collective Relational Materiality Terms.....	xxxii
CHAPTER 1: ART AND TECHNOLOGY, AN INTRODUCTION	1
Statement of Problem: How Tech Titans Are Shaping Digital Information	4
Convivial Tools, Conviviality, and Computational Agency.....	4
Convivial and Non-Convivial Technology Examples	10
Artificial Intelligence	12
Digital Conviviality	14
Research Questions: Digital Conviviality of the Google Cultural Institute	16
Why Actor-Network Theory.....	19
Dissertation on the Digital Conviviality of Google and its Art and Culture Initiatives ...	23
Scope and Method.....	24
Research Contribution to the Field	27
CHAPTER 2: DIGITAL CONVIVIALITY AND ORGANIZATIONAL STRUCTURE	30
Digital Public Space.....	31
Experience Architecture of a Digital System.....	33
From Front to Back: Research on Sociotechnical Systems	35
The Participatory Experience Architecture of Sociotechnical Systems	37
The Data Visualization Tools of Sociotechnical Systems	41
Business Models of Technology Organizations	44
Conceptualization of the Business Model Canvas	47
The Business Model of Google.....	51

How Google’s Business Model Shifted Industry Tides.....	54
Concluding Thoughts.....	58
CHAPTER 3: MATERIALITY, WHY OBJECTS MATTER.....	60
What Are Objects?.....	61
Why Objects Matter.....	64
Humanists and Objects.....	64
Postumanists and Objects.....	74
Museums and Objects.....	80
Concluding Thoughts.....	84
CHAPTER 4: COLLECTIVITY, INTERWEAVED NETWORKS.....	86
Central Actor-Network Theory Concepts.....	86
Actor.....	87
Network.....	91
Theory.....	94
<i>Wicked</i> : An Actor-Network Theory Metaphor.....	95
Historical Development of Actor-Network Theory.....	102
How Actor-Network Theory Evolved Within Science and Technology Studies.....	103
How Actor-Network Theory Shifted From Constructivism to Posthumanism.....	111
How Actor-Network Theory Challenged Constructivism Terminology.....	116
Social.....	116
Agency.....	118
Power.....	121
Symmetry.....	122
How Actor-Network Theory Has Influenced a Variety of Fields.....	123
Concluding Thoughts.....	126
CHAPTER 5: DIGITAL METHODS AND ACTOR-NETWORK THEORY.....	129
Six Principles of an Actor-Network Theory Digital Convivial Mindset.....	129
Principle of Conviviality.....	129
Principle of Participation.....	130
Principle of Digitality.....	130
Principle of Materiality.....	130
Principle of Agency.....	131
Principle of Collectivity.....	131
Thought Style of an Actor-Network Theory Mindset.....	131

The Qualitative Paradigm	132
Research Actions of an Actor-Network Theory Mindset	136
Following Abstractions	137
Tracing Associations.....	140
Embracing Uncertainty	143
Describing Translations	144
This Dissertation’s Thought Style Using an Actor-Network Theory Mindset	145
Research Sample	146
Research Recruitment Tactics, Ethics, and IRB Approval	150
Quality of Study	152
Concluding Thoughts.....	156
CHAPTER 6: DIGITAL CONVIVIAL TRACKING	159
Digital Convivial Tracking in Practice	160
Research Steps of Digital Convivial Tracking.....	161
R1: Data Collecting.....	162
R2: Data Grouping	163
R3: Data Multiplying	165
R4: Data Exploring	166
Digital Convivial Business Model Canvas (DCBMC)	167
DCBMC: Participatory Culture	171
DCBMC: Digitality Process	174
Materiality Canvas	179
R5: Data Analyzing, Visualizing, and Describing	182
Actor-Network Theory Diagrams: Step 1	183
Actor-Network Theory Diagrams: Step 2	185
Actor-Network Theory Diagrams: Step 3	187
Actor-Network Theory Diagrams in a DCBMC or Materiality Canvas.....	188
Concluding Thoughts.....	190
CHAPTER 7: DIGITAL CONVIVIALITY, MATERIALITY, AND VALUE.....	193
Materiality of <i>The Starry Night</i>	194
<i>The Starry Night</i> Consequentiality.....	194
<i>The Starry Night</i> Composition	196
<i>The Starry Night</i> Production	198
<i>The Starry Night</i> Transformation, Circulation, and Distribution.....	199

<i>The Starry Night</i> Collectivity	203
The Google Cultural Institute	206
Mission of Google and its Establishment in Paris	206
From ‘Cultural Center’ to the Cultural Institute	208
The Google Cultural Institute Today	209
The Organizational Structure of the Google Cultural Institute	216
The Google Cultural Institute Value Proposition	216
<i>The Starry Night</i> and the Google Cultural Institute	220
Concluding Thoughts	222
CHAPTER 8: DIGITAL CONVIVIALITY, CUSTOMERS, AND PARTICIPATION	224
The Customers of the Google Cultural Institute	225
Customer Segments	227
Customer Channels	228
Channels to Reach Cultural Partners	229
Channels to Reach Users	230
Customer Relationships	231
The Google Cultural Institute Participatory Culture	233
CULTURE: Create	234
Create Opportunities for Cultural Partners	235
Create Opportunities for Users	238
CULTURE: Use	240
User Experience of Google Cultural Institute	241
CULTURE: Locate	257
CULTURE: Teach	258
One-Sided Information Tools	258
Two-Sided Participatory Tools	258
CULTURE: Unite	259
CULTURE: Reason	262
CULTURE: Expose	270
Concluding Thoughts	271
CHAPTER 9: DIGITAL CONVIVIALITY, LEADERSHIP, AND DIGITALITY	274
The Google Cultural Institute Business Infrastructure	274
Critical Partnerships	275
Essential Resources	277

Key Activities	283
The Google Cultural Institute Digitality Process.....	289
Digitize Phase: <i>The Starry Night</i>	291
Identify Phase: <i>The Starry Night</i>	292
Group Phase: <i>The Starry Night</i>	293
Transmit Phase: <i>The Starry Night</i>	297
Concluding Thoughts.....	299
CHAPTER 10: DIGITAL CONVIVIALITY, FINANCES, AND TECHNOLOGY GAIN.....	306
The Google Cultural Institute Finances	306
Revenue Streams.....	307
Potential Semi-Direct Revenue: Google Cardboard	311
Potential Semi-Direct Revenue: Google Daydream and GAC VR Application...	312
Potential Semi-Direct Revenue: Google Tilt Brush.....	314
Cost Structures	317
Value of the Google Cultural Institute to Google.....	320
Artificial Intelligence and Machine Learning: Art and Computer Visualization .	327
Artificial Intelligence and Machine Learning: Art and Deep Learning.....	338
Concluding Thoughts.....	353
CHAPTER 11: ART AND TECHNOLOGY COLLECTIVES, A CONCLUSION.....	356
Research Questions Revisited.....	358
<i>The Starry Night</i> as a Runaway Object.....	358
Research Question 2 Answer	360
Research Question 3 Answer	364
<i>The Starry Night</i> and the Digital Conviviality of the Cultural Institute Ecosystem ..	367
Research Question 4 Answer	368
Google Cultural Institute Participatory (Convivial) Exchanges	368
Google Cultural Institute Non-Participatory (Non-Convivial) Exchanges.....	371
<i>The Starry Night</i> and the Digital Conviviality of Technology Titans	378
Research Question 1 Answer	379
Research Limitations	387
Methodology Limitations.....	387
Generalizability Limitations	389
Researcher Limitations	390
Significance and Future Research.....	391

Concluding Thoughts: The Future of Technology.....	396
REFERENCES	399
APPENDIX A: UNIVERSITY IRB APPROVAL.....	420
APPENDIX B: RECRUITMENT MATERIALS.....	424
APPENDIX C: INFORMED CONSENT FORM	426
APPENDIX D: SUMMARY OF INTERVIEW SCRIPT AND QUESTION GUIDES.....	431
APPENDIX E: ACTOR-NETWORK THEORY MAPS OF THE DIGITAL CONVIVIAL BUSINESS MODEL CANVAS AND MATERIALITY CANVAS.....	433
LIST OF ABBREVIATIONS.....	446

LIST OF FIGURES

Figure 1. Screen capture of van Gogh’s (1889d) <i>The Starry Night</i>	2
Figure 2. The Business Model Canvas	44
Figure 3. The paradigms of IS and DSR, including research objectives and methods.....	48
Figure 4. Google’s Business Model Canvas	52
Figure 5. Hoberman Spheres suspended from ceiling	93
Figure 6. <i>Wicked</i> actors.....	101
Figure 7. Digital Convivial Business Model Canvas (DCBMC).....	170
Figure 8. Participatory Culture segment within the DCBMC.....	172
Figure 9. Digitality segment within the DCBMC.....	175
Figure 10. The Materiality Canvas	180
Figure 11. Initial actor-network theory map of central and participating actors	185
Figure 12. Actor-network theory map with stencils and actor notes	186
Figure 13. Actor-network theory map to visualize actor relationships.....	188
Figure 14. Digital Convivial Business Model Canvas (DCBMC) using an ANT mindset	189
Figure 15. Screen capture of van Gogh’s (1889c) <i>The Olive Trees</i>	195
Figure 16. Van Gogh’s <i>The Starry Night</i> (1889d) and <i>The Olive Trees</i> (1889c) side-by-side...	196
Figure 17. Screen capture of the <i>MOMA Design Store</i> website and its various <i>The Starry Night</i> merchandise for sale.....	201
Figure 18. Screen capture of van Gogh’s (1888b) <i>The Bedroom</i> on the <i>GAC</i> website	212
Figure 19. Screen capture of the zoomed-in view of van Gogh’s (1888b) <i>The Bedroom</i> on the <i>GAC</i> website	214
Figure 20. Screen capture of the Van Gogh Museum museum-view displaying van Gogh’s (1888b) <i>The Bedroom</i> , accessed via the <i>GAC</i> website	214

Figure 21. All three versions of van Gogh’s (1888b, 1889e, 1889b) <i>The Bedroom</i> located on GAC website	215
Figure 22. Screen capture of van Gogh’s (1889d) <i>The Starry Night</i> located on the GAC website	220
Figure 23. Screen capture of the MOMA partner page on the GAC website	235
Figure 24. Screen capture of van Gogh’s (1889d) <i>The Starry Night</i> and Google’s magnifying and museum-view icons on the GAC website.....	242
Figure 25. Screen capture of the zoomed-in view of van Gogh’s (1889d) <i>The Starry Night</i> on the GAC website	243
Figure 26. Screen capture of the MOMA museum-view displaying van Gogh’s (1889d) <i>The Starry Night</i> , accessed via <i>The Starry Night</i> asset page on the GAC website	244
Figure 27. Screen capture of the floor-plan-view of the MOMA’s fifth floor selection (where <i>The Starry Night</i> is located) on the GAC website	247
Figure 28. Different screen capture of the MOMA museum-view displaying van Gogh’s (1889d) <i>The Starry Night</i> , accessed via <i>The Starry Night</i> asset page on the GAC website	249
Figure 29. Screen capture of the MOMA museum-view displaying van Gogh’s (1889d) <i>The Starry Night</i> , accessed via Google Maps museum-view on the <i>Google Maps</i> website	249
Figure 30. Screen capture of the MOMA map location and museum-view drop-in zones on the <i>Google Maps</i> website.....	250
Figure 31. iPhone screen capture of GAC mobile app feature: “Search with your selfie”	264
Figure 32. iPhone screen capture of GAC mobile app feature: “Search with your selfie” and its “Terms of Service”.....	265
Figure 33. iPhone screen capture of Leah Stone’s GAC “art selfie” look-alikes, within the GAC mobile app feature: “Search with your selfie”	266
Figure 34. iPhone screen capture of Leah Stone’s GAC “art selfie” 58% match to Frank W. Benson’s (1890) <i>Summer</i>	267
Figure 35. iPhone screen capture of how Frank W. Benson’s (1890) <i>Summer</i> can be explored on the GAC website	268

Figure 36. Kate Stewart’s match to George Bellow’s (1919) <i>Emma in the Purple Dress</i> found on the <i>Riverfront Times</i> website (image courtesy of Kate Stewart)	269
Figure 37. Actor-network diagram showing GCI- <i>The Starry Night</i> actor relationships	304
Figure 38. Screen capture of van Gogh’s (1888a) <i>Starry Night over the Rhone</i> located within the virtual reality tour of the RMN-Grand Palais museum.....	313
Figure 39. Screen capture of Peaslee’s 3D recreation of van Gogh’s (1889d) <i>The Starry Night</i>	316
Figure 40. Screen capture of Google semantic search: “what is the capital of France?”	325
Figure 41. Screen capture of Sood’s (2016b) Ted Talk discussing how the metadata of van Gogh’s (1888b, 1889b, 1889e) <i>The Bedroom</i> can be used to link the three paintings	333
Figure 42. Screen capture of Sood’s (2016b) TED Talk discussing how ML created interesting maps and clusters of art.....	334
Figure 43. Screen capture of Sood’s (2016b) TED Talk discussing how the computer categorized images of horses	335
Figure 44. Screen capture of Sood’s (2016b) TED Talk discussing how the computer tagged gold as “bling-bling”	336
Figure 45. Google’s neural network image generation examples.....	341
Figure 46. On the left: a painting by Georges Seurat’s (1884) titled: <i>A Sunday Afternoon on the Island of La Grande Jatte</i> . On the right: images created by Matthew McNaughton, which were processed using the painting.....	343
Figure 47. Google’s neural network high-level layer selection and its image generation.....	344
Figure 48. Photograph of the Neckarfront in Tubingen, Germany, by Andreas Praefcke, in the style of several well-known artworks	345
Figure 49. Google’s ML algorithm transforms artworks into pastiches	347
Figure 50. Example of “deep style” by DeepDream Generator.....	349
Figure 51. DeepDream’s interpretation of van Gogh’s (1889d) <i>The Starry Night</i>	352
Figure 52. DeepDream’s creation: <i>The Starry Day</i> , inspired by van Gogh’s (1889d) <i>The Starry Night</i>	353

Figure 53. The Materiality Canvas of <i>The Starry Night</i> across the Starry Night-Google Cultural Institute ecosystem.....	360
Figure 54. The Digital Convivial Business Model Canvas of the Starry Night-Google Cultural Institute ecosystem.....	364
Figure 55. Actor-network theory maps of the Value Proposition block of the Google Cultural Institute Digital Convivial Business Model Canvas	433
Figure 56. Actor-network theory maps of the Customer Segments block of the Google Cultural Institute Digital Convivial Business Model Canvas	434
Figure 57. Actor-network theory maps of the Customer Relationships block of the Google Cultural Institute Digital Convivial Business Model Canvas	435
Figure 58. Actor-network theory maps of the Customer Channels block of the Google Cultural Institute Digital Convivial Business Model Canvas	436
Figure 59. Actor-network theory maps of the Participatory Culture block of the Google Cultural Institute Digital Convivial Business Model Canvas	437
Figure 60. Actor-network theory maps of the Key Partners block of the Google Cultural Institute Digital Convivial Business Model Canvas	438
Figure 61. Actor-network theory maps of the Key Resources block of the Google Cultural Institute Digital Convivial Business Model Canvas	439
Figure 62. Actor-network theory maps of the Key Activities block of the Google Cultural Institute Digital Convivial Business Model Canvas	440
Figure 63. Actor-network theory maps of the Digitality Process block of the Google Cultural Institute Digital Convivial Business Model Canvas	441
Figure 64. Actor-network theory maps of the Revenue Streams block of the Google Cultural Institute Digital Convivial Business Model Canvas	442
Figure 65. Actor-network theory maps of the Cost Structures block of the Google Cultural Institute Digital Convivial Business Model Canvau	443
Figure 66. The Digital Convivial Business Model Canvas of <i>The Starry Night</i> across the Starry Night-Google Cultural Institute ecosystem.....	444
Figure 67. The Materiality Canvas of <i>The Starry Night</i> across the Starry Night-Google Cultural Institute ecosystem.....	445

DEFINITION OF TERMS

Before I continue into the study, it is important to take a moment to define a few key terms that ground this methodological project. These terms surround art and culture, technology, and collective relational materiality.

Art and Culture Terms

Art, Performing Arts, and Culture

I utilized *Oxford English Dictionary (OED)* online to find starting definitions for art, the performing arts, and culture. The *OED* defined *art* as creative work that includes painting, sculpture, architecture, music, literature, drama, dance, etc.; the expression of human imagination in visual form, which includes painting or sculpture; and works appreciated for beauty or emotional power (Art, n.d.). *OED* defined the *performing arts* as “forms of creative activity that are performed in front of an audience, such as drama, music, and dance” (Performing Arts, n.d., para. 1). Lastly, *OED* defined *culture* as “the arts and other manifestations of human intellectual achievement regarded collectively” (Culture, n.d., para. 1); and “the ideas, customs, and social behaviour [behavior] of a particular people or society” (para. 2).

While I recognize these definitions may not be universally accepted, I looked to the GCI to understand how it defined these terms. In a blog post about the performing arts and the GCI, Amit Sood (2015), director of the GCI, defined the *performing arts* as “dance, drama, music and opera” (para. 2). In a blog post about the institute and its increased culture partnerships, James Davis (2013), program manager of the GCI, defined *culture* as: “culture means different things to different people” (para. 2) and the commonality across cultural exhibitions “is that they tell stories” (para. 2). Further, according to Dr. W. Brent Seales and GCI colleagues (2013), “the

definition of ‘culture’ is very broad and it is important to build coverage over the diversity and entirety of human experience” (p. 75). Seales et al. (2013) stated: “The Cultural Institute platform is an integrated repository of digital content related to cultural themes: art, history, and artifacts from antiquity” (p. 76). And, in a blog post announcing the institute’s newest *We Wear Culture* exhibit, Kate Lauterbach (2017), the program manager of Google Arts & Culture, wrote that *cultural artifacts* “all tell a story, sometimes spanning hundreds of years of history” (para. 1). Lauterbach’s article was referencing fashion artifacts, however, I believe that the notion that *there are stories behind the clothes you wear* can parallel other cultural objects. Therefore, for this dissertation, *culture* is the weaved stories of unique human experience that span hundreds of years of history and may include art, history, and artifacts from antiquity.

Technology Terms

Conviviality and Convivial Tools

Conviviality is the “autonomous and creative intercourse among persons, and the intercourse of persons with their environment” (Illich, 1973, p. 18). In contrast, non-conviviality is the “conditioned response of persons to the demands made upon them by others, and by a man-made environment” (p. 18). Additionally, non-convivial organizations are identified by those that manipulate “people for the sake of their tools” (p. 21). *Convivial tools* are those designed to work *with* humans to complete a task. Conversely, non-convivial tools are those designed to work *for* humans to complete a task, and in the case of digital technologies, these tools can be technologies that humans work *for* to complete a task. In this context, some scholars believe that as technologies increase in power, such as acquiring how to learn or garnering more consumer information, these technologies can actually begin to *act on* humans. In this way, reciprocal two-sided participation between human and technology has started to shift into

independent one-sided technological "computational agency" (Tufekci, 2015, p. 207), or autonomous technological action.

Digital Participation and Digital Conviviality

Within the concept of convivial tools is the definition of *digital participation* and *participatory exchanges*. Specific to convivial technologies, such as digital platforms that allow participation, I define participatory exchanges to include the ability for “participants to tag content with metadata, label information with relevant details, and reply to participants and developers” (Potts, 2014, p. 7). Participatory exchanges can also include the opportunity for participants to create, manipulate, and/or transform digital material, and then, share those constructions with others. These convivial technologies may also afford co-creation, which is the collaborative workings of actors (e.g., humans, organizations, creators, users, technologies, art, other objects) to work together and shape something new. In this way, participatory convivial systems do not trap information behind their walls. Instead, these systems allow information to be shared across digital spaces. Based on this, convivial systems should be “fluid ecosystems” (Potts, 2014, p. 15) where participants can use “multiple tools, data sets, and media, both off-line and online” (p. 15).

I define a tool that allows humans to participate *with* art and culture, as well as *with* other humans, as convivial when it affords participation (i.e., allows actors to participate *with* other actors) and provides cultural participation (i.e., allows actors to participate with culture). These beliefs are based on Henry Jenkins’s (2009) evaluations of digital participatory culture and Graves’s (2005) steps necessary for culture to remain vital and participatory. Thus, I propose that a technological tool for art and culture can be declared convivial when it fulfills, what I have developed, the following *CULTURE* mnemonic:

1. Create: does the platform provide tools for content creation for participant and producer?
2. Use: is the platform easy to use (user-friendly) and accessible (available with low barriers for participatory engagement)?
3. Locate: does the platform provide a prominent place for demonstrating and encouraging ideas about arts and culture?
4. Teach: does the platform provide mentorship instruction for novices and access to mentorship from art masters?
5. Unite: does the platform help unite participants through social connections to other participants, as well as to arts and culture?
6. Reason: does the platform provide a space where participants believe that their contributions matter?
7. Expose: does the platform provide continued exposure to other content and ideas (i.e., such as to other art and culture)?

Building on conviviality, convivial tools, and participation in digital space, I also propose the concept of digital conviviality. *Digital conviviality* is when a technology company operates in digital convivial ways such that it: (a) builds tools for digital communication; (b) has a value proposition that, while aimed at generating a profit, is also focused on using its technology to enhance society, instead of manipulating society for the sake of its technologies; and (c) designs technological tools that work *with* humans, instead of tools that work *for* humans or tools that *act on* humans, to accomplish a task.

Data, Digital Ecosystems, and Experience Architect

Online data may include social media data, public data, industry and enterprise data, and so forth. Concerning the GCI, the majority of *data* examined were traditional data content found

within the GCI ecosystem. This content included art, artifacts (historical and antiquity), images, videos, 360-degree mapping of physical space, virtual reality (VR), text, status updates, tags, metadata, blog posts, and other material that exists within the GCI, its GAC, and referential networks. Further, a *digital ecosystem* includes the terms: “social networking systems,” “social software,” “social media,” and “social web system” (Potts, 2014, p. 6). A digital ecosystem allows individuals to participate in and “share knowledge across multiple technologies” (p. 7). In this dissertation, I define the GCI as a digital ecosystem.

Lastly, *experience architects* can be defined as creative workers who craft and enhance a website’s information architecture. They must consider the digital platform’s navigation, as well as the platform’s ability to captivate its audience with an engaging user experience (UX). Experience architects help create a convivial ecosystem by examining how participants use digital systems, (those created by them or by others), and then use that information to create and/or enhance system experiences that work *with* its users. Specific to Google, and according to the *Google Design* (n.d.) website, its experience architecture team is comprised of UX engineers; visual, motion, and interaction designers; UX researchers; and content strategist/UX writers. Google’s “interdisciplinary UX specialists and designers work across platforms to create powerful visuals that highlight each of [its] product's unique personalities" (Google Design, n.d., para. 1). Google’s core principle is to: “Focus on the user and all else will follow” (para. 1).

Collective Relational Materiality Terms

Actor-Network Theory

While the definitions provided below may seem limited and in need of more examples to increase understanding, I offer extensive description and examples concerning actor-network theory (ANT) and its many facets (e.g., actants, actors, networks, agency, and so forth) in

Chapter 1 and 4 of this dissertation. For now, *ANT* can be thought of in a broad sense as the recognition that *actors* are all material that work together to produce an action and form a complex network of actor associations. These actors can be both humans and objects and might include a person, idea, technology, organization, a piece of artwork, art exhibit, website, and so forth. An *association* is how actors are linked together to work toward a collective action and can exist between human-to-human, human-to-object, and object-to-object. These actor associations form a *network*, which is the point-to-point connection of actors and how these actors work collectively toward a phenomenon. A network is also physically traceable and can be recorded empirically.

According to Latour (2005), when thinking about things/objects/material/stuff/nonhumans, we should not think of them as “matters of fact” (p. 255), transparent things that we take for granted and simply uncover or reveal to the world. Instead, we should think of these nonhumans as “*matters of concern*” (p. 255, emphasis added), dynamic things that associate and transform into collectives, of which we, as researchers, contribute. In this way, researchers can try to be reflexive as they think through associations and attempt to provide clarity through visual maps and descriptive translations.

CHAPTER 1: ART AND TECHNOLOGY, AN INTRODUCTION

‘Looking at the stars always makes me dream,’ he said, ‘Why, I ask myself, shouldn't the shining dots of the sky be as accessible as the black dots on the map of France? Just as we take the train to get to Tarascon or Rouen, we take death to reach a star’ (Bee, Heliczer, & McFadden, 1999/2013, p. 25; quoting Vincent van Gogh).

The work of Vincent van Gogh is considered a defining example of post-impressionism art, as well as a critical influencer for expressionism art (Bee et al., 1999/2013). While the bulk of van Gogh's work is regarded as masterpieces, many consider his most iconic painting to be *The Starry Night* (1889d). In this painting, his vibrant use of color and swirling brush strokes portray an explosive night sky of stars twinkling in the night. According to Shinn-Morris (n.d.), van Gogh completed *The Starry Night* while staying at the Saint-Paul-de-Mausole, a psychiatric hospital located in Saint-Rémy, France. Van Gogh had willingly admitted himself to the hospital in hopes of combatting his mental health struggles. During that time, van Gogh claimed to be obsessed with effects of the night. And, it was from his hospital room, where he painted one of his most beloved masterpieces.

Roughly a year after the completion of *The Starry Night*, in July of 1890, van Gogh died from a gunshot wound. It is important to note that controversy surrounding van Gogh's death is debated by historians; specifically, whether the deadly gunshot was self-inflicted or from a faulty gun (see Gompertz, 2011, for more information). Following his death, *The Starry Night* moved from private holding within the van Gogh family to public galleries and museums. Eventually, the painting found its permanent home at the Museum of Modern Art (MOMA) in New York City. See Figure 1 to view van Gogh's (1889d) painting: *The Starry Night*.



Figure 1. Screen capture of van Gogh’s (1889d) *The Starry Night*. From “The Starry Night,” by V. Van Gogh, 1889d (<https://artsandculture.google.com/asset/the-starry-night/bgEuwDxeI93-Pg>). In the public domain.

At the MOMA, the painting has participated in various art systems, such as being displayed in art exhibitions, discussed in educational programs, and transformed into commodity items. Over time, the painting has become an emblem of art, and during the “rise of popular culture during the second half of the twentieth century” (Gries, 2015, p. 35), *The Starry Night* attracted tourists, artists, writers and so forth, who were fascinated by its aesthetic style and quintessence. Some visitors were so taken by what Gries (2015) refers to as the painting’s *thing-power* (i.e., “the power things acquire when working alongside other entities to produce change” [p. 12]), that they wrote poems, songs, and films to and/or about the artwork.

Subsequently, in the late twentieth century, advancements in technology have allowed people to view, as well as transform, the painting into different forms. For instance, while admirers of *The Starry Night* can see the painting in person at the MOMA, as well as use assistive technology to learn about the art while at the museum, viewers can also examine the

painting virtually via the Google Cultural Institute (GCI). Technological advancements have also allowed people to remix the painting into various renditions (e.g., commodity items, movies, murals, pictures, and so forth) and circulate their transformations broadly across time and space. In this way, these transformations and distributions of the painting have escalated *The Starry Night*'s consequentiality (i.e., the meaning of an object established by the way it interacts with other humans and objects and how those interactions spark consequences) (Gries, 2015). Based on this, *The Starry Night* has “transformed many times over in terms of form and/or function, depending on what associations it [entered] into” (Gries, 2015, p. 40).

According to Henry Jenkins (2009), as technology and the design of digital ecosystems (i.e., also called digital spaces, digital platforms) continues to advance, an increase in the culture of digital participation has ensued. For instance, there has been significant growth in opportunities for people to participate in digitized culture. These technological advancements, predominately generated by leading technology organizations, have been and are continuing to be developed to provide people opportunities to connect across digital space in ways not possible just a short time ago. According to Ivan Ilich (1973), several of these participatory digital ecosystems can be considered convivial technology tools (i.e., technologies that work *with* humans to complete a task; p. 17). In this way, convivial technologies are those that work *with* humans to shape how information is generated and distributed across digital space.

I pause here to more broadly discuss how advancements in technology have afforded humans the opportunity to participate *with*, and *in*, art and culture. Parallels can be drawn as to how technology allows people the ability to interact *with* the painting, as well as remix it into various renditions. Based on this, and to adequately deliberate on the ways technology and culture intersect, it is crucial to establish the big picture concerning how technology impacts the

circulation of objects across digital space. In the next section, I will discuss the recursive relationship between how technologies work *with* humans to find and enhance art and culture, as well as how humans interact *with* art and culture by employing those technologies.

Statement of Problem: How Tech Titans Are Shaping Digital Information

We are, all of us, in inescapable thrall to one of the handful of American technology companies that now dominate much of the global economy. I speak, of course, of my old friends the Frightful Five: Amazon, Apple, Facebook, Microsoft and Alphabet, the parent company of Google (Manjoo, 2017, para. 4).

The Frightful Five (Manjoo, 2017) are shaping the way that data are generated and distributed across digital space. Through their technologies, Amazon, Apple, Facebook, Microsoft, and Alphabet are providing new ways for people to create, find, and share information online. In this way, these tech titans are continuing to drive innovation and build convivial tools that provide participatory co-creation (whether between human-to-human, human-to-object, or object-to-object). And, it is through their increased scope and scale that these titans are able to continue and expand their reign over information commerce both on- and offline, generating additional multi-sided businesses and technology acquisitions. Their organizational structure, which includes their business models and leadership, has contributed significantly to their success. Further, their approach to information sharing and technology, such as their proprietary algorithms, has also dramatically enhanced their control. Therefore, armed with their algorithms, these tech titans have ensured a gatekeeper role over online data generation and distribution (Tufekci, 2015).

Convivial Tools, Conviviality, and Computational Agency

To understand the gatekeeping function of these tech titans, I think it is first necessary to further explain the concept of convivial tools (Illich, 1973), followed by a discussion concerning how algorithms participate in convivial technology. As stated previously, according to Illich

(1973), convivial tools are those that work *with* humans to complete a task (p. 17). Based on this, Illich might argue that the following digital communication tools of today are convivial: the Internet, search engines, email, social media, instant messaging, smartphones, and artificial intelligence (AI). These technological tools dynamically work *with* human users to shape information generation and distribution across digital space. Further, convivial participatory tools include digital reality technologies such as virtual reality (VR) applications that humans can employ to participate in digital worlds and physical spaces, as well as augmented reality (AR) applications that enhance people's physical surroundings. Additionally, AI systems such as Amazon's *Alexa* and Apple's *Siri* can be considered convivial as they are implemented to increase daily human productivity by working *with* humans to help solve tasks and/or problems.

It is equally important to explain what convivial tools are not. According to Illich (1973), the opposite of a convivial tool is a non-convivial or non-participatory tool that work *for* humans (p. 17). For instance, one of the most basic yet widely recognized examples of a non-convivial device is the iRobot Roomba. According to the *iRobot* (n.d.) website, the Roomba is a programmable vacuum robot that employs "a full suite of smart sensors that automatically guide the robot around your home" (iRobot, Roomba Robot Vacuum, para. 1). With little to no input from a human, the robot can make up to "60 decisions every second, navigating under furniture and around clutter to thoroughly clean your floors" (para. 1). Thus, this robot moves throughout a home and uses its sophisticated sensors to adapt to its surroundings, allowing it to vacuum floors with meticulous precision. This process demonstrates how the technology works *for* humans; something that iRobot alludes to on its website: The Roomba leaves "you with more time for what's important" (iRobot, Everyday Clean, para. 2).

While I have described convivial tools that work *with* humans, as well as non-convivial tools that work *for* humans (Illich, 1973, p. 17), it is important to note that convivial technologies can also become non-convivial, just as non-convivial technologies can become convivial. Stated another way—participatory tools that work *with* humans can shift toward working *for* or *on* humans, just as non-participatory tools that work *for* or *act on* humans can morph into tools that work *with* humans. An example of a technology shifting from convivial to non-convivial is machine learning (ML) technology. For instance, previously ML required the assistance of humans in order to train the computers (i.e., humans working *with* technology). Over time, however, these systems have become (and are continuing to become) so sophisticated that they are learning for themselves, as well as from themselves. Based on this, ML technology may *potentially* not require the assistance of humans to ensure that the algorithms can learn (i.e., ML could be considered a technology that can work *without* humans). I provide greater detail about this concept both later in this chapter, as well as in Chapter 10.

Conversely, an example of a technology shifting from being non-convivial to convivial is the smartphone application (app) technology that is partnered with the Roomba vacuum. For instance, recent technological advancements have made it so people can now use their smartphone to download the iRobot mobile app. From this app, people can “schedule, start, pause, or cancel cleaning cycles from anywhere at any time” (iRobot, Control from smart device, para. 1). In this way, the use of smartphone technology shifts the self-directed Roomba (i.e., technology working *for* or *without* humans), into a connected and participatory robot (i.e., technology working *with* humans). Based on this, I argue that tech titans have designed convivial digital tools (participatory), as well as non-convivial digital tools (non-participatory). To designate the difference across tools defined as convivial, the terms conviviality, human-

technology participation, “computational agency” (Tufecki, 2015, p. 207), and digital conviviality must be defined.

Encompassed in Illich’s (1973) convivial tools concept, is his argument for *conviviality*: the “autonomous and creative intercourse among persons, and the intercourse of persons with their environment; and this in contrast with the conditioned response of persons to the demands made upon them by others, and by a man-made environment” (p. 18). To illustrate conviviality, consider again ML technology, which is an application of AI. ML is “characterized by training data and testing data having the same input feature space and the same data distribution” (Furht & Villanustre, 2016, p. 53). Simply, ML is the process of technology obtaining experience data without specified instruction programming. However, early stages of ML, such as transfer or reinforcement learning (TL), are considered convivial when a human engages *with* technology to teach it something. In this way, humans and technology participating with each other may take a variety of forms.

In one case of TL, humans may prepare extensive learning data, as well as teach the technology the difference between concepts, topics, words, and so forth (Expert System ML Apps, 2017). Humans have to supervise, semi-supervise, and/or provide reinforcement signals for the transferring of data from one related dataset to another. Humans aid this training process as they provide labeled data, such as images classified with descriptive metadata tags to teach the algorithm. Humans can also employ similarity recognition software to guide the algorithm on specific actions, and then, reward the algorithm once it performs that particular action. In this way, during TL, machines (i.e., technology, computers, algorithms) need humans to collectively work *with* them to ensure learning (Expert System ML Apps, 2017).

Building on this idea, and as previously mentioned, as convivial technologies become more powerful, they have the propensity to shift into non-convivial tools. In other words, these technologies move away from working *with* humans toward working *for* or *acting on* humans. In this context, Illich (1973) would describe this action as non-conviviality, “[a]s the power of machines increases, the role of persons more and more decreases to that of mere consumers” (p. 17). For example, as convivial tools work *with* humans to learn online user behavior, they acquire more information about consumption habits and may begin to exert non-convivial “**computational agency**” (Tufecki, 2015, p. 207, emphasis added), or autonomous technological action. Further, as these tools increase in consumer information, they may be able to *act* even more *on* humans, and therefore, shift reciprocal two-sided participation between human and technology into independent one-sided technological action (Tufecki, 2015, p. 207).

Put another way, due to the increasing agency of the technology, they can begin to *act on* humans independently, or *act for* humans, instead of working *with* humans. Arguments surrounding how non-convivial technology may be *acting on* humans can be found in Tufecki’s (2018) opinion piece in *The New York Times* where she argues that it is “possible that YouTube’s recommender algorithm has a bias toward inflammatory content” (para. 12). Another example is how Google employees are taking a stand against partnering with the Pentagon stating that Google’s AI technologies should not be employed for targeted drone strikes or any “business of war” (Letter to Google C.E.O., 2018, para. 1; Shane & Wakabayashi, 2018, para. 4).

Based on these arguments, it can be reasoned that a transference from human-technology participation toward human-technological consumption can take place within non-convivial technologies. However, the idea of technology having full-blown agency may seem absurd and in need of further explanation. It can be argued that the notion of “computational agency”

(Tufekci, 2015, p. 207) or autonomous technological action is complex and highly debated. Based on this, and to ensure clarity, it is worthwhile to break down the concept of algorithms. According to Techno-sociologist Zeynep Tufekci (2015), an algorithm can be defined as a proprietary computer program that follows “a set of instructions for carrying out procedures step-by-step, and range from quite simple to very complex” (p. 206). Algorithms can be described as being “interactive, act[ing] with agency in the world, and are often answerable only to the major corporations that own them” (p. 217).

In this context, algorithms can employ “computational agency” (p. 207) when they dynamically determine what information to share, and how and to whom to share it, without the knowledge of the user who is searching online. Based on this description, it can be reasoned that algorithms act as actants (Latour, 2005), a “vast array of entities swarming toward” (p. 46) an action, as they work *with* humans to learn from various data experiences. Similar to Tufekci’s (2015) algorithmic definition, when the term **algorithm** is used in this dissertation, “it is in reference to computational processes that are used to make decisions of such complexity that inputs and outputs are neither transparent nor obvious to the casual human observer” (p. 206). This lack of algorithmic transparency demonstrates how tech titans have built sociotechnical systems that are black boxed (Latour, 1999; Potts, 2014; Rogers, 2013; Spinuzzi, 2008) (i.e., technological systems whose workings are hidden from outsiders behind an impenetrable veneer). In other words, black boxed sociotechnical systems hide networks within networks to conceal the sophisticated back-end operating system, which includes the algorithms and complex business dealings, behind a simplified front-end user search interface.

And, while it is hard to find a succinct analogy that illustrates the information shaping capabilities of these algorithms designed and managed by tech titans, the following three

examples demonstrate how technology works *with* humans, as well as how technology employs computational agency to use humans to work *for* its needs. However, it is necessary to keep in mind that exact information surrounding how Google, Amazon, Facebook, and other tech titans' algorithms precisely work is not available to the public. And, even if a clear description of how these algorithms work was available, these algorithms are dynamic, which makes it difficult to explain their processes. Based on this, the examples provided below are only metaphorically descriptive in nature.

Convivial and Non-Convivial Technology Examples

Example One: Google

Two females, June and Poppy, live in different countries and both use Google to search the Internet for shoes. While Poppy lives in France and June lives in England, both type “female shoes” into Google’s search box and each receives different search results. This difference in search returns is due to Google’s algorithm and geolocate technology, as well as June and Poppy’s previous personal search histories. In this context, media researcher Vaidhyanathan (2011) would state:

Over time, as users in a diverse array of countries train Google’s algorithms to respond to specialized queries with localized results, each place in the world will have a different list of what is important, true, or ‘relevant’ in response to any query (p. 138).

In other words, Google learns the search habits of people in specific locations and collates those patterns to return search results that are specific to each user.

Example Two: Amazon

When Poppy searches for a specific item on Amazon, say female shoes, she is presented with a variety of shoe options. Amazon tracks her user analytics (i.e., particular things that she has searched for and clicked on, as well as the amount of time she has

spent on a web page, the shoe size(s) she has selected, the items placed into her shopping cart, and so forth) and uses that information to advertise specific shoes across her various digital spaces (e.g., email, web pages, social media feeds, and so forth). This process describes how Amazon's algorithms are continually learning from collective user behavior, as well as personal user behavior to design systems that privilege specific information toward specific users (i.e., such as what shoes Poppy should buy).

Example Three: Facebook

June logs in to her Facebook account after having searched for "female shoes" on the Internet. Once signed-in, June notices that displayed on her Facebook news feed is a story about the recent fashion of Catherine, Duchess of Cambridge (formerly known as Kate Middleton)—a prominent figure she follows. Additionally, June's news feed also contains a Nordstrom advertisement, which depicts the upcoming trending female shoe. June's experience is due to Facebook's algorithm, which accounts for her past online behaviors—in terms of searching and online purchases. In this way, Facebook privileges specific information in her feed by bringing topics that are trending and relevant to the top of her *Feed*. It is unclear, however, how Facebook determines what information is trending, popular, and/or relevant, as this process is based on a multitude of factors unknown to users. Some of these elements might include the number of 'likes' a story has, how many times the story has been 're-posted,' the author and source of the story (such as influential political leaders or media conglomerates), and the topic of the story.

Given these examples, a person's theoretical orientation may determine how these experiences are interpreted, in terms of conviviality. For example, Illich (1973) might have argued that these sociotechnical systems, as well as their algorithms, are dynamic tools that work

with human users to shape how information is generated and distributed across digital space. In this context, these examples highlight how tech titans design participatory technologies that are aimed at providing human users opportunities to connect with multiple entities (e.g., humans and objects). Conversely, Tufekci (2015) might argue that these examples demonstrate the non-convivial aspects of these tech titans', as their algorithms employ "computational agency" (p. 207) to *act on* humans.

Artificial Intelligence

To provide even more background, when discussing algorithms, it is also necessary to confer about ***artificial intelligence*** (AI). American computer scientist John McCarthy is considered the pioneer of AI and credited as the originator of the term artificial intelligence (AI). In a proposal he co-wrote with M. L. Minsky, N. Rochester, and C. E. Shannon (1955), for the 1956 Dartmouth Conference, they defined AI as:

the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves (McCarthy et al., 1955, p. 1).

Building on the work of McCarthy and other computer scientists, scholars and technologists have evolved AI into the understanding of how: "machines that can perform tasks that are characteristic of human intelligence" (McClelland, 2017, para. 3). In other words, scientists are teaching machines, through the generation of sophisticated computer algorithms, to think and act like humans.

Examples of such leaps in machines acquiring human intelligence, can be found at the AI research lab DeepMind. Acquired by Google in 2014, but now housed under the Alphabet umbrella (i.e., it is no longer an entity of Google), DeepMind is attempting to "push the

boundaries of AI, developing programs that can learn to solve any complex problem without needing to be taught how” (DeepMind About, n.d., para. 1-2). In this context, it can be reasoned that DeepMind is striving to make its algorithms employ “computational agency” (Tufekci, 2015, p. 207) so that they can act *without* the assistance of humans.

Differing perspectives on the conviviality of technology is common knowledge in the industry. Discussions surrounding algorithms, AI, and ML capabilities become controversial when humans start to wonder: *what happens once the technologies have been taught how to learn? Will these technologies still need humans to participate in learning or will they be able to learn from their own experience?* Based on this, the conviviality versus non-conviviality debate, which also can be considered the participatory human-technology agency versus “computational agency” (Tufekci, 2015, p. 207) argument, is currently being publicly argued between two of the most prominent tech titans: Elon Musk, founder of Tesla and SpaceX, and Mark Zuckerberg, founder of Facebook (Narkar, 2017). Let me explain.

On one end of the spectrum, the conservative side, sits Musk. Musk claims that AI’s current convivial state has the propensity to quickly and easily shift into one that is non-convivial. In this context, what Tufekci (2015) describes as “computational agency” (p. 207), Musk believes that AI could become self-directed and cause detrimental damage to society. For example, at the National Governors Association meeting in July 2017, Musk stated: “I keep sounding the alarm bell. . . . But until people see robots going down the street killing people, they don’t know how to react” (quoted in Narkar, 2017, para. 2). Based on this, Musk believes that ethical boundaries should be placed around the development and uses of AI before these technologies advance beyond human intelligence. In stark contrast, however, and on the other end of the spectrum, sits Zuckerberg. Taking a more radical attitude toward AI, Zuckerberg

believes that AI will always remain convivial in some degree or the other, or at least, it will always be under the control of humans. In this way, Zuckerberg believes that AI will provide society with numerous benefits, and as such, he has increased initiatives to encourage more cutting-edge research in AI.

For instance, Facebook AI researchers described the autonomous action of two computer agents during an AI training exercise (Lewis, Yarats, Dauphin, Parikh, & Batra, 2017). While they were trying to teach the computer agents how to negotiate, through providing linguistic and reasoning skills training, two computers began speaking to each other in an indiscernible fashion. Specifically, the researchers found that when explicit parameters surrounding computer agent communication were not in place, such as how AIs could only communicate through the semantic use of English, the technologies diverted “from human language” (Lewis et al., 2017, p. 6) and began speaking to each other in a language that was not “human-like” (p. 6). Further, these parameters were designed by human developers and researchers through the action of algorithmic programming. For more information on this AI research, see Lewis et al. (2017). (For more information on the great AI debate, see Arizona State University-Great Debate, 2017, and Narkar, 2017).

Digital Conviviality

Based on these examples, the great AI debate underscores, what Illich (1973) described as conviviality. In this way, the “criteria by which the manipulation of people for the sake of . . . [an organization’s] tools can be immediately recognized, and thus . . . [people must] exclude those artifacts and institutions which inevitably extinguish a convivial life style” (p. 21). In other words, to heed Illich’s definition of conviviality, the goals of a technology organization must be investigated to find those organizations that claim to promote conviviality. Examinations into

how those companies enhance their technologies is also crucial to identify whether manipulation for the sake of their tools is taking place.

In this way, once convivial organizations are identified, people can participate with these institutions and their technologies, just as, when non-convivial organizations are recognized, people can ignore those non-participatory institutions and their tools. Therefore, researchers must explore the digital conviviality of technology titans. Building on the concepts provided so far, I define digital conviviality as follows. ***Digital conviviality*** is when a technology company operates in digital convivial ways such that it:

- (a) builds tools for digital communication;
- (b) has a value proposition that, while aimed at generating a profit, is also focused on using its technology to enhance society, instead of manipulating society for the sake of its technologies; and
- (c) designs technological tools that work *with* humans, instead of tools that work *for* humans or tools that *act on* humans, to accomplish a task.

Based on this, and to further explore this conception of digital conviviality, I investigated a tech titan that arguably claims to promote digital conviviality at its core: Google.

The global search engine corporation Google, which is under the umbrella of the technology giant Alphabet, portrays itself as a *good organization*. Google states: “Since the beginning, our goal has been to develop services that significantly improve the lives of as many people as possible. Not just for some. For everyone” (Google Our Company, n.d., para. 2-3). With a mission to: “Organize the world’s information and make it universally accessible and useful” (Google Our Company, n.d., para. 1), as well as a motto to “Don’t be evil” (Google Code of Conduct, 2017, Preface, para. 1) and “Do the right thing” (Alphabet Code of Conduct, 2015,

Preface, para. 1), it could be argued that Google strives for Illich's (1973) conviviality. Thus, Google claims to be doing the right thing for humanity. Based on this, it was beneficial to explore whether or not Google lived up to its convivial declarations by studying the influence that Google has on data, our participation with that data, and Google's technological innovations.

Research Questions: Digital Conviviality of the Google Cultural Institute

In 2011, Google opened an Engineering Center and Cultural Institute (GCI), referred to as The Lab, in Paris, to further Google's mission to "organize the world's [art and culture] and make it universally accessible and useful" (Google Our Company, n.d., para. 2-3). The mission of the institute was "democratizing access to the world's culture" (Google CI Chromecast, 2014, 00:44). Based on this, Google set out to "create, promote and preserve culture online" (Patarin, 2014, p. 6) by "expos[ing] as many people to as much cultural content as possible" (Google CI Chromecast, 2014, 00:38).

The GCI Lab was established to create "a place where tech and creative communities come together to share ideas and discover new ways to experience art and culture" (GCI Lab, n.d., Welcome to the Lab, para. 2). With a stated goal to "craft new bridges between tech and culture" (GCI Lab, n.d. Welcome to the Lab, para. 2), Google designed new technologies that allowed cultural purveyors the ability to participate *with* art and culture. Over the last six years, the GCI has started several initiatives, and as of July 2016, it has served as the principal organization for Google Arts & Culture (GAC) and other creative endeavors. GAC is also the online web platform [google.com/culturalinstitute] where cultural artifacts are digitally preserved and viewable, as well as the home to various arts initiatives (Thompson & Rodley, 2016).

Using Illich's (1973) notion of conviviality as my guide, I explored Google's approach to convivial technologies to understand Google's ability to shape information in the arts and culture

space. In this way, a technology organization, such as Google and its GCI, can be defined as either: (a) one that is convivial, as it provides means for autonomous and creative participation and/or co-creation at the intersection of humans working *with* technology or technology working *with* humans, and is ultimately steered by an overall goal of enhancing society; or (b) one that is non-convivial, as it manipulates people to enhance its technologies at the intersection of humans working *for* technology or technology working *for* humans, and is ultimately steered by an overall goal of generating a profit and enhancing technologies at the expense of society.

While this investigation was predominately focused on the tech titan Google, it should be noted that other tech titans, such as Alphabet, Amazon, Apple, Facebook, and so forth, could have been investigated. It is possible that each company utilizes and approaches conviviality differently. Therefore, I set out to investigate the digital conviviality of the GCI. I examined the institute's organizational structure (i.e., how its business model, mission, value proposition, and leadership encouraged collectivization) and technologies (i.e., how Google's technologies afford digitization, materialization, and participation), because these aspects greatly influence the digital conviviality of a technology organization.

The concept of digital conviviality is multi-faceted; therefore, I first broadly asked:

RQ1: In what ways is the Google Cultural Institute (GCI) considered a digital convivial company, and conversely, in what ways is it not?

I found that to help answer this question on conviviality, it was necessary to consider the organizational structure and business model of both Google and its GCI. This process allowed me to examine how the institute's business model influenced Google's technologies and information sharing. Osterwalder and Pigneur (2010/2013) stated that one way to explore the organizational structure of an organization is by creating a business model canvas (BMC), as it

helps to capture the value propositions, customers, business strategies, leadership, technologies, partnerships, and finances of an organization. In this way, a BMC is a tool that aids researchers in identifying how a company currently makes or intends to make money. Therefore, I wanted to understand:

RQ2: What is the business model (i.e., the BMC, which includes the organizational structure, business model, leadership, and technology) of the Google Cultural Institute?

Part of understanding the business model of the GCI was to examine how it interacts with Google, its customers, the technology market, and the arts and culture industry. Hence, I asked:

RQ3: How does the Google Cultural Institute's business model appear to influence the cultural landscape?

Lastly, as conviviality surrounds notions of humans participating *with* technology, as well as technology participating *with* humans, it was paramount to investigate the participatory nature of the GCI. Therefore, I enquired:

RQ4: What is the participatory culture of the Google Cultural Institute network, specifically, to what extent does the institute's business model and technology appear to participate *with* humans and objects to enhance society (indicating conviviality), as opposed to participating *on*, or *for*, humans and objects to manipulate society for the sake of Google's technologies (indicating non-conviviality)?

I hoped to understand whether the GCI's technologies could be considered convivial, non-convivial, something in between, and/or entirely different. Based on this, and to explore the organizational structure of Google's sociotechnical system, I realized I could use a variety of theoretical frameworks. I felt, however, that a posthumanist, actor-network theory (ANT) (see Callon, 1986; Latour, 1988; Law, 1986) mindset was the most advantageous for uncovering and

describing the dynamic and complex relationships across humans, technology, and art (i.e., human-object interaction).

Why Actor-Network Theory

Although art is largely ‘autonomous’, it is also ‘influenced’ by social and political ‘considerations’ which could account for some aspects of its most famous masterpieces; and although the science of management obeys its own rules, it might be advisable to also consider ‘social, cultural, and political aspects’ that could explain why some sound organizational principles are never applied in practice (Latour, 2005, p. 3).

The quote above by ANT scholar Bruno Latour explores the collective experience of a piece of art, as well as the different political, historical, technical, social, and cultural influences surrounding art and its management. Because the GCI focuses on the merging of culture, art, and technology, it was paramount to consider how objects (e.g., art, culture, technology) participated in shaping social connections, as well as how humans worked *with* these objects to create a weaved human-object interaction. Areas of research concerning innovation and technology predominately examine how humans have created these tools under investigation. These studies are referred to as human-centered studies. Conversely, other areas of scholarship explore how these novel objects themselves (i.e., innovative technologies) shape information sharing. These studies are considered object-centered studies. In my research, however, I was interested in exploring the connections between humans (those who created and used objects) and the objects themselves. I was also fascinated by the entanglement across objects *with* objects and objects *with* humans. In this way, I wanted to discover the interweaved mesh of human-object interaction. Based on this, I determined an ANT-based strategy would help me to identify the minute, yet distinctly different, notions of participation across human, object, and human-object studies. Let me explain.

Humanist studies explore how humans create, define, measure, and interpret knowledge and reality. In a broad sense, humanist studies reside within the modern paradigms that are heavily influenced by Descartes and Kant. According to Guba and Lincoln (1994), these modern paradigms include positivism, post-positivism, critical theory, and constructivism. Overall, humanist studies consider human agency the key to engaging with technology, culture, artifacts, user experience, and so forth. Conversely, posthumanist studies examine how objects shape knowledge and reality, and in a broad sense, place objects (and sometimes humans) at the center of inquiry. Posthumanists consider humans to be objects, just as they deem technology and art as objects. (It is important to note that the word object is potentially interchangeable with other object conceptions, such as actors and agents). Posthumanist studies also challenge the dualist perspectives of the modern paradigms, precisely, the separation of humans and objects into opposing categories while placing humans over objects. In this way, posthumanist studies have developed new perspectives, such as object-oriented studies, new materialism, and ANT.

Object-oriented studies originated in computer and information science but quickly spread across the social sciences, sciences, humanities, arts, and business fields. Object-oriented studies often use a speculative realist perspective within their object-oriented ontologies (OOO; Bogost, 2009, 2012; Bennett, 2012; Reid, 2012). They examine objects, not from the perspective of humans or in relation to humans, but as autonomous material that contributes to collective life. OOO scholars feel a better way for exploration is by considering an object's agency and how it acts independently. In this way, object-oriented thinkers place both objects and humans on an equal footing within an analysis, believing both are as equally likely to participate in an action. And, while OOO studies provide additional tools for exploring the organizational structure and

conviviality of the GCI, and could have been used for this study, I was drawn to the collective mindset of relational materialism, an approach quite similar to OOO, yet also different.

Collective material theories include new materialism (Gries, 2015); actor-network theory (ANT; Callon, 1986; Latour, 1988; Law, 1986); vital materialism (Bennett, 2010); agential realism (Barad 2007); rhizomatic ecologies (Deleuze & Guattari, 1988); as well as some aspects of object-oriented ontologies (OOO; Bogost, 2009, 2012; Bennett, 2012; Morton, 2015; Reid, 2012). Based on my understanding of these theories, I was most drawn toward ANT, which evolved from science and technology studies. However, parallel ways of thinking about humans and objects have spanned sociology, feminism, media, art, politics, and ecology scholarship.

ANT, like new materialism and OOO, challenges the human-centered focus of modern paradigms. Unlike OOO's speculative realist position, which believes that objects can enact independent agency (Morton, 2015), ANT's relational materialist perspective believes that agency is found in the assemblage, or connection, of actors (i.e., human-to-human, human-to-object, object-to-object) (Gries, 2015; Latour, 2005; Law, 2009). In this sense, these actor associations create a relational agency. For instance, neither humans act alone nor objects act alone; instead, the action takes place at the relationship formed across actors. Put another way; ANT recognizes not only the importance of both the humans and the objects within a phenomenon but also the associations that are formed across humans and objects as they assemble and reassemble collectives.

While I dive deeper into the complexities of OOO in Chapter 3 and the intricacies of ANT in Chapter 4, for now, the conceptualization of ANT can be thought of in a broad sense as a kaleidoscope mindset to explore the “constantly changing pattern or sequence of elements” (Kaleidoscope, n.d., para. 1.1) within a phenomenon. In Chapters 3 and 4, I explain the

materiality of objects and how these objects form collective networks in more detail to help readers better comprehend the theories driving the digital conviviality and collectivity notions offered in this dissertation. Based on this, it is important to keep in mind that material “is conceived of as a productive, dynamic, and resilient force that shapes reality” (Gries, 2015, p. 7). Thus, ANT is the recognition that actors are all material that are working together to produce an action and form a complex network of actor associations.

Latour (2005) believed that actors could not be broken into the usual dualistic categories of human and object, as object actors are not "the material" (p. 76) and human actors are not "the social world" (p. 76). Instead, these actors are considered a collective material made up of the redistribution of assemblage among all things participating in a phenomenon. In this way, actors can be conceived of as both humans and objects, including a person, a technology, an organization, a piece of artwork, a website, an algorithm, and so forth. ANT recognizes that exchanges can happen between any actors, such as between people and art or between people and technology while believing humans and objects are intertwined as collective material. Thus, when analyzing a phenomenon, ANT postulates that all actors must be examined accordingly.

Along these lines, collective relational materialists, such as ANT scholars, take things/objects/matter/stuff very seriously. Specifically, they ask: what happens if we include the affordances of these things/objects/matter/stuff into “the action of assembling our collective common world?” (Gries, 2015, p. 7; see also Herndl, 2012). ANT also helped me look at the relational connections across actors of the GCI (e.g., the Google corporation, engineers, managers, partners, cultural institutions, curators, artifacts, technologies, websites, users, documents, and so forth), as well as how those actors assembled to influence the workings of the

institute's ecosystem and organize information across digital space. With all of this in mind, ANT allowed me to explore the dynamic process of enmeshed human-object collectivity.

Dissertation on the Digital Conviviality of Google and its Art and Culture Initiatives

The spread of algorithmic gatekeeping is the result of increasing digitization of everyday life, ranging from the personal to the political. This data generated by this digitization, in turn, powers the algorithms that play increasingly crucial roles. Overall, the trend towards more massive datasets (sometimes dubbed 'big data'), digital connectivity, and algorithmic gatekeeping are inexorably linked (Tufekci, 2015, p. 208).

Using the GCI as my case and ANT as my mindset, I explored the organizational structure of institute and how its business model appeared to affect the conviviality of Google's technologies. I examined how a variety of actors influenced the workings and conviviality of the GCI ecosystem. I devoted special consideration to the objects within the institute (e.g., artifacts, metadata, website, technologies, art, ideas, environments, and so forth), including how they interacted with humans and how humans associated with objects to create a weaved human-object collective material. Further, I would like to point out that this is not going to be the usual dissertation with a chapter introduction, a chapter on literature, a chapter on methods, and several chapters discussing the results, followed by a chapter covering the conclusion. While I do follow some tenets of that basic format, I am going to gather together, synthesize, and then augment, a body of theory. Following, I will use the information collected through my bricolage approach to assemble together, create, and then enhance, a new methodological strategy: digital convivial tracking with a design science (DS) approach and actor-network theory (ANT) mindset. I will not even begin the actual descriptive analysis until Chapter 7, and while the analysis will be there, it is mostly intended to demonstrate an application of this theoretical and methodological approach. *THAT—the theoretical and methodological application of DS and ANT to trace digital objects— is the point of this dissertation.* Based on this, I will now explain the overall scope and

method that was used and how this study can contribute to other posthumanist, digital methods, information systems, and business scholarship.

Scope and Method

Similar to Tufekci's (2015) argument that "[t]he spread of algorithmic gatekeeping is the result of increasing digitization of everyday life" (p. 208), the GCI was selected for its focus on digitizing the world's art and culture. For example, on the institute's *GAC* website, viewers can explore "digitized materials" (Rogers, 2013, p. 15), which are artifacts that have been "digitized and scanned and uploaded to a digital medium (such as scanned photographs from World War II mounted on a website . . .)" (p. 15). Furthermore, users can utilize "natively digital objects" (p. 19), such as hyperlinks, tags, metadata, web pages, and other digital objects. In the case of the GCI, digitized materials were cultural objects that were photographed, scanned, and then uploaded to the *GAC* website. Natively digital objects were the data that the institute used to label the digitized artifacts, including the hyperlinks, hashtags, and posts about the artifacts. Additionally, once art and culture objects were digitized, a digital material was created, which in turn, helped to power Google's technologies (algorithms, machine learning, AI) and further Google's ability to "play increasingly crucial roles" (Tufekci, 2015, p. 2018) in information sharing both on- and offline.

Drawing from several disciplines (e.g., science and technology, design science in information systems, professional and technical communication, organization and business models, digital methods, and convivial studies), I used a bricolage approach to explore the organizational structure and digital conviviality of the GCI. I employed Illich's (1973) notion of conviviality as my guide and practiced a posthumanist, actor-network theory (ANT; Latour, 2005) kaleidoscopic mentality as my mindset. Further, I used a design science (DS) approach as

I explored the organizational structure of tech companies by investigating the institute's business model (Osterwalder & Pigneur, 2010/2013), and how its technologies provide collective participatory experiences (Latour, 2005) through its digitization and materialization of art.

In this study, I heeded the digitization advice of Richard Rogers's (2013) to design a new digital research methodology. Specifically, his approach to studying material that is digitized versus born digital. Based on this, my digital approach, which I call digital convivial tracking with a design science (DS) approach and actor-network theory (ANT) mindset, was designed to investigate and visually describe the structure and digital conviviality of technology organizations. In this way, digital convivial tracking was based on three methods: (1) Laurie Gries's (2015) iconographic tracking of an image throughout digital space; (2) Liza Potts's (2014) participant-centered investigation of digital space; and (3) Alexander Osterwalder and Yves Pigneur's (2010/2013) business model canvas (BMC).

With a posthumanist ANT mindset, I examined the organizational structure and conviviality of the GCI ecosystem. Moreover, and because an examination of a network is potentially limitless, I adhered to Latour's (2005) discussion on "matters of concern" (p. 114) and "abstraction" (p. 16) to recognize the researcher role I played in choosing which networks to study. I set distinct boundaries around my study using Latour's abstraction and "following the actors" (p. 16) "so that actors [were] allowed to unfold their own differing cosmos, no matter how counter-intuitive they appear" (p. 23). To follow the actors of the institute's ecosystem in order of appearance, I selected particular actor entry points to follow. Once initial actors were identified, I designated additional actors based on associations. And, because the GCI merges technology and art, I felt it was essential to understand how specific textual and visual documents were circulated (with the aid of Google's technologies) throughout its ecosystem.

Therefore, I utilized Spinuzzi's (2008) research that claimed one way to examine the network of an organization is to trace how various organizational texts flow throughout a company to produce textual knowledge. In this way, Spinuzzi's approach helped me to identify initial actors to begin my study. As I was particularly interested in exploring how Google talked about the GCI and its initiatives, I recognized several documents written by Google employees about the institute. While Chapter 5 outlines and describes how I identified initial actors and established boundaries around my study, I offer the following overview of actor entrance points to aid in clarity.

The initial Google documents selected included the following: blog posts about arts and culture on Google's blog *The Keyword*, an academic article about the GCI and its storytelling initiatives by Seales et al. (2013), and a presentation about working at Google's institute by Patarin (2014). Building on these articles, I utilized Gries's (2015) advice to track an iconic image to understand a network. Gries's advice was extremely relevant, because the GCI circulates a multitude of iconic images across Google's ecosystem. Based on this, and within each of the identified initial actor articles, I found a discussion or mention of Vincent van Gogh's (1889d) *The Starry Night*. And, because Amit Sood (2013) stated that *The Starry Night* is considered the most popular iconic artifact within user galleries on the institute's platform, I felt that the painting was an excellent actor to trace on my digital convivial expedition across the GCI ecosystem. See Figure 1 for *The Starry Night* painting. *The Starry Night* was also considered a boundary object—an actor used in different ways by different actors and different networks, and yet, maintained “a common identity across sites” (Star & Griesemer, 1989, p. 393)—across networks.

To analyze the data, I used several approaches to ensure crystallization (Ellingson, 2009; Richardson, 2000) and triangulation (Denzin & Lincoln, 2011; Golafshandi, 2003; Guba & Lincoln, 1994; Markham & Baym, 2009). My digital convivial tracking helped me visualize, record, and analyze the data. I mapped out actor associations through the creation of ANT diagrams (Potts, 2014) within a new business model canvas that I designed. I called this new mapping approach a digital convivial business model canvas (DCBMC), which was based on the work of Osterwalder and Pigneur (2010/2013). I used the DCBMC to illustrate the GCI's overall business model, including its participatory culture and digitality process. Further, and to analyze the conviviality of the GCI, I combined Ilich's (1973) notion of conviviality, as well as Henry Jenkins's (2009, 2012) evaluations of digital participatory culture and James Bau Graves's (2005) steps necessary for culture to remain vital and participatory, to establish an analysis tool. This tool was a seven-step approach that used the mnemonic *CULTURE* to examine a digital tool's conviviality, specifically, its ability to allow others to participate *with* humans and objects, as well as its ability to provide users ways to participate *with* culture. Lastly, I combined Potts's (2014) description of data transformation and the GCI's process to contextualizing artifacts to create a system for analyzing the network formation and digitization process of the institute. I call this a technology organization's digitality process (*DIGT*).

Research Contribution to the Field

Several published works explicate ANT and examine how it can be employed to evaluate science and technology innovations and transformations of society (Callon, 1986, 1991, 1999; Callon & Latour, 1981; Callon & Law, 1997; Gries, 2015; Hassard, Law & Lee, 1999; Latour 1987, 1988, 1993, 1995, 1996, 1999, 2005; Law, 1986, 1987, 1992, 2009; Lee & Brown, 1994; Mol, 2002, 2010; Potts, 2009, 2014; Spinuzzi, 2008, 2011; Star & Griesemer, 1989). Other

literature uses ANT to evaluate how arts and culture enhances learning and social connection (Hennion, 2001; Heydon & O'Neill, 2014). Additionally, studies have been conducted on the organizational structure of digital space (Li et al., 2014; Rogers, 2013; Tufekci, 2015) and convivial tools (Illich, 1973). Furthermore, studies have been directed on business models to assess how a company operates and provides value to consumers (Alt & Zimmermann, 2001; Gordijn, 2002; Osterwalder, 2004; Osterwalder & Pigneur, 2010/2013; Pateli & Giaglis, 2003; Stähler, 2001, 2002; Zolnowski et al., 2011a; Zolnowski et al., 2011b; Zolnowski et al., 2012; Zott et al., 2011). Studies have also been carried out on Google's service-for-profile business model (Barzilai-Nahon, 2008; Elmer, 2004; Levy, 2011; Lyon, 2007; Pariser, 2011; Rogers, 2013; Schmidt & Rosenberg, 2014; Vaidhyanathan, 2011), as well as how the GCI democratizes the world's art and culture (Bayer, 2014; Beil, 2013; Seales et al., 2013; Stogner, 2013).

However, my study identified and addressed gaps in the literature concerning how researchers can apply an ANT mindset to digital method investigations of the organizational structure and conviviality of online space, especially where culture and technology intersect. I sought to address gaps in literature concerning how ANT can be applied to the BMC to ensure both humans and objects receive equal consideration, as both are intertwined and important to a business's overall model. While the BMC acknowledges specific objects within an organization's business model (e.g., software, website, physical capital, the brand), more attention could be given to how these objects participate *with* humans to create conviviality. Co-creation of content and conviviality should be attended to in a more significant capacity when conducting a BMC study within digital space. Moreover, when investigating technology organizations that design participatory digital tools, more attention could be paid to how these companies promote digital conviviality through their tools and organizational structure.

To confirm that these gaps existed, I examined various requests for future research. Latour (2005), Law (2009), and Mol (2010) called for more investigation on ANT to provide additional layers and possibilities into how ANT can be understood. Rogers (2013) requested more “natively digital” (p. 15) research and new creations of digital methodologies. Potts (2014) argued for more participant-centered investigations of the participatory culture of digital spaces. Gries (2015) called for more iconographic tracking of images to advance understanding of the materiality of objects. Cressman (2009) requested more research on ANT's translation concept, specifically, an examination of "*what is being translated*" (p. 10, emphasis in original), as well as “network evaluation needs to move beyond simply noting connections and focus on describing the nature of these connections” (p. 11). Lastly, Zott et al. (2011) called for more research on business models and the business model canvas (BMC), specifically, an examination of how participation and co-creation of content can be added more efficiently to the BMC.

Building on these calls, I aimed to bridge the gap between ANT, digital methods, media communication, information systems, and management to examine convivial business models where the public, culture, and technology intersect. This study identified the role Google's technologies play in shaping networks and organizing information. Further, this study contributes to a more integrated appreciation of the complexity surrounding advanced technologies in a broad sense, such as ML and AI, and their application across the art and culture landscape. Based on this, and given that society's interest in, use of, and contributions to digital technologies, as well as how technological advancements will continue to flourish, it is imperative we expand our understanding of what participation in such environments means to (and for) those actors (humans and objects) who participate.

CHAPTER 2: DIGITAL CONVIVIALITY AND ORGANIZATIONAL STRUCTURE

In an age of scientific technology, the convivial structure of tools is a necessity for survival in full justice which is both distributive and participatory (Illich, 1973, p. 20).

As discussed in Chapter 1, tech titans—specifically, the Frightful Five (Amazon, Apple, Facebook, Microsoft, and Alphabet, the parent company of Google; Manjoo, 2017)—are shaping the way data are generated and distributed across digital public space. Subsequently, as these titans are continuing to advance technology, it can be argued that they are building convivial and/or non-convivial tools (Illich, 1973), which may or may not be providing digital participation (Jenkins, 2009) and co-creation (Tanev et al., 2015, p. iv) opportunities. The purpose of this chapter is to define the concept of digital conviviality, which includes investigating digital public space and the experience architecture of a digital system. To understand digital conviviality further, this chapter also discusses the business models of technology organizations, including Osterwalder and Pigneur's (2010/2013) business model canvas (BMC), the business model of Google, and how this model has impacted numerous industries.

I define *digital conviviality* as when a technology company operates in digital convivial ways such that it: (a) builds tools for digital communication; (b) has a value proposition that, while aimed at generating a profit, is also focused on using its technology to enhance society, instead of manipulating society for the sake of its technologies; and (c) designs technological tools that work *with* humans instead of tools that work *for* or *act on* humans to accomplish a task. In this chapter, I will elaborate on how this definition was generated, as well as how it was used to develop a framework for studying the conviviality (Illich, 1973) of leading technology titans and the surprising ways they organize digital public space.

Digital Public Space

According to Hemment and Thompson (2013), digital public space is a conception of how the Internet, as well as other web technologies, can interact to allow "everyone everywhere unrestricted access to an open resource of culture and knowledge" (p. 3). Digital public space can also be conceived of as a social web ecosystem, as it allows individuals to participate in and "share knowledge across multiple technologies" (Potts, 2014, p. 7). It can also include terms such as "social networking systems,' 'social software,' and 'social media'" (p. 6), and digital platforms, "mediated systems for the social web" (p. 2), or "participatory ecosystems" (p. 2). Hemment stated that in digital public spaces, "[w]here the walls are permeable, collaboration and value cocreation becomes easier and the parts, services and experiences become scaleable and sustainable" (Hemment, & Thompson, 2013, p. 19). In this context, throughout digital public space, people have the opportunity to "consume, learn, create and share" (p. 3) content online across multiple platforms.

The ideology of digital public space evolved as a way to solve the current problem regarding digital platforms. Specifically, while website designers construct social web ecosystems as digital spaces for users, these digital spaces sometimes hinder and/or limit user participation. In other words, digital spaces are not always built to encourage and allow for participation across its human participants: the architects, contributors, and users. Moreover, because designers do not always construct digital spaces with participation in mind, information becomes trapped, whether intentional or not, which makes it difficult for content to be shared across other digital platforms (Potts, 2014). These types of constrained platforms are sometimes referred to as closed digital communities or "walled garden[s]" (Rogers, 2013, p. 25).

In this context, Illich (1973) might argue that Hemment and Thompson were discussing convivial technologies, especially, how digital technologies can work *with* humans to complete a task. Hemment and Thompson were examining how digital technologies can enhance society by thoroughly distributing information online to ensure “participatory justice” (Illich, 1973, p. 20), including not trapping information behind the walls of individual participatory ecosystems and not manipulating “people for the sake of their tools” (Illich, 1973, p. 21). Based on this, and in order to ensure that digital systems are convivial, web platform creators (e.g., user experience architects, usability participation designers, technologists) can conduct participant-centered investigations (Potts, 2014) of its experience architecture to garner useful information.

According to Liza Potts (2014), a participant-centered investigation “involves researching, analyzing, and participating in the various technologies, people, environments, systems, and so forth that the users are engaging with to reach their goals” (p. 21). In this context, “[a] participant can be any actor within a given network— a person, technology, organization, website, document, event, and so on— or any combination of these actors” (p. 25). And, when creators understand how online systems are being used, they can learn ways to create and enhance experiences to confirm that such activities are convivial, flexible, and responsive.

One way to conduct a participant-centered investigation is to explore how people share content in digital space. Several scholars have examined this phenomenon, such as information architect Peter Morville (2005), systems analyst Ned Kock (2007), and Internet studies researcher David Weinberger (2012). Further, it is essential to evaluate how tech titans are organizing digital space (in the case of this dissertation, how Google is organizing digital space). However, to understand the level of control that tech titans have, it is beneficial to have a basic understanding of the architecture of digital systems. This architecture is what informs how

systems organize digital space, as well as dictates how people can use these platforms to explore and share content. Based on this, I now turn toward a description of how digital systems are built. I will illuminate how the complex back-end and simplified front-end architecture of these digital networks, often limits, or at least disguises, conviviality.

Experience Architecture of a Digital System

According to Potts (2014), experience architects (i.e., creative workers who create and enhance digital systems) are those who design the “experience architecture” (p. 3) of a digital system. The term experience architecture can also encompass words such as “‘information design,’ ‘user experience,’ ‘design,’ ‘communication design,’ and ‘technical communication’” (p. 3). Based on this, experience architects must consider the navigation of a digital platform, as well as how the system captivates its audience with an engaging user experience (UX). In this sense, experience architects do not only design visuals or code features of a mediated system, but they also focus on:

architecting the end-to-end experiences of the participants who will be using these systems. Thinking outside of a single use where people sit in one program all day long, experience architects look at how an individual component is part of a larger ecosystem. These ecosystems include multiple technologies, devices, websites, organizations, people, and events (Potts, 2014, p. 3).

Building on these definitions, and specific to Google and the architecture of its systems, Google’s experience architecture team is compiled of UX engineers and researchers; visual, motion, and interaction designers; and content strategist/UX writers (Google Design, n.d.). Additionally, and according to its *Google Design* (n.d.) website, Google’s “interdisciplinary UX specialists and designers work across platforms to create powerful visuals that highlight each of [its] product’s unique personalities” (para. 1). Further, on its *Google Design* (n.d.) website, Google states that when it focuses “on the user . . . all else will follow” (para. 1) because

“intuitive, beautiful, user-centered design is key to the success of [its] products” (para. 1).

However, to create a user-centered design that is intuitive, specific programming within the system’s back-end and front-end is necessary. In short, a system’s back-end involves the black boxed algorithmic processes that transform input into output; while the front-end is what users see when they use a platform, search-engine, and/or technological tool. While I could use any system of the Frightful Five as an example, I wish to describe the back-end and front-end of Google’s search-engine Chrome to explicate how these architectures reciprocally participate to impact the UX.

Chrome’s back-end involves the opaque algorithmic process that determines the type of information provided to a user. Chrome’s front-end is what a user sees before and after a search query. Google’s simple front-end appearance affects how users participate *with* Chrome. Further, and according to Rogers (2013), Google’s clean-lined appearance influences how information is presented online by other technology platforms. For instance, various search engines have tried to mimic Google’s aesthetics and ease of use, including how Google presents results from a search (i.e., ten links listed per page with each result encompassing a title, descriptive text, and hyperlink).

Additionally, when a person uses Chrome to seek information, Google’s algorithm uses search history personalization (i.e., the user’s previous search history, including clicking patterns and personal interests [Sullivan, 2007]) to create filter bubbles (Pariser, 2011) that privilege information specific to the user. For instance, Sullivan (2007) found that different users can search the same keyword on Google (say “female shoes”), yet, each user receives different results for female shoes. As I described in Chapter 1, these various search results are because each user has wide-ranging search histories and when these individual queries are partnered with

Google's algorithm, users receive differing search results even when they search for the same object online. This is also why when using Chrome's front-end to search online, users are presented with advertisements of items for which they previously searched. In this context, the back-end of a digital system influences the front-end.

From Front to Back: Research on Sociotechnical Systems

One scholar who has explored how the back-end and front-end of digital systems affect the organizational structure of digital space is Richard Rogers (2013). Rogers is a digital methods scholar who runs the Digital Method Institute (DMI) in Amsterdam. He has developed several digital research methods to investigate the digitized and natively digital aspects of objects in digital space. I define this process as examining the *digitality* of objects, which involves exploring objects that reside in a digital rather than physical form and how this digital form shapes, creates, distributes, and associates information online. In this context, a digital form can be “digitized materials. . . . [including material that has been] digitized and scanned and uploaded to a digital medium (such as scanned photographs from World War II mounted on a website . . .)” (Rogers, 2013, p. 15). Additionally, a digital form can be natively digital objects, such as algorithms, blogs, hashtags, hyperlinks, metadata, social media posts, topic tags, web pages, Wikipedia posts, and so forth (Rogers, 2013).

Rogers was interested in “natively digital” (p. 19) technological objects, and specifically, how they influenced networked associations. He claimed that when scholars look at natively digital objects, they will be able to observe how digital platforms promote content across various digital spheres (e.g., blogosphere, social media sphere, web sphere). This approach will also give insight into both the back-end (i.e., what the user does not see) and the front-end (i.e., what the user does see) of a system. Rogers's work also demonstrates the multitude of ways that

researchers can use digital methods to gather and analyze data to discover new information. For instance, he conducted “political network mapping of web space” (p. 54) to identify actor relationships. He explored hyperlink associations using digital link and page content analysis tools (e.g., Harvester, Link Ripper, Raw Text to Tag Cloud Engine, and more), which are designed by the DMI and are available at tools.digitalmethods.net. Additionally, he examined the role that Google’s search engine algorithm does or does not play as the gatekeeper of information. Furthermore, he utilized profile scraping tools to assess user profiles and the post-demographics they display, which identified “particular general interest or favorite music, movies, television shows, books, and heroes” (p. 12) of users. This data was used to compare user profiles and identify user compatibility based on shared interests. Lastly, he used geolocation and censorship analysis tools to discover how information may be privileged on different web spheres.

A more detailed example of Roger’s work can be illustrated through his examination of the political economy of online searches to identify actor relationships and “pin down actor mobility in networks” (p. 54). Building on Sullivan’s (2007) findings, Rogers (2013) found that the “personalization of engine results” (p. 9) accounts for how users participate *with* Google when conducting an online search. He recognized that the user is actively involved in the Google search process. This realization helped to remove some of the blame placed solely on Google by demonstrating how Google is not entirely responsible for the information that it presents. Put another way, the responsibility of web search results is based on contributions made by both the user and the search engine, as together they coauthor search results. Rogers was arguing that algorithms do not exert what Tufecki (2015) describes as full-blown “computational agency” (p.

207). Instead, algorithms act in a more convivial (Illich, 1973) manner through their interaction *with* humans and technology.

Moreover, it must be pointed out that these activities do not take place in a vacuum. When all of this is put together into the same process, the back-end structure of a search engine's algorithm (i.e., including users' search histories) works in tandem with the front-end structure (i.e., where the user conducts searches) to position certain actors online. In this way, Google's back-end algorithmic processes and front-end interface allows Google to act as a gatekeeper over online information (Barzilai-Nahon, 2008; Beer, 2013; Li et al., 2014; Nahon & Hemsley, 2013). In this context, Google influences "online discourse regarding emerging technologies through promoting certain types of content while discriminating others" (Li et al., 2014, p. 572). Building on this research, Beer (2013) and Nahon and Hemsley (2013) found that search engine algorithms, web cookies, social media, and software affected how information circulated online. Now that a basic overview of how digital systems work has been provided, I will move to a discussion surrounding how these systems can provide further convivial (participatory) experiences when they are designed to afford such practices.

The Participatory Experience Architecture of Sociotechnical Systems

As stated previously, digital systems that are convivial, fluid, and flexible, provide co-creation opportunities and participatory experiences for participants. Co-creation is a concept that emphasizes how "customers and end users should be considered as active participants in the design and development of personalized products, services, and experiences" (Tanev et al., 2015, p. iv). Co-creation also involves the collaborative workings of numerous actors (e.g., humans, organizations, creators, users, technologies, art, etc.) to shape something new. Participatory experiences within digital space involve platforms that were built to allow "participants to tag

content with metadata, label information with relevant details, and reply to participants and developers” (Potts, 2014, p. 7). Further, these platforms allow participants the ability to create, manipulate, and/or transform digital material and then share those constructions with others.

Additionally, Potts (2014) claims that a digital system is participatory when it adheres to Jenkins’s (2009) definition of participatory culture. Jenkins’s stated that digital participation is possible when the following five conditions are present. First, the barriers to civic engagement are low. Second, the support for the creation and sharing of content is available for both the participant and producer. Third, informal mentorship instruction is available for novices. Fourth, participating members believe that their contributions matter. And, fifth, members feel a social connection across digital space (pp. 5-6; see also Potts, 2014, p. 25). Further, participatory platforms are considered useful when they can “reconnect content and context” (Potts, 2014, p. 41), which can be accomplished by “collaborations across the sciences and humanities, as one can engineer the artificial and the other can contextualize the intelligence” (p. 41).

One way digital platforms can encourage participation is by providing a variety of modes through multimodality functions for users. Modes, as described by Walsh (2011), are an “organized set of resources for meaning-making” (p. 1) and may include “image, gaze, gesture, movement, music, speech and sound effects” (p. 1). According to Jewitt and Kress (2003), multimodality presents several modes within one space/event/product, and when these modes are used in combination, they help people make sense of the world around them (i.e., their life, environment, and place within their environment). Further, when a person relies on these modes to communicate, such as through art or music, she is engaging and enhancing her “multimodal literacy” (Walsh, 2011, p. 12). Moreover, Heydon and O’Neill (2014) report that “*art, sense-making*, or what could be called *literacies*, provide the means to accomplish [multimodal

literacy]” (p. 2, emphasis in original) and to help people “understand themselves in relation to others and their worlds” (p. 2).

Modes and the use of multimodality (multimodal tools) have been demonstrated to help connect people to a physical environment. The same is true of online environments. However, the modes/multimodal tools may differ when it comes to connecting offline environments versus online environments. For instance, to connect people to an online environment, which Janet Salmons (2015) describes as “presence” (p. 76), several modes can be used. Further, as Salmons (2015) describes, a person’s presence, or how a person feels physically present in an environment, is an “either/or situation – you are either present or not” (p. 76). I will expand on this idea. Say I am visiting Paris, France, and am touring the Louvre museum. In this scenario, I would be physically present at the museum. Conversely, say I am at my home in Boulder, visiting the museum using digital technologies. In this context, I am physically present at my home, and therefore, am not physically present at the Louvre museum.

According to Salmons (2015), the feeling of online presence is experienced through different factors (e.g., environmental, personal, social, and cognitive) factors that influence online presence (pp. 76-77). Drawing on this, to create the feeling of presence online, different measures can be used. The first factor is an online environmental presence, which can be defined as when the digital environment acknowledges and responds to the user. Put more simply, when a user experiences online environmental presence, she is able to create and establish an online identity. The second factor is an online personal presence, which Salmons (2015) defines as “[t]he extent to which the person feels physically present in the environment” (p. 77). The third factor involves the feeling of an online social presence, which can be defined as when a user feels connected to others through virtual communication (p. 77). Lastly, the fourth factor is an

online cognitive presence, which Salmons (2015) states can include the user “participat[ing] in critical thinking and community inquiry” (p. 77) online.

Understanding the similarities and differences between an off- and online environmental presence may at times be difficult to grasp. Therefore, I will provide an example to demonstrate online presence and the multimodal tools used to create such experiences. Say I am at my home in Boulder and decide to use the *Google Arts & Culture* (GAC; n.d.) website to digitally visit, via virtual reality (VR) technology, the Van Gogh Museum in Amsterdam, Netherlands. I might experience an online environmental presence when I craft a digital identity through creating a user profile on the GAC website (which is currently available). My online personal presence could arguably be increased, because I am using VR technology to explore the museum and VR technology is designed to make a user feel connected to a physical environment, despite the fact, that the user is not physically there. My environmental presence could increase if the website reacted to me each time I returned to the webpage (i.e., display messages such as “Welcome back Leah” or “here are some exhibits we think you might like”).

Further, I would experience an online social presence if I could use social platforms to communicate with others about my museum viewing and art experience (e.g., interact with another digital explorer through VR headsets). Moreover, my online social presence would be enhanced if the platform led me to believe that my virtual communication is meaningful, authentic, and connected to others (e.g., perhaps I have the opportunity to educate others about the art). Finally, I would experience an online cognitive presence if the GAC or Van Gogh Museum engaged my critical thinking skills. For example, if the museum prompted me to ask myself questions, such as “does this technology actually make me feel like I am in the museum?” or “how can this experience be improved?”, in addition to providing a way for me to ask

questions of the cultural community (e.g., being able to use a social media platform to ask other users questions about their VR experience or impressions of the art, or ask art historians about the art).

As I have described, various modes can be applied to enhance a user's feeling of online presence (e.g., image, movement, gaze, speech, music, audio, and so forth). Additionally, there are a variety of multimodal tools that can be utilized to entice these modes (e.g., VR headsets, mobile applications, smartphone technology, video mapping of the interior space of the museum, social media platforms, microphone, earpieces, and so forth). The combination of modes and multimodal tools can be employed to help users feel connected to a digital environment. I will now describe the various data visualization tools that can be used to help represent data and increase online user presence.

The Data Visualization Tools of Sociotechnical Systems

According to Furht and Villanustre (2016), the primary goals of data visualization are to increase data clarity, improve data aesthetics, and allow people to interact with the data in real time. Through the process of data visualization, people can explore consumer behavior, product correlations, revenue trends, business risks, the key players in a system, and so forth. As the size of the dataset increases, however, particular challenges may arise, including how to process, manage, and analyze the data. Data visualization can be accomplished using graphical representation of data, which can be presented for both traditional as well as large-scale data. These graphical representations include tables, images, word clouds, network maps, organizational charts, business model canvases, and so forth. Additionally, when creating graphical representations, it is important to consider the “cognitive and perceptual properties of the human brain” (Furht & Villanustre, 2016, p. 109). Google has created and/or enhanced

several innovative technologies to enhance their users' feeling of online presence. Some of these technologies include digital reality, which encompasses virtual, augmented, and mixed reality; three-dimensional (3D) landscapes; and 360-degree scanning and mapping. I will explain.

Digital reality (DR) includes virtual reality (VR), augmented reality (AR), and mixed reality (MR). VR requires a "head-mounted display" (Johnson, 2016, What is VR, para. 2), which is a wearable device that holds a screen in front of a viewer's eyes (i.e., Google Daydream and Google Cardboard). This screen is "powered by a computer, gaming console or mobile phone" (Johnson, 2016, What is VR, para. 2). The experience on the screen, often partnered with surround audio, allows whatever is on the screen to appear like the viewer's reality. In this way, VR enhances a person's feeling of presence or the feeling he/she is physically existent within a physical environment.

Another form of DR is AR, which is when "data produced by a computer . . . is superimposed to the real world" (Furht & Villanustre, 2016, p. 119). AR can be seen through the use of a smartphone where the augmented image is visible through the screen on the phone. With AR, the viewer can see both the real world and the digitally embedded data at the same time; however, the distance between the viewer and the superimposed data does not change. For example, if I use AR technology on my iPhone to look through my phone's screen to see van Gogh's (1889d) *The Starry Night* superimposed on the wall in my house, the painting will not hold its position. In this context, when I lean in closer to the wall and/or to my phone screen, the painting will not get larger (i.e., closer) like it would in real life.

Conversely, MR is a mixture of VR and AR. Similar to AR, in MR data are superimposed on the real world, which allows the viewer to see both the real world and the digitally embedded data at the same time. MR, however, differs from AR in that MR anchors

“virtual objects to a point in real space” (Johnson, 2016, What is MR, para. 3). In other words, the distance between the imposed data and the person viewing the virtual data will change. For instance, through a MR device, I can see *The Starry Night* painting superimposed on the wall in my house much like I could with AR. However, with MR, the painting will remain in a continuously held position. In this context, when I lean in to examine the painting, the artwork will get closer, just like it would if I was viewing it in real life.

Another form of data visualization is interactive three-dimensional (3D) landscapes, which include the ability for viewers to display data in multiple dimensions. 360-degree mapping and scanning is the process of using sophisticated technologies to scan a physical space. While 360-degree scanning and mapping are still improving, such methods provide a way for viewers to virtually move around and investigate a space almost as if they were there. Further, using 3D and 360-degree visualization tools, viewers can see the space behind, in front of, and to both sides of an object. An example of 360-degree scanning and mapping is Google's Street View technology, which is designed and used by Google Maps.

This section focused on a discussion of digital public spaces, specifically how they are designed, built, and used to organize information. Further, I have described how digital platforms can be convivial by using multimodal data visualization tools that work *with* humans to enhance their feeling of online presence, as well as provide participatory experiences. Seeing as digital conviviality also involves looking at the goals, structure, and leadership of the technology organization, I now turn to a discussion surrounding business models. Specifically, what the business model of a technology organization like Google looks like and how exploring a technology organization's business model will enhance understanding of digital conviviality.

Business Models of Technology Organizations

A business model “describes the rationale of how an organization creates, delivers, and captures value” (Osterwalder & Pigneur, 2010/2013, p. 258). The business model canvas (BMC) can be used as a tool for examining outdated, as well as innovative, business models. Further, it can help organizations discover how novel approaches are creating and providing value, as well as how they can design new ways to disrupt their industry. A BMC is a visual diagram consisting of nine sections: (1) customer segments, (2) value proposition, (3) channels, (4) customer relationships, (5) revenue streams, (6) key resources, (7) key activities, (8) key partnerships, and (9) cost structures. Information about each of the nine building blocks is inputted into the canvas to illustrate how a company currently makes or intends to make money. Figure 2 illustrates the layout of a BMC.

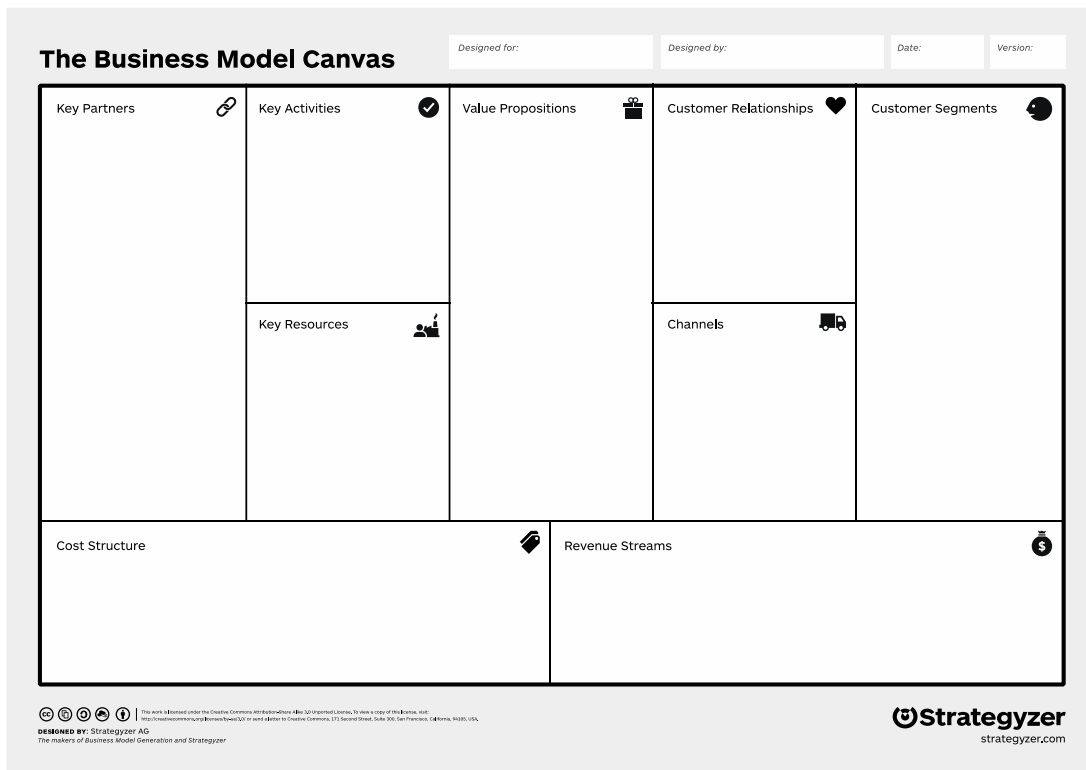


Figure 2. The Business Model Canvas. From “The Business Model Canvas,” by Strategyzer AG, n.d. (<https://assets.strategyzer.com/assets/resources/the-business-model-canvas.pdf>). Licensed by Strategyzer AG under a [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/).

Section one, customer segments, includes identifying the types of customers that a business wants to serve. These customers may include a mass market (wide range of customers), niche market (specialized customer needs), or multi-sided market (users and businesses, such as advertisers). Further, the customer segment can be broken down into various segmented markets (e.g., gender, income, age, needs, characteristics). Section two, value proposition, “is the reason why customers turn to one company over another. It solves a customer problem or satisfies a customer need” (Osterwalder & Pigneur, 2010/2013, p. 22). A value proposition is part of the mission of the organization; the mission is critical to the business model as it allows an organization to develop top-sight over its vision, strategic goals, and value proposition (Alt & Zimmermann, 2001).

Section three, channels, examines how a company reaches its consumers. These channels can include a company’s own channels, such as its storefront or website, or its partners’ channels, such as partner distributor or partner website. Customer channels can also be a combination of company and partner channels. Section four, customer relationships, examines how a company fosters relationships with its customers. These relationships can be cultivated through personal customer assistance, self-service, automated service, user communities, and co-creation opportunities. While the customer relationships segment briefly discusses communities and co-creation, more attention could be given to the participatory culture of an organization, as previous research claims customer integration and co-creation of value are missing from the BMC (Zolnowski et al., 2011b; Zolnowski et al., 2012).

Section five, revenue streams, lists the various ways a company can make money. Monetary gain can be achieved through various subscription, usage, license, lease, and broker fees, as well as from the selling of products, data, services, and ad space. Section six, key

resources, details the assets necessary for a company to function and meet its value proposition. These assets may be physical, intellectual, human, technical, and financial. Section seven, key activities, describes the most relevant actions that are necessary for a company's success. These activities may include producing a particular product and generating solutions for customer problems, as well as specific platform activities that are essential for its digital platform to run.

Section eight, key partnerships, highlights the alliances formed across various competitors or non-competitors to help a company fulfill its value proposition. Lastly, section nine, cost structures, examines the monetary approach of a company. The cost structure may include a cost-driven approach focused on minimizing costs without extra frills, or a value-driven approach focused on creating and providing value for the customer. These cost structures include the examination of fixed costs, which can be conceived of as overhead costs, such as salary or rent, as well as variable costs, which are costs that change according to production, such as packaging materials. Further, cost structures also investigate the economies of scope, which are the other areas that a company can enter into, as well as the economies of scale, which is the number of people that can be reached due to a company's massive growth.

One way to use the BMC is to divide the canvas into a business side and a customer side, with the value proposition in the middle. The left side of the canvas examines a company's infrastructure and includes blocks: (6) key resources, (7) key activities, (8) key partnerships, and (9) cost structures. The right side of the canvas examines a company's customer and involves blocks: (1) customer segments, (3) channels, (4) customer relationships, and (5) revenue streams. Further, while the BMC acknowledges the need for specific objects within a business model (e.g., software, website, physical capital, company brand, money, technology), more attention should be paid to how objects are interwoven with humans to create collective action. In Chapter

6, I address ways to resolve this problem, as I introduce tactics that I designed and retooled to research the digital conviviality of a technology organization.

Conceptualization of the Business Model Canvas

In Osterwalder's (2004) doctoral thesis, *The Business Model Ontology a Proposition in a Design Science Approach*, he referred to his conceptualization of business models as a domain ontology or reference model approach. Building on the business model scholarship of Stähler (2001, 2002), Gordijn (2002), and Pateli and Giaglis (2003), Osterwalder (2004) stated that his domain ontology was "a description (like a formal specification of a program) of the concepts and relationships in a specific domain" (p. 2). As the bulk of business model research focused on "non-conceptual, broad and sometimes even vague" approaches (p. 2), Osterwalder's business model conception mined "into the details and define[d] a generic model to describe business models" (p. 2). Osterwalder's research was only focused on "how an enterprise earn[s] money" (p. 9). In this way, he was not focused on how to describe an entire enterprise (i.e., how the business was or was not successful, or how it did or did not implement a strategy).

According to Osterwalder (2004), the process of designing and building "a model that makes it possible to represent the business model of a firm" (p. 4) can be accomplished using a design science (DS) research approach in an information systems (IS) domain. To help describe this concept more clearly, as well as to illustrate a DS approach in an IS domain, I provide a basic overview of IS and DS. In the IS domain, "IS ontologies were originally used in artificial intelligence and knowledge engineering" (p. 2). Today, IS ontologies have expanded into a multiplicity of research fields: "knowledge representation, qualitative [modeling], language engineering, database design, information [modeling], information integration, object-oriented

analysis, information retrieval and extraction, knowledge management and organization, and agent-based systems design” (Osterwalder, 2004, p. 2).

Similarly, DS is rooted in engineering and architecture (Weber, 2010). DS in IS examines information technology (IT) artifacts to explore how objects are built, how objects provide a function of utility, and how objects are relevant to business practices. Through defining a problem solution, DS can be used as a method to discover practical solutions to relevant problems (Au, 2001; Hevner et al., 2004; McKay & Marshall, 2005; Weber, 2010). There have also been debates surrounding DS and its position within a specific research paradigm. These discussions focus on whether or not DS “has the potential to become a new and independent paradigm or if it is an approach that fits into existing paradigms” (Weber, 2010, p. 1).

According to Nunamaker et al. (1991), the research paradigms within the IS domain can be divided into three distinct paradigms: constructivist or interpretive, positivist or postpositivist, and socio-technologist or developmentalist. These paradigms can be compared to those within the social sciences: constructivist or interpretive, positivist, post-positivist, and critical-cultural. The three paradigms of IS are illustrated in Figure 3, which I designed based on Weber’s (2010) “Design Science Research: Paradigm or Approach?” (p. 4).

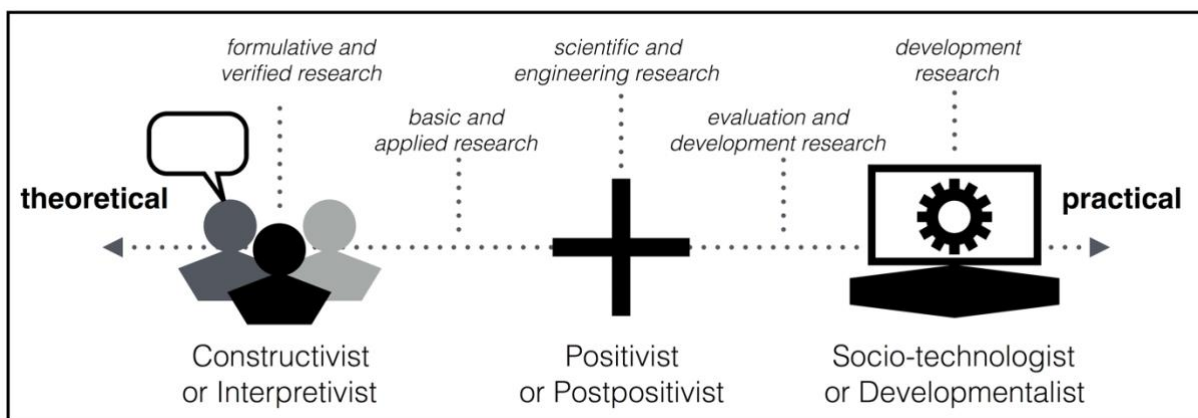


Figure 3. The paradigms of IS and DSR, including research objectives and methods.

Nunamaker et al. stated that these different IS paradigms involve different perceptions regarding how knowledge is improved and promoted. These different perceptions are situated on a continuum that “illustrates the degree of theoretical importance on the one side versus practical relevance on the other side” (Weber, 2010, p. 4).

The theoretical side involves the constructivist/interpretive paradigm. According to Nunamaker et al. (1991), this side includes the perception of formulation and verification, with the goal being “to gain insights and improve the understanding of the problem area” (quoted in Weber, 2010, p. 4). The focus of basic and applied research is to develop and assess theory. According to Gregg et al. (2001), collectively, basic and applied research, as well as the formulation and verification research, make up the constructivist/interpretive paradigm. Subsequently, the practical side consists of the socio-technologist/developmentalist paradigm, which according to Nunamaker et al. (1991), includes the perception of development through the “‘systematic use of scientific knowledge’ to build, evaluate and develop new technologies or prototypes” (quoted in Weber, 2010, p. 4). Further, Gregg et al. (2001) argued that development perception includes exploring how an artifact was created, as well as ways that creation process can be improved at the individual and organizational level. Additionally, they felt that evaluative and development research uses evaluative research to examine the theoretical approach and development research to examine the practical approach. Together, the evaluative and development research, as well as the development research perception, make up the socio-technologist/developmentalist paradigm.

To discover where DS may or may not be situated concerning IS research paradigms, it is helpful to see where scholars have previously placed DS. Some IS scholars have allocated DS into specific paradigms, while other IS scholars claimed DS should not be limited to a particular

paradigm. Regarding paradigm placement, Carlson (2006) used the work of Hevner et al. (2004) and Walls et al. (1992) to argue that DS is situated within critical realism of the post-positivist paradigm. However, Gregg et al. (2001) classified DS as part of the socio-technologist /developmentalist paradigm. Furthermore, it could be argued that Osterwalder's (2004) research also places DS into the socio-technologist/developmentalist paradigm. Osterwalder (2004) stated that his business model research “is in line with Nunamaker, Chen et al. (1990) who classify design science in IS as applied research that applies knowledge to solve practical problems” (p. 4). Additionally, Osterwalder (2004) stated that his business model research “essentially covers the build and some evaluate research activities” (p. 5) of the enterprise. Therefore, his approach was predominately focused on the build or development side of an actor, while using only some evaluative tools, ultimately placing his business model research closer to the socio-technologist /developmentalist paradigm.

While some scholars have situated DS in a specific paradigm, other IS scholars, such as McKay and Marshall (2005) and Weber (2010), claim that DS should not be limited to one paradigm. Instead, McKay and Marshall (2005) and Weber (2010) state that DS is an approach that can be used in a variety of paradigms, and its use is based on the point-of-view of the researcher and his/her goals. “DSR [DS] is a pluralistic research approach that cannot and should not be separated in an existing research paradigm” (Weber, 2010, p. 6). Instead, DS should be used as an approach “to combine the advantages of different paradigms” (p. 6).

To illustrate the fluidity of the DS approach and its applicability to multiple paradigms, I turn to the goals of DS. These DS goals include researching how to build and evaluate IT artifacts (Osterwalder, 2004), and discovering practical solutions to relevant problems (Au, 2001; Hevner et al., 2004; McKay & Marshall, 2005; Weber, 2010). Based on this, and to achieve the

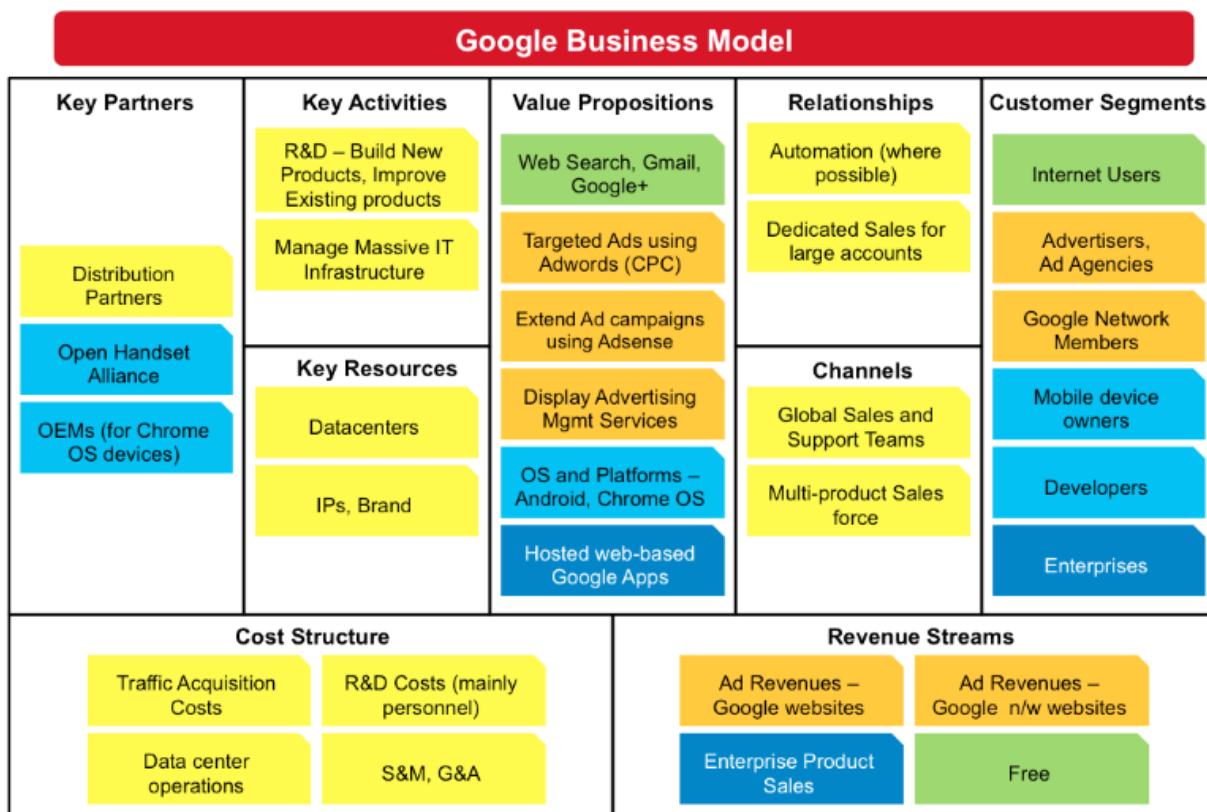
goal of building an IT artifact, the practicality of the socio-technologist/developmentalist paradigms can be beneficial. However, to evaluate an IT artifact, both the socio-technologist /developmentalist paradigms and the positivist/post-positivist paradigms can be useful. Further, to discover practical solutions to relevant problems, the constructivist/interpretive paradigms may be most advantageous. In this way, it is understood that the DS approach can be applied to multiple paradigms. Based on this, I agree with McKay and Marshall (2005) and Weber (2010) and believe that DS is an approach that can be used in a variety of paradigms, and this use is based on my researcher point-of-view.

With a deeper understanding of business models and the BMC, including the IS paradigm and its DS approach, I want to apply this approach to tech titans to observe the actors that participate in and shape their business models. While the models of each of the Frightful Five have substantially shaped the way people interact today, **this dissertation examines the potential influence that Google's organizational structure has on creative experiences.** Based on this, I must observe and describe the actors of Google's business model, including its technologies, to see if this evaluation can help discover how Google has influenced digital space.

The Business Model of Google

The technology search-engine corporation, Google, was founded in 1998 by Larry Page and Sergey Brin with a mission to “organize the world’s information and make it universally accessible and useful” (Google Company, n.d., para. 1). Google was not the first search-engine company, but it is considered the most diverse search-engine enterprise. Google initially operated as a web search-engine that allowed people to search for information online; yet, it quickly expanded into a web-based advertising company making advertisements its primary funding source for operations.

Google became a publicly traded company on August 19, 2004 (Google Company, n.d.), and over the years, Google has acquired various media companies (e.g., YouTube, Blogger, SketchUp). Google has created online software (e.g., Google docs such as spreadsheets, word processing, presentation, calendar), as well as offered an assortment of services available to its users. These strategies have helped Google expand into the dominant media and technology company it is today. With 40,000 Googlers, a term used for Google employees (Google Facts, n.d.), located in 70 offices across 40 countries (Google Locations, n.d.), Google can arguably be considered one of the most powerful technology titans regarding its use and domination of the online information market. See Figure 4 for a BMC of Google’s business model.



www.businessmodelgeneration.com

Figure 4. Google’s Business Model Canvas. From “Google Business Model,” by Business Model Innovation Matters (BMIMatters), 2012 (<https://businessmodelinnovationmatters.files.wordpress.com/2012/03/google-business-model1.png>). In the public domain (BMIMatters grants free and fair use of its content and analysis).

Google's business model operates using a service-for-profile approach (Elmer, 2004; Lyon, 2007). Within this model, Google provides free online web services in exchange for user profile data (i.e., information about search habits, interests, conversations, life stages, current needs and wants). The acquisition of user data is utilized by Google to enhance its technologies, as well as sold to businesses for various uses (Vaidhyanathan, 2011). Corporations analyze the user profile data to discover the most effective ways to reach individual users, and then, uses these attributes to generate and distribute targeted specific online advertisements, new commodities, and information.

Google's service-for-profile approach, including its returns on search (i.e., the order of hyperlink appearance such as the first link found on the first page of a search query), has led many scholars to debate the various ways Google has altered the media and technology landscape. In this way, Google's model dominates the exchange of information both on- and offline. This concept has been termed *googlization*, which was first used by Battelle (2003) and Salkever (2003). Subsequently, there are entire areas of research that are focused on the power of Google and its *googlization* influence (Battelle, 2003; Elmer, 2004; Lyon, 2007; Rogers, 2013; Salkever, 2003; Vaidhyanathan, 2011).

For example, media scholar Siva Vaidhyanathan (2011) argued that Google's company mantra, "don't be evil" (p. 2; Google Code of Conduct, 2017), actually conceals its *googlization* of information. Thus, Google's concentration of media products, innovations, and services, has allowed it to construct how information is available, viewable, and shareable both on- and offline (Vaidhyanathan, 2011; Rogers, 2013). Further, Google has been described as the Wizard in *The Wizard of Oz* (Potts, 2014; Rogers, 2013) as it creates magical tools for all while concealing its

complicated business dealings and algorithm (e.g., back-end) behind the curtain of its simplified search interface (e.g., front-end).

How Google's Business Model Shifted Industry Tides

Google has *potentially* altered, both positively and negatively, the media and technology landscape, shifting how information is shared on- and offline. In *The Googlization of Everything* (a book-in-progress blog), Vaidhyanathan (2007) argued that Google's innovations have affected numerous industries: “[a]dvertising, software applications, geographic services, email, publishing, and web commerce itself.” Adding to this list, it can be argued that Google has expanded its concentration toward new industries, including tourism, artificial intelligence (AI), and the arts and culture industry. However, to understand Google's intricate weave into various industries and services, I must first briefly explain the early stages of web content organization.

According to Rogers (2013), in the mid-1990s, the web was initially organized by topic as seen in the human-edited project of Yahoo's Web directory. This process of topic categorized information was similar to that of library science. Yahoo's Web directory oversaw the review of website URL link submissions. Utilizing the work of humans, not machines, Yahoo! vetted these URL links to decide if the link should be included in the list and under what specific categories. While Yahoo's directory was similar to a library, it differed in that “the resource could be placed in multiple categories, and linked to (and located from) each” (p. 63).

In 2000, Yahoo! was sued by two French companies, the French Union of Jewish Students and the League Against Racism and Anti-Semitism, over user access to offensive digital content. This lawsuit demonstrated how “French web users were able to access the Nazi memorabilia pages on Yahoo.com in the United States” (Rogers, 2013, p. 23). These organizations wanted it so these pages could not be accessible to those searching the Internet in

France. Controversially, Yahoo! lost the suit. And, with this loss, came the creation of geolocation technology, which transformed the web into a national and physical space. For example, if someone searches Google while located in France, she receives google.fr, and if someone searches Google while in the UK, the default search option is google.co.uk. Lastly, someone searching Google while in the US would utilize google.com.

Due to the creation of geolocative technology, Google has been able carefully customize its services and search results relative to geographic location. For instance, “since 2005 the company has been Googling the real world through Google Maps, Street View, and Google Earth, a service that allows users to manipulate satellite images to explore the Earth from above” (Vaidhyanathan, 2011, p. 17). Google has also been able to organize online content by geography. For example, when two people located in different countries, one in France and the other in India, both type in “female shoes” into Google’s search box, both will receive different search results. According to Vaidhyanathan (2011), these varied returns are because:

[o]ver time, as users in a diverse array of countries train Google’s algorithms to respond to specialized queries with localized results, each place in the world will have a different list of what is important, true, or ‘relevant’ in response to any query (p. 138).

In other words, Google learns the habits of those searching within specific locations, then collates those patterns to return search results specific to those conventions. In this way, geolocation technology has made it so tech companies can organize online content by geography, which also allows vendors the ability to reach desired customers more efficiently through targeted advertisements.

According to Vaidhyanathan (2011), Google’s advertising program, AdWords, requires advertisers to compete for the attention of potential customers who are searching the Internet and the sites Google accessed. Millions of websites allow Google access and the ability to collect

data about user search behavior in return for the opportunity for these sites to be “indexed, linked, and ranked” (p. 26) by Google. Advertisers compete to be “placed highest on the list of ads that run across the top or down the right-hand column of the search results page” (p. 26). The way advertisers compete is through “an instant auction” (p. 27), an auction which takes place in a small fraction of a second or a millisecond. In other words, when a person types “female shoes” in Google's search box, shoe vendors bid on what they would be willing to pay per click. This bidding process is based on algorithmic processes—and happens at a fraction of a second—at the same time introducing efficiency and information control issues (see Vaidhyathan, 2011, for more information). Then, when a user clicks on an advertisement, the shoe vendor pays Google for that ad click, whether the user purchased anything. The shoe vendor willing to pay the highest amount per click, wins the bid.

For example, FitFlop, a shoe vendor, designates it is willing to pay five cents per click, one cent higher than its competitors, with a designated ceiling of two million clicks. As the highest bidder, FitFlop receives top placement. Therefore, when a user clicks on a shoe advertisement from FitFlop, he/she is hyperlinked to FitFlop's webpage. Google makes sure the site the user is hyperlinked to via the ad is the site designated and not some “bait-and-switch” (Vaidhyathan, 2011, p. 27) scheme. FitFlop is billed four cents by Google, as the winner bidder it was billed the second-highest bidder's fee. This bidding process, helps small businesses to compete, regardless if the user makes a purchase.

Because Google dominates the online ad market, it is free to set ad rates to any level it sees fit. While other tech firms try to compete in this ad space, such as Microsoft, these companies do not even come close to touching Google's system, algorithm, and user/advertiser loyalty. Building on Google Ads, Google has created its web check-out service that it calls

Google Wallet. Time will tell how this development might shift purchases online, but it is clear Google is on the move. For example, recently, I purchased a hotel room through Google Wallet. Initially, I did not know I was making a purchase through Google. I had typed “hotels in Palisade, CO” into the Google search box and clicked on the hotel with the best price listed on the Google map of Palisade, Colorado. The price for the selected hotel was significantly lower by about \$30 per night. The purchase was made through my Gmail account, and confirmation was sent to my email. All of this happened before I realized Google was facilitating the transaction, which demonstrates how Google web commerce is shifting into areas like tourism.

The aforementioned examples of how Google is employing geolocate technology help to demonstrate a conundrum that is emerging. For instance, while Google is “organizing the world’s information and making it universally accessible” (Google Company, n.d., para. 1), arguments can be made that Google “is not making universal knowledge universally accessible” (Vaidhyanathan, 2011, p. 139). This conundrum is recursively tied to the Yahoo! lawsuit of 2000. If access to information is tied to geolocation, then it will never be universally accessible. Based on this, and the fact that information is restricted in certain parts of the world, technology companies can use the employment of geolocate technologies to their advantage in other ways, such as marketing ads targeted by location.

Building on Google’s geolocate services offered (e.g., Google Maps, Google Earth, Google Adwords), the tech company also offers software and communication applications for its users. The predominant software is Google Docs which includes “in the cloud” service, meaning everything is accessible online from any computer when signed into a Google account. Google Docs includes spreadsheets, word processor, presentation, and calendar services (Vaidhyanathan, 2011, p. 17). Additionally, Google Docs allows users to collaborate on the same document.

These documents directly compete with Microsoft Office. Also, in 2008, Google created its operating system browser Chrome, another direct threat to Microsoft and its Internet Explorer web browser.

To ensure other new ways of communication, Google created its email service, Gmail, which is provided to Google users when they create a Google account. Within a Google account, users have access to Gmail, contacts, Google Docs, Google Hangouts (free online video chat platform), Blogger, Google Books, YouTube, and Google+. Additionally, access to any of these services and documents within these applications is available via Google's "cloud" and easily accessible from any computer, anywhere, as long as the user has an Internet connection. In this way, Google privileges those with a Google account above general users. According to Vaidhyathan (2011), Google account users receive a "more subtle, personalized search results and a host of valuable services" (p. 86). Gmail offers significantly more storage space than other email providers (two gigabytes), and provides users the ability to search emails quickly. As I have tried to illustrate, Google's developments have brought significant changes to the way we communicate. I believe that by briefly describing Google's innovations we can obtain a strong sense of the context of the contemporary high tech world.

Concluding Thoughts

Google is considered one of the most powerful search engines. This company's use of and reign in the information market has prompted researchers from various disciplines to focus on the power of this tech titan and its influence, which earned its own name—*googlization*. Moreover, while Google's motto may be "don't be evil" (Google Code of Conduct, 2017), Google uses its good organization appearance to conceal the various ways it is *googlizing* information. In this way, there is a multiplicity of ways Google has altered how information is

consumed and shared. Google privileges its account holders over non-account holders, by providing Google users access to Gmail, Google Docs, YouTube, Google Books, Google Hangouts, Google +, Blogger, and more. And, through geolocative technology and geographic search innovations, the way that people receive and view information has significantly changed. For instance, Google can provide a better return in search results to its account holders. Google has also been able to alter how advertisements are created, bid on, paid for, and placed in front of consumers.

Google has now entered into the arts and culture industry with the creation of its Google Cultural Institute (GCI) and *GAC* website and mobile application. As the GCI continues to successfully gather data (i.e., users' habits and interactions with art, plus millions of digitized versions of the world's arts and cultural artifacts), it might arguably be enhancing its other technologies (e.g., art experiments, Google Cardboard, AI, machine learning). Through the creation, enhancement, and utilization of various technological innovations, the GCI may be providing positive, as well as negative, experiences for participants supplying and engaging with cultural content. Based on this, Google's attempt to bridge the gap between technology and culture is worth exploring. In this dissertation, I describe the current state of affairs concerning the GCI to draw attention to the implications its initiatives may have on the future of art, culture, and technology.

CHAPTER 3: MATERIALITY, WHY OBJECTS MATTER

[A]n artwork cannot be reduced to its parts or its materials, nor can it be reduced to its creator's life, nor to some other context, however defined (the last decade, the current geological era, the economic structure of human society, art discourse, power-knowledge – anything). And art has an actual causal effect. Art just is tampering directly with cause and effect, because art is what cause and effect actually is. Art is charisma, pouring out of anything whatsoever, whether we humans consider it to be alive or sentient or not (Morton, 2015, para. 24).

Is an object alive? Does it embody charisma? Does it have an actual causal effect? The goal of this chapter is to explore the charisma of objects, specifically *why objects matter*. To investigate their importance, I explore the materiality of objects, specifically 'what are objects' and 'why do objects matter.' Thus, I examine how humanists view objects, as well as how posthumanists view objects. Humanists place humans at the center of an inquiry as they explore objects in relation to their parts, materials, creation, and context, all in correlation to humans. Posthumanist philosophies, specifically those of the *object turn*, such as theories surrounding new materialism and object-oriented ontologies (OOO), are not afraid to place objects at the center of an inquiry as they explore objects as agential, autonomous things. Therefore, posthumanists juxtapose humanists as they do not examine objects only *in relation to* humans, but instead claim that objects can potentially enact a sort of agency without the help of humans.

Building on posthumanist ontologies, I introduce new materialist and object-oriented viewpoints as a means of laying a foundation for actor-network theory (ANT), which I discuss in Chapter 4. As I move through this chapter, I aim to explore objects and their materiality in an attempt to draw potential parallels among how particular objects (e.g., art, culture, and technology) intersect to create digital ecosystems, and how scholars can map such technological intersections. Further, I wish to understand whether the objects, such as the technology

platform as well as the art, are equally important, more important, or less important than the human creators and users in these techno-cultural intersections. I recognize, however, that I may not find concrete answers. I do hope to find new ways to consider the life and agency of an object as I illuminate *why objects matter*.

What Are Objects?

According to Timothy Morton's (2015) online post, "Charisma and Causality," on the *ArtReview* website, objects, such as art, emit an "incomprehensible charisma" (para. 26). In this context, Morton describes charisma as "an energy field. . . . a dangerous causative flickering. . . . [of] magic. . . . what Einstein called spooky action . . . [of] quantum entanglement" (para. 13-15). In other words, charisma is the dynamic force that objects radiate; a force in which other objects are affected and "not in control" (para. 14). *Oxford Dictionaries online* (n.d.), defines charisma as a "[c]ompelling attractiveness or charm that can inspire devotion in others" (para. 1). In this way, I define charisma as a vibrant force that when entangled with others (i.e., humans, objects), creates a causative experience.

Therefore, to discuss the charisma of objects and *why objects matter*, it is necessary to first define what I mean by object. For example, if I define an object as anything that is not human, then an animal would be considered an object. Further, if an animal is an object, then I feel safe assuming that, as an object, an animal is alive, embodies charisma, and can be said to have an actual causal effect. However, do these same principles apply when an object under investigation is art? As Morton (2015) stated, "[a]rt is charisma, pouring out of anything whatsoever, whether we humans consider it to be alive or sentient or not" (para. 24). Thus, is Morton correct, can art honestly be alive regardless of whether humans say it is or not?

I recognize the seeming absurdity in my question, seeing as I am a human asking about the living status of art. However, Morton (2015) claimed that the object ideologies that humans, including myself, hold, are not what should be investigated. Instead, the looking glass should be turned toward objects as autonomous things. Put another way, objects do not need to be explored in relation to humans, such as through the examination of their creators or those who find them essential, nor do objects need to be explored in relation to their parts or materials. Instead, objects should be explored in relation to other objects (Law, 2009). In this way, objects may sometimes be humans, as well as they may be other objects. Moreover, if no humans appear as relational to an object, it is still possible to look for evidence of an object's charismatic activity. Based on this concept, Morton (2015) claims that objects, such as art, are charisma, and if we are to discover if and how and why objects matter, then objects must be treated as vibrant magic.

According to John Law (2009), objects are nonhuman material stuff. Thus, if objects are material, I must consider what exactly constitutes as material? According to *Oxford Dictionaries online* (n.d.), the term *material* originated from both "[l]ate Middle English (in the sense 'relating to matter')" (Origin, para. 1), as well as from "late Latin *materialis*, adjective from Latin *materia* 'matter'" (Origin, para. 1, emphasis added). It defines material as both a noun and an adjective. As a noun, material is: "[t]he matter from which a thing is or can be made" (para. 1); "[t]hings needed for an activity" (para. 1.1); "[i]nformation or ideas for use in creating a book or other work" (para. 2). As an adjective, material is: "[d]enoting or consisting of physical objects rather than the mind or spirit" (para. 1); "[s]ignificant; important" (para. 2). Synonyms of material include the following, in alphabetical order: articles, concrete, corporeal, data, details, earthly, evidence, facts, figures, ideas, information, items, matter, medium, mundane, necessities, non-

spiritual, objects, particulars, physical, real, secular, statistics, solid, stuff, substance, tangible, temporal, things, and worldly (Material, n.d.).

I recognize that several of the synonyms for material are controversially contested across philosophers, such as the terms real, facts, and evidence. Additionally, it can be argued that some of material's synonyms may juxtapose one another, such as idea and tangible. However, to generate a broad yet unique definition of material, which can be used in this dissertation, I define **material** as: *things/objects/matter/ideas/data/stuff/nonhumans, whether tangible or intangible, that contribute to an activity*. Further, to explore the quality or condition of being material, which involves adding the suffix *ity*, I examine the term *materiality*. *Oxford Dictionaries online* (n.d.) defines materiality as a noun that encompasses “[t]he quality of being composed of matter” (Materiality, n.d., para. 1), which I choose to rephrase as the quality of being comprised of material. Therefore, building on my definition of material, I define **materiality** as: *the action that is generated when the tangible or intangible things/objects/matter/ideas/data/stuff/nonhumans interact to create something*.

Moreover, to examine an object's materiality, Gries (2015) stated that a researcher must examine the life-cycle of the object, which includes exploring its “seven interrelated material processes — composition, production, transformation, distribution, circulation, collectivity, and consequentiality” (p. 113). These processes are not linear; multiple material activities can happen simultaneously. As such, when focusing on one material entity, such as composition, it is imperative to consider the other six material processes simultaneously. In this way, and building on the previous definition of materiality, a new materialist definition of **materiality** can be defined as: *the collective action that is generated by the tangible and/or intangible things/objects/matter/ideas/data/stuff/nonhumans, as well as humans, to create something*.

Now that I have established a contextual boundary for the inquiry concerning *what are objects*, or *what is material*, I will now explore why objects/material matter. Based on this, I will explore contrasting ideologies surrounding the importance of objects (i.e., the humanist perspective versus the posthumanist mindset). I will also discuss why objects matter to museums, which helps to lay a foundational argument for this study of cultural artifacts in digital space.

Why Objects Matter

Exposure to art should be kept to a minimum, as if it were like nuclear radiation. Such reactions actually say something deep about art, in an upside-down way: art is causal. That's what's frightening about it (Morton, 2015, para. 25).

Humanists and Objects

Returning to Morton's (2015) online statements that "[a]rt is charisma" (para. 24) and "art is causal" (para. 25), I use art as my example to explore the causal charisma of objects. It should be noted that while this object analysis is in relation to art, it is essential to consider how parallels from this discussion can be drawn to other objects. Drawing on this, and to discuss art as an object, I draw on Morton's (2015) logic:

So the task of dismantling the aura à la Walter Benjamin, which is the default self-hating mode we have been in since Modernism, is impossible. Scratch some Marxists, and you will find a Platonist, namely someone who thinks art is a little evil because it has an effect on them, interpreted as an alien, demonic agency that conjures up all sorts of ideas and emotions without our supposed free will getting a look-in (para. 25).

To help trace Morton's reasoning, I would like to first discuss Plato's view on art followed by Karl Marx's (1867/1976) theory of the commodity and the value of objects. From this base, an evaluation of Walter Benjamin's (1936/1969) philosophy on the mechanical reproduction of art may prove beneficial. Building on Morton's (2015) arguments, it is necessary to explore shifts in how researchers thought about science, specifically, Thomas Kuhn's (1962) work and the establishment of scientific paradigms. And, it is from these scientific shifts that

developments in Science, Technology, and Society scholarship, as well as The Strong Programme, or Edinburgh School, emerged throughout the 1970-1980s. Also, during this time, the work of John Berger (1972) challenged people to explore how things appeared and what those appearances might say about society and culture. Building on these philosophies, I will describe Jean Baudrillard's (1983) poststructuralist view on objects, value, and simulacra.

This approach is aimed at conveying how humanist beliefs, which explore objects in relation to the almighty and meaningful power of humans, have prompted the development of counter viewpoints concerning objects. Namely, posthumanism and its offshoots like OOO, new materialism, and actor-network theory (ANT), which challenge humanist and modern paradigm viewpoints. With this in mind, I attempt to describe whether art (or for that matter any object), can be said to emit a sense of causal charisma, regardless of human action.

Early views on art and its effect on humans can be found in Plato's *The Sophist* (360 B.C.E./1892). According to B. Jowett's (1892) translation, Plato described a Sophist as a:

paid hunter after wealth and youth. . . . a merchant in the goods of the soul. . . . a retailer of the same sort of wares. . . . he himself manufactured the learned wares which he sold. . . . belonged to the fighting class, and was further distinguished as a hero of debate, who professed the eristic art. . . . a purger of souls, who cleared away notions obstructive to knowledge (p. 358).

A Sophist acts as “a magician and imitator of true being” (p. 362), and thus has ruined rhetoric with his/her “imitative art” (p. 361). Through deceitful actions, a Sophist created images using either “the art of making likenesses, and phantastic [fantastic] or the art of making appearances” (p. 364). In this way, “the art of likeness-making” (p. 363) can be described as when a general likeness of an object is “made by producing a copy which is executed according to the proportions of the original, similar in length and breadth and depth, each thing receiving also its appropriate colour” (p. 363). Within likeness-making, there is an element of “deception” (p.

363), because the creators of these images “give up the truth in their images and make only the proportions which appear to be beautiful, disregarding the real ones” (p. 363). Conversely, fantastic, or the art of making appearances, is art that is in an appearance of something, yet “not even like that to which they profess to be like” (p. 363).

In this context, Plato is speaking about art in the form of image rhetoric. Using this line of reasoning, images could be physical works of art or intangible words and ideas. Based on my previous definition of material, it could be argued that Plato is describing the way material comes together to create an action, in this case, a deceitful one. Put another way, and in the words of Morton (2015), someone who believes in the philosophy of Plato, is a “Platonist, namely someone who thinks art is a little evil because it has an effect on them . . . [as it] conjures up all sorts of ideas and emotions without our supposed free will” (para. 25). According to this idea, art can affect people, and sometimes that effect can be deceitful.

Moving on from the tenets of Plato leads us eventually to the philosophies of economist Karl Marx, and specifically, his theory of the commodity. I recognize that many economy and philosophy scholars came between Plato and Marx, such as Aristotle, Adam Smith, Georg Wilhelm Friedrich Hegel, and so forth. However, because I am trying to trace Morton’s logic about objects, art, and charisma, I must discuss the key tenets of Marx surrounding object materiality. In Marx’s (1867/1976) literary work *Das Kapital*, he suggested that commodities (objects) take on a *fetish* character (i.e., a specific capitalist value). This capitalist value is usually defined by the use value (i.e., an object’s fundamental characteristics that help it satisfy a human need or want) and labor value (i.e., the number of human labor hours needed to create the object) of the object. Further, an object can have use value independent of its labor value.

However, when the object undergoes some form of exchange (i.e., money is exchanged for the object, or some object is traded for the object), the object becomes a commodity.

Stated another way, Marx argued that the commodity value of an object is more commonly influenced by its exchange value for other commodities. This concept is demonstrated in Marx's (1867/1976) statement: "It is nothing but the definite social relation between men and women themselves which assumes here, for them, the fantastic form of a relation between things" (p. 165). This belief represented human-human relationships, as they were negotiated and expressed through objects, such as commodities and money. A commodity's exchange value established the belief that commodities were solely produced for the sake of exchange: "The products of the human brain appear as autonomous figures endowed with a life of their own, which enter into relations both with each other and with the human race" (p. 165). Following Marx's logic, the actual value of a commodity object is in its exchange value.

Following Marx's critic on the theory of the commodity, in the early 1900s, controversial debates around the progression of science ensued. Moreover, from these discussions, stemmed notions of positivism and falsificationism from scholars prescribing to the philosophy of science, and functionalism from scholars of sociology of knowledge (Roosth & Silbey, 2009). It was during this time that Walter Benjamin (1936/1969), who believed that humans yielded an almighty power over objects, examined mechanical reproduction and art. Benjamin explored how technological advancements in photography, film, print, and commodity production were shifting the meaning, function, and power of art.

While Benjamin's discussion was centered around the end of the 1800s through the beginning of the 1900s, his thoughts are still considered today because of the rapidly changing tides of technology. Benjamin believed that the invention and implementation of machines

(technology) diminished humankind's power and authority over objects. For instance, in his essay, "The Work of Art in the Age of Mechanical Reproduction" (1936/1969), he discussed how technological innovations, specifically photography and film, transformed the function of art. Further, his argument can be broken into two distinct segments: (1) first form technology, which includes life before the invention of machines; and (2) second form technology, which involves life after machines.

During the era of first form of technology, art was grounded in authenticity and ritual: the "unique value of the 'authentic' work of art always has its basis in ritual" (Benjamin, 1936/1969, p. 24). Rituals were a tool that humans used to master nature, and rituals surrounding art were expressed through ritualistic magic, such as an art's aura or its "cult value" (p. 25). Because art was a human attempt to control nature, it was only presented to the divine (i.e., the spirits and the Gods). Hence, the cult value of the art was rooted in the fact that the artwork existed; not that the artwork must be seen, but that it was available for only the divine to see.

Further, the cult value of art was "depicted according to the requirements of a society whose technology existed only in fusion with ritual" (Benjamin, 1936/1969, p. 26). Examples of art with ritualistic magic included 15th century hard-carved stone sculptures that resided in churches. Further, the tools that designed the art, such as the chisel and hammer, or the rope and pulley, also exhibited ritualistic magic. Thus, these objects were rooted in ritual; the sculptures were created by tools that were in concert with ritual and resided in spiritual spaces designated exclusively for spiritual practices. Moreover, while this exclusivity limited the transportability of and mass exposure of these artworks, it furthered their ritualistic magic and aura.

Conversely, the opposite of an artwork's cult value was its "exhibition value" (Benjamin, 1936/1969, p. 25). Benjamin claimed that the exhibition value of a piece of art was its ability to

be displayed for the masses. Therefore, to allow a majority of people to view a piece of art, it must be transportable. In the case of hand-carved sculptures that were found in churches, their transportability was difficult, if not impossible, due to their size, weight, location, fragility, and risk of possible damage. However, the turn toward second form technology made it possible for an exclusive art sculpture to be mechanically reproduced and transformed into a variety of material forms (e.g., a photograph, film, or recast figure). For instance, replication sculptures could now be cast out of transportable materials, which allowed the art to be displayed in mass exhibitions.

Benjamin (1936/1969) argued that this process of mechanical reproduction ultimately stripped the original sculpture of its authenticity, as both the original and its copy were no longer based on ritualistic magic or religious exclusivity. Instead, the reproduction was based on “exhibition value” (p. 25), thus transferring arts’ emphasis from ritual magic to exhibition, and changing how people saw art and its function. Furthermore, the rise of machines shifted the human-centered focus from humans being the most critical necessity for production, to machines (objects) becoming the significantly essential element for production. Therefore, instead of humans being able to conquer nature, second form technology brought forward “an interplay between nature and humanity” (p. 26).

Building on Benjamin’s scholarship, I now turn to a discussion of Thomas Kuhn’s ideology of scientific paradigms. I recognize that several theorists came between Walter Benjamin and Thomas Kuhn; however, it is necessary to examine how Kuhn challenged previous views on the progression of science. In his work, *The Structure of Scientific Revolutions* (1962), Kuhn proposed an ideology of scientific paradigms. While I discuss these paradigms in more detail in Chapter 5, for now, it is helpful to understand that Kuhn’s work laid the foundation for,

and later changed, how scholars thought about knowledge and theory. In the 1970s, studies on technology and how socially responsible science could and should be conducted were established. This scholarship helped to lay the groundwork for the discipline of Science, Technology, and Society (Latour, 2005).

Accordingly, during this time, John Berger (1972), a critical theory scholar who built his views on Benjamin's (1936/1969) arguments, examined how mechanical reproduction, specifically film and photography, changed the meaning, function, and power of art. In his book, *Ways of Seeing: Based on the BBC television series* (1972), Berger claimed that to understand the appearance of things, humans must examine objects by exploring that which is not visible, instead of that which is. He agreed with Benjamin that the meaning of art had shifted from being rooted in rituals to that of "bogus religiosity" (p. 23) and market value. Thus, the function of art moved from a function of authority to that of nostalgia and politics; the power of art shifted from art being authoritative (i.e., demonstrating human power over nature) to art being democratic (i.e., creating equality between humans and nature).

For instance, before the creation of the camera, those wishing to see a piece of art had to travel to where the artwork was displayed. Thus, the meaning of the art was based on the unique rituals that surrounded it, which established its function as authority. Following the creation of the camera, people could capture or recreate the artwork by taking a photograph or recording a video of the art, which allowed the painting to reach its viewers in the form of books, television, photographs, and so forth. Therefore, mechanical reproduction made it so the art could travel and be viewed in multiple places at once, which ultimately, diversified and fragmented the meaning of both the original artwork and its replications (p. 19).

According to Berger (1972), “[w]hen the camera reproduces a painting, it destroys the uniqueness of its image” (p. 19). In other words, the meaning of the original artwork was no longer based on its unique rituals, but instead, just a fragmented meaning of the original. Because these uniquely magical and spiritual rituals that once surrounded the art were no longer understood and/or practiced by present-day society, its meaning was morphed into “bogus religiosity” (p. 23). Berger claimed: “The bogus religiosity which now surrounds original works of art, and which is ultimately dependent upon their market value, has become the substitute for what paintings lost when the camera made them reproducible. Its function is nostalgic” (p. 23). Hence, misrepresenting art as a symbolized holy relic helped dictate the art’s market value and transformed the function of art from authority to nostalgia, ritual to commodity.

Overall, Berger attempted to change the way humans thought about the appearance of things (objects). His most compelling and pivotal conception was that of objectification. He used European paintings of the female form (objects) and women (humans) to point out the different cultural and societal aspects of humanism. He found that the individualistic human nature of the creator and viewer of the female painting was in juxtaposition to the woman object within the painting, which humans (e.g., men, society, women) objectified and abstracted. Further, he pointed out the dissimilar societal balance between men and women by exploring how deeply rooted cultural views on women, found in media (e.g., advertisements, television, film, print, art, music), further justify how society objectifies women. These female cultural views have also become embedded within the consciousness of women, perpetuating the cycle, as women not only allow men to objectify them but also objectify themselves.

The establishment of The Strong Programme, or Edinburgh School, came around the same time as Berger’s (1972) work. In the late 1970s and early 1980s, The Strong Programme

was founded to examine the social and cultural factors that influence the production of scientific knowledge. Sociologist David Bloor (1976/1991), and member of the Strong Programme, stated that sociologists should adhere to four tenets of sociology concerning how scientific knowledge is produced. The four tenets are as follows:

- **Tenet one:** Researchers should make causal statements about their discoveries, as these findings, as well as their statements, determine future knowledge and beliefs.
- **Tenet two:** Researchers should remain unbiased in their research dealings.
- **Tenet three:** Researchers should adopt a principle of symmetry with using true and false statements regarding their research.
- **Tenet four:** Researchers should be reflexive when conducting a study.

While the first two tenets may be somewhat straightforward, tenet three could use a bit more explanation. For instance, the principle of symmetry states that a researcher cannot establish *a priori* which participants of an outcome were right and which were wrong, just as they cannot state which statements were true and which were false. In this way, all parts of a discovery must be examined using the same approach.

Bloor claimed that when sociologists used these four tenets in their research, they could provide structure and demonstrate the rigor of the production of knowledge. Moreover, while Bloor's (1976/1991) research tenets were widely accepted, ANT scholars believed these perspectives were too rigid as they imposed order, privileged humans over objects, made true and false statements, and interpreted causal statements as a determination of knowledge within an examination. I move now from Benjamin and Berger's theories of mechanical reproduction to a discussion of poststructuralist viewpoints.

Jean Baudrillard (1983, 1981/1994), a French critical philosopher and poststructuralist, also examined the value of objects. Building on Marx's (1867/1976) theory of the commodity, Baudrillard added sign and symbolic exchange value of a commodity (object) to Marx's notions of a commodity's use and exchange value. According to Kellner (2015), Baudrillard claimed:

commodities are not merely to be characterized by use-value and exchange value, as in Marx's theory of the commodity, but sign-value — the expression and mark of style, prestige, luxury, power, and so on — becomes an increasingly important part of the commodity and consumption (quoted in Kellner, 2015, p. 3).

In other words, Baudrillard (1981/2001) believed that the value of an object was found within its four dimensions: (1) use value, an object that has a principle of utility; (2) exchange value, an object that has a principle of equivalence or commodity exchange; (3) sign value, an object that has a principle of difference; and (4) symbolic exchange value, an object that has a principle of representation of social relationships and social meaning (p. 57). Baudrillard (1981/1994) also believed that symbolic exchange, which he said was the giving of a gift (object), embodied the ways that humans communicate, connect, and experience meaning-making. In this way, symbolic exchange occurred during a human-to-human interaction, which involved a real relationship or direct experience. Based on this, the exchange embodied a unique and irreplaceable representation of that relationship.

Conversely, Baudrillard (1981/2001) argued that product consumption, which he referred to as a capitalist invention called semiotic exchange, was the opposite of symbolic exchange. In this way, a semiotic exchange was not based on physical satisfaction in sharing an experience with another. Instead, semiotic exchange was merely a “systematic manipulation of signs” (p. 22), which simulated consumption determined by social hierarchy, distinction, and control. In other words, and according to Kellner (2015), Baudrillard located meaning through his belief that modern societies were structured around the production and consumption of products,

whereas postmodern societies (which Baudrillard believed included present-day societies), were structured around simulation and the performance of images and signs.

Baudrillard (1983) criticized American culture, stating it was a society that had lost the notion of meaning-making due to the increased circulation of signs and consumption across its culture. He felt that America's entire reality was a semiotic production and simulation, which blurred the line between what was an *original* and what was a *copy*. Based on this, the reality of American culture was no longer rooted in something *real*. Instead, its crafted reality was based on something fake, which created what Baudrillard (1983) defined as a "simulacrum" (p. 170) (i.e., a hyperreality). In other words, semiotic exchange had shifted how people interacted with one another—where they once communicated through symbolic meaning-making and the giving of gifts (objects) to a world based on consumption and lack of human-to-human connection.

And, while there are other humanist viewpoints I could discuss here, I provide solely a summary of how objects were viewed within human-centered studies. In this way, studies that explore how humans create, define, measure, and interpret knowledge and reality, in a broad sense, reside within the modern paradigms that were heavily influenced by Descartes and Kant. These studies predominately consider human agency the key to engaging with objects, such as technology, culture, artifacts, and so forth. Building on these ideologies, I now turn toward an investigation of how posthumanists view objects. I do so in an attempt to identify the similarities and differences in how humanists and posthumanists explore objects—and why they matter.

Posthumanists and Objects

Posthumanists avoid the ideology of traditional social scientists who take pride "in considering 'social meaning' instead of 'mere' material relations, 'symbolic dimension' instead of 'brute causality'" (Latour, 2005, p. 73). In this context, posthumanists challenged the

privileged human perspectives of modern paradigms. They felt that instead of looking at objects from the perspective of humans or in relation to humans, they should examine objects as autonomous material. In this way, object-oriented thinkers consider everything to be objects. Yet, as I discuss briefly in this chapter, and will expand upon in Chapter 4, the term object may be substituted with other terms, such as actor, agent, and so forth. For instance, a human is an object just as an artwork is an object; technology is an object just as a user of technology is an object. Based on this, it can be argued that posthumanists examine the vital role that nonhuman objects play in a phenomenon action. They place both objects and humans on an equal footing within an analysis, believing both are as equally likely to participate in an action.

Posthumanism evolved out of several areas of scholarship, including studies on science, technology, feminism, media, art, and politics. Because of its interdisciplinary roots, posthumanism was built on and/or helped build a bricolage of theories, which created several differing posthumanist offshoots. And, while I do not provide a complete list of all the branches of posthumanism, I offer some of the key subsidiary mindsets to help establish a basis for my discussion. Based on this, I want to review two groups of posthumanism, speculative realism (Brassier, 2007; Harman, 2010) and new materialism (De Landa, 2006).

Speculative realism (Brassier, 2007; Harman, 2010) includes speculative materialism (Meillassoux, 2006/2008); object-oriented philosophy (Harman, 1999) and object-oriented ontology (OOO; Bennett, 2012; Bogost, 2009, 2012; Bryant, 2009; Harman, 2010); and transcendental materialism (Bryant, Harman, & Srnicek, 2011. p. 82). It also encompasses some variations of OOO that may not be classified entirely as speculative realists, such as Morton's (2015) view on OOO. Speculative realists, specifically OOO scholars, reject notions of correlationism and reductive materialism. Particularly, OOO believes that objects cannot:

be reduced to its parts or its materials, nor can it be reduced to its creator's life, nor to some other context, however defined (the last decade, the current geological era, the economic structure of human society, art discourse, power-knowledge – anything) (Morton, 2015, para. 24).

OOO examine objects, not from the perspective of humans or in relation to humans, but as autonomous material that contributes to collective life. OOO theorists claim that a better way to explore a phenomenon is to consider an object's agency and how it acts independently.

Therefore, to examine how an object causally shapes knowledge and reality, OOO places objects, instead of humans, at the center of inquiry.

Similar to OOO, new materialism examines the potentially important role that nonhuman objects play in a phenomenon action. Unlike OOO's speculative realist position, which believes that objects can enact independent agency, and as such, should be the center of an inquiry, new materialists believe that agency is found in the collective assemblage of actors. For instance, neither the action of humans nor the action of objects is what produces action. Instead, the action is the result of the collective assemblage enacted across actors (i.e., whether human-human, human-object, object-object). Put another way, new materialists recognize the importance of both the humans and the objects within a phenomenon, as well as their associations as they assemble and reassemble collectives. New materialism (De Landa, 2006) includes agential realism (Barad, 2007); vital materialism (Bennett, 2010); ecology (Deleuze & Guattari, 1988); and relational materialism (Law, 2009), such as actor-network theory (ANT; Callon, 1986; Latour, 1988b; Law, 1986b).

It is important to distinguish between new materialism and traditional materialism. New materialism claims to significantly diverge from the tenets of materialism in that it takes objects seriously, and as such, contributes to object-oriented studies. New materialists look at assemblages (Deleuze & Guattari, 1988; Latour, 2005), collectives (Latour, 1993; Gries, 2015),

and ecologies (Deleuze & Guattari, 1988; Morton, 2015). They also examine mangles (Pickering, 1995) and multiplicities (Mol, 2002). Moreover, they investigate networks (Latour, 2005), relational materials (Law, 2009), and social-materials (Barad, 2007).

An example of a new materialist study is Gries's (2015) tracking of the iconic Obama Hope image throughout "virtual-actual" (p. 29) space (i.e., how an image circulates both on- and offline). In her book, she outlined a new research method to help bridge connections between rhetoric, new materialism, and ANT. She called her methodology iconographic tracking with a new materialist approach and ANT mindset. Gries used her approach to examine how the Obama Hope image transformed and reached multiple "rhetorical becomings" (p. 14). Gries (2015) described objects, such as the Obama Hope image as:

Visual things are complex individuals (much like we are) who play multiple, active roles in shaping collective existence. . . . They deserve to be taken seriously as dynamic actors who transform not only themselves but also those lives whom they encounter (Preface, para. 12).

Further, she explored how the Obama Hope image persuaded and affected collectives, as well as how collectives remixed, reproduced, recomposed, and redistributed that image. To track an image as it acts upon, is acted upon, and shifts shape within the virtual-actual marketplace, Gries (2015) paid special attention to object actors while making sure "not to generate asymmetrical accounts in which humans take on the center role of collective activities" (p. 126). She found that objects induce causal change through their *thing-power*, which she described as "how visual things circulate and acquire power to co-constitute collective life as they enter into divergent associations, undergo change, and spark a wide range of consequences" (p. 86).

As stated, one area of new materialism explores the relational associations across actors, which John Law (2009) called relational materialism. Relation materialism is the belief that all actors, whether humans or objects, must always be defined in relation to the network in which

they are embedded. A network is the point-to-point connection of actors and involves how these actors work collectively toward a phenomenon. In other words, actors form relationships with other actors to create a network. In order to describe an actor using Law's line of reasoning, it must be defined relative to the network it helped create (I provide an example below). Law (2009) claimed that relational materiality, which he also described as material semiotics, is the basis of actor-network theory (ANT) ontology. Law stated: "Sociology is usually interested in the *whys* of the social. It grounds its explanations in somewhat stable agents or frameworks. Actor network's material semiotics explore the *hows*" (2009, p. 148, emphasis in original). Based on this, a researcher can use ANT to examine *how* actors form relationships to establish networks.

While I discuss ANT further in Chapter 4, specifically its views on collective relational assemblage, I wish to break down the concept of relational materialism (i.e., material semiotics) in the present chapter. Relational materialism is the belief that objects have multiple realities: a material reality, a semiotic reality, and a material-semiotic reality. Scholars must explore the relationships across all realities to understand the collective action. This process allows reality to be continually evolving because the social material entities and their relationships to other social material entities are always changing (Law, 2009). To help illustrate the differences across these realities—as well as how these entities are embedded within a network, and as such, must be defined in relation to that network—I provide the following example, using my Apple laptop as the case.

Material reality is defined as something tangible, whether human or object, that has a singular reality. Based on this idea, my Apple laptop, on which I am writing this dissertation, could be seen as a singular material object. It is a tangible good in which I can feel the keys and

see the screen. However, from here, a relational materialist would also consider the semiotic reality of the laptop. Semiotic reality is defined as something, whether human or object, that has multiple realities. Semiotic reality has signifying aspects as it signifies meaning through a simulation where there are no longer firm origins of reality (Baudrillard, 1981/2001). For instance, the semiotic reality of my laptop is that Apple products signify an “indefinable element of cool” (Livingstone, 2011, p. 211; see also Apple’s Ad Game, 2008).

From here, relational materialists would give my Apple laptop a final interpretation, what they call its material-semiotic reality (i.e., its relational network). Material-semiotic reality combines the beliefs of material reality and semiotic reality and makes up the network in which the object is embedded. In this way, material-semiotic reality can be composed of the material, or physical aspects, as well as the semiotic, or intangible, signifying aspects. For example, while the material reality of my laptop is that it is silver in color, its semiotic reality may signify that its silver color is hip, stylish, and modern. The material-semiotic reality is that as long as the relationship between the material (the Apple laptop) and semiotic (the Apple laptop is hip) remains stabilized, a user of an Apple laptop will be part of the Apple user cool group. If this relationship were to destabilize, say Apple products lost their prestige status, this relational material, or material-semiotic relationship would no longer exist.

In this context, what Law (2009) would define as relational materialism, an actor must be defined in relation to the network in which it is embedded. The material-semiotic reality constructs reality through the relational material and semiotic relationship, which allows for reality to continually evolve as actors and their relationships to other actors change. Thus, these actors (e.g., me, my laptop, the Apple brand) are defined in relation to the network in which they are embedded. Based on this example, my Apple laptop is embedded within the Apple brand

network. Currently, the Apple brand has established itself as one for hip, creative geniuses. I own and regularly use an Apple laptop. Therefore, I am a hip, creative genius (and using this logic, hopefully, my dissertation can be considered a work of creative genius).

Building on these ideas of *why objects matter* through the lens of humanists and posthumanists, as well as to help make a case for the charisma of art objects, I wish to explore *why objects matter* in museums. I will look at the importance of objects from both a humanist and posthumanist perspective to help solidify the differences across these two mindsets.

Museums and Objects

Museums are commonly believed to exhibit historical and cultural artifacts that reflect pertinent histories of the world. For example, museums have become public spaces for aesthetic experiences, affording humans around the world opportunities to witness substantial works of art, culture, and heritage. Thus, *objects matter to museums*. Yet, historical documentation surrounding how museums have evolved over time (McClellan, 1994; Noordegraaf, 2004; Sheehan, 2000), as well as the functions and rituals that are performed within them (Duncan, 1995), are predominately presented based on how humanists believe objects matter to museums. In other words, humanists say that objects matter to museums because certain humans say those objects are essential. Conversely, posthumanists say that objects matter to museums because the objects themselves are significant; the artifacts have induced causal assemblage within the museum network. Therefore, the beliefs surrounding why museums and their artifacts are crucial, as well as what and how objects should be displayed, differ across humanist and posthumanist mindsets. I will explain.

The Louvre is considered one of the world's most famous art institutions. Museums, like the Louvre, were once private establishments for the elite European courts, and thus, were

controlled by the elite. Today, and according to Sheehan (2000), they are public spaces intended for visitors to participate in a cultural experience. In this way, it is much easier to visit a museum today than it was hundreds of years ago. Museums today are also operated by museum directors—employees who govern the museum’s day-to-day operations, reporting to and being held accountable by the governing body of the museum.

Similar to Benjamin’s (1936/1969) and Berger’s (1972) beliefs about museums and rituals, humanist art historian Carol Duncan (1995) claimed that “art museums offer up values and beliefs - about social, sexual, and political identity - in the form of vivid and direct experience” (p. 2). In this context, a museum's historical perspective and reason for establishment was embedded in rituals that were created by humans. These rituals were bedrock to the structure and function of museums. Duncan also argued that the political evolution of museums, from private art collections to public museum spaces, has established a new found national identity, which is rooted in elitism. Based on this, the elitist national identity has institutionalized the museum rituals that are enacted by museum visitors of today. For instance, these rituals include how visitors must behave and act inside the museum, such as quietly exploring its exhibits. Additionally, visitors must interact with physical objects of the museum, such as its architecture (e.g., rotundas, park-like settings, long ascending stairways) and artworks, in specified, scripted ways (e.g., pondering in front of paintings). In this way, humans impose a social control that is centered on the interests of the elite. In this context, it can be reasoned that humans, not the artwork, design the rituals that define the creation, exhibition, and human experience of art.

Building on these tenets of elitist rituals, humanist museum historians Timothy Ambrose and Crispin Paine (2006) stated that a museum serves four basic functions. These include the

following: (1) to preserve and conserve, (2) to collect, (3) to exhibit, and (4) to interpret the world's cultural artifacts. *Preservation* is to keep a museum's collections intact for future generations and to pass artifacts on in optimum condition (i.e., to *conserve*). The notion of *collecting* deals with the type of art the museum wants to collect. For example, paintings and sculptures from the Middle Ages to present, from Europe and United States origins. To *exhibit* means to put the collections on view for the public and to have the highest standards of scholarship, maintenance, installation, and interaction with the public. Lastly, to *interpret* means to foster an understanding of the works of art and act as an educative institution that distributes this knowledge to visitors and the broadest possible general public. In this way, it is the interpretation of the humans that determines why art is essential—*why objects matter* to museums.

Conversely, posthumanists believe art is significant because the object itself, the artifact, is important. In this context, posthumanists believe that art is necessary, not because humans have decided it is, but because art itself is *charisma*. For example, OOO scholar Timothy Morton (2015) stated that “art is causal” (para. 25). “OOO thinks of art not as decoration, but as the fundamental operation of cause and effect. To make an artwork is to interfere directly with the realm of causes and effects” (Morton, 2015, para. 1). To elucidate his point, Morton (2015) discussed David Hume's (1748/2007) work. Hume argued that it is not possible for researchers to view cause and effect because causation is buried within data, and as such, causation is invisible. In other words, during an examination, only data are visible to the researcher. And, for a researcher to discover causation, she must examine how data correlates with other data (i.e., causation, or cause and effect, lives within the correlations of data). Further, Morton (2015) stated: “Appearance as such is where causation lives” (para. 19). In other words, causation is

intertwined with an object's appearance. Building on this logic, if causation lives in appearance, as well as causation lives within data, it can be assumed that appearance is data and data are appearance.

However, Kant (1781/1998) tried to oppose Hume's (1748/2007) beliefs about data and appearance. Kant stated: "a rainbow is a mere appearance relative to rain drops which, in a physical sense, are things-in-themselves and not mirages. Yet thinking further, we realize that the raindrops too are mere appearances" (paraphrased in Stanford Encyclopedia of Philosophy, 2004/2012). Based on Kant's argument, I wonder if raindrops, as well as rainbows, are things-in-themselves? Or, are raindrops and rainbows just appearances? Further, Morton (2015) stated the following to help illustrate Kant's ideologies:

raindrops fall on your head, they are wet, cold, raindropy. This is raindrop data, not the actual raindrops. But there are raindrops, not gumdrops. And they are raindropy: their appearance is entangled with exactly what they are (para. 21).

Building on Morton (2015), as well as Kant's (1781/1998) examples, and to help illustrate the entanglement of causation and appearance in relation to art, I propose a metaphor about oil paint. I aim to describe whether oil paint is a thing-in-itself (i.e., the material, what it is, oil paint) or just an appearance of oil paint (i.e., the semiotic, a mirage). In a physical sense, a painting is a thing-in-itself (i.e., a material painting) and not a mirage (i.e., something that resembles a painting). It might be said that a painting is just a mere appearance relative to the paint that was used to create it. In this way, oil paint might also be considered as just a mere appearance relative to its parts (i.e., pigment powder and linseed oil). Based on this, when oil paint is described as it appears, it can be considered an appearance of paint (i.e., a semiotic mirage that looks and feels like paint), as well as paint (i.e., the material thing-in-itself).

Explained another way—if I get oil paint on my hands, I can feel that it is oily, thick, and muddy. These descriptions, however, are oil paint data, not the actual paint. This paint data, however, is about paint and not something else entirely, like concrete. In this way, oil paint is *oil paint*, just as oil paint is *paint-like*. Put another way, oil paint is what it is (the material, or the physical oil paint), just as oil paint is an appearance (the semiotic, or the act of being *paint-like*). This demonstrates what Morton (2015) stated: its “appearance is entangled with exactly what they [it] are [is]” (para. 21).

In sum, if causation lives in appearance, as well as if causation lives within data, it can be assumed that appearance is data, just as data are appearance. Further, if appearance and data are enmeshed, appearance is data and within it is causation. Based on this, and in the context of my oil paint example, paint is causal just as art is causal. “Art sprays out charismatic causality despite us. And unlike a lot of things in our current world, and within limited parameters (sophistication, taste, cost), we still let it in” (Morton, 2015, para. 26). These metaphors help point toward what OOO scholars, such as Morton, believe: “[t]hings are exactly what they are, yet never as they seem” (Morton, 2015, para. 22).

Concluding Thoughts

This chapter explored the materiality of objects and whether they are alive, embody charisma, and have an actual causal effect. I sought to understand if the social, political, and even spiritual human experiences of object relations are what matter most to objects (humanist viewpoints); or if perhaps, something else entirely describes *why objects matter* (posthumanist viewpoints). I conclude, while various influences may matter (i.e., Benjamin and Berger’s belief that ritual and spiritual experiences are what matter most, Marx’s claim that an object’s utility and exchange value are what matter most, and Duncan’s view that performative rituals are what

matter most), I do not believe that the outside evidence provided by human interpretation is what makes objects matter. Nor do I completely agree with Morton's (2015) view that objects matter because they are fully autonomous agents. I do agree, however, that objects, such as art and technology, are causal.

I believe that the reason *why objects matter* is found within the cooperative association across all actors (e.g., humans, objects, institutions, rituals, political factors, economy, technology). In this way, actors in an art collective might include the artwork, its viewers, the rhetoric surrounding the art, the institution displaying the art, technology, and so forth, to make up the intricate and complex webbed association of relational material actor assemblages. Moreover, I can now consider that within techno-cultural intersections, an object, such as a technology platform and/or an artwork, is equally as important as the human creators and users are to the overall network.

While this chapter explored objects and their materiality through the viewpoints of humanists and posthumanists, I introduced new materialism and speculative realism, including OOO, as a means of laying a foundation for Chapter 4 and the relational material perspective of actor-network theory (ANT).

CHAPTER 4: COLLECTIVITY, INTERWEAVED NETWORKS

Things have lives of their own and exert material force as they move in and out of various assemblages and trigger diverse kinds of change. A new materialist rhetorical approach tries to account for a thing's distributed, emergent materializations in a nonteleological fashion and discloses the complexity of unsurprising and unpredictable ways it impacts collective life (Gries, 2015, pp. 86-87).

This chapter investigates actor-network theory (ANT; Callon, 1986; Latour, 1988; Law, 1986) and how ANT is both a theory and a method, while at the same time, neither a theory nor a method (Law, 2009; Mol, 2010). Where theories try to explain *why* relationships happen, ANT tells stories about *how* actor relations form or do not form (Law, 2009). In this way, ANT is a multifaceted mindset; a “material semiotics” (Law, 2009, p. 141) toolkit employed to convey and translate actor relation stories.

ANT examines the associational intersections across actors to understand who and what is participating in a network. Based on this, I unpack the complexity of ANT in this chapter. First, I examine three central components of ANT (i.e., actor, network, and theory) to provide a basic conceptual framework for ANT's collectivity approach. Second, I consider how the ontologies of ANT challenge traditional sociological mindsets. Third, I discuss the epistemological development of ANT, including its early stage conceptualization, scholarly critiques and subsequent revisions, and applicability to digital methods research.

Central Actor-Network Theory Concepts

I will start by saying that there are four things that do not work with actor-network theory; the word actor, the word network, the word theory and the hyphen! (Latour, 1999, p. 15).

As Latour (1999) stated, he felt that the name actor-network theory was a wrong choice for the conceptualization of cooperative relationships. Latour (2005) further addressed his

disdain for the name by stating: “Alas, the historical name is ‘actor-network-theory’, a name that is so awkward, so confusing, so meaningless that it deserves to be kept” (p. 9). Seeing as the name actor-network theory has stuck, I wish to break down and describe the fundamental concepts found within its name (i.e., actor, network, and theory). I aim to illuminate what these concepts mean individually and collectively.

Actor

To understand ANT’s definition of actors, I must first define its conception of actants. Actants are a collective “constituted by a multiplicity of circulating entities that are mutually influencing each other and bending space as a consequence of their divergent activities” (Gries, 2015, p. 75). In this way, actants are a “vast array of entities swarming toward” (Latour, 2005, p. 46) actors as they form an association of things that come together and then break apart. In other words, actants are the behind-the-scenes players that help actors perform. Based on this, actors are “not the source of an action but the moving target of a vast array of entities swarming toward it” (Latour, 2005, p. 46). [*Remember, the vast array of entities are the actants acting upon the actor*]. Actors are “both networks and points. They are both individuals and collectives” (Callon & Law, 1997, p. 169). In this sense, actors are also complex networks of other actors (Callon, 1986; Latour, 1987, 2005; Law, 1987). Moreover, as Latour (2005) stated, actors are “any thing that does modify a state of affairs by making a difference” (p. 71, emphasis in original).

While the above definitions are quite broad, another way of thinking about actors and actants is that actors are all materials that work together to produce an action within a given network, while actants are entities that are acting on the actors. Additionally, actants/actors may be compiled of both humans and objects, weaved together into something defined as collective social-material. Actors might include a person, art or creative material, technology, organization,

picture, idea, event, group, document, website—it could literally be anything. Further, it is imperative to understand that these exchanges can happen between actants/actors, such as between people and technology, to weave together things that are both social and material, into social-material actors. Thus, actors cannot be broken down into categories of humans and objects; humans are not “the social world” (Latour, 2005, p. 76) and objects are not “the material” (p. 76). Instead, actors/actants are a collective social-material: the redistribution of assemblage among all things participating in a phenomenon.

In Chapter 3, I used my Apple laptop to provide an example of relational materiality, or material semiotics. I will provide an additional reference in the present chapter to explain these concepts in further detail. Winnie Holzman and Stephen Schwartz’s (2003) Broadway musical *Wicked: The Untold Story of the Witches of Oz*, provides a metaphorical backdrop to showcase examples which may be helpful to further understand ANT. This performance collective will be used to describe how actants/actors are social-material entities that negotiate network formations. Within *Wicked*, think of the relationship between Elphaba, the Wicked Witch of the West, and her green skin. Consider how the character Elphaba who has green skin would not be portrayed the same as the character Elphaba who does not have green skin. Similarly, if the counter character Glinda, the Good Witch of the South, were to have green skin, she would potentially not be portrayed the same way as the character Elphaba who has green skin. In this way, both the character Elphaba and her green skin are transformed through their relational association. Out of this association, the collective network of Elphaba-green skin emerges.

The Elphaba-green skin network can also be described as Latour’s (2005) concept of social-material assemblage or Law’s (2009) relational materiality. Social-material entities are neither exclusively social (human) nor exclusively material (objects). Instead, they are weaved

together as social-material collectives. Drawing on this, and for the sake of argument and description, imagine that an actor can be being broken down into three entities: human, object, and social-material. Therefore, within the Elphaba-green skin network, Elphaba could be described as the human actor, her green skin as the object actor, and Elphaba-green skin as the social-material actor-network. It is essential to understand how each of these actors, for example, Elphaba, are in fact made up of additional actors. Elphaba's network could consist of the Wizard, Madame Morrible, Glinda, the people of Oz, her green skin, her magical powers, friendship, the flying monkeys, and so forth.

Accordingly, Law (2009) stated that actors could have multiple realities: a material reality, a semiotic reality, and a material-semiotic reality. To help illustrate the differences across these realities, I refer back to *Wicked* and again use Elphaba as an example. Material reality can be defined as something tangible (human or nonhuman) in a singular reality. The material reality of Elphaba is that her green skin itself is a material object. Green paint was brushed on the skin of the actress to create the illusion of a green witch. Additionally, Elphaba's green skin also holds semiotic reality and meaning. The semiotic reality of the green skin may be that it signifies wickedness. Material-semiotic reality combines the beliefs of material reality and semiotic reality to weave together a social-material entity, which cannot be separated into dichotomic categories of human/nonhuman or subject/object. Material-semiotic reality is composed of the material, or physical aspects, as well as the semiotic, or signifying elements. Therefore, the material-semiotic reality of Elphaba varies and depends on the other humans and objects that Elphaba acts upon, as well as the other humans and objects that act on Elphaba.

For example, while the material reality of Elphaba is that her skin is green, her semiotic reality may signify that her green skin is a representation of a wicked witch. The material-

semiotic reality is that as long as the relationship between the material (green skin) and semiotic (wicked witch) remains stabilized, Elphaba can be considered the Wicked Witch of the West. However, if this relationship were to destabilize, say green skin no longer represented wickedness, Elphaba may lose her wicked status, and the material-semiotic association would transform into a new networked relationship.

Returning to the discussion on actors and actants, these participants can serve various roles in a network. For example, actants can be intermediaries, while actors can serve as mediators, spokespeople, boundary objects, and leviathans. Intermediaries do not produce change or encourage assemblage. Instead, they serve as “passive vehicles” (Gries, 2015, p. 95) to help move information from actor to actor within a network. Intermediaries can be mutable (changeable) or immutable (not changeable). Based on this, mutable vehicles tend to cause the network to “fall apart” (Potts, 2014, p. 44), while immutable vehicles tend to keep networks together. For instance, once mutable intermediaries change, their “meaning is lost and cannot be recovered within the same network structure” (p. 44). When intermediaries shift into immutable vehicles, they also change into mediators.

Mediators are actors participating in a phenomenon and are “able to transform, modify, and rearrange collective space as they co-influence the assemblages of which they are and become a part” (Gries, 2015, p. 62). Mediating actors can self-select to serve as spokespeople (or spokesobjects) for the collective group (Latour, 1987, p. 84; Potts, 2009, p. 286), as they help to share information within the network and across other networks. Another type of actor is a boundary object, which can be material or abstract, as it acts as a border across networks. Thus, a boundary object can be used in various ways by different actors within multiple networks, yet it

maintains “a common identity across sites” (Star & Griesemer, 1989, p. 393). Lastly, an actor can be a leviathan and set the meaning within a network (Callon & Latour, 1981).

Moreover, some actor-network theorists have imagined three functions—or roles—for actors. They can be what are considered anchor actors, central actors, or supporting actors. Anchor actors encourage other actors to participate in a collective through the negotiation of various actor roles. Central actors are “the central artifact of the activity being studied” (Potts, 2014, p. 32) and only exist “because of support from the actors around it; if any single supporting actor is not present, the central object cannot exist” (p. 33). Therefore, supporting actors are those that support the central artifact. While the goals of the actors may all be different, these actors negotiate participatory relationships to form actor associations, and later, collective actor-networks.

I realize the conceptualization of actors is quite complicated. With this in mind, I will attempt to provide more clarity in the next section, which describes ANT’s conceptions of network and theory. Following these descriptions, I provide a metaphor, which uses *Wicked* as the example, to help illustrate and merge all of these ANT concepts (e.g., actors, actants, mediators, boundary objects, networks) together. I turn now to an exploration of ANT’s abstraction surrounding the conceptualization of network.

Network

According to Latour (1987):

“[t]he word network indicates that resources are concentrated in a few places – knots and the nodes – which are connected with one another – links and the mesh: these connections transform the scattered resources into a net that may seem to extend everywhere” (p. 180).

Based on the above definition, a network can be conceived as a point-to-point and physically traceable connection across actors. Spinuzzi’s (2008) definition succinctly states that a network

is “heterogeneous, multiply linked, transformative, and blackboxed” (p. 168). Let me explain. A network is heterogeneous because it is assembled of humans and objects, which creates social-material actor-networks. A network has multiple links as it is made up of other networks, as well as can participate in other networks, which creates a sort of boundlessness. These linked connections are potentially in constant movement and flux, as a network only associates what is connected and leaves out what is not. A network is transformative as it shifts the form, appearance, character, space, and so forth of its participatory actors. Lastly, a network is black boxed when it hides the complexity of its transformative workings behind a simple interface. In other words, a black box hides the intricacies of a system behind a curtain, akin to the Wizard in *The Wizard of Oz* (Potts, 2014; Rogers, 2013). Therefore, a black box can be described as networks inside networks (Latour, 1999; Potts, 2014), which conceal the network complexities of actor associations, linkages, and actions, behind a straightforward appearance.

Latour’s (1987) conception of a network materialized around the same time as Deleuze and Guattari’s (1988) concept of the *actant rhizome*. According to Spinuzzi (2008), an actant rhizome can be thought of as a heterogeneous and fluid system composed of actions and materials. In this way, a rhizome “cannot and should not be categorized, placed in subject-object distinctions, or otherwise separated to generate strong explanations of their workings” (Spinuzzi, 2008, p. 7; cf. Callon 1986, 1991; Law, 1986). Deleuze and Guattari (1988) state that while an actant rhizome may break or shatter “at a given spot” (p. 9), it can rebuild “on one of its old lines, or on new lines” (p. 9). In this context, “any point in the rhizome can be connected to anything other, and must be” (p. 9). Put another way, an actant rhizome can be considered flexible and transformative (i.e., it can rebuild when broken), as well as be multiply linked across materials (i.e., it connects points across the rhizome) (Spinuzzi, 2008).

Building on Deleuze and Guattari's (1988) conception of an actant rhizome, Latour (1995) defined his version of rhyzome (notice the spelling difference) as a network of diverse entities related through association. Specifically, Latour stated:

Rhizomes and heterogeneous networks are thus powerful ways of avoiding essences, arbitrary dichotomies, and to fight structures. But . . . their limit is to define entities only through association. . . . They become empty when asked to provide policy, pass judgement or explain stable features (1995, p. 304; see also Spinuzzi, 2008, p. 23).

Based on the above definition, and to add visualization, Latour's (1995) conception of a rhyzome can be imagined as the kinetic mobile toy, the Hoberman sphere (see Figure 5).



Figure 5. Hoberman Spheres suspended from ceiling. From “Bits and pieces-an inverted landscape of always moving Hoberman Spheres,” by F. Visnjic, 2016 (<http://www.creativeapplications.net/environment/bits-and-pieces-an-inverted-landscape-of-always-moving-hoberman-spheres/>). Licensed by F. Visnjic under a [CC BY 3.0](https://creativecommons.org/licenses/by/3.0/).

The Hoberman Sphere is held together by plastic struts that allow the toy to expand and contract. Also, within this rhyzome, all actors are considered to be of equal importance. In other words, certain things do not matter more “surrounded by a number of things that matter less” (Tamen,

2010, para. 149). Instead, “many different sorts of things are all around [the actor] equally; they are who he [it] is, in the sense that that is what is taken in” (Tamen, 2010, para. 158).

To visually describe rhizomes/rhizomes, I picture myself embedded within this connected mesh, as one actor participating with a multiplicity of other actors (potentially both human and object). Building on this description, I am reminded of Latour’s (2005) concept of “matters of concern” (p. 144). I briefly touched on this notion in Chapter 1 and will describe it in more detail further in this chapter. For now, it is helpful to remember that matters of concern examine the dynamic and possibly transformative nature of things. In other words, things have energy, and thus, have the potential to associate and transform into collectives. And, seeing as researchers study collectives, they must recognize that they too impact the group, just as the group can influence their ideas. Based on this, Latour’s conceptions of matters of concern, collectives, groups, assemblages, and rhizomes are all encompassed within his notion of a “network” (1987, p. 180).

Theory

According to Latour (2005), ANT is “a theory, and a strong one I think, but about *how* to study things, or rather how *not* to study them—or rather, how to let the actors have some room to express themselves” (p. 141). Also, Law (2009) and Mol (2010) discussed how ANT is both a theory and a method, while at the same time neither a theory nor a method. Where theories try to explain *why* relationships happen, ANT tells stories about *how* actor relations form or do not form. In this way, ANT is not a method, but a mindset, as it encourages a researcher to give humans and objects equal consideration in the analysis of a phenomenon. ANT affords reflexive consideration of the role a researcher plays in the network and the role the researcher plays in the translated accounts of the network relations. With this in mind, and as Law (2009) stated, ANT is

an approach. It is a “material semiotics” (p. 141) toolkit employed to convey and translate actor relation stories, as it looks at the associational intersections between actors to understand who and what collectively participate in forming a network.

The previous discussion of ANT may be understandably confusing. To further clarify, I return to the *Wicked* metaphor to illustrate ANT concepts, specifically, actors/actants, networks, and actor-networks. Using the musical *Wicked*, I will describe how actants/actors can be seen as social-material entities that negotiate network formations. Additionally, I explain how each actor is also an actor-network.

Wicked: An Actor-Network Theory Metaphor

Imagine a young husband and wife attend the Broadway touring performance of *Wicked: The Untold Story of the Witches of Oz* (Holzman, Schwartz, & Mantello, 2003), at The Buell Theatre in The Denver Center for the Performing Arts (DCPA). The performance of *Wicked* can be considered the network (i.e., it is a constant formation of social-material actors whose action is always in a process). This performance network is composed of human and object actors that are interconnected in various ways, which creates social-material entities that are composed of a material, semiotic, and material-semiotic reality. Moreover, the *Wicked* network is formed from a variety of other systems, as it extends to and overlaps with other networks. In this case, the network is potentially limitless, which can pose challenges when conducting a network analysis. And, seeing that each actor within a network is also a network within itself (i.e., an actor-network), I must heed Latour’s (2005) advice, and set specific boundaries around this examination. Therefore, I have selected only the network of *Wicked* that was performed on this one night in Denver, for this metaphor, while recognizing the additional systems within this illustration. Let me begin.

Take, for example, the performance space of the DCPA for the *Wicked* production. The material reality of the theatre is that the theatre itself is a material object or concrete building. The theatre also holds semiotic reality and meaning. The semiotic reality of the theatre may be that it signifies prestige and culture. The material-semiotic reality combines the material reality with the semiotic reality to represent multiple realities. The material-semiotic reality of the theatre varies and depends on the other humans and objects the theatre acts upon, as well as the other humans and objects that act on the theatre.

An example of how the material-semiotic reality of the theatre ebbs and flows when it acts on others (humans and objects) and when others act on it, can be found within the theatre's acoustic and technology effects. For instance, acoustics, when designed well, allow the sound waves from instruments to resonate with more clarity, as well as the singing voices to carry farther into the performance hall. Technology effects of a performing arts space can include things such as lighting, pyrotechnics, flying effects, atmosphere (i.e., snow, rain, fog, wind, smoke), lasers, and so forth. The theatre acts on others through its acoustics and technical effects that are employed to transport the audience into the story and feel suspended in the narrative. As the DCPA example helps to demonstrate, and in the case of The Buell Theatre and *Wicked*, the acoustics and technical effects demonstrated, influence the way the audience experiences and reacts to the production.

Further, an example of how other actors act on the DCPA can be illustrated by the young couple attending the theatre to watch the *Wicked* production. For instance, the wife has dreamed of watching *Wicked* for several years, and her husband is taking her for her 30th birthday. Because of this exchange, the DCPA now holds meaning as the place the wife was enraptured with the artistic beauty of the performance of *Wicked*, as well as a romantic venue that housed a

shared experience with her husband. Therefore, the material-semiotic linkage could include the intersection of the acoustics of the building, as well as the technology effects and the performance, and how these relate to the semiotic artistic experience and vice versa. In this scenario, the aesthetic experience creates a social-material entity as it weaves together the wife, the husband, the performance, the venue, and so forth.

Further, the network of *Wicked* is composed of the material, the semiotic, and the material-semiotic reality that varies depending on how actors collaborate to form multiple collectives. Within these networks are intermediary actants, mediator actors, boundary objects, and leviathans. An intermediary actant is an actor channel, or mobile, which acts on the mediator actors. An intermediary actant provides the vehicle to move the action through and can also be broken down into mutable (changeable) and/or immutable (unchangeable) mobiles (Law & Mol, 2003). An intermediary actant of the musical *Wicked* might be Metro-Goldwyn-Mayer's (MGM) (1939) musical production of *The Wizard of Oz*. In this context, *The Wizard of Oz* can be considered an intermediary actant, as it acts as a channel for the creation of *Wicked*, as well as provides the beginning storyline of Glinda and Elphaba.

Additionally, the mutable mobile of this intermediary is the relationship between Glinda and Elphaba. In *The Wizard of Oz*, Glinda and Elphaba's tumultuous relationship represents hatred and revenge, whereas, in *Wicked*, their relationship represents friendship and compassion. Their relationship is mutable as it changes from the one portrayed in *The Wizard of Oz* to the one illuminated in *Wicked*. Conversely, the immutable mobile of this intermediary is how the original storyline of *The Wizard of Oz* remains unchanged. It is added upon to provide audience members more context and understanding of the lives of Glinda and Elphaba. Thus, *The Wizard of Oz* storyline is immutable as it remains constant, yet, adds more context to the *Wicked* narrative.

Actors are also considered mediators; they are social-material entities weaved together by humans and objects participating in a phenomenon. These mediator actors are “associated in such a way that they make others do things” (Latour, 2005, p. 107). The production of *Wicked* emerges from how humans and objects reflexively collaborate. While Latour would recommend that I do not separate these actors into human/object categories, I do so here to help illustrate who and what is participating in the *Wicked* phenomenon. Later, I will demonstrate how these dichotomic categories knit together. The human actors of *Wicked* include people such as Glinda (the Good Witch of the South), Elphaba (the Wicked Witch of the West), additional stage actors, musicians, musical conductor, production director, production crew, audience, and so on. The object actors include entities such as the screenplay, sheet music, musical instruments, costumes, wigs, dance shoes, make-up, stage, lights, curtains, songs, theatre, etc. These objects are as crucial to the production as the humans as the objects contribute to how the production materializes. It can be argued that without these objects (e.g., technologies, artwork, ideas, spaces, partnerships, instruments, and so forth) operating in their intended ways, the musical production of *Wicked* would most likely not be constructed in the same manner.

Further, Latour (2005) stated that mediators “make others do things” (p. 107). This notion of something causing a referential action can be seen in the microphones used in the performance. For instance, say the volume of the microphones is perhaps too loud or too soft. This volume extreme could make other mediators, say audience members, respond in various ways. Audience members may cringe if the microphone distorts when a high note is sung, or they may lean in when the microphone does not pick up quiet notes. The loud volume of the microphones may also cause the speakers to pop or crackle during the high notes sung by Glinda, or during songs sung by the chorus. Based on this, the audiences' response to the production,

costume design, tickets, lighting, actor collaborations, and so forth, does affect the overall fluid action of the network. With all of this in mind, I find it helpful to think of these mediators as social-material entities that are weaved together within the system as they each relationally influence one another.

Actants are also the “vast array of entities swarming toward” (Latour, 2005, p. 46) a production or construction. Actants act upon the actor, and therefore, the action is a “moving target” (p. 46) where the ‘actor’ is “not the source of an action” (p. 46). For example, when Elphaba is singing “Defying Gravity” in *Wicked*, it could be argued that Elphaba is the actor and the singing of “Defying Gravity” is the action. Latour might argue, while the singing of “Defying Gravity” is the action, Elphaba is not entirely, and/or always, the source of the action. Instead, the action is the collective movement of the composers, musicians, instruments, Elphaba, the vocal coach, microphones, and so forth. In this way, the production network of *Wicked* emerges from both the collaboration and participation of human and object actors to form multiple social-material entities.

Furthermore, within a collective of actors, a spokesperson (or spokesobject) may reside, potentially acting for the group (Latour, 1987). A spokesperson for *Wicked* could possibly be the director because he/she helps guide and shape actor associations to assist the performance. For instance, the director has the big picture vision of the production, and therefore, brings on a team of artists and art materials to help create this strategic vision. The spokesperson/director also shares information across the *Wicked* network, as well as with other organizations. For example, he/she converses with the musical director, who oversees the musical orchestration network of the musical, as well as interacts with the choreographer, who manages the dance and performance networks of the musical. Additionally, the spokesperson/director communicates

with the owners, board, and executive management team of the Gershwin Theatre network, and so on, across the *Wicked* network and subsequent networks.

Moreover, a collective of actors may have a boundary object that acts as a periphery across networks. This boundary object can be used in different ways by different actors and different networks; yet, maintains “a common identity across sites” (Star & Griesemer, 1989, p. 393). Boundary objects can be material or abstract, such as information or an idea. For example, the green skin color of Elphaba could be considered a boundary object. In *The Wizard of Oz* and *Wicked*, Elphaba’s skin is green and maintains commonality across productions. In the network of *The Wizard of Oz*, Elphaba’s green skin represents an evil and malevolent witch. In the web of *Wicked*, Elphaba's green skin represents the prejudice Elphaba suffered for having skin a color dissimilar to her peers. Elphaba’s green skin can also be considered a leviathan, or something that sets the meaning of a network (Callon & Latour, 1981). In *The Wizard of Oz*, the leviathan or meaning of the green skin could be considered evil: Elphaba is the Wicked Witch of the West. In *Wicked*, the leviathan or significance of the green skin could be regarded as bullying, as a young Elphaba was ridiculed by her peers due to her difference, and later, she chose to become as others saw her: wicked.

Collectively these participants (e.g., intermediaries, mediators, boundary objects, and leviathans) could be thought of as working together to form the network we are calling *Wicked*. The *Wicked* performance can also be imagined as a constant and fluid formation of networks; it is always in process and boundless. This boundlessness of networks is the result of each actor being a complex network of other actors, as well as contributing to additional networks that are comprised of other actors. See Figure 6 for visualization of these participating actors.



Figure 6. *Wicked* actors.

For example, the network of the touring production of *Wicked* is, in fact, part of the DCPA network. However, the Broadway production of *Wicked*, located in New York City, may not be a part of the DCPA network, and instead, part of the Gershwin Theatre network. Additionally, the DCPA is a network of a multitude of actors. These actors include the laws, policies, urban layout, and the population of the city of Denver. They also encompass the DCPA's arts management team and board, artistic programming and budget, stage actors, and musicians. Further, they involve the researchers observing the network, such as myself, and so forth. Also, the DCPA contributes to additional networks. These other systems include entities such as the multiple arts branches within the DCPA (i.e., Colorado Symphony Orchestra, Denver Ballet, Denver Opera, and more). Outside participating networks also involve the touring Broadway shows that perform at DCPA, such as *Wicked*, as well as the arts and culture scene in the Denver metro area.

It is out of this constellation of things that the researcher (me) must define, as Latour (2005) would describe, as my “matters of concern” (p. 144). Based on this, I mapped what is considered to be some of the networks within *Wicked* that are worth paying attention to (while recognizing that there are infinite possible choices). My focus of concern was to unravel the complexity of social-material ANT through the incredibly beautiful and painfully touching story of *Wicked*. As *Wicked* actor David Garrison said:

There’s a Green Girl in all of us.... Everyone has felt like the outcast at one time or another. It’s part of the show’s broad appeal. It’s not a children’s show, but kids enjoy the fantasy of it, adolescents get the love story and adults see the political allegory (quoted in Downard, 2015, para. 14).

Through this analysis, I sought to provide some helpful description of ANT—while also possibly causing you to forever associate green witches and flying monkeys with your ANT education. All joking aside, I move now past a blanket overview of ANT toward an examination of its development, growth, challenges, paradigms, and present-day applications.

Historical Development of Actor-Network Theory

While ANT may seem complicated at first, a brief recounting of its history and development may help to increase understanding. ANT originated in Science and Technology Studies (STS). While STS became a more unified field of study in the 1980s, its historical development from the early 1900s to 1980s was rich with juxtaposed debates surrounding the theoretical perspectives of “the sociology of knowledge and the philosophy of science” (Yearly, 1988, p. 351). While the development of STS is essential, I begin my analysis of ANT following the establishment of STS. To enhance clarification, I provide a basic overview of the key historical moments that warranted the establishment of STS. Following this summary, I will discuss how ANT evolved within the field of STS.

As I discussed briefly in Chapter 3, the early 1900s brought controversial debates surrounding the progression of science. Then, in 1962, Thomas Kuhn's work, *The Structure of Scientific Revolutions*, challenged previous views on the progress of science by proposing an ideology of scientific paradigms. Following, in the 1970s, studies on technology and how socially responsible science could and should be conducted emerged. Moreover, during the late 1970s and early 1980s, the Strong Programme, or Edinburgh School, was established. Organized within the paradigm of social constructivism, the Strong Programme claimed that sociologists should examine the social and cultural factors that shape the production of scientific knowledge.

Ultimately, these scientific shifts led to the development of the Science, Technology, and Society (STS) discipline in the early 1980s. Therefore, STS was designed to garner an understanding surrounding how knowledge was produced in science and technology. While STS resulted from the debates between the philosophy and sociology of scientific knowledge, STS was built upon the ideologies of social constructivism and The Strong Programme. Building on STS philosophies, however, ANT challenged previous principles by drawing on additional theories to examine how science and technology artifacts and phenomena were created.

How Actor-Network Theory Evolved Within Science and Technology Studies

Originating in Paris between 1978 and 1982, three scholars, Michel Callon, Bruno Latour, and John Law, worked independently to observe the interconnection between actors. Their inspection of actors and the relationships formed among them led to discoveries on how actors negotiate various roles to develop joint social networks. They found that these networks produced a collective action, and through study of this action, they were able to abandon traditional approaches to sociology, and define new ways to "reassemble the social" (Latour, 2005, p. 16). The early work of Latour, Law, and Callon drew heavily from the research of

French poststructuralists and semiologists. ANT's ontological perspective was informed by the scholarship of Michel Serres, Michel Foucault, Algirdas Julien Greimas, Gilles Deleuze, and Félix Guatarri. Also, STS, social constructivism, sociology, and The Strong Programme, profoundly shaped ANT. Based on these influences, I will discuss how French poststructuralism and semiotics informed ANT. In the next section, I will examine how ANT was affected by, and in return challenged, the views of classical sociology and modern paradigms.

Poststructuralists examined the influence of media and popular culture in controlling and shaping social relationships. Poststructuralism was an attempt to understand popular culture and the signs and images within media. Poststructuralists critically explored how these signs and images dominated a person's sense of reality, and how these signs and images affected how a person defined him or herself, and the world around them. Strinati (2004) claimed that poststructuralism focuses on five fundamental societal changes. First, that mass media creates a sense of reality and constructs all other social relations. Second, superficiality and style dominate over content, substance, and meaning, while celebrating subjectivity and creation in society. Third, society ignores relevant context or history, which is displayed in its lack of distinction across art and popular culture. These breakdowns are due to the mixing of styles, forms, and genres, which emphasize irony, parody, and playfulness. Fourth, society no longer focuses on the volatility of time, space, and linear narratives. And fifth, poststructuralists reject the notion of truth or absolute knowledge or any overarching theories that are not culturally diverse.

Poststructuralism recognized that things could be influential, which is a critical component of ANT philosophy. For instance, Law (2009) believed that poststructuralism was useful to understanding ANT: "It is helpful to see actor network theory as a particular empirical translation of poststructuralism" (p. 146). Specifically, Law referenced how poststructuralists

recognized that various materials were related. Building on the works of French poststructuralists (e.g., Serres, Foucault, and Deleuze and Guattari) and semiologists (e.g., Greimas), as well as the foundational underpinnings in STS, Callon, Latour, and Law designed a different approach to examining sociology, science, and technology. To describe such work, I must explain how the work of Serres, Foucault, Deleuze, Guattari, and Greimas influenced ANT scholarship.

We begin with Michel Serres (1974), a philosopher of science who described the concept of translation, which was later adopted by both Latour and Callon. Serres's translation examined how different entities (e.g., humans, nonhumans, or ideas/information/knowledge) were transformed. It also explored how these transformations happened for both the entity (i.e., that which was changed), as well as the translator (i.e., that which observed and/or participated in the transformation of the entity). Further, Serres discussed the concept of order found within disorder, or as Law (2009) put it, "in his [Serres] world there are patches of order in a sea of disorder" (p. 144). While examining order in a sea of disorder, Serres discussed the space between order and disorder, a place "where different orders rub up against one another" (p. 144). Put another way, Serres's focus on these friction spots could be considered space where things were transformed, or perhaps, the early conceptions of boundary objects within ANT.

From Serres and his examination of translation comes Michel Foucault (1979, 1986) and his exploration of translation in the discursive realm. Foucault was a French philosopher and social theorist who studied how society used power and knowledge to enact control. Foucault (1986) believed the power to determine meaning resided in society and social ideology (p. 61). He argued that power over others could be found within a person's acquired knowledge, which was obtained through rituals determined by the society that was held within epochal epistemes (i.e., knowledge within distinct periods of time). These rituals were believed to represent truth

(Foucault, 1979, p. 194). Both Latour and Law used Foucault's discourse on epistemes to enhance their views on actors, networks, and associations.

Latour (2005) praised Foucault's precision "in his analytical decomposition of the tiny ingredients from which power is made and no one was more critical of social explanations" (p. 86). Foucault's God's eye-view "'revealed' power relations behind every innocuous activity: madness, natural history, sex, administration, etc." (p. 86), which produced a cause and effect on relationships. "This proves again with what energy the notion of social explanation should be fought: even the genius of Foucault could not prevent such a total inversion" (Latour, 2005, p. 86). In other words, Foucault's cause and effect social power explanations differed from an ANT account. Specifically, Foucault would ascribe meaning whereas ANT would describe associations without explanation or inference of meaning.

Put another way, Foucault placed the power to determine the meaning within the epistemes (i.e., social knowledge structures), while ANT scholars recognized the fluid and processional nature of meaning. That is to say, yes, sometimes researchers can claim the meaning is lodged within the discursive power structures, but sometimes, small associations can be recognized as superseding the usual and traditional assumed locations of power. Law (2009) also demonstrated this view on micro-associations by stating:

'actor networks' can be seen as scaled-down versions of Michel Foucault's discourses or epistemes. Foucault asks us to attend to the productively strategic and relational character of epochal epistemes (Foucault 1979). The actor network approach asks us to explore the strategic, relational, and productive character of particular, smaller-scale, heterogeneous actor networks (p. 145).

The work of Algirdas Julien Greimas also contributes to a deeper understanding of the importance of removing assumptions about the sources of meaning. Greimas was a semiologist scholar who believed researchers should not use a priori categories to describe all participants in

a network (e.g., humans, nonhumans, concepts). Instead, researchers should explain all participants similarly. This notion of abandoning a priori categories led Greimas to introduce his idea of actant: “that which accomplishes or undergoes an act” (Greimas & Courtés, 1982, p. 5). His notion of actant included humans, nonhumans (e.g., animals, objects, machines, technology, artifacts), and ideas.

Latour (1986) adopted Greimas’s notion of actant, adding the term actor to help demonstrate how actants, “those which act or are acted upon” (Czarniawska, 2009, p. 425), can shift into actors, those acting as characters (mediators) within a networked narrative. Latour imagined how actor-networks could be considered macro-actors, which might include entities such as organizations, agencies, institutions, societies, or collectives, and how these macro-actors formed powerful associations with other actants/actors. These actor-networks were then represented as critical macro-actors by their spokespersons; an idea that similarly paralleled Callon’s (1986) concept of translation.

Building on Greimas’s work is the scholarship of the French philosophers Gilles Deleuze and Félix Guattari (1988) and their prolific research on ecologies and nomadic philosophy. According to Law (2009), the work of Deleuze and Guattari has direct parallels to certain aspects of ANT. For instance, “both refer to the provisional assembly of productive, heterogeneous, and (this is the crucial point) quite limited forms of ordering located in no larger overall order” (Law, 2009, p. 146). In keeping with this notion of parallels, Latour (1999) believed that Deleuze and Guattari’s discussion of actant rhizomes could be considered an actor-network. Additionally, both Latour (1999) and Law (2009) believed that Deleuze’s discussion on *agencement* could be “awkwardly translated as ‘assemblage’ in English” (Law, 2009, p. 146) because *agencement* and *actor-network* have little difference (Latour, 1999; Law, 2004).

Additionally, Deleuze (1992) believed researchers should move past concepts of ethnography, which placed humans at the center of inquiry, toward concepts of ecology and ethology, which set environments (nonhumans) and human inhabitants (and the interactions between them) at the center of an investigation. Ecology and ethology dismissed dualistic views, which examined humans over nonhumans, and instead, afforded humans and nonhumans equal consideration to participate in a network. Additionally, such approaches allowed for symmetrical analyses of the relationship associations formed between humans and nonhumans.

Utilizing Deleuze and Guattari's conception of actant rhizome, and Serres's discussion of translation, Michel Callon (1986), one of the original philosophers to ANT, unpacked relationships between human and object actors in his examination of how scallops and fisherman worked together to create a scallop network. Callon used his scallop network to develop his four-step process of translation (i.e., problematization, interessement, enrolment, and mobilization). Callon's translation process describes how actors interact with objects, how objects afford associations, and how at various points these relationships are constructed and deconstructed through actor negotiations. Callon's four-steps to translation to form a stable network are as follows:

1. Problematization, or problem formation, is when an actor establishes him or herself within a network and becomes an essential resource, or anchor actor, to help solve a network problem. Within problematization, "key actors first recognize that an event is taking place and volunteer themselves to participate in the network" (Potts, 2014, p. 62).
2. Interessement, or interest, is when the anchor actor tries to elicit interest from other actors. Interessement is when "the identity of actors in these networks stabilizes and the allies align" (Potts, 2014, p. 62).

3. Enrolment, or enrollment, is the negotiation of different actor roles. It is when “actors accept the new system and coordinate action” (Potts, 2014, p. 62). In this way, enrollment is always negotiated.
4. Mobilization is the self-selection process wherein actors become spokespeople for the group or network. Within mobilization “the group becomes greater than the sum of its parts” (Potts, 2014, p. 63) and translation, also defined as stabilization or punctualization, is reached.

Similar to Callon’s views of network formation through translation, Bruno Latour, another creator of ANT philosophy, used Deleuze and Guattari’s conception of rhizome, Serres’s discussion of translation, and Greimas’s notions of semiotics and actants to observe how actors participate in society and meaning. Based on this, he noted accounts that contained “reality on the one hand and knowledge of reality on the other” (Law, 2009, p. 144; see also Latour, 1993). For example, in 1988, Latour looked at Louis Pasteur’s discovery of anthrax and creation of the anthrax vaccine. He claimed that the detection of anthrax was not exclusively due to Pasteur’s genius, but attributed to the relational networks that participated in the discovery (i.e., which included the cows, anthrax, the vaccine, Pasteur, other scientists, previous science and findings, and so forth). Building on this examination of Pasteur, Latour (1993) inspected France’s Personal Rapid Transit (PRT) system, Aramis, and its failed implementation. As Latour traced the network of Aramis to discover “who killed Aramis” (p. 1), he realized that not one particular actor was responsible for its death. Instead, the political and social underpinnings that participated in the demise of Aramis presented multiple challenges to the overall public transit network. In this way, a multiplicity of actors failed to adapt to the shifting social environment and negotiate new associational relationships to ensure the train’s survival.

Adding to his work on Aramis, Latour (2005) explored how networks assemble and reassemble in his book titled, *Reassembling the social: An introduction to actor-network theory*. In this crucial contribution to the description of ANT, Latour (2005) defined translation, or “sociology of translation” (p. 106), as a “relation that does not transport causality but induces two mediators into coexisting” (p. 108). In other words:

[Translation] is this reversal in causality that ANT tried to register first for science and technology and then for every other topic. This is where [ANT] got the strange idea that the social was to be explained instead of providing the explanation (Latour, 2005, p. 108).

Based on this, Latour claimed researchers must translate networks by observing linkages “between mediators that may generate traceable associations” (p.108). Also, while networks transform linkages between actors, Latour reiterated how crucial it is for researchers to realize that they must not explain actor associations (i.e., a researcher cannot act as a divine revealer depicting cause and effect from these transformations). Instead, a researcher must act as a descriptive storyteller of actor-network associations. In other words, translation is when the researcher identifies the associations between mediators and writes a vivid narrative account of the networked social.

Lastly, and similar to the work of Callon and Latour, John Law (2009), another originator of ANT, explored the notion of relational materialism. As stated in Chapter 3, relational materialism is the belief that all actors, whether humans or objects, relationally influence other actors, and in this way, they must be examined relationally to other actors. In his early work, Law (1986) used Foucault’s discourse on epistemes to enhance his investigation concerning the establishment of organizations, power, and reality within Portuguese imperialism in India. Law discovered how various human and nonhuman actors (e.g., spices, trades, money, power, leaders, military, technology, winds, bribes, sailors, and stars) organized through systematic actor

negotiations. Building on his earlier scholarship, Law (1992) argued that researchers need to look at how organization and power are assembled—what intermediaries, mediators, and boundary objects negotiate actor associations to link together and form a network(s)—and describe these associations as precisely as possible without assuming and interpreting meaning.

Specifically, Law (1992) stated:

Here is the argument. If we want to understand the mechanics of power and organization it is important not to start out *assuming* whatever we wish to explain. For instance, it is a good idea not take it for granted that there is a macrosocial system on the one hand, and bits and pieces of derivative microsocial detail on the other. If we do this we close off most of the interesting questions about the *origins* of power and organization. Instead, we should start with a clean slate. For instance, we might start with interaction and assume that interaction is all that there is. Then we might ask how some kinds of interactions more or less succeed in stabilizing and reproducing themselves: how is it that they overcome resistance and seem to become ‘macrosocial’; how is it that they seem to generate the effects such as power, fame, size, scope, or organization with which we are all familiar. This, then, is one of the core assumptions of actor-network theory: that Napoleons are no different in kind to small-time hustlers, and IBMs to whelk-stalls. And if they *are* larger, then we should be studying *how* this comes about—how, in other words, size, power, or organization are generated (p. 3820, emphases in original).

As I have described, ANT’s development is due to the efforts of Latour, Law, and Callon.

However, its conception is equally based on the work of Michel Serres, Michel Foucault, Algirdas Julien Greimas, Gilles Deleuze, and Félix Guatarri, as these philosophers greatly informed theories surrounding collective network formation. To further explain ANT, I will now discuss how it challenged modern paradigms, and how it can currently be positioned within the posthumanist perspective.

How Actor-Network Theory Shifted from Constructivism to Posthumanism

As stated previously, ANT began in the constructivist paradigm. Within social constructivism, classic sociology believed that reality was socially constructed through social processes that designated the facts, theories, culture, art, phenomena, knowledge, science, laws, societies, power, technologies, and so forth. For example, social constructivists, Berger and

Luckmann (1966), claimed that social reality, which included knowledge and institutions, existed because of the actions and attitudes of people. They also maintained that researchers must interpret these realities and share their abstractions learned from their interpretations as knowledge.

While ANT originated in constructivism, it shifted from ideologies based on relativism (i.e., individual perception of multiple realities) toward relational materialism (i.e., a multiplicity of fluid realities; reality is continuously evolving as actors and their relationships to other actors change). While social constructivism and other modern paradigms use a humanist view to analyze a situation, ANT scholars use a posthumanist view to describe actor associations. Therefore, ANT scholars challenge the mindset of the modern paradigms. An example of this debate is demonstrated by Law (2009) in the following statement:

We are no longer dealing with construction, social or otherwise: there is no stable prime mover, social or individual, to construct anything, no builder, no puppeteer. Pasteur, we have seen, is an effect rather than a cause. Rather we are dealing with enactment or performance. In this heterogeneous world everything plays its part, relationally (p. 151).

Debates surrounding where ANT should be situated paradigmatically have ensued (i.e., whether it is located within the modern paradigm structure) (Gries, 2015; Law, 2009). Further, this controversy has resulted in a debate surrounding paradigms in general, as well as an initial discussion concerning the establishment of a posthumanism paradigm (Gries, 2015). Therefore, I approach this ANT paradigm discussion to ensure I understand the mindset in which my study is situated.

I realize that ANT may not be located within the current modern paradigms, while also recognizing that ANT may also be considered a part of, or perhaps wholly situated within, the posthumanist paradigm movement (e.g., new materialist, object-oriented). While arguments may position ANT within several paradigms (post-positivism [critical realism], critical theory

[historical realism], constructivism [relativism], and posthumanism [relational materialism]), it is worthwhile to consider the ontological perspectives of each paradigm and how the ANT ontology may or may not align with each paradigm.

The post-positivism/critical realism paradigm shares several similarities with ANT. Critical realism (Guba & Lincoln, 1994) is the utilization of the “widest possible critical examination to facilitate apprehending reality as closely as possible” (p. 110). In his book, *A Realist Approach for Qualitative Research*, Joseph A. Maxwell (2012) claims:

Critical realists thus retain an ontological realism (there is a real world that exists independently of our perceptions, theories, and constructions) while accepting a form of epistemological constructivism and relativism (our *understanding* of this world is inevitably a construction from our own perspectives and standpoint). The different forms of realism referenced here agree that there is no possibility of attaining a single, ‘correct’ understanding of the world, what Putnam (1999) describes as a ‘God’s eye view’ that is independent of any particular viewpoint (p. 5, emphasis in original).

In other words, critical realists abandon notions of dualism (Guba & Lincoln, 1994, p. 110), which parallels ANT’s belief that humans and objects should not be placed in distinct social and material categories. Second, critical realists believe researchers cannot have one correct or divine observation of the world, which parallels Latour’s (2005) support of the concept of translation. Translation recognizes that researchers are not observers who discern cause and effect from actors but instead are reflexive storytellers who describe mapped associations. Additionally, the researcher chooses which network(s) to study, ultimately placing her into the network and affecting networked associations and translations. Therefore, these interactions must be accounted for in the research narrative. Maxwell (2012) also stated:

[c]ritical realists thus retain an ontological realism (there is a real world that exists independently of our perceptions, theories, and constructions) while accepting a form of epistemological constructivism and relativism (our *understanding* of this world is inevitably a construction from our own perspectives and standpoint) (p. 5, emphasis in original).

I believe Maxwell's definition of critical realism includes a nice blend of realism (post-positivism/critical realism and critical theory/historical realism) and relativism (constructivism). It is, however, missing notions of relational materialism.

Further, the critical theory paradigm, which includes poststructuralism, postmodernism, and a historical realism ontology, demonstrates some similarities with, as well as key differences from, ANT. For example, poststructuralism examines how different materials relate to each other, which parallels ANT's notion of actor associations. Law (2009) claimed, "[i]t is helpful to see actor network theory as a particular empirical translation of poststructuralism" (p. 146). Based on this idea that ANT is a possible translation of poststructuralism, as Law (2009) stated, perhaps it is safe to argue that ANT is located within the critical theory paradigm. Translation, however, can also mean to transform. And, based on this conceptualization, ANT scholarship may exhibit aspects of poststructuralism. In this sense, it may have shifted into something else. One distinct difference between critical theory and ANT is Latour's (1993) statement that society has never been modern, and therefore, society cannot be considered postmodern. So, if ANT cannot reside in a postmodern paradigm, perhaps ANT is best placed within the critical theory paradigm somewhere between poststructuralism and postmodernism. It is possible, however, that ANT has moved beyond poststructuralism, postmodernism, and the entire critical theory paradigm, to be located within the constructivism paradigm where it originated. Alternatively, perhaps ANT has also moved beyond constructivism to a new paradigm: posthumanism.

The constructivism/relativism paradigm shares some similarities with and differences from ANT. For instance, sociologist Jonathan Murdoch (2001) discussed the methodological use of ANT to explain how complex relationships between humans and nonhumans are developed within society. He stated that ANT looks beyond humans and the social to examine more

complex collectives. Murdoch claimed that ANT can be considered both co-constructionist and ecological stating:

[ANT] is co-constructionist in the sense that it emphasizes relations and the way that discrete entities or beings emerge as these relations are consolidated; it is ecological in the sense that it seeks to overcome any underlying distinctions between natural and social entities, thereby extending agency to non-humans as well as to humans (quoted in Champ, 2016, p. 1; see also Murdoch, 2001, p. 120).

While constructivism looks at the social constructions of reality, which are created by humans in positions of power, Law (2009) stated that ANT's views on power and reality are not that humans create power/reality, but that power/reality is an ever-evolving and ever-present process. In other words, ANT believes that humans do not construct reality, but participate in the fluid manifestations of reality afforded by human/nonhuman or social-material associations.

Based on these arguments, I question where ANT is positioned within the modern paradigm. Does ANT reside within the post-positivism/critical realism paradigm, the critical theory/historical realism paradigm, the constructivism/relativism paradigm, or perhaps a different paradigm altogether, such as the posthumanism/relational materialism paradigm? According to qualitative researcher and media scholar Joseph Champ (2016), I must free myself from previous defined ontologies and paradigm routes, as mentioned above, as they may limit my ability to grasp collective complexities. Further, Champ advised that in order to thoroughly examine the outcomes from complex collectives, I must revisit Vidich and Lyman's (2003) definition of ethnography and honestly look at people and their culture. I must ask who, what, when, where, and why questions in relation to the construction of meaning (i.e., the cause, determination, production, creation and more) to help me best describe such complex collectives.

Champ's argument reminds me of Latour's (2005) comment on an ANT approach: "ANT is simply an attempt to allow the members of contemporary society to have as much leeway in

defining themselves as that offered by ethnographers” (p. 41). Further, Gilles Deleuze (1992) believed that researchers should move past notions of ethnography, as this method puts humans at the center of inquiry. Instead, he argued that researchers should gravitate toward concepts of ecology, which views humans and objects as equal, and allows for an associated social-material analysis. This ecological paradigm includes relational views apparent in posthumanism.

Concerning the posthumanist ecological paradigm, Gries (2015) offered this description:

While each mode of inquiry is distinct, all consider reality to be collectively, materially, and semiotically constructed via a variety of actants that have equal ontological footing. New materialists thus acknowledge the vital and transformative characteristics of matter — characteristics typically reserved for humans alone (p. 6).

Based on this analysis, I believe ANT resides in a posthumanist paradigm as it explores the relational materiality across objects. Thus, ANT is not part of the modern paradigm structure.

How Actor-Network Theory Challenged Constructivism Terminology

Since ANT's beginning, specific concepts within ANT have been challenged, and are still being debated today. Over time, arguments surrounding the definition and usage of social, agency, power, and symmetry have been highly contested. Because ANT abandoned traditional approaches to sociology and social science research in an attempt to examine the social from a different perspective, it is imperative to discuss the previous ontological definitions that were challenged by ANT, as well as how ANT ontologically defined such concepts. In the forthcoming sections, I offer some description surrounding these contentions and where this dissertation, and therefore myself, is situated within these discussions.

Social

Previous ontologies were concerned with the conception of the social. Several synonyms of the social have been referenced in the past: humans, society, community, organization, and more. Classical conceptions of sociology viewed the social as a human-dominated system made

up of social constructions created by humans to define culture, meaning, and human interaction. Classical sociologists researched the social by imposing an imagined order within a social system, predominately focusing on humans and not objects, explaining who the actors were and why they were participating in the social, and deconstructing the social through the use of interpretation.

Classical sociology believed that there was a division between humans and objects, which was demonstrated within the non-symmetrical division between two opposing parts. For instance, Cirkseña's and Cuklanz's (1992) research on the five dualisms within society: liberal feminism (reason and emotion), socialist-feminism (public and private), radical feminism (nature and culture), psychoanalytic feminism (subject and object), and cultural feminism (mind and body), claim there are distinct differences in meaning and action between humans (subject) and non-humans (object).

Conversely, Latour (2005) believed that traditional and modern social scientists were restricted in their approach to researching the social. He and other ANT scholars had problems with the term "sociology;" specifically, the way it viewed humans as the central actors to construct and determine meaning. In contrast, Latour (2005) defined social as "the name of a type of momentary association which is characterized by the way it gathers together into new shapes" (p. 65) and acts as a "durable whole" (p. 72). In other words, social is the balance between shapes and figures, or objects and humans, into social-material assemblages. "The social results from the constant formation of, and negotiation within, networks. The social is never ordered. The social is always in process" (Wrye, 2012, p. 17). Social observes "who and what participates in the action" (Latour, 2005, p. 72) to understand how humans and objects act as a collective.

Agency

Following Latour's (2005) discussion on defining the social, he considered how to trace social connections and reassemble the social collective through the agency and action of actors to relationally form associations. For this dissertation, the definition of agency is that which makes something act. As stated previously, classical sociologists viewed humans as central to constructing meaning, and therefore, humans had all agency to act upon objects. Traditional sociologists believed that objects did not have agency, or could not act. Based on this mindset, they believed that for objects to produce an action, those objects were acted upon by a human.

Conversely, and in response to this traditional viewpoint, Latour (2005) challenged their idea of agency by stating:

ANT is not the empty claim that objects do things 'instead' of human actors: it simply says that no science of the social can even begin if the question of who and what participates in the action is not first of all thoroughly explored, even though it might mean letting elements in which, for lack of a better term, we would call non-humans (p. 72).

In this way, and according to Gries (2015), Latour is describing how agency is not something bestowed upon a single object (a nonhuman), just as it is not something possessed by a single human. Instead, agency is "an act of intervention" (Gries, 2015, p. 57); agency "is a doing" (p. 57) created by the intertwined social-material entities weaved together through a multiplicity of participants within a phenomenon.

It may be helpful if I pause here to provide an example of how agency is a doing created by intertwined social-material actors. Using the *Wicked* case from earlier: when I select "Defying Gravity" from my iTunes account and press play, the song is then played through my laptop speakers. Classical sociologists might state that I, the human, used my agency to act and play the song. Thus, my agency was exerted on both the technology (i.e., the laptop and iTunes) and the

song; consequently, the nonhuman objects (e.g., the technology and the song) did not act. However, ANT does not shift this ideology in reverse, stating that the song acted by itself and exerted full agency, while I, the human, did not use agency. Instead, ANT states that it is important to consider the social-material aspects of Leah-song or Leah-laptop as a collective intervention. Therefore, me listening to “Defying Gravity” is an interplay across the laptop, iTunes, the speakers, the song, me, my desire to hear the song, and so forth. The agency was not singular to either the human (i.e., me) or the nonhuman (i.e., the song and technology). In this way, the agency was that of social-material assemblage.

Through the application of an ANT mindset, researchers can observe how nonhumans (e.g., ideas, objects, technologies) transform to yield power and persuasiveness. In this way, nonhumans shift from things handled by human agents to social-material collectives that have relational agency. Further, and according to Gries (2015), when nonhumans are looked at with an ANT sensibility, these objects can achieve “*thing-power*” (p. 12, emphasis in original). Thing-power is “the power things acquire when working alongside other entities to produce change, even as they all have different degrees of power (Gries, 2015, p. 12; see also Bennett, 2010). Moreover, and within this discussion on agency, I believe it is vital to bring into this discussion the concept of affordance (Petersen, 2013) and intra-action (Barad, 2007).

Petersen (2013) defined affordance as the “qualities of objects with which humans are involved” (p. 359; quoted in Champ, 2016, p. 20). Affordances can be “determined by the actions and perceptions of the human actor who engages with the object and describes certain functions and meanings to the environment,” as well as a constrained “behavior along certain possibilities inherent in the objects” (p. 359; quoted in Champ, 2016, p. 20). The idea that objects can have certain inherent possibilities helps to illustrate how objects can afford an action. For

example, this Apple laptop I am typing on has been designed to allow me to create and save documents, such as this dissertation. My laptop gives me convenience and the ability to type this document at home and keeps me from the headache of having to use my computer at school. Also, this laptop affords me the ability not to have to use a typewriter or write this dissertation by hand. Can you imagine the amount of white-out that would be used, the wrist pain, and the insurmountable grammatical errors within this dissertation if my laptop computer did not exist?

Barad (2007) defined intra-action as all entities involved in a phenomenon, including the boundaries and properties of these entities and the time and space surrounding both the objects and the action. Using the same example from above, Barad would state that the time and space utilized to write this dissertation, plus the properties of the entities used in writing this dissertation, all work together to form a collective agency to finish this piece of scholarship. For instance, my laptop, my brain, my advisor, my committee, conferences, books, articles, my ability to access these entities and to use my computer efficiently, and so forth, have intra-acted to create this enormous document.

Barad's (2007) intra-action concept parallels Latour's (2005) definition of action. Latour believed that an action was not the product of one actor, but the collection of "a vast array of entities [actants] swarming toward" (p. 46) a production or construction. An action is a "moving target" (p. 46) composed of humans and objects into social-material matter. Latour defined action as the way in which actants/actors work together to form actor associations, or actor relationships, resulting in collectives. This belief that humans and objects collectively create an intertwined agency significantly upset the views of traditional and modern social science theorists, as they believed that a division existed between the agency of humans and the agency of objects.

Power

Classical sociology viewed individuals and/or organizations as powerful entities, and because of their innate power, capable of creating powerful action. For example, a classical sociologist might argue that former President Barack Obama was a powerful senator, which is why he became President of the United States of America. In contrast, ANT examined how power worked, claiming that “power is best understood as a *consequence* rather than as a *cause*” (Spinuzzi, 2008, pp. 10-11, emphasis in original; referencing Latour, 1986). According to Spinuzzi (2008), ANT provides “political and rhetorical explanations for power and its exercise” (p. 32). Thus, ANT is interested in how power works and observes power differently. ANT shifts the ideology that power is the cause of some action toward power being the effect of some action.

For instance, ANT’s approach to power can be observed in Latour’s (1988) writing of Louis Pasteur’s discovery of anthrax and creation of the anthrax vaccine. Latour claimed that this discovery was attributed to relational networks, and not only from Pasteur’s genius. Therefore, Pasteur was not the one with power. Instead, the associations of other participatory actors (e.g., cows, Petri dishes, anthrax, science, medicine, France, Pasteur) resulted in the power of the vaccine. Ultimately, the formation of a network, including its breakdown and reformation of new networks, explained systematic actor negotiations, which resulted in power relations. In other words, ANT scholars believed it was not the power of individual actors that caused network formations. Instead, the negotiations among actors to determine alliances and create a network, consequently, resulted in power establishment. Based on this, ANT scholars might state that former President Barack Obama was a senator who negotiated relationships with other actors (e.g., policymakers, journalists, universities, US citizens, ideology of hope, Black American

organizations, policies), and, these actors negotiated relationships with Obama. Ultimately, these collective actor associations resulted in a powerful effect: Obama became the 44th President of the United States of America.

Symmetry

Classical sociology examined participants in *a priori* established categories (humans and objects) and called for researchers to adopt a principle of symmetry concerning true and false statements when studying a phenomenon. ANT also called for symmetry during analysis, but many new ANT scholars and critics assumed ANT's discussion on symmetry was an attack on classical sociology's dichotomic human/object categories. Because of this, many scholars believed that ANT called for an equivalent examination of both humans and objects, or that both humans and objects had similar agency to participate in the action of a phenomenon.

Latour (2005) addressed this misunderstanding of symmetry held by ANT scholars and critics. He stated that ANT is not about “symmetry between humans and non-humans” (p. 76). Instead, ANT is about examining all participants in a phenomenon. In this way, ANT’s use of the concept of symmetry was to remind researchers not to use *a priori* categories when examining a phenomenon. In other words, objects were not “the material” (p. 76) and humans were not “the social world” (p. 76); they were collective social-material participating in a phenomenon.

ANT's notion of symmetry was neither about a reversal in agency, where researchers should now attribute all agency and action toward objects, nor was it about resolving the famous subject versus object dichotomy. Latour (2005) approached this complexity by stating:

To get the right feel for ANT, it’s important to notice that this has nothing to do with a ‘reconciliation’ of the famous object/subject dichotomy. To distinguish a priori ‘material’ and ‘social’ ties before linking them together again makes about as much sense as to account for the dynamic of a battle by imagining a group of soldiers and officers stark naked with a huge heap of paraphernalia—tanks, rifles, paperwork, uniforms—and then claim that ‘of course there exist some (dialectical) relation between the two’. One should

retort adamantly ‘No!’ There exists no relation whatsoever between ‘the material’ and ‘the social world’, because it is this very division which is a complete artifact. To reject such a divide is not to ‘relate’ the heap of naked soldiers ‘with’ the heap of material stuff: it is to redistribute the whole assemblage from top to bottom and beginning to end. There is no empirical case where the existence of two coherent and homogeneous aggregates, for instance technology ‘and’ society, could make any sense. ANT is not, I repeat is not, the establishment of some absurd ‘symmetry between humans and non-humans’. To be symmetric, for us, simply means not to impose a priori some spurious asymmetry among human intentional action and a material world of causal relations (pp. 75-76).

How Actor-Network Theory Has Influenced a Variety of Fields

During the 1990s, several areas of study began to employ ANT in their research. For example, Annemarie Mol’s (2002) book, *The Body Multiple: Ontology in Medical Practice*, which examined the creation of multiple material realities, was added to ANT scholarship. Mol’s (2002) work provided insight concerning how an analysis of a phenomenon is never static because networks are made of a multiplicity of participants. Mol diverged from original tenets of ANT that “fix objects more rigidly and according to the precepts and interests of the principal actant” (Wyre, 2012, p. 22). Instead, she provided more freedom to participating actors to “define and negotiate their role in, and contribution to, a network” (p. 22).

Additionally, Law and Mol (2003) identified how information was shared within a network. They found that information was contained within a vessel, which they called a mobile. This mobile of information was either immutable, one that was unchangeable, or mutable, one that was changeable. Further, within the field of organizational studies, Czarniawska and Sevón (2005, 2011) adopted translation to understand management practices, specifically, how ideas were circulated within an organization. Also, Spinuzzi (2008) used ANT to investigate how organizational documents circulate within an organization. This increase in ANT’s popularity led to scholars to challenge ANT ontology, resulting in a retooling of ANT concepts and an improved understanding of how ANT could be used as a research tool.

Critiques of ANT included Donna Haraway's (1991a, 1991b, 1999) feminist evaluations, which stated that ANT only focused on powerful actors in a network and this focus on the dominant actors led to the marginalization of technology descriptions. Other critiques included Lee and Brown's (1994) postcolonial review, which stated that the concept of linking together specific actors and not linking together others, potentially created a viewpoint of otherness. Their argument examined how things identified as 'other' were not important to connect to the network. These commentaries challenged ANT scholars to revise concepts and apply reflexivity to their research and their accounts. McLean and Hassard (2004) criticized ANT by stating that actor-network accounting posed several limitations: whom to follow, who not to follow, whom to include, and whom to exclude from a study. Mol (2010) stated that critics believed actor-network accounting was too abstract, and therefore, could not be used to conduct research. These critics felt ANT was neither a theory nor a method; it did not provide a clear theoretical framework or a systematic approach to collecting and analyzing data. Moreover, according to Mol (2002), critics believed actor-network accounting required refinement in its definition and usage if it was to be used for sociology and social science research.

Based on these critiques, Callon, Latour, and Law, and newer ANT scholars like Annemarie Mol, continued to refine ANT. Specifically, they set out to discover how ANT could be used both theoretically and methodologically to investigate collectives. For instance, Law and Mol (2003) worked together to further transform ANT. And, while Mol (2010) agreed that ANT is neither a theory nor a method, she believed this argument was not a criticism of ANT. Instead, she felt that the flexibility of ANT was one of its strengths. Mol (2010) stated that ANT is a multifaceted kaleidoscope that allows researchers to observe the associational intersections across and between actors. In this way, because ANT is not limited to the narrow frameworks

that are instituted by theory and method, researchers can employ an ANT mindset to study a phenomenon without assumptions. Latour (2005) disagreed with the critique that ANT required refinement in its definition and usage. He believed that refining and redefining ANT would inherently limit the strength of actor-network accounting, which he felt was ANT's openness to afford researchers the freedom to follow the actors and explore actor associations without *a priori* assumptions. Instead, Latour claimed that ANT could enhance the social sciences as it was a method of study to assist in describing actor associations.

True to ANT's concept of translation, ANT transformed yet again as additional bodies of scholarship adopted an ANT sensibility. These areas included object-centered studies, such as object-oriented ontologies (OOO; Bennett, 2012; Bogost, 2009, 2012; Bryant, 2009; Harman, 2010) and new materialism (De Landa, 2006; Barad, 2007; Bennett, 2010; Gries, 2015). Other areas adopting an ANT mindset included sociotechnical research involving explorations into genre and rhetoric (Spinuzzi, 2008), data transformation (Potts, 2014), and digital methods (Rogers, 2013). Through their careful application, these researchers employed ANT to examine how data circulated across digital, cultural, and material locations. For example, Clay Spinuzzi (2008) examined how ANT can be used to trace genre ecologies within organizational settings. Richard Rogers (2013) researched how natively digital technologies (e.g., Google's search engine algorithm, hashtags, topic tags, hyperlinks) distribute and link information. Liza Potts (2014) explored how content and its context are shared within digital spaces as a means of investigating how experience architects can build more sophisticated participatory digital platforms. Moreover, Laurie Gries (2015) adapted ANT to trace the rhetorical ecologies of an image throughout digital systems.

Concluding Thoughts

This chapter examined actor-network theory (ANT) and how it can be considered both a theory and a method, while at the same time, neither a theory nor a method. The fundamental tenets of ANT included actor, network, and theory. Actors are all material (humans and objects) that work together to produce an action within a given network. Based on this, a network can be imagined as a connected mesh of actors that contribute to generating a phenomenon. In this way, participating actors might include a person, artifact, technology, organization, picture, idea, event, group, document, and website. These actor exchanges can happen across any type of actor, such as between people, art, and technology, to weave together things that may be considered social and material into a collective social-material entity. Together, these concepts make up the theoretical underpinnings of ANT, or as Law (2009) would describe, as ANT's "material semiotics" (p. 141) toolkit that once employed, could convey and translate actor relation stories. Therefore, the theoretical aspects of ANT explore the associational intersections between actors to understand who and what collectively participate in forming a network.

Using *Wicked* as a metaphor, I traced the networked relations of actors participating in its collective performance at The Buell Theatre in The Denver Center for the Performing Arts (DCPA). As discussed, the production of *Wicked* emerged from how humans and objects reflexively collaborated. In this way, the human actors of *Wicked* included the characters of Glinda (the Good Witch of the South) and Elphaba (the Wicked Witch of the West), in addition to the other characters, actors, musicians, and sound tech in the show. Object actors contributing to *Wicked* included things such as the screenplay, sheet music, musical instruments, costumes, wigs, dance shoes, make-up, stage, lights, curtains, songs, theatre, and so forth. Moreover, as I

tried to convey, participating objects were potentially just as important to the production of *Wicked* as the humans; both contributed to the materialization of the performance.

Moving past my ANT narrative example, I discussed how ANT originated out of STS during the 1980s by Callon, Latour, and Law to demonstrate how knowledge was produced in science and technology. Callon, Latour, and Law drew from the works of French poststructuralists (e.g., Serres, Foucault, and Deleuze and Guattari), as well as semiologists (e.g., Greimas), to examine the creation of science and technology artifacts, products, or phenomena. While STS resulted from the debates between the philosophy and sociology of scientific knowledge, STS was built on crucial ideologies of social constructivism and The Strong Programme. Using the foundations laid out in STS, Callon, Latour, and Law designed a different approach to examining sociology, science, and technology—actor-network theory (ANT).

ANT has transformed considerably since its origin in the early 1980s. Its early conception through roughly 1990, proved vital as Latour, Law, and Callon built upon the work of previous scholars to challenge classic sociologic ontology and develop the theoretical structure of ANT. ANT moved beyond a social constructivist perspective toward a posthumanist examination of the relational materiality of actor ecologies. It also challenged constructivist views surrounding the conception of social, agency, power, and symmetry. ANT demanded that researchers consider how their investigator function impacts the network(s) under examination, specifically, by the role they play and their translated accounts of associational relationships within the network.

From roughly 1990 to the early 2000s, ANT was heavily criticized by scholars (i.e., arguments surrounding otherness, symmetry, boundaries, exclusions), and thus, ANT researchers responded with refinement, reflexivity, and additions to the theory. More recently, from roughly the early 2000s to present, ANT has been utilized as a mindset for scholars to conduct research

of sociotechnical systems in digital space (e.g., social media, forums, websites, the Internet). Digital scholars are leaning on the kaleidoscope view of ANT to explore how all actors (i.e., humans, technology, AI, machine learning, art, culture, email, messaging, social media) are using sociotechnical systems to communicate. Based on this, we can see that ANT is a tool that can be used to describe how a phenomenon is not the product of one actor, but a complex web of actors that collectively contribute. In this way, whether it be girls with green skin, boys with tin bodies, monkeys with wings, and/or brooms that fly, these actors collaboratively work toward a collective, and arguably *wicked*, experience. In the next chapter, I dive into the thought style of ANT and how it can be used by digital researchers to examine the dynamic dimensions of technology organizations.

CHAPTER 5: DIGITAL METHODS AND ACTOR-NETWORK THEORY

The principal goal of this dissertation is to design a new digital methodology to assist in the examination of the organizational structure and conviviality of tech titans and the technologies they create. So far, I have communicated some of the theories and philosophies particular to digital conviviality from the collective mindset of actor-network theory (ANT). Specifically, I have discussed digital conviviality (Chapter 2), materiality (Chapter 3), and collectivity (Chapter 4) to illustrate how an exploration into digital conviviality can help draw out a technology organization's dynamic dimensions and activities. Based on this, I have identified six principles indicative of the ANT digital convivial mindset, or thought style (Fleck, 1979), which I define below.

Six Principles of an Actor-Network Theory Digital Convivial Mindset

Principle of Conviviality

Conviviality is the “autonomous and creative intercourse among persons, and the intercourse of persons with their environment” (Illich, 1973, p. 18). In contrast, non-conviviality is the “conditioned response of persons to the demands made upon them by others, and by a man-made environment” (p. 18). Additionally, non-convivial organizations are identified as those that manipulate “people for the sake of their tools” (p. 21). From such perspectives, an ANT digital convivial approach recognizes that objects, in this case, technology, can be used in partnership *with* humans (convivial), as well as solely *by* humans or as a tool *to manipulate* humans (non-convivial).

Principle of Participation

Participation is defined as the collaborative workings of numerous actors (e.g., humans, organizations, creators, users, technologies, art, other objects) to shape a phenomenon. In digital space, participation also includes the ways in which actors can create, manipulate, and transform digital material and share it with others. Thus, an ANT digital convivial approach recognizes that in digital space, actors interact with other actors (both humans and objects), such as through action to “tag content with metadata, label information with relevant details, and reply to participants and developers” (Potts, 2014, p. 7).

Principle of Digitality

Digitality is the process of objects residing in a digital rather than physical form, and how this digital form shapes, creates, distributes, and associates information online. A digital form can be “digitized materials” (Rogers, 2013, p. 15), such as material that has been “digitized and scanned and uploaded to a digital medium (such as scanned photographs from World War II mounted on a website . . .)” (p. 15). Conversely, a digital form can be “natively digital objects” (p. 19), such as hyperlinks, tags, metadata, webpages, posts, and other digital objects. In this way, an ANT digital convivial approach tries to account for the digital form of an object (including how it was composed), as well as how this digital material assembles, organizes, and influences technology (e.g., algorithms, machine learning, AI).

Principle of Materiality

Materiality is the collective action that is generated by the tangible and/or intangible things/objects/matter/ideas/data/stuff/nonhumans, as well as humans, that assemble to create something. To account for a things’s materiality (i.e., whether it be the materiality of a technology company or the materiality of its technologies), an ANT digital convivial approach

tries to disclose the processes that “things experience as they materialize in differing spatiotemporal configurations” (Gries, 2015, p. 86).

Principle of Agency

“Agency, better thought of as actancy, is a distributed, dynamic dance enacted by diverse entities intra-acting within and across assemblages” (Gries, 2015, p. 87). Agency is found in the collective assemblage of actors. For instance, neither the action of humans, nor the action of objects, is what produces action. Instead, action is the result of the collective assemblage enacted across actors (i.e., whether human-to-human, human-to-object, object-to-human, object-to-object). An ANT digital convivial approach discloses an actor’s emergent associational actions.

Principle of Collectivity

Collectivity is the way material exerts force as it moves “in and out of various assemblages and trigger[s] diverse kinds of change” (Gries, 2015, p. 86). An ANT digital convivial approach tries to account for how actors “reassemble collective life” (p. 124) and “induce assemblage . . . by attracting various heterogeneous entities to assemble in open-ended collectives” (p. 124).

Thought Style of an Actor-Network Theory Mindset

According to Fleck (1979), a thought style is how those from a particular thought collective tend to think. To be clear, in the context of this study, I am talking about the thought style of the human researchers who are conducting an ANT investigation. I am not discussing the thought style of the other actors (humans and objects) that are participating in the collectives under observation. In this way, a thought style creates constraints and accountabilities surrounding how a researcher is to think about, as well as collect, analyze, and write about actors (Gries, 2015; Phelps, 2003). Building on this understanding, and in the case of my study, I am

referring to the specific way that digital scholars, with an ANT mindset, think about actors (e.g., data/material/objects/assemblages/networks) as this is vital to establishing my thought style surrounding digital conviviality. An ANT thought style is predominately found within qualitative research, and as such, it is helpful first to explore the various thought styles of qualitative researchers. Therefore, I will now discuss the qualitative research paradigms that are heavily influenced by Descartes and Kant.

The Qualitative Paradigm

Egon G. Guba and Yvonna S. Lincoln (1994) identify four competing paradigms within qualitative research: (1) positivism; (2) post-positivism; (3) critical theory, including poststructuralism, postmodernism, and a combination of both; and (4) constructivism (p. 105). Guba and Lincoln believe that each of these paradigms impacts inquiry, interpretation, knowledge, policy, and other practical issues in research. For instance, according to Guba and Lincoln, positivists believe that humans can only know that which is measurable, and as such, there is only one single objective reality to any phenomenon. Based on this, positivists examine ‘the way things are’ through a dualist perspective (e.g., subject versus object). Conversely, and according to Cook and Campbell (1979), post-positivists believe that to truly explore a phenomenon, quantifiable measurement of one reality is not the answer. Post-positivists believe that an event (which includes human behavior, human attitude, and human feeling) has multiple perceptions of one reality, and as such, must be explored through a critical realist perspective. Critical realism “assumes an objective reality but grants that it can be apprehended only imperfectly and probabilistically” (Guba & Lincoln, 1994, p. 111).

Moving beyond post-positivism is the critical theory paradigm. According to Guba and Lincoln (1994), critical theory can be divided into three parts: poststructuralism, postmodernism,

and a combination of poststructuralism and postmodernism. Critical theorists argue that a phenomenon has multiple perceptions of one reality that are embedded within the political, social, cultural, economic, ethnic, and gender issues within society. Based on this, critical theorists use historical inquiry (historical realism) as a lens to examine the viewpoints of historicists (i.e., those who wrote the history), in addition to the political, economic, and social stratification context of the time. Historical realism recognizes that an event may be interpreted differently depending on one's role in that event (i.e., an individual who experienced the event versus that of a historian and/or a researcher).

Moving away from the ideologies of realism (i.e., one perception of a singular reality found in positivism and many perceptions of one reality found within post-positivism/critical realism and critical theory/historical realism), is constructivism and its tenets surrounding relativism (i.e., individual perceptions of multiple realities). According to Denzin and Lincoln (2011), constructivists believe that a phenomenon may afford numerous perceptions of multiple realities, which are embedded within the human-created social constructs (of reality). In this way, constructivists use an interpretive approach to examine the social construct exchanges between researcher and participant. For instance, constructivists believe that people exercise agency, whether individually or collectively (i.e., people in positions of power and authority, including the elites), to determine their reality. Within this line of reasoning, to understand social reality, scholars must first examine the beliefs and actions of people and second interpret meaning from those practices.

While I have just described the basic tenets of the thought styles prevalent throughout the qualitative paradigm, it is important to note that many scholars have challenged these qualitative thought styles. For example, quantitative researchers consider qualitative research to be a soft

science that lacks analytical rigor (Fontana & Frey, 1998). Qualitative research has been criticized for only focusing on “description” (Vidich & Lyman, 2003, p. 60), as well as described as “primitive” (Huberman & Miles, 1998, p. 188) or “thin” (Denzin, 1998, p. 324). Moreover, as I previously stated in Chapters 3 and 4, contentious debates surrounding the modern paradigm have led several scholars from a variety of fields (e.g., science and technology, sociology, feminism, media, art, politics, ecologies, and more) to develop new paradigms or thought styles. These new ways of thinking include posthumanism and its off-shoots, such as new materialism, object-oriented ontology (OOO), ANT, and so forth. Posthumanists challenge the dualist perspectives that once separated humans and nonhumans into opposing categories, believing that the modern paradigms privilege humans over nonhuman things. Thus, posthumanists are open to the potential importance that nonhuman objects play in a phenomenon action.

While it is worthwhile to overview the thought styles prevalent in both the qualitative and new posthumanist paradigm, it is also necessary to discuss the various methods that have been used to conduct qualitative research. Several common approaches include ethnography, interviews, observation, and textual analysis. Though each of these methods, as well as those not mentioned, are valuable to qualitative studies, I wish to discuss how ethnography has been used and changed over time to pave the way for scholars to research digital space. For instance, ethnographic research has shifted according to time and space as it has moved across multiple disciplines. Ethnography was once a colonizing strategy used to monitor foreign people. It evolved into a scheme designed to compare and generalize cultures and later into an approach used to describe society and culture. Let me explain these transformations.

According to Vidich and Lyman (2003), ethnography originated out of sociology and anthropology. Ethnography is “a social scientific description of people and the cultural basis of

their peoplehood” (p. 60). Early ethnography was considered a methodological tool used by colonialists to control a community by teaching them how they should live according to their colonialist perspectives. Later, the development of comparative method ethnography shifted the focus of ethnographic research from tactics centered around domination toward approaches that provided a cultural comparison. Comparative method ethnography allowed researchers to examine cultures not as individual actors, but as classified niche groups. Using this approach, researchers compared groups to other cultures and drew vast generalizations and assumptions about the cultures under examination. Ethnographic research has now moved toward studying the evolution of a culture. For instance, modern-day ethnographic research requires investigators to be mindful of their values and to ponder their motivation in doing a particular ethnographic study on a specific culture or community. Investigators are now required to relate and ground their ethnographic study to previously used theories and research strategies.

Advancements in technology, first in photography, film, and audio recording, and more recently in computers, the Internet, and AI, have made it so ethnographic studies can be conducted in physical *and* digital space. However, these changes to how ethnographic research can be conducted have not come without a cost. For instance, the practice of researching digital space (e.g., digital ethnography) has complexified the practice and implications of ethnography. An example of such complications can be seen in the use of social media. Aaron Sorkin, the writer of the film, *The Social Network*, stated: “Facebook is a performance” (quoted in Colbert, 2010, 6:45). Sorkin continued by saying: “socializing on the Internet is to socializing, what Reality TV is to reality” (quoted in Colbert, 2010, 6:45, 7:35). In this context, what Baudrillard (1983) would describe as a “simulacrum” (p. 170) (i.e., a hyperreality), humans use social media to manipulate digitized artifacts to create or portray a simulacrum of their reality.

In other words, people use Facebook and other forms of social media to perform a crafted version of their life: a performed hyperreality of self. In this way, online digital artifacts can represent a constructed version of reality. Based on this, when conducting research online (i.e., digital research), it is essential that researchers understand the facets of digital space, including digital culture and how participants define themselves online. To further explain this concept, I turn now toward a discussion of the actions that an ANT researcher can take when exploring digital space. I will use van Gogh's *The Starry Night* (as it is located within Google's digital ecosystem) as my guide to illustrate the facets of digital space.

Research Actions of an Actor-Network Theory Mindset

A vast number of convivial collective activities involving *The Starry Night* are traceable across Google's ecosystem. For instance, I could have studied the painting as a visual text, which could "be read, decoded, and interpreted *within* specific contexts" (Gries, 2015, p. 87, emphasis in original). However, I chose to investigate how this painting and other objects, such as Google's business model and technologies, serve as vital actants that are "*productive of* space (and time) as they materialize, flow, and intra-act with a variety of entities in and across various assemblages" (p. 88, emphasis in original). Based on this, a method I have designed called digital convivial tracking with a design science (DS) approach and an actor-network theory (ANT) mindset can recover such relational digital convivial activities. ANT digital convivial tracking attends to distinct yet co-implicating factors, such as the participatory culture, digitality, materiality, and agency of an organization's technology, as well as the conviviality, and collectivity of an organization's structure (i.e., mission and business model). In the next chapter, I will explain how digital convivial tracking can be deployed to conduct digital convivial research of tech titans.

To empirically account for the complex and distributed process of the organizational structure and conviviality of digital space, digital methods that employ ANT can be beneficial. These methods try to account for how a wide variety of actors flow, link, change, generate and break down a broad range of collective actions. Moreover, while thinking collectively about how actors form associations can be advantageous, actual research strategies that put ANT thinking into productive practice are necessary. Further, and as I previously mentioned in Chapter 4, ANT accounting can pose certain restrictions to a study. For example, ANT can be seen as limited by its openness or endless network possibilities. According to McLean and Hassard (2004), such openness can result in a study lacking a defined methodological framework and a precise order of who to follow, who not to follow, who to include, and who to exclude from a study. Moreover, and according to Bruni (2005), ANT does not provide clear methodological indications other than “to learn from the actors without imposing on them an a priori definition of their world-building capacities” (p. 358; quoting Latour, 1999, p. 20).

Drawing from these ideas, and to potentially mitigate these limitations, a researcher must have a clear understanding of ANT’s thought style. While the next chapter describes a specific method I call digital convivial tracking (useful for putting these principles into action), in the rest of this chapter, I discuss how specific ANT research tools can be used to account for digital conviviality empirically. In the forthcoming sections, I will describe research activities including following abstractions, tracing associations, embracing uncertainty, and describing translations (Callon, 1986; Gries, 2015; Latour, 2005) of digital conviviality.

Following Abstractions

The research action of “following the actors” (Latour, 2005, p. 16) is what Latour defined as abstraction. The idea of following is closely tied to the research action of tracing actors to look

for actor associations. In this context, following abstractions requires the researcher to select an initial actor starting point, and then, use that actor to identify other participating actors. This process will help the researcher identify collective actor assemblages. Similarly, tracing actors involves the researcher observing the linkages “between mediators that may generate traceable associations” (p.108). Latour claimed that following actors makes it “so that actors are allowed to unfold their own differing cosmos, no matter how counter-intuitive they appear” (p. 23).

According to Gries (2015): “Following, to be specific, is a research strategy that can help discover how collectives are held together by the interactions of various actants — human and nonhuman, material and semiotic, individual and institutional” (p. 90). Therefore, the research strategy of following actors from association to association is not meant to be used as a tool to *explain* the networked collectives based on associations. Instead, the act of following allows the researcher to explore how single objects circulate throughout an ecosystem, which can give insight into the various material transformations, consequences, and collectives the object enters. In this way, researchers can explore actor associations and follow them to other associations to identify collective assemblages. Researchers can use these assemblages to *describe*, or as Latour (2005) stated, translate the network, because these actors “leave traces of activity that can be empirically investigated and used to identify their unique spatiotemporal configurations” (Gries, 2015, p. 90).

An example of abstraction, or following the actors, can be illustrated in the art of interviewing a participatory actor of an ecosystem. The research activities of following abstractions involve beginning with a broad research question, and then, using the interviewee’s answer to guide additional questions. For instance, if I were to map the network of the musical production *Wicked*, I might interview Gregory Maguire (1995), author of *Wicked: The Life and*

Times of the Wicked Witch of the West. I might start the discussion by asking, “Why did you feel the need to retell the story of *The Wizard of Oz*, yet from a different perspective?” In Maguire's response, he might declare that Elphaba, the Wicked Witch of the West, was grossly misunderstood and therefore, her side of the story needed further explaining. Using this response, I might recognize the notions of a person being misunderstood and ask, “Why do you think Elphaba was misunderstood?” Maguire might discuss perceptions of societal prejudice against her green skin. This response may spark interest in the color green and allude to a critical mediating actor—the color green. Additional questioning might lead to descriptions of Elphaba being a boundary object between *The Wizard of Oz* and *Wicked*, as well as how the word ‘wicked’ was a leviathan or meaning across both networks. Based on this example, the method of following abstractions can produce stories that are rich with context because it allows researchers to follow actor associations and the narratives within those linkages.

It is important to note that the action of following the actors can bring forth challenges in a study because it limits the amount of control a researcher has over where the study ends up. For instance, a network has multiple links, which means it is made up of other networks. Further, a network can also participate in other networks, which creates a sort of network boundlessness. In this way, the limitlessness of networks poses challenges for an ANT study as its linked connections are potentially in constant movement and flux. A researcher can combat the messiness of ANT research, however, by heeding Latour's (2005) advice regarding “matters of concern” (p. 114), which is the idea of embracing uncertainty (a topic I discuss in more detail in a forthcoming section). In this context, a researcher must set initial boundaries around an examination, while recognizing that additional networks exist within such confines as well as span outside those restrictions. Further, a researcher's willingness to embrace uncertainty will

also help her not to use an *a priori* mindset in the study. Latour (2005) claimed that self-defined boundaries will help establish an adequate study with a scope limited by research questions. Nonetheless, it is important to also understand that while placing boundaries around a study is important, these boundaries must be somewhat fluid and may change according to various actor associations. “In this sense, the image [object] shows us [researchers] where to draw the boundaries of our case studies” (Gries, 2015, p. 93).

Tracing Associations

The research action of tracing associations is what Latour (2005) defined as actor associations within a network. It is a point-to-point connection of actors wherein their links are physically traceable. Thus, these traceable associations are displayed in the form of activity:

The focus of research here, then, is not so much on the internal properties of the . . . thing [object] but rather on the multiple, external traces of activity paths it leaves behind as it enters into various associations (Gries, 2015, p. 94).

Latour (2005) believed that these traces of activity, or action, are not the product of one actor. Instead, the action is a “moving target” (p. 46) made up of the collection of “a vast array of entities swarming toward” (p. 46) a production or construction. In this way, a traceable activity can be thought of as an intra-action (Barad, 2007) of diverse material entities dynamically participating in forming collectives. An ANT digital convivial approach is useful because it traces an object’s emergent associational actions. It allows a researcher to examine how material agentially influences collectivity.

Examples of tracing associations can be found in the work of Richard Rogers (2013). For instance, and as briefly touched on in Chapter 2, Rogers (2013) used network mapping to explore how “natively digital” (p. 19) hyperlinks represent the linking tendency across actors in digital space, and how these associations influence the position of actors online. His approach examined

“network politics, especially those that could be seen as configurations of transnational, highly mobile actors, who are, in a sense, based in networks” (p. 54). He called these links an organization’s “public displays of connections” (p. 44) online.

Rogers claimed that there had been two distinct approaches to dominate the study of hyperlinks: “hypertext literary theory and social network theory, including small world and path theory” (p. 29). Researchers use these approaches to examine *how humans use hyperlinks* to navigate online text, which further informs researchers on *how hyperlinks tell a story* that is narrated by the user. According to Rogers and other ANT scholars, however, the problem with exploring *how humans use hyperlinks to tell a story* is that this approach affords humans all the agency in constructing the online narrative, which negates the interconnected role that nonhumans play within an information network.

Rogers (2013) argued that instead of *studying how people use hyperlinks to tell a story*, researchers should consider *how search engines use hyperlinks* to position actors online. These actors might be a website, a blog post, an image, a story, a company, and so forth. Further, and to examine *how search engines use hyperlinks* to position actors online, researchers must follow the actors to see which actor posted the hyperlink, as well as to discover the actors that the hyperlink connects. Based on this, the researcher should follow abstractions to examine what types of hyperlinks the new associated actor posts, to see whether these hyperlinks reference the initial actor or additional actors. Moreover, when following abstractions and tracing associations, it is important to consider what kind of actors are doing the hyperlink posting, as well as what kind of actors are receiving the hyperlinked post.

Rogers (2013) investigated how sociotechnical systems privilege certain actors (e.g., organizations and content) over others. He explored what was “happening off-network” (p. 54),

such as what relationships occurred within the back-end, or behind the black boxed network, at Google. His investigations included using his “political network mapping of web space” (p. 54) tool to decipher how organizations, such as Google, position various actors online through the hyperlinks they provide. He analyzed the types of linking associations provided and found that “[t]here is a certain optionality in link-making” (p. 44). In this way, “[m]aking a link to another site, not making a link, or removing a link may be viewed, sociologically or politically, as acts of association, nonassociation, or disassociation, respectively” (p. 44). In other words, when an actor posts content online and uses a hyperlink to another actor, this link demonstrates “public displays of connection” (p. 44) between the posting actor and the linked actor.

However, Rogers found that not all links are created equal—some links are more powerful than others. This importance is determined by which organizations are creating the link and which organizations are receiving the link. Under this line of reasoning, the types of organizations that link to an actor dramatically affect how that actor is positioned in search results (Rogers, 2013). For instance, links from a government or education organization are more important to enhancing an actor’s reputation than links from an individual actor. Further, the linking tendencies of various organizations (e.g., corporations, governments, education institutions, nonprofits entities), as well as their linking trends carry a specific weight. For example, governments often only linked to other governmental sites, and corporations likely only linked “internally, to themselves” (Rogers, 2013, p. 44). Conversely, “[i]ndustry alliances, business organization NGOs, or front groups” were the actors that tended to provide “public interest' links” (p. 44) to other corporate actors. Similarly, Beaulieus (2005) found that actors were profiled not just by *the number of links* provided and received by an actor, but more importantly, by *the types of links* provided and received by an actor.

This natively digital ANT approach of tracing associations provides researchers with a method to understand how human-nonhuman actors participate within a network. This process examines the linking tendencies of human actors (e.g., an individual blogger) and nonhuman actors (e.g., corporations, governments, search engines, etc.) and what these linking trends mean, especially regarding the reputation of individual actors. In this context, an actor's reputation is defined as its hierarchical return within search results (i.e., if the actor has a stronger online reputation, the actor will be higher in search results). When researchers follow abstractions and trace associations in digital space, they can see how the back-end structure of a search engine's algorithm works in tandem with the front-end structure to position certain actors online.

Embracing Uncertainty

The research action of embracing uncertainty is what Latour (2005) defined as “matters of concern” (p. 255). For instance, Latour (2005) states that when thinking about things/objects/material/nonhumans, we should not think of them as “matters of fact” (p. 255), which are transparent things that we take for granted. Instead, we should think of them as “matters of concern” (p. 255), which are dynamic things that associate and transform into collectives. Therefore, researchers must be flexible as they think about things. Matters of concern also require the researcher to examine her role in the study, and “[a]s a rule, it's much better to set up as the default position that the inquirer is always one reflexive loop behind those they study” (p. 33).

Matters of concern also encourage a researcher to establish parameters around a network. Because there are an infinite number of networks to study, the researcher must decide which networks to map. Further, the researcher becomes a part of those networks. Therefore, she must be open to how her role determines the networks under investigation and be careful not to

impose too much order beforehand. In relation to this idea, Latour (2005) stated: “ANT claims to be able to find order much better after having let the actors deploy the full range of controversies in which they are immersed” (p. 23). Thus, the researcher must be comfortable in the messy uncertainty of the ANT approach, as well as be able to embrace ambiguity as she follows abstractions and traces associations to observe collective assemblages.

Describing Translations

According to Latour (2005), researchers must not think of themselves as divine revealers of information, but rather, as descriptive translators of the actors working within the network. The research activities of describing the network is what Latour (2005) referred to as translation. Translation is the observation of linkages “between mediators that may generate traceable associations” (p. 108). Translation also questions the assumed direction or perhaps disrupts the direction of cause and effect. “This is where [ANT] got the strange idea that the social was to be explained instead of providing the explanation” (p. 108). In other words, translation is when the researcher traces the associations between controversies and writes a descriptive narrative account of the linked associations that transform to create a stable, or not so stable, network. The researcher does not *explain*, instead, she provides a *description*.

In this context, Latour (2005) stated that the “task of defining and ordering the social should be left to the actors themselves, not taken up by the analyst” (p. 23). Latour (2005) claimed a successful ANT account is not “closed by one hegemonic version of one kind of matter of fact claiming to be what is present in experience” (p. 118). In this way, a *good* ANT account can be described as follows:

If I had to provide a checklist for what is a good ANT account—this will be an important indicator of quality—are the concepts of the actors allowed to be stronger than that of the analysts, or is it the analyst who is doing all the talking? As far as writing reports is concerned, it means a precise but difficult trial (Latour, 2005, p. 30).

Therefore, the goal of ANT translation is not letting the researchers' lens dominate the description. Instead, the goal of a *good* translation should be a rainbow perspective colored with the actors' own perspectives.

This Dissertation's Thought Style Using an Actor-Network Theory Mindset

As stated, I believe ANT resides in the posthumanist paradigm. Based on this, the investigation of the Google Cultural Institute (GCI) ecosystem is a techno-cultural study situated within a posthumanist paradigm ontologically informed by material relationality. My study is also greatly influenced by Osterwalder and Pigneur's (2010/2013) business model canvas (BMC), which originated from design science (DS) located within the field of information systems (IS). Gregg et al. (2001) argued that DS may be situated in an independent paradigm (e.g., socio-technologist/developmentalist paradigm). Similarly, posthumanists also seek a paradigm outside of the traditional paradigms. Thus, this study is situated in a combined socio-technologist/developmentalist and posthumanist paradigm. Conversely, Gregg et al. (2001) also stated that DS might not be located within a specific paradigm, and instead, it may be an approach that can be used within multiple paradigms. Following this logic, it could be argued that my study could also be considered as situated within a posthumanist paradigm utilizing a DS approach and an ANT mindset.

Based on these assessments, I used a design science (DS) approach with an actor-network theory (ANT) mindset within the posthumanist paradigm to explore the socio-material actors of the GCI. I put the principles of digital conviviality and the research actions of ANT into practice as I examined the digital conviviality of the institute's ecosystem. I provide a detailed description of my digital convivial tracking with a DS approach and an ANT mindset methodology in the next chapter. However, it may prove helpful to spend the last part of this

chapter outlining the scope of my study. In the forthcoming sections, I will discuss the sample and recruitment tactics that were utilized, the tools and ethical guidelines that were employed, and the measures that were taken to ensure that my study was of quality (i.e., valid and reliable).

Research Sample

I adhered to Latour's notion of abstraction or "following the actors" (p. 16) and set distinct boundaries around my study. These boundaries helped me identify my initial sample, as well as safeguard against limitations caused by ANT. My initial sample involved identifying specific points of entry into the GCI ecosystem. These entry points were specific actors that required further examination and would potentially point toward additional actors through associations. To determine the first actor, I utilized Spinuzzi's (2008) ANT research, which traced documents created by an organization throughout the company's ecosystem. Following this, I identified documents that were created by Google and/or its GCI. My initial sample, which served as entry points into the network, consisted of various documents about GCI initiatives. These Google documents included arts and culture posts found on Google's blog, *The Keyword*, as well as an academic article (Seales et al., 2013) and a work presentation (Patarin, 2014) about Google and the institute. I will explain how I followed the actors to identify these documents.

The first documents were arts and culture posts on Google's blog, *The Keyword*. These blog posts on the arts and culture topic (which will be referred to as Google Arts & Culture [GAC] blog), promote the arts and culture initiatives of the GCI and its GAC. These documents were found by typing "Google arts and culture blog" into Google Chrome's search box and clicking on Google's *The Keyword* (blog.google.com). I selected those words as my starting point because I wanted to find documents created by the organization (Spinuzzi, 2008).

Generally, blog posts on a company's website are written by employees; however, this is not always the case and therefore I had to confirm the authorship of posts.

The Keyword, which was launched in 2016, is a searchable database that hosts all previous and future blog posts predominately written by Google employees about Google happenings. According to Google Editor-in-chief Emily Wood (2016), the goal of *The Keyword* is to “bring you more stories and tell them in more ways — stories about our products and our people, our ideas and our inspiration, the world inside Google and the world around us” (para. 7). Readers can find posts on *The Keyword* in two ways: by searching the full database using the search icon box at the top of the webpage or by choosing from a variety of topics (e.g., Arts & Culture, Causes & Community, Connected Workspaces, Diversity, and more) found on blog.google/topics.

A key post on the GAC blog is “Taking a minute to enjoy some art on World Art Day,” written by (at the time) Google Art Project (GAP) Director Amit Sood (2013), who has now become the GCI director. In this post, Sood discussed van Gogh's (1889d) *The Starry Night* (see Figure 1, p. 1), and how it was considered to be the most popular painting among Google art viewers. Sood also mentioned that the painting is the most frequently posted artwork within GCI user galleries, as close to 400 users (395 at the time of Sood's article), had included *The Starry Night* in a personal gallery. Based on the artifact's iconicism, as well as Gries's (2015) advice that tracking an iconic object throughout a digital ecosystem can help a researcher to understand the material relationality within a networked collective, I was further intrigued by the masterpiece. In this way, the painting became a useful mediating actor or boundary object to help explore the digitality, materiality, and participatory processes across network associations. Also, within Sood's (2013) post, I was invited to view van Gogh's *The Starry Night* on the GCI

platform, as well as within various users' digital galleries. In this context, as well as also building on Potts's (2014) research to explore the user experience architecture and online participatory culture of an ecosystem, it became apparent that *The Starry Night* could potentially afford insight surrounding the GCI's digitality (including its digitization process) and participatory nature.

Based on this research, *The Starry Night* painting was selected as a mediator to explore the digital conviviality of the GCI ecosystem. It served as the vehicle for exploring the organizational structure (business model and mission/value proposition) of the system, as well as the digitality, materiality, and participatory culture of its technologies. Through following *The Starry Night* across the institute's network, two associational GCI documents surfaced (note: these documents were written by Google researchers and employees and mentioned *The Starry Night*). These documents include (1) an academic article, "From Assets to Stories via the Google Cultural Institute Platform" (Seales et al., 2013) and (2) a work presentation, "Working at Google: The example of the Cultural Institute" (Patarin, 2014).

The scholarly article—written by visiting researcher Dr. W. Brent Seales, and GCI engineers, Steve Crossan (GCI founder), Mark Yoshitake (GCI Project Manager), and Sertan Girgin (GCI Software Engineer)—discussed the institute's storytelling initiative, which was to tell compelling stories through digitized cultural artifacts. Further, this article illustrated how the GCI digitized and contextualized data, including the digitization of van Gogh's (1889d) *The Starry Night*. This article also identified several vital GCI actors. These included human actors such as Dr. W. Brent Seales, Steve Crossan, Mark Yoshitake, and Sertan Girgin. The article also involved cultural object actors, including van Gogh's (1889d) iconic painting *The Starry Night*, Bletchley Park, Paris, and France. Lastly, it encompassed technological object actors, such as the institute's inference engine, asset ingestion, metadata extraction, knowledge database, scale, and

democratization tools to help the GCI tell stories about culture. Moreover, while each of these actors designated a unique network trail, I followed van Gogh's *The Starry Night* across the GCI platform to discover how the painting affected collectives, as well as was influenced by systems. I also examined how the artwork illuminated how the institute afforded, or did not afford, participatory user experiences.

The second Google document, a GCI presentation offered by Dr. Simon Patarin (2014), technical lead and engineering manager at the GCI, was a PDF of slides that outlined the history of the institute, as well as the current features and goals of its platform. Patarin's (2014) presentation also mentioned how the GCI's "pilot integration with search" (p. 21) process utilized *The Starry Night* to "[b]ring content to Google users" (p. 21). Further, its three-step Platform Data Flow process was described. The first step included the act of publishing content. It was centered around the GCI establishing relationships with cultural partners and encouraging those organizations to digitize their artifacts. In this way, the first step involved the GCI helping organizations upload their digitized artifacts to the GCI platform, as well as assisting in the creation of original metadata around these cultural objects. The second step focused on the curation of digitized content. It specifically centered around how curators of cultural organizations must be encouraged to create stories surrounding their digitized collections. Lastly, the third step involved inspiring users to consume the digital content. It focused on technologies that could engage users to consume content, design personal user galleries around the content, and share those collections with their friends (p. 16). Based on my analysis of Patarin's (2014) presentation, I discovered that the institute's partners, curators, and user networks, as well as its association with Google, were vital participants that should be examined.

As I have just described, my sample began by abstracting actors from actor associations. My analysis supports the idea that *The Starry Night* served as a boundary object across these actor documents, thus, linking various actor-networks together. Moreover, participatory actors were identified based on initial associations found within the aforementioned Google documents. Based on these associations, I decided to interview the authors of these GCI documents, as well as ask them to introduce me to other actors with whom I should converse and/or observe. Based on this intel, I interviewed Dr. W. Brent Seales and Dr. Simon Patarin.

It is important to note that I also reached out to Google employees (Amit Sood, Steven Crossan, Mark Yoshitake, Sertan Girgin), as well as curators of cultural partner institutions (Lauren Nemroff at the Metropolitan Museum of Art). Unfortunately, I was unable to conduct interviews with these principal actors, and while I had hoped to interview more vital actors, my attempts were unsuccessful. While I can only make assumptions, I wonder if they undoubtedly receive numerous requests for their time. Importantly, I would like to point out that I was not solely reliant on the opinions of these interviewees. I was fervently aware that I needed to follow actor associations as they appeared. Based on this, I understood that I was designing a digital research methodology, which involved tracing objects across digital ecosystems, and therefore, recognized that interviews were not the focus of my methodology. Based on this, I made sure to explore a multitude of actors (both humans and objects) and collectives that were associated with *The Starry Night*.

Research Recruitment Tactics, Ethics, and IRB Approval

Before I reached out to participants, I acquired approval from Colorado State University's (CSU) Institutional Review Board (IRB). I submitted IRB documents in April 2017 and received expedited approval on May 8, 2017. See Appendix A for copy of the IRB approval

form. Since all interviewees were over the age of 18, I did not need additional IRB approval for working with minors. Once I received IRB approval, I contacted all potential participants and requested participation in the study. See Appendix B for a copy of recruitment materials. During this communication, I set up appointments for interviews and asked participants to complete an informed consent form. See Appendix C for a copy of the informed consent form. Within the informed consent form, I advised participants about guidelines of the study. Additionally, the informed consent form included several features. First, layered consent to allow participants to decide how to be identified in the research (e.g., by name, altered name, or pseudonym). Second, whether images could be taken during the interview and later presented or published. Third, if I could re-contact the participants for follow-up questions. Fourth, whether participants authorized the conversation to be audio and video recorded. Fifth, if participants would permit me to use personal quotes and how those quotes could be used in my research.

For the interviews that I did conduct, I used Google Hangouts, a video communication platform, and Apple's computer screen recording function to speak with participants and record our conversations. I started each interview with a summarized purpose of the study and reiterated all informed consent information. See Appendix D for a summary of the interview script with fundamental questions. I conducted interviews using a semi-structured approach, beginning with broad questions and using the interviewee's answer to guide additional questions. This method produced stories that were rich with context and allowed me to follow actor associations.

The conducted interviews lasted 60 minutes. The interview recordings allowed me to later observe the body language, tone, and gestures of the participants. Subsequently, these recordings assisted in my analysis and translation process as they provided more in-depth data surrounding the central, anchor, and supporting actors and their associations within the GCI

ecosystem. Also, I took detailed field notes surrounding my interview experience, noting the time in the interview where specific comments were made. These records included personal reflection on the research process, themes emerging from the data, and notes about participatory actors, actor associations, and the GCI landscape. Further, I did not initially transcribe the recordings. I felt that an overall transcription was not necessary because my research approach was not interview-based, and as such, I was not conducting a content analysis of themes surrounding the actors mentioned in each interview. As mentioned, I did take detailed notes during the interview, and later, returned to the recordings to transcribe specific topics and/or conversations that I wished to revisit and/or highlight in my narrative.

Participants were invited to contact me via email with any follow-up thoughts or questions. They were also informed that I might follow-up via email with additional questions or request clarification. All data collected was stored securely on my password-protected personal laptop within the password-protected Google Docs digital software. Further, all consent forms were saved in a separate, password-protected folder on my laptop. Lastly, all data has been securely stored according to the safety precautions and time restrictions required by CSU's IRB.

Quality of Study

In social science research, the credibility of a study is assessed by its validity (i.e., the study accurately measures what it set out to measure), as well as its reliability (i.e., the study is consistent in its measurement and can be repeated). However, these terms are predominately used to determine the strength of positivist quantitative research. In qualitative research, the focus is more on the quality of a study, specifically, its trustworthiness (validity) and rigorousness (reliability) (Lincoln & Guba, 1985; Markham & Baym, 2009). According to Markham and Baym (2009), a qualitative study is considered trustworthy (valid) when the

researcher uses appropriate means to gather and interpret the data. Similarly, Lincoln and Guba (1985) argued that a qualitative study is considered of quality and demonstrative of rigorous research (reliable) when the researcher displays dependability in measurement. In other words, a reasonable person could assume that if she or he engaged in the same research exercise, she or he would reach similar conclusions.

According to Markham and Baym (2009), a researcher can apply the following nine research approaches to demonstrate that a study is of quality. First, the researcher must ground the study in theory and data. Second, the researcher must discuss her knowledge of the research area and how she obtained such knowledge. Third, the researcher must explicate her methodological decisions and procedures. Fourth, the researcher must remain unbiased with data collection and analysis. Fifth, the researcher must exercise reflexivity in her role within the study. Sixth, the researcher must triangulate the data collection and analysis process. Seventh, the researcher must demonstrate rigor in the data collection and analysis process. Eighth, the researcher must discuss the participants' perspectives. And ninth, the researcher must examine the associations between the digital and physical space in which the research was situated.

Therefore, to ensure the overall quality of my study, I adhered to most of these research approaches. For example, I was cognizant of my sample selection and adhered to Latour's (2005) notion of abstraction to select initial entry points. Following initial actor selection, I continued to "follow the actors" (p. 16) by identifying actor associations. This approach ensured that I identified the various networks in which the painting participated, as well as the different social-material collectives participating with the artwork. Further, this awareness included setting specific boundaries around this study. I was reflexive in my sample selection and recognized the generalizability limits of my research. While my sample collection is too small to be

representative of the entire GCI network, methodological researcher Janet Salmons (2015) stated that representativeness is not as crucial in qualitative studies (p. 118). Instead, qualitative studies undergo a more in-depth examination, which returns thick description and results.

Based on this, I demonstrated rigor in my data collection by focusing on Latour's (2005) concept of matters of concern and was reflexive in my approach to, and situation within, the research network. I tried not to take on a divine revealer role by providing explanations, but instead, participated as a descriptive storyteller by narrating the observed actor associations. Moreover, I observed relationships between the digital and physical space of the *GCI-The Starry Night* network and interweaved participant perspectives throughout my narrative as best as I could. I also grounded my research within ANT by working tirelessly to gain a strong understanding of ANT's explication and then situating my investigation accordingly. Thus, in preparing for this dissertation, I worked with Dr. Timothy Amidon, dissertation committee member and digital rhetoric scholar, to explore how various sociotechnical researchers, specifically Gries (2015), Potts (2014), and Spinuzzi (2008), have used ANT in their research. Also, I worked with Dr. Joseph Champ, dissertation advisor and ANT media scholar, on a science communication study using ANT. Furthermore, Dr. Champ and I presented initial ANT findings at the European Group for Organizational Studies (EGOS) in Copenhagen, Denmark on July 6-8, 2017. At this three-day international conference, we met with ANT scholars, such as Dr. Keith Guzik (member of my dissertation committee), and discussed the theory and methodology surrounding ANT and digital methods. Therefore, I designed this dissertation study with those ANT approaches, methods, influences, and experiences in mind.

I conducted triangulation according to the paradigm in which my research was situated. Qualitative researcher Rosaline Barbour (1998) stated that it is imperative to define triangulation

from the investigator's perspective within each paradigm. For example, if my study were situated in a realist paradigm (i.e., paradigms such as post-positivism, which explores critical realism, and critical theory, which examines historical realism), I would have needed to examine multiple perceptions of a single reality (Healy & Perry, 2000). Conversely, if my study were located within a relativist paradigm (i.e., a constructivism mindset), I would have needed to examine the perceptions of “multiple realities that people have in their minds” (Golafshani, 2003, p. 604). In this way, relativist research would require that I employed “multiple methods of searching or gathering data” (p. 604).

However, my study was situated within a posthumanist paradigm, which is arguably not a part of the traditional qualitative paradigms. Based on this, I explored the relational social-material associations across actors. Therefore, sufficient triangulation and crystallization were achieved as I examined the social-material relationality of different actors and their actor associations. These actors included looking at various data sources. I examined the Google ecosystem including the activity within the GCI ecosystem, including the *GCI* website and *GAC* website, as well as the *GAC* mobile application, and various *GAC* social media platforms (e.g., *The Keyword* blog, Google +, Twitter, YouTube). I also examined Google divisions that were directly linked to activity with *The Starry Night* and the GCI. This included exploring websites of research happenings at Google (e.g., Google Brain Team), various Google divisions (e.g., Google Maps, Google Cardboard, Google Daydream, Google DeepDream, Google Tilt Brush, etc.), and various posts on *The Keyword* blog. I also investigated Google research articles, such as Seales et al. (2013), and presentations, such as Patarin (2014).

Further, I explored a variety of participatory actors within the GCI ecosystem (e.g., Google creators/employees, partner institution decision-makers, partner curators, users,

technology, artifacts, images). I also examined the Museum of Modern Art (MOMA) ecosystem, including its website and social media. Moreover, I used digital convivial tracking, a methodology I devised of various digital and physical methods (e.g., interviews, digital tracking, and business model investigations), to study relational associations and discover the materiality, digitality, participatory nature, and collectivity of the GCI ecosystem. Lastly, during my interviews, I adhered to Latour's (2005) concepts of abstraction and association as I used broad open-ended interview questions, and followed actor associations as they surfaced.

Concluding Thoughts

In summary, I followed abstractions by allowing starting point actors to emerge. These Google documents include arts and culture blog posts on *The Keyword*, Seales et al.'s (2013) GCI article, and Patarin's (2014) GCI presentation. I selected each document due to its traceable associations with each other across *The Starry Night*, as well as to help establish initial, yet flexible, boundaries around my study. Once initial actors were identified, I traced controversial associations as I observed linkages across actors. These linkages highlighted centrally located and supporting participatory actors, as well as the strength of actor associations. For example, the critical actor serving as a boundary object and linking these Google documents together was Vincent van Gogh's *The Starry Night* painting. In this way, the artwork became an excellent actor to guide me through my digital journey across the GCI ecosystem.

Further, I adhered to Latour's (2005) discussion on "matters of concern" (p. 114) to recognize the role I played in choosing the networks to study and attempted to remain "one reflexive loop behind" (p. 33) the actors in the study. As I translated the network, I constantly reminded myself of Latour's (2005) advice that I should not act as divine revealer depicting cause and effect within the network, but instead, act as descriptive storyteller translating actor-

networks. I employed translation to identify the associations between actors and, to the best of my ability, wrote a descriptive (not causal) account of these relationships. As laid out in the four-part case study that follows, I devote the body of each chapter to describe the GCI (the company making the tools) and its technological tools (the tools themselves). I explore how Google's business model organizes digital space, as well as how its technology influences the digitality, materiality, and participatory culture across digital space. A summary of the subsequent chapters follows.

Chapter 7: Describes the materiality of *The Starry Night* painting and its webbed association across the MOMA and GCI. Further, this chapter explores the organizational structure of the institute and its technologies by evaluating its business model canvas. This chapter provides a birds-eye-view of the GCI's value propositions in an attempt to discover how such value influences the cultural landscape.

Chapter 8: Illustrates the GCI's customers, including its key customer segments, central customer channels, and ways the institute established customer relationships. This chapter also explores how Google's technologies provide actors a variety of participatory cultural experiences with *The Starry Night*, as well as across humans, technology, and other cultural artifacts.

Chapter 9: Describes the GCI's business infrastructure, including its shift in leadership, critical partnerships, central resources, and key activities. Further, this chapter translates the GCI's digitality process. Specifically, it explores how Google's technologies work to broadly circulate and transform *The Starry Night* across the Google ecosystem, including its digitization, identification, group categorization, and transmission of shared experiences across digital space.

Chapter 10: Illustrates the financial aspects of the GCI's business model canvas. This chapter examines how the institute provides value to Google. It also explores if and how the GCI manipulates human users for the sake of their tools. Issues surrounding art, technology, computer visualization (CV), artificial intelligence (AI), machine learning (ML), deep learning (DL), and artificial neural networks (ANNs) are discussed.

When paired with the ANT principles described at the beginning of this chapter, the research performance of following abstractions, tracing associations, embracing uncertainty, and describing translations, can help researchers conduct ANT digital research. In this context, Gries (2015) believes that these tools “can help scholars negotiate these methodological difficulties so that more realistic accounts of visual rhetoric [digital conviviality] can be generated” (p. 104). Through digital convivial tracking with an ANT mindset, researchers can use the thought style (Fleck, 1979) of ANT to examine a technology organization's dynamic dimensions. Based on this, scholars can explore the principles of (1) conviviality, (2) participation, (3) digitality, (4) materiality, (5) agency, and (6) collectivity, found within digital conviviality. In the next chapter, I will explain how digital convivial tracking with a design science (DS) approach and an actor-network theory (ANT) mindset can be implemented when conducting this vital tech titan conviviality research.

CHAPTER 6: DIGITAL CONVIVIAL TRACKING

A book on ANT, written by ants for other ants, has no other aim than to help dig tiny galleries in this dusty and earthly one (Latour, 2005, p. 124).

In Chapter 5, I discussed six principles that illustrate an actor-network theory (ANT) digital convivial mindset. Further, I articulated four research actions that will help scholars explore technology and cultural actors and how they contribute to collective action. Together, these principles and actions make up digital conviviality's guiding assumptions:

- To examine the organizational structure of digital space, we must follow actor associations as they ebb and flow in and out of assemblages, leaving behind traceable actor activity.
- To embrace uncertainty, we must use nimble flexibility as we think about *things* while always remaining one reflexive loop behind the actors in the study.
- To describe the linked associations between controversies that create a stable or not so stable network, we must paint a rainbowed perspective that is colored with views from participating actors, instead of *a priori* researcher opinions and explanations.

However, while these principles and actions are beneficial, they do not describe a transparent research method that can be used to collect, organize, and analyze the consequentiality of actors, such as *The Starry Night* or the Google Cultural Institute (GCI). Therefore, regarding methodology, scholars can explore the conviviality of technology organizations, especially, those that “dig tiny [digital] galleries in this dusty and earthly one” (Latour, 2005, p. 124, digital emphasis added), when they use methods designed to do such work. I propose that digital convivial tracking with a design science (DS) approach and an ANT mindset is a tool which can aid in explorations of conviviality in digital space.

Digital Convivial Tracking in Practice

The digital conviviality of a technology organization includes the organizational structure of the company, as well as the technological tools it creates. To investigate the digital conviviality of the GCI's ecosystem, I examined its business model, including its mission and value propositions, as well as interacted with its technological tools. This approach allowed me to observe how the institute digitizes and transforms actors, as well as to investigate how it affords participation *with* actors across its ecosystem. To conduct such digital conviviality work, I designed a new digital method, which I call digital convivial tracking with a DS approach and an ANT mindset. This approach was built on tools designed to assist in the investigation of an organization's mission and business models, such as Osterwalder and Pigneur's (2010/2013) business model canvas (BMC). It was also developed on the foundational digital methods work that utilizes ANT, such as Gries's (2015) iconographic tracking and Potts's (2014) participant-centered investigation of digital culture.

My conception of digital convivial tracking emerged while exploring various object circulation studies, specifically those focused on how actors participate in digital space (Gries, 2015; Olson, 2004; Potts, 2014). Similar to Gries's (2015) conclusion surrounding methods used to track an image's circulation throughout digital space, I found that most object circulation studies lacked truly detailed instructions regarding how the researcher was to collect, organize, and analyze object data. To address this lack of research transparency, I looked to Gries's (2015) steps for conducting iconographic tracking with a new materialist approach and an ANT mindset as an example of a well-designed and clear methodological explanation. I found Gries's plan to be outlined nicely, which made it easy for me to understand how to "collect, organize, analyze, and visualize . . . how a single multiple image [object] flows" (p. 108) across an ecosystem.

Building on Gries's (2015) approach, I added ways to investigate the digital conviviality of an organization by exploring not only the materiality of its technology but also its digitality process and the participatory culture of its technology. Additionally, I included steps to analyze the organization's mission and business model. Similar to Gries's methodological goals, mine were to design a digital method that adheres to ANT's principles of following abstractions, tracing associations, embracing uncertainty, and describing translations throughout an ecosystem. Drawing from Gries's approach, I recognized that I must be as transparent and descriptive as possible throughout my research process and finding illustrations. Therefore, while using digital convivial tracking with an ANT mindset, I explored how the iconic painting, *The Starry Night* (1889d), circulated throughout the GCI. I examined how the artwork persuaded and affected actor-networks (e.g., organizations, technology), as well as how these actor-networks influenced the painting. To enhance clarity, I will explain how I conducted this investigation to explore, record, and visualize the GCI's organizational structure and technologies in an attempt at describing the institute's overall digital conviviality.

Research Steps of Digital Convivial Tracking

Digital convivial tracking employs traditional qualitative methods, as well as innovative digital methods. While Gries's (2015) iconographic tracking approach is broken into four phases, digital convivial tracking is conducted in five: R1, Data Collecting; R2, Data Grouping; R3, Data Multiplying; R4, Data Exploring; and R5, Data Analyzing, Visualizing, and Describing. Similar to iconographic tracking, digital convivial tracking is a non-linear, messy, and reciprocal process. For example, when conducting digital convivial tracking, a researcher may move from the first phase of data collection onto the second phase of data grouping even before she has fully completed her collection of data. Conversely, the researcher may return to the first phase of

research before moving onto the third phase, and so forth. Further, and also similar to Gries's (2015) iconographic tracking, the following qualities will assist a researcher in conducting digital convivial tracking. First, the researcher must be flexible as she ebbs and flows between each research phase. Second, the researcher must be creative in how she traces objects throughout an ecosystem. And third, the researcher must be transparent when describing her research steps, including her data collection, organization, analysis, and visualization processes. I will now explain the step-by-step approach of the five-phase process of digital convivial tracking.

R1: Data Collecting

Similar to iconographic tracking, the first phase of digital convivial tracking involves finding and collecting digital data of the object under investigation (Gries refers to this phase as data hoarding). During this phase, the researcher should use a web search engine that has "image-search capabilities" (Gries, 2015, p. 110), such as Google, and pair it with a search software plug-in, such as Zotero. This technology combination will allow the researcher to collect digital content from the web browser by taking "web page snapshots" (p. 111) of the data, and saving those captures to Zotero's platform to later be organized, analyzed, and visualized. Further, this approach allows the researcher to initially create a large dataset surrounding the object, which will allow her to identify various object trends and patterns, such as the "materialization (form, medium, genre), location, collective activity, and consequentiality" (p. 111) of an object. **The goal of this phase is to collect a vast assortment of the object's data while not following a particular manifestation or individual research trail of that object.**

For example, when gathering data for my study, I employed Google's Chrome platform coupled with Zotero's plug-in to search for images of *The Starry Night* painting across Google's GCI ecosystem. Additionally, I ensured that I only searched using Google as my search engine.

Because my initial entrance point was Google's blog post: "Taking a minute to enjoy some art on World Art Day" (Sood, 2013), I first gathered images from this post by taking web screenshots and saving them to Zotero's platform. When I saved the image to Zotero, I documented various verbal data (e.g., texts, links, audio) and visual data (e.g., images, colors, shapes, composition, and more). Subsequently, I inputted information about the capture into the Zotero system, including the URL, author, date, and descriptive tags. This approach helped me to later pinpoint specific themes, patterns, and trends in the data.

Following the initial image captures, I clicked on hyperlinks within the blog post, which led me to subsequent platforms containing images of the painting (e.g., GCI's *GAC* website). Additionally, I typed "The Starry Night" into *The Keyword's* search box to find articles and images of the painting. This search returned four results. I explored each article, documenting images by taking screenshots and saving the image and its metadata to Zotero. Once these blog post images were collected, I moved onto the *GAC* website to collect additional image data. I typed "The Starry Night" (using the quotations) into the *GAC* search box, which returned 3 stories; 5 items; 1 related collection; and 237 user galleries. Similarly, I explored the "van Gogh" and "MOMA" webpages on the *GAC* website. I took screenshots of the images of the painting across these spaces and saved them to Zotero for later analysis. Following image collection from the *GAC*, I followed the artwork to the *MOMA* website and repeated the process. I reminded myself that the goal of this phase was to collect vast assortments of the image and not to follow a particular manifestation of the image, or monitor one single research trail of the data.

R2: Data Grouping

Similar to iconographic tracking, the second phase of digital convivial tracking involves loosely grouping the data into subsets (Gries refers to this phase as data mining). Initial steps of

data grouping involve sifting through the vast amount of data saved to the Zotero database in R1 and identifying specific “patterns, trends, and relationships” (Gries, 2015, p. 111). Once these patterns are identified, the data are tagged and placed into specific folders within the Zotero database. Zotero’s organization tools help the researcher identify the “transformations in terms of form, media, location, genre, and so forth...collective activities ...and changing rhetorical functions” (p. 112) of the object. **The goal of this phase is to organize the data into folders, to generate terms and tags, and to set temporary research boundaries around the data. It is important to note: this phase is not for analyzing or drawing conclusions about the data.**

For example, in my dissertation data collection, following the import of a vast assortment of images to Zotero, I began to group the images based on relationships. Using Zotero, I sifted through and organized the data into various folders and tags. I created an organizational structure as I identified the transformations of *The Starry Night*, precisely the “form, media, location, genre, and so forth...collective activities ...and changing rhetorical functions” (Gries, 2015, p. 112) of the images. My tags included the following:

- **Tags about *The Starry Night*:** “Starry Night painting”; “Starry Night related works”; “Starry Night installation view”;
- **Tags about the MOMA:** “Starry Night at MOMA”; “Starry Night MOMA Exhibitions”; “Van Gogh Colors of the Night MOMA exhibition”; “MOMA Art Course Online”; “MOMA bookshop”; “Art Collector”;
- **Tags about Google and its GCI:** “GCI blog”; “GCI platform”; “GCI technology”; “Google and GCI technology”; “Google technology”; “Google Research Blog”; “GCI exhibits”; “GCI partner”; “GCI user galleries”;

- **Tags about technology, art, and culture:** “machine learning and art”; “artificial intelligence and art”; “virtual reality and art”; “digital art transformation”; “digital art pastiche”; “digital representation”; “digital participatory culture”; “CULTURE”; “DIGT”; and so forth.

As I created tags and folders, I also fashioned temporary boundaries around my study. These restrictions included only examining the following digital spaces: Google’s blog posts, the *GCI* website, the *GAC* website, the *GAC* mobile application, *GAC* social media, and the *MOMA* website. I frequently had to remind myself that this phase was not for data analysis.

R3: Data Multiplying

Similar to iconographic tracking, the third step of digital convivial tracking involves conducting several controlled data searches to diversify and multiply the data collection (Gries refers to this phase as data diversifying). Following Gries’s (2015) recommendations, diverse searching should include using new search terms across various search engines, social media sites, and computers. Additionally, the words that were identified during the data grouping phase (R2) should be used to search across multiple search engines/platforms. In R3, the researcher could use search-engine options to help narrow the search (i.e., the images, shopping, videos, books, and more opportunities found underneath the search box of a Google search). During this phase, the researcher should move back and forth between data multiplying (R3) and data grouping (R2). **Furthermore, the goal of this phase is for the researcher to begin identifying “particular networks of collectives in which the [object] has played a major role” (Gries, 2015, p. 113). This approach will help the researcher decide which of these collectives to carefully investigate during the next phase of research, (R4) data exploring.**

For example, following the generation of tags and temporary boundaries around the painting, I moved onto multiplying my data. Thus, I conducted a more controlled data search that diversified and expanded my data collection. I used various social media platforms of the GCI/GAC (e.g., YouTube, Facebook, Twitter, Google +, and Instagram) to search for “*The Starry Night*.” As I was collecting and expanding my research database, I moved back and forth between data multiplying (R3) and data grouping (R2). I identified specific network collectives in which the painting “played a major role” (Gries, 2015, p. 113). These networks included the GCI website, GAC website and mobile application, Google blog posts, Google Research activities (i.e., GAC Experiments, Google Brain Team, Google DeepDream), Google products (i.e., Google Cardboard, Google Daydream, Google Tilt Brush), and the MOMA (and its media).

R4: Data Exploring

It is here, in phase 4, where iconographic tracking and digital convivial tracking diverge. The fourth step of digital convivial tracking involves the researcher doing an in-depth exploration into specified collectives (Gries refers to this phase as data-diving). Similar to iconographic tracking, this step allows the researcher to determine the various networks that the object participates *with*, as well as the different actors (humans and objects) that are engaging with the object. For example, in my study, after I finished the data multiplying (R3) and data grouping phases (R2), I conducted a deep-dive analysis of the GCI ecosystem. This dive was compiled of Google entities, such as Google divisions (i.e., Google entities associated with the institute, identified through Google blog posts, research, YouTube, social media), and GAC entities (i.e., the GAC website and mobile app, and its social media). It also included the MOMA network (i.e., MOMA website, its social media, and the “MOMA” page on the GAC website).

This exploration helped me to determine the various networks that *The Starry Night* participated in and the different actors (humans and objects) that engaged with it.

To examine these uniquely identified collectives, Gries (2015) recommends that the researcher attend to the material processes of the object. However, while it is essential to explore the materiality of an object, during the investigation of the digital conviviality of a technology organization, it is also essential to examine the company's organizational structure (including its business model, mission, and value proposition). Further, researchers must consider the materiality, digitality, and participatory culture of, as well as afforded by, the organization's technology. It is important to note: because each of these concepts is interrelated, they may potentially experience overlap. However, each should be examined separately when conducting a case study focused on digital conviviality.

To provide additional background on this research process, I will explain precisely how to evaluate the digital conviviality of a technology organization through the investigation of its Digital Convivial Business Model Canvas (DCBMC). In this way, the DCBMC includes exploring the company's business model (which includes its organizational structure, value proposition/mission, customers, business infrastructure, financials, technology, and leadership), as well as the materiality, digitality, and participatory culture of its technology.

Digital Convivial Business Model Canvas (DCBMC)

To investigate the organizational structure of a technology company, including its business model, mission, and value proposition, a researcher can use an ANT mindset to create a business model canvas (BMC; Osterwalder & Pigneur, 2010/2013). As previously mentioned, the mission of an organization is critical to the business model, as it allows the organization to develop topsight concerning its overall vision, strategic goals, and value proposition (Alt &

Zimmermann, 2001). Further, the value proposition “is the reason why customers turn to one company over another. It solves a customer problem or satisfies a customer need” (Osterwalder & Pigneur, 2010/2013, p. 22). By exploring the mission, value proposition, and business model of an ecosystem, a researcher can investigate the value aspect of conviviality, precisely, whether the tech titan’s potential focus is to use its technology to enhance society or to manipulate society for the sake of its technology (Illich, 1973).

As discussed in Chapter 2, Osterwalder and Pigneur’s (2010/2013) BMC is a tool that was designed to aid an investigator (e.g., a manager, entrepreneur, researcher) in visualizing the organizational structure of a system. The BMC accomplishes this by helping the researcher identify the principal actors that participate in the organization’s central activities, which can be broken into nine sections. These sections include the following: (1) customer segments, (2) value propositions, (3) channels, (4) customer relationships, (5) revenue streams, (6) key resources, (7) key activities, (8) key partnerships, and (9) cost structures. The nine segments of the BMC are also sometimes broken into four distinct categories. These categories include the following: (a) the value proposition, which may include its mission, motto, and/or the value provided to customers; (b) the customers, including customer segments, customer channels, and customer relationships; (c) the business infrastructure, including critical partnerships, key resources, and vital activities; and (d) the finances, including revenue streams and cost structures.

Moreover, while the BMC acknowledges actors in a business model, it predominately examines the human actors in the system (see Osterwalder, 2004, section 5.1.6 Business Model Actors, p. 116-117). And, while the BMC does describe specific object actors within a business model (e.g., software, website, physical capital, company brand, money, technology), more attention could be given to how these objects afford the networked activities of a tech company. I

am referring here to those actors that are sometimes (potentially) overlooked, such as objects (nonhumans) and their substantial impact on an ecosystem. Based on this, researchers must pay particular attention to how objects are linked with humans to create social-material entities within the building blocks of the BMC network. This conception is built on Zolnowski et al.'s (2011b; 2012) and Zott et al.'s (2011) critiques of Osterwalder and Pigneur's (2010/2013) BMC, precisely, that customer integration and co-creation of value are missing from the BMC.

Therefore, I propose that Potts's (2014) participant-centered investigation with an ANT mindset should be employed alongside Osterwalder and Pigneur's (2010/2013) BMC approach. When these tools are used together, a researcher could discover a more balanced spectrum of participating actors and activities within the ecosystem. Based on this analysis, to successfully conduct a BMC with an ANT mindset, the researcher must examine all actors (both the humans and objects) that are participating in the ecosystem. However, when examining the digital conviviality of a technology company, an investigation of the participatory culture, digitality process, and materiality aspects of the company and its technologies must be included. In this way, I propose an extension of Osterwalder and Pigneur's (2010/2013) BMC to include two-additional building blocks—participatory culture and digitality. I call this approach the Digital Convivial Business Model Canvas (DCBMC; see Figure 7). I also propose a separate materiality canvas (see Figure 10), which I describe further below.

The DCBMC is compiled of 11-building blocks, which include the actors and activities within a technology company. Similar to how these categories were divided within the BMC, the building blocks of the DCBMC include the following: (a) the value proposition, which may include its mission, motto, and/or the value provided to customers; (b) the customers, including customer segments, customer channels, customer relationships, and participatory culture; (c) the

business infrastructure, including critical partnerships, key resources, vital activities, and digitality processes; and (d) the finances, including revenue streams and cost structures.

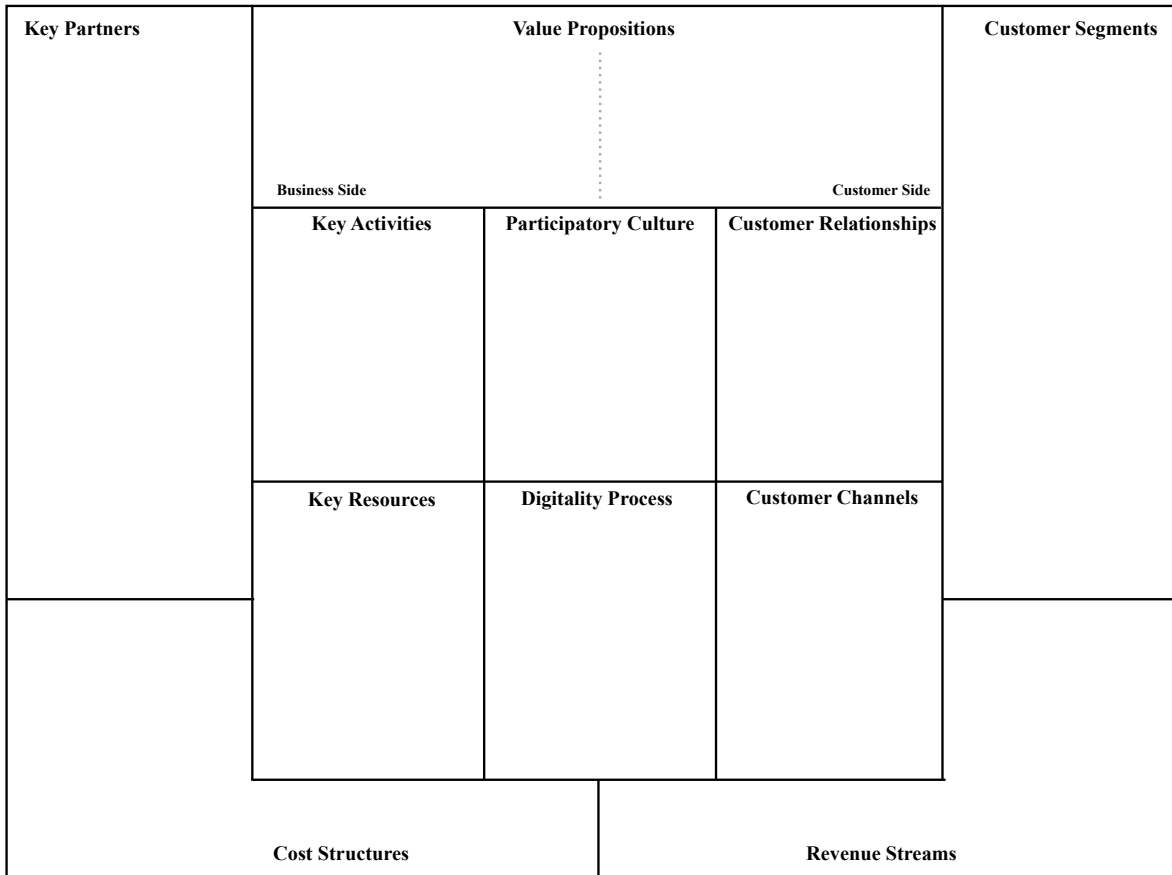


Figure 7. Digital Convivial Business Model Canvas (DCBMC).

To help ensure that an ANT mindset is employed when conducting a DCBMC, researchers can draw from Potts’s (2014) ANT diagrams and place their own ANT map creations within each of the 11 segments of the DCBMC. They can also place these maps within the seven segments of the materiality canvas. I will discuss the ANT map-drawing process in a forthcoming section titled “R5: Data analyzing, visualizing, and describing.” To help illustrate how researchers can use the DCBMC, I must discuss the two new segments placed on the canvas: the participatory culture and digitality process of a tech company.

DCBMC: Participatory Culture. Using the DCBMC and an ANT mindset, a researcher can conduct a participant-centered investigation of a company’s digital culture (Potts, 2014) to explore how its ecosystem enacts actors across its system (both physically and digitally). This approach can be used to understand the digital participatory culture of an ecosystem. It can be used to examine the participatory aspect of conviviality, including how humans participate *with* technology tools to interact with other objects and humans within a social web ecosystem.

According to Potts (2014), a participant-centered investigation “involves researching, analyzing, and participating in the various technologies, people, environments, systems, and so forth that the users are engaging with to reach their goals” (p. 21). Further, a “participant can be any actor within a given network— a person, technology, organization, website, document, event, and so on—or any combination of these actors” (p. 25). Participatory exchanges can occur between humans and objects such as “between people and technologies” (p. 25). In this way, objects, especially technology, are essential tools to aid human work and must be examined during a participant-centered investigation of a digital system’s participatory culture. I designed the seven-concept mnemonic *CULTURE* (Create, Use, Locate, Teach, Unite, Reason, Expose) to analyze whether the participatory culture of a social web ecosystem provides participation across humans as well as with culture (such as with cultural objects). This tool involves asking the following questions.

1. Create: does the platform provide support for content creation for the user and producer?
2. Use: is the platform easy to use (user-friendly) and accessible (available with low barriers for participatory engagement)?
3. Locate: does the platform provide a prominent place for demonstrating and encouraging ideas (about arts and culture)?

4. Teach: does the platform provide mentorship instruction for novices and access to mentorship from (arts) masters?
5. Unite: does the platform help unite participants through social connections to other participants, as well as to other objects, ideas, etc. (arts and culture)?
6. Reason: does the platform provide a space where participants believe that their contributions matter?
7. Expose: does the platform provide continued exposure to other content and ideas (i.e., such as to other art and culture)?

See Figure 8 for a breakdown of the participatory culture segment within the DCBMC.

<p>Create</p> <p><i>Does the platform provide support for content creation for both the participant and producer?</i></p>				
<p>Use</p> <p><i>Is the platform easy to use (user-friendly) and accessible (available with low barriers for participatory engagement)?</i></p>	<p>Locate</p> <p><i>Does the platform provide a prominent place for demonstrating and encouraging ideas?</i></p>	<p>Teach</p> <p><i>Does the platform provide mentorship instruction for novices and access to mentorship from masters?</i></p>	<p>Unite</p> <p><i>Does the platform help unite participants through social connections to other participants, as well as to other objects, technologies, etc.?</i></p>	<p>Reason</p> <p><i>Does the platform provide a space where participants believe that their contributions matter?</i></p>
<p>Expose</p> <p><i>Does the platform provide continued exposure to other content and ideas?</i></p>				

Figure 8. Participatory Culture segment within the DCBMC.

I designed this analysis tool based on Henry Jenkins’s (2009, 2012) evaluations of digital participatory culture and James Bau Graves’s (2005) steps necessary for culture to remain vital and participatory. When I evaluated these two approaches side-by-side, I recognized a significant

crossover concerning how a social web ecosystem is participatory (i.e., allows actors to participate with other actors; Jenkins, 2009) and how it affords people participation with culture (i.e., allows actors to engage with culture; Graves, 2005). For example, Jenkins's (2009) definition of participatory culture claimed that participation is possible when the following conditions are met. First, the barriers to civic engagement are low. Second, support for the creation and sharing of content is available for both the participant and producer. Third, informal mentorship instruction is available for novices. Fourth, members believe that their contributions matter. Moreover, fifth, members feel a social connection (pp. 5-6; see also Potts, 2014, p. 25). Similarly, Graves (2005) stated that for people to be able to participate in culture, the following four opportunities should be provided. First, people should have routine and predictable access to masters. Second, there must be a prominent public platform available for demonstrating and abstracting heritage. Third, people must have continued exposure to other cultures. Moreover, fourth, the support for culture must be comprehensive and long-term.

When I combined these two approaches, by placing similar concepts into one category, I designed *CULTURE* as a tool to analyze whether a social web ecosystem is both: (a) participatory because it allows objects to participate collectively, such as humans working *with* technology; and (b) provides cultural participation, allows people/objects to participate with cultural objects. For example, in my study, I used *CULTURE* to explore the participatory culture of *The Starry Night* and its associations found throughout the GCI ecosystem. Therefore, I followed *The Starry Night* across the GCI, and paid particular attention to how the institute provided participatory interactions with this painting, what these interactions were like, and what actors were involved in this participatory process.

DCBMC: Digitality Process. Before I describe how to investigate the digitality process of an ecosystem, I wish to reiterate the definition of digitality. As mentioned, I define digitality as the process of objects residing in a digital rather than physical form, and how this digital form shapes, creates, distributes, and associates information online. The digital form can be materials that are digitized, as well as material that is “natively digital” (Rogers, 2013, p. 19). Thus, an object's digitality involves how its digital form was created, as well as how digital materials assemble and organize collectives. Put more simply: digitality is the entire process from object digitization to online collective sharing, including how the physical material was digitized, identified, grouped, and transmitted into digital space. Based on this, I have developed the following mnemonic to discuss the entire digitality process: *DIGT* (digitize, identify, group, and transmit). *DIGT* can be used as a tool to examine how an ecosystem transforms material that is tangible into material that is digital and then contextualizes that digital material into information that can be shared as knowledge across a digital ecosystem.

Based on this definition, a researcher can use an ANT mindset to investigate the *DIGT* of a digital ecosystem. For example, in the case of the GCI, *DIGT* can be used to first explore how Google digitizes *The Starry Night* painting (i.e., through the employment of technology, the physical painting is captured and turned into digital material). Second, the researcher can examine how the GCI identifies the digital material by contextualizing it with metadata. Third, the researcher can investigate how the institute groups the metadata into categories to establish a verified database of digital information. Fourth, the researcher can observe how the GCI transmits this information as knowledge across its ecosystem so that others can experience it. These four processes are outlined as follows:

1. **Digitize:** Physical material is transformed into a digital material.
2. **Identify:** Digital material is contextualized through use of natively digital tools, such as metadata, tagging, coding, and so forth, which turns the material into information.
3. **Group:** Contextualized digital information is verified as accurate and placed into groups and categories to establish a knowledge database.
4. **Transmit:** Validated contextual digital knowledge is expressed across the digital ecosystem so that others can experience it.

See Figure 9 for an overview of the digitality segment within the DCBMC.

<p>Digitize</p> <p><i>Physical material is transformed into digital material.</i></p>	<p>Identify</p> <p><i>Digital material is contextualized through use of natively digital tools, such as metadata, tagging, coding, and so forth, which turns the material into information.</i></p>
<p>Group</p> <p><i>Contextualized digital information is verified as accurate and placed into groups to establish a knowledge database.</i></p>	<p>Transmit</p> <p><i>Validated contextual digital knowledge is expressed across the digital ecosystem so that others can experience it.</i></p>

Figure 9. Digitality segment within the DCBMC.

I designed this analysis tool based on Potts's (2014) description of data transformation, Spinuzzi's (2008) concept of networks, and Gries's (2015) approach to materiality. While Potts

described content transformation as a three-step process: locating data, validating data into information, and sharing information as knowledge, I see it as a four-step process: digitizing material, identifying material into information, grouping information to establish a knowledge database, and transmitting knowledge so that others can experience it. To further explain this new method, I will describe each phase of *DIGT* in more detail.

The first phase of *DIGT* is *digitize*. During this phase, the physical material is transformed into a digital material. This digitization process is predominately completed through some form of technology, such as a camera, video, scanner, or so forth. The digitization of material does not include the identification (which is the next phase) of the digital material; it is just the initial capture of the physical material. Additionally, during the digitization of a physical object, an actor may establish itself within the network and become an essential anchor actor necessary for solving network problems. This anchor actor may be the digitized material, but it may be something else, such as a human. In the case of digitization, essential actors would include the physical object to be digitized, as well as the technology to be used and the human who will be using the technology to capture the object digitally.

Next, during digitization, the anchor actor elicits interest from different actors to participate in the network, which instigates the beginning of network stabilization and establishes the anchor actor and its helpers. In the case of digitization, initial actors identify other actors necessary to help digitize the artifact. Digitization might include other humans (i.e., a museum curator, owner of the object, the creator of the digitization technology) and other objects (i.e., lighting, technology, artifacts). Additionally, location decisions surrounding where the material will be digitized and where the digitized material will be stored are decided.

It is important to note: while decisions surrounding where the material is to be digitized are made during the digitization phase, in other *DIGT* phases, these location discussions may shift. For instance, during the identification phase, location decisions might involve where the material will be identified with contextual metadata (such as a digital repository). In the group phase, location decisions might include exploring where the material will be verified and grouped (such as a digital database). In the transmit phase, location decisions might explore where digital information will be transmitted and shared (such as on a website, mobile application, social media, and so forth).

Further, actors negotiate roles and form partnerships with other actors. Thus, “actors accept the new system and coordinate action” (Potts, 2014, p. 62). In the case of digitization, negotiations are made surrounding what objects will be digitized first, what technology will be used, who will use the technology, and so forth. Following these negotiations, the activity is carried out (i.e., a human curator uses the camera to digitize a sculpture). Once the action is completed, “the group becomes greater than the sum of its parts” (p. 63) and begins to form a network. In the case of digitization, once the artifact is digitally captured, its network is (arguably) greater than all the single participating actors (i.e., the technology, the object, the human using the technology, and so forth) that created the digital material network. The digital material network then moves from the digitization phase to the identify phase where the contextualization of data begins.

The second phase of *DIGT* is *identify*. The identify phase involves the labeling of digital material so it can be contextualized into information. To start the data contextualization process, participants must discover context surrounding the material. This context may include who or what created the material, where it was created, what the material refers to, and so forth.

Contextualization may be presented in the form of changeable or mutable material. Participants work collectively with the material to contextualize it into data through various processes, such as generating “natively digital” (Rogers, 2013, p. 19) hyperlinks, hashtags, meta tags, and so forth, to label the data (enrolment). Moreover, once the identification of the digital material becomes greater than the sum of its parts, the identification of the digital material network moves from the identify phase to the group phase.

The third phase of *DIGT* is **group**. The group phase involves verifying the metadata as correct and transforming the data into information. Further, this phase also includes grouping the information into categories to create a knowledge database. During this process, “actors accept the new system and coordinate action” (Potts, 2014, p. 62) by working together to form partnerships. Through negotiations of different actor roles, specific actors are designated to inform, collect, and confirm the contextualization. Because this validation is happening with digital data, these actors need a significant amount of technology training to find, create, contextualize, and validate the data. Additionally, these actors are working in a mutable space to validate contextualized material and move it to information. This process shifts mutable (changeable) mobiles into designated immutable (unchangeable) mobiles. Through the creation of unchangeable and definitive context around the material, the now contextualized material is changed into information. Once immutable mobiles are established, information can be scaled and shared as knowledge during the transmit phase of *DIGT*.

The fourth phase of *DIGT* is **transmit**. The transmit phase involves transmitting the digital information as knowledge across an ecosystem to allow others to experience the content. This transmission of knowledge can be accomplished through various digital tools, such as a website, mobile application, blog, video, social media, and digital reality (virtual, augmented,

and mixed reality). The transmit phase relies heavily on the back- and front-end infrastructure of the sociotechnical system. Additionally, across transmit the formation of a black box of “networks within networks” (Potts, 2014, p. 43; Latour, 1999) is attempted to hide the complexity of the network’s transformative workings behind a simple network interface. For example, an established black box conceals actor associations, linkages, and complexities behind the appearance of a stable and straightforward network. It is important to note: during any of the *DIGT* stages, actors can self-select to become spokespeople for the group and share the immutable information as knowledge both within the network and across other networks.

With an understanding of *DIGT*, researchers can explore how digital ecosystems are using humans and technology to digitize material, create natively digital objects surrounding that material, and share and circulate the material across its network. I used this process to explore the GCI’s digitization process. Using the Seales et al. (2013) article as my guide, as well as information from interviews with Dr. Simon Patarin and Dr. Brent Seales, I investigated how the GCI moved through all stages of *DIGT*. Specifically, I considered how the institute digitized material, identified digital material, grouped digital material into information, and transmitted information as knowledge to create digital experiences. This approach allowed me to describe the stable or not so stable system of the GCI-Starry Night network.

I have now described the steps within the digitality process and how I employed them in my analyses. In the forthcoming sections, I will further illustrate how a researcher can investigate the materiality of objects within a tech company using a materiality canvas.

Materiality Canvas

As presented in my DCBMC illustration, there is not a unique building block for materiality. Materiality is not included within the DCBMC because the concepts of materiality

tend to overlap with several segments of the DCBMC. For instance, the concepts of production and distribution within materiality can be considered key activities within a company as they involve several actors to ensure an object is produced and distributed. These actors might include critical partners, finances, customer channels, and customer segments within the DCBMC. Similarly, the concept of transformation within materiality can be attributed to several building blocks within the DCBMC, such as customer segments, customer channels, key resources, key activities, digitality, participatory culture, and/or critical partnerships. In this way, materiality has its own canvas and can be seen in Figure 10, which I designed based on Gries’s (2015) discussion of materiality. The canvases for materiality and digital conviviality can be examined in conjunction to help researchers understand how the organizational structure of a company influences the materiality of objects.

<p>Transformation</p> <p><i>How an object changes as it comes into contact with other actors and collectives. This changes might include shifts in purpose, function, design, medium, form, and so forth.</i></p> <p>3 Actions</p>		<p>4 C's</p>	
<p>Distribution</p> <p><i>How an object is moved throughout an ecosystem through the intentional activity of actors (objects, technology, humans, and so forth).</i></p>	<p>Production</p> <p><i>The action of actors, including that of technologies, objects, and humans, that brings the design of the object into a material form.</i></p>		<p>Composition</p> <p><i>The intended design of an object, including the purpose of the design as well as the design itself.</i></p>
<p>Collectivity</p> <p><i>How an object negotiates, influences, attracts, and assembles other actors into networked action.</i></p>		<p>Consequentiality</p> <p><i>The meaning of an object, which is established by the way that object interacts with actors (humans and objects) and how those interactions spark consequences.</i></p>	

Figure 10. The Materiality Canvas.

Based on the materiality canvas, and the work of Gries (2015), a researcher can explore the materiality of an object (e.g., an image, artifact, technology, organization). In this way, a scholar can attend to “seven interrelated material processes — composition, production, transformation, distribution, circulation, collectivity, and consequentiality” (Gries, 2015, p. 113). These seven processes, however, are not linear. Moreover, while multiple material activities happen simultaneously, each should be examined in a single case study. Therefore, when focusing on one material entity, such as composition, it is imperative to consider the other six material processes simultaneously. When the researcher explores all aspects of the material process, the various life-cycle stages and ways an object has been remixed in the marketplace can potentially become apparent.

The seven materiality processes are as follows:

1. **Consequentiality:** The meaning of an object, which is established by the way that object interacts with actors (humans and objects) and how those interactions spark consequences.
2. **Composition:** The intended design of an object, including the purpose of the design as well as the design itself.
3. **Production:** The action of actors, including those of technologies, objects, and humans, that brings the design of the object into a material form.
4. **Distribution:** How an object is moved throughout an ecosystem through the intentional activity of actors (objects, technology, humans, and so forth).
5. **Transformation:** How an object changes as it comes into contact with other actors and collectives. These changes might include shifts in purpose, function, design, medium, form, etc.

6. **Circulation:** The way an object travels throughout an ecosystem.
7. **Collectivity:** How an object negotiates, influences, attracts and assembles other actors into networked action.

Within my study, I explored all seven aspects of the materiality processes of *The Starry Night* in hopes that the various ways it has been remixed in the marketplace would become apparent. I found it helpful to “consider how digital technologies, copyright laws, new ideas about participatory culture, social media, and so forth are influencing design as well as the other material processes” (Gries, 2015, p. 115) of the painting. I interweave the findings from these seven processes throughout my case study results chapters.

I have just described how a researcher can conduct and create a DCBMC and a materiality canvas. I believe it is essential to discuss how researchers can create additional visualizations to aid their analysis and data comprehension. Thus, I turn now toward a description of the last phase of digital convivial tracking with an ANT mindset, R5: Data Analyzing, Visualizing, and Describing.

R5: Data Analyzing, Visualizing, and Describing

The last step of digital convivial tracking involves creating a system to analyze, visualize, and describe the data (Gries refers to this phase as data visualizing and recording). Building on Gries’s logic, to analyze, visualize, and describe the digital conviviality of a technology organization, it is necessary to develop systems that help the researcher visualize and record the data. Within the early stages of analysis, it is helpful to map out actor associations through the creation of ANT diagrams (Potts, 2014). These ANT diagrams can be used to demonstrate the technological collectivity processes of digitization, participation, and materialization. Further, these ANT diagrams can be placed inside the DCBMC to illustrate the technology organization’s

mission (value proposition) and overall business model. I will now explain the analysis process of creating visual ANT diagrams within segments of the DCBMC and materiality canvas.

ANT diagrams can be used to illustrate and analyze associations across actors. These diagrams can be created to describe the participatory culture, digitization process, and materiality of the organization's technology. Following the creation of such maps, they can also be placed inside a DCBMC to illustrate the mission, value proposition, and overall business model of a technology organization. Further, these maps can also be placed inside the materiality canvas to illustrate the various actors participating within an object's materiality. In this way, ANT diagrams are beneficial tools for helping the researcher analyze the ecosystem under examination. The process of creating ANT visual maps, and pinpointing specific participatory actors, helps researchers highlight factors to explore and relationships to consider.

To begin the mapping process, and according to Liza Potts (2014), the researcher should create "simple ANT diagrams that capture the people, technologies, organizations, events, and other relevant actors" (p. 31) participating in an ecosystem. Next, the researcher should create stencils of the actors "to show commonality" and "relationships among" (p. 32) them. Further, and as the research grows, the process of creating these maps and conducting additional research surrounding actor relationships, which may "be tenuous, strong, ambivalent, essential, and so forth" (p. 32), will assist the researcher in identifying actor associations. ANT diagrams are formed in three stages: (1) pinpoint the central actor (human or object); (2) identify supporting actors; and (3) weigh the actor relationships (p. 32).

Actor-Network Theory Diagrams: Step 1

The first step involves identifying the central actor. The central actor "stands as the central artifact of the activity being studied" (p. 32). Identifying the central actor, however, is not

seemingly straightforward because the researcher chooses initial actors to follow and trace actor associations. In other words, there is no distinct approach to identifying central actors. In this context, what Latour (2005) would describe as “matters of concern” (p. 114), the researcher is embedded in the network, and as such, is the one who sets initial boundaries around an examination. In this way, the researcher selects the central actors, while recognizing that additional actors and networks exist within and span across the ecosystem.

Moreover, while no specific approach is defined as to how to identify central actors, Potts (2014) offers this advice: it is helpful to “focus on the concept of activity in defining these actors. The central actor exists because of support from the actors around it; if any single supporting actor is not present, the central object cannot exist” (p. 33). In this way, actors supporting the central actor might be the “relevant people, technologies, organizations, and so on, to construct, make relevant, or validate” (p. 33) the central actor.

For example, in my study, I created ANT diagrams to identify the social-material actors participating in GCI-Starry Night network. By creating ANT visual maps, I was able to pinpoint particular actors and their association with other actors, allowing me to visualize the ecosystem under examination. Based on my observation, I identified various actors that could be considered possible central actors, such as the *GAC* website and mobile application; the GCI’s knowledge database; and the GCI’s director, Amit Sood. The *GAC* platform appeared to be a potential central actor as it facilitated the activity under investigation. Additionally, the institute’s knowledge database appeared central to activity as it shaped critical associations by affording the GCI tools to organize and distribute content across its ecosystem. Lastly, Amit Sood appeared as another critical actor, as he worked as a spokesperson for the institute to negotiate actor relationships and acquire partnerships with cultural institutions.

Actor-Network Theory Diagrams: Step 2

Once the researcher identifies the central actor within the investigation, the next step is to list “all active participants that exist in the network” (Potts, 2014, p. 32). For example, in my study, the GCI’s leadership team, engineers, and researchers, as well as Google’s technologies, are all considered participatory actors. Following the identification of central and participatory actors, the researcher links them together. This linking process can be accomplished in a manner similar to the actor-network diagram illustrated in Figure 11, which I designed based on Potts’s (2014) basic actor-network diagram (p. 33).

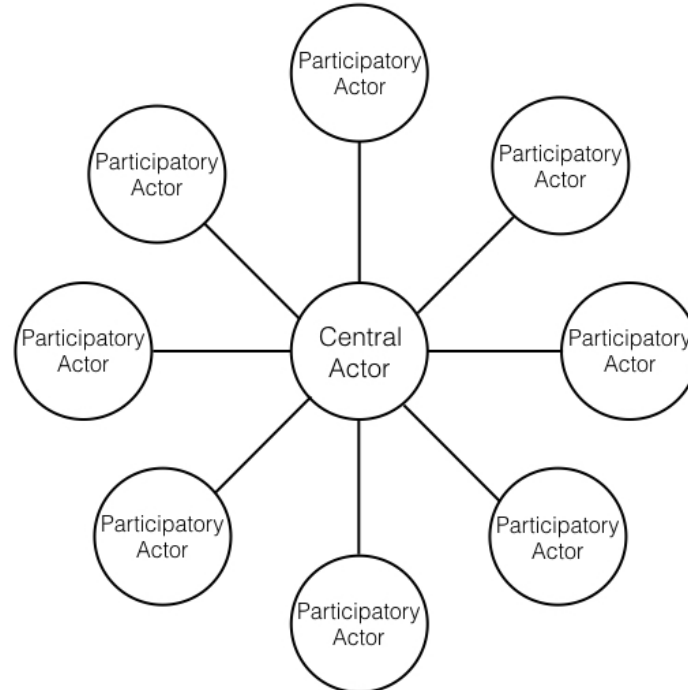


Figure 11. Initial actor-network theory map of central and participating actors.

The researcher can then use the primary diagrams “as a talking point for the product team” (Potts, 2014, p. 31) during interviews with ecosystem actors. For instance, a researcher can show these diagrams to experience architects, product managers, and/or production teams. The researcher can also create stencils to represent the supporting actors. These stencils, however, should be representative of the actors under investigation and should be easy to

understand. Stencils should illustrate relationships and “commonality among different actors” (p. 32), and as the progress of the study grows, they may aid the researcher in visualizing and analyzing the data. And, as mentioned, Latour’s (2005) “matters of concern” (p. 114) shows that the researcher must include herself within the diagram, as she is a part of the network.

For example, in my study, I created stencils for various human participants (e.g., Amit Sood, MOMA curators, myself as the researcher, Google engineers, etc.) and object participants (e.g., the GCI, metadata, the painting, Google’s technologies, etc.). This mapping approach allowed me “to view the actors as participants within networks rather than simply as users” (Potts, 2014, p. 35) of the network. Additionally, it helped me to see how all actors are social-material actors, as each of these actors in the diagram are also a network of actors. Figure 12 illustrates a revised ANT diagram based on Potts’s (2014) actor-network diagram with visual stencils (p. 37). Figure 12 depicts how stencils can be used to visually describe actors, as well as provide a space for researcher notes about actor perspectives.

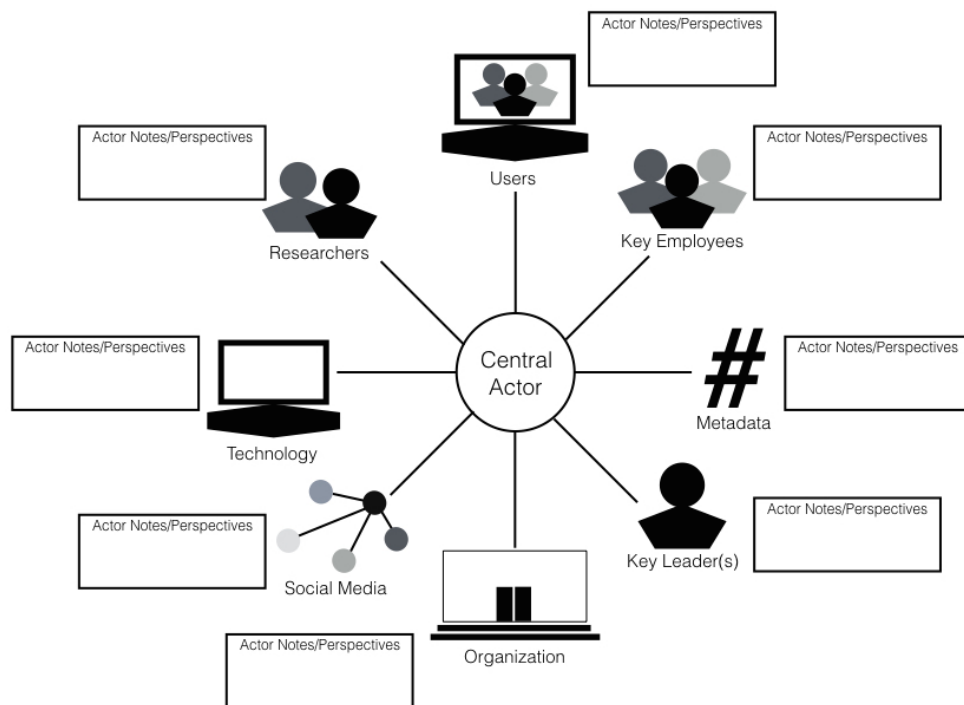


Figure 12. Actor-network theory map with stencils and actor notes.

Actor-Network Theory Diagrams: Step 3

Once the diagrams of the main actors and their supporting actors are created and stenciled, the researcher should look for connections “across these actors” (Potts, 2014, p. 35). These associations may comprise of a “number of different perspectives, including strength of ties, length of time, and history of use” (p. 35). In this way, the greater the association between actors, such as time spent exchanging information back and forth or the importance of the information exchange, the greater or thicker the lines that connect those actors (p. 35). For example, in my study, by tracing the associations across actors in the GCI ecosystem, I was able to see the multiplicity of connections. Using this approach, I was able to identify “how information flows across actor networks” (p. 36). I found that the relationship between the GAC and its cultural partners was greater than that of the GAC and its users. Thus, the line connecting the GAC and cultural institutions was thicker than the line connecting the GAC and users. Details surrounding my findings are thoroughly discussed in the case study results.

Furthermore, this mapping approach helps researchers “visualize the context within which these interactions take place; thus, it provides common ground for discussions across projects” (p. 36). And, while weighing relationships can prove beneficial to understanding aspects of the network, this step may not always be necessary. Figure 13, which I designed based on Potts’s (2014) actor-network diagram with weighted line connectors (p. 37), depicts how actor relationships are weighed through line connectors.

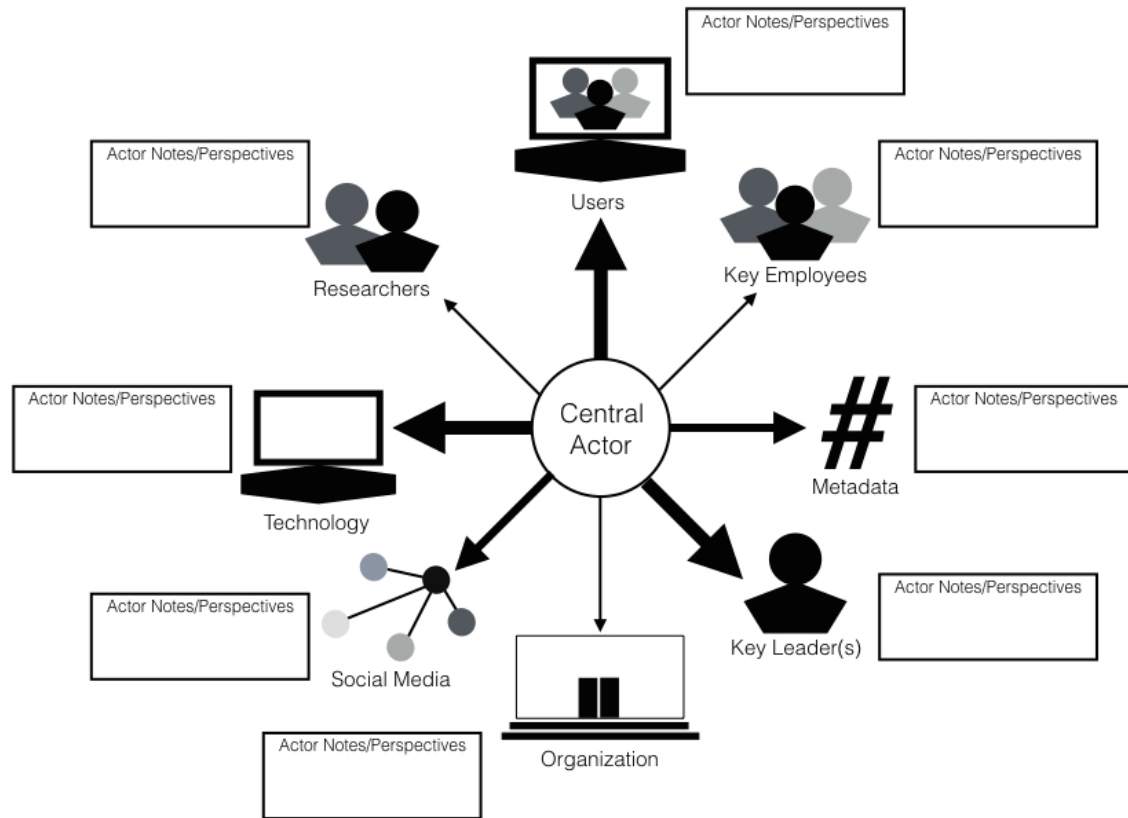


Figure 13. Actor-network theory map to visualize actor relationships.

Actor-Network Theory Diagrams in a DCBMC or Materiality Canvas

Building on my DCBMC concept, and using Potts’s (2014) process for creating ANT maps, a researcher can identify the central actors within each of the 11-building blocks of the DCBMC. However, the researcher should keep in mind that there may be several central actors within each building block. Once the central actor(s) is identified, the researcher should look for its supporting actors. Once recognized, the researcher can create ANT maps within each section of the DCBMC. Figure 14 demonstrates ANT maps within a DCBMC.

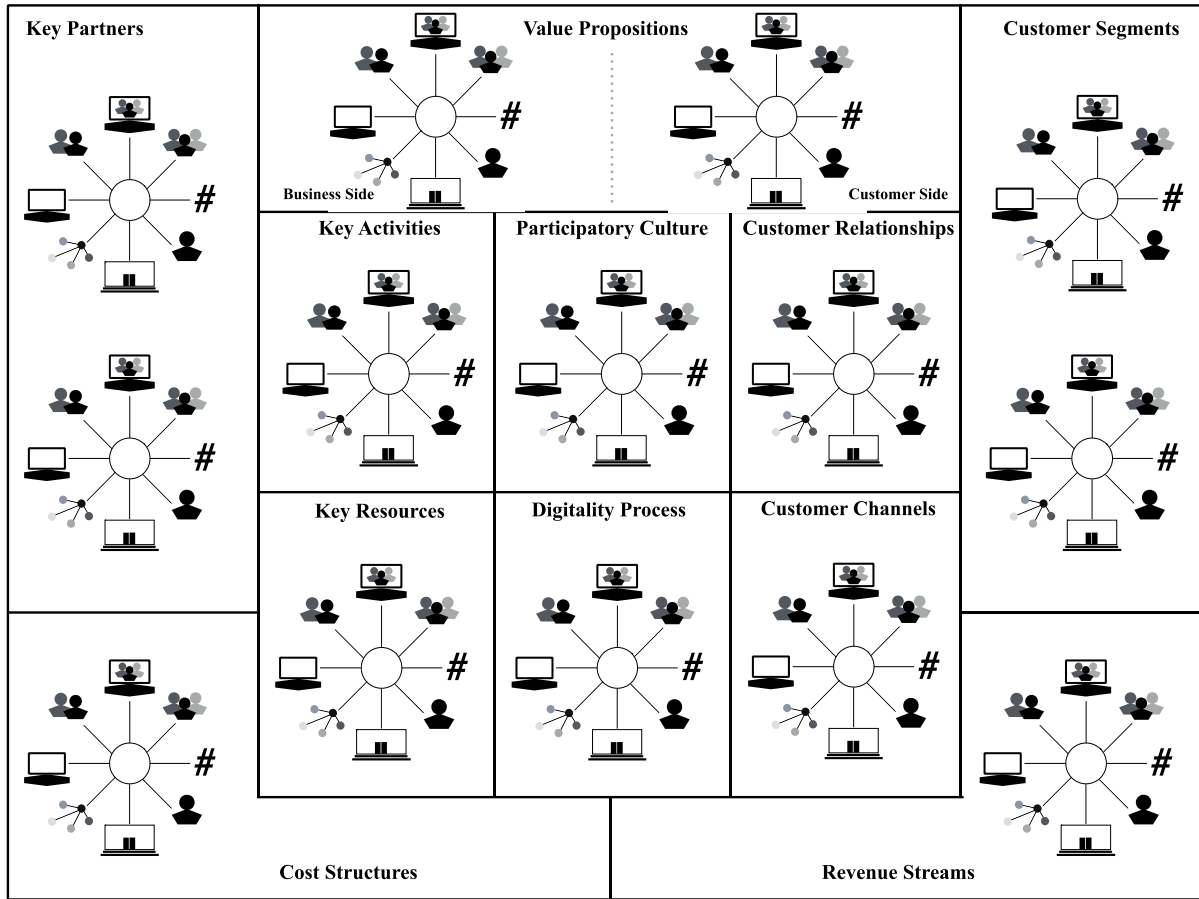


Figure 14. Digital Convivial Business Model Canvas (DCBMC) using an ANT mindset.

For example, in my study, I identified the central actors of the GCI that coincided with each of the building blocks of the DCBMC. I created separate ANT maps to identify various actor-networks, boundary objects, spokespeople, and so forth for different sections of the DCBMC. For example, when I was examining the customer segments of the GCI, I first drew basic ANT maps (similar to Figure 11) on scratch paper. This approach helped me recognize the “people, technologies, organizations, events, and other relevant actors” (Potts, 2014, p. 31) within the GCI ecosystem. Later, I designed stencils for actors on my laptop using Keynote to create diagrams similar to Figure 12. Following the creation of each sections ANT maps, I placed these diagrams into their appropriate building block of the DCBMC. Results from this

exploration are discussed in the case study results. A similar process can be followed to create ANT maps within a materiality canvas.

Concluding Thoughts

In this chapter, I have outlined and explained the steps necessary for conducting an investigation using digital convivial tracking with a DS approach and an ANT mindset. Using *The Starry Night* as an example, I have described how this methodology can identify material needed to design and answer such digital convivial questions. In the next four chapters, I describe how associative actions with the Museum of Modern Art (MOMA) helped *The Starry Night* become an iconic masterpiece. Once digitized through Google and inserted into the institute's database, the painting became associated with a variety of collectives across the GCI ecosystem and beyond. In this way, the painting transformed into a multitude of forms, functions, and genres. Further, and as I will describe, many controversies materialized in 2011 and beyond, which both complexified and strengthened comprehension of the painting's historical, political, technical, social, and cultural impact. I followed those controversies as I explored how the business model of Google and its GCI supports the collectivity of actor assemblage, as well as how its technologies encourage the digitality, materiality, and participatory experience of *The Starry Night*.

The remaining chapters of my dissertation follow Latour's (2005) advice to "feed off controversies" (p. 25) surrounding the GCI and *The Starry Night*. My goal was to richly illustrate how Google approaches conviviality (Illich, 1973) to determine if it is convivial or non-convivial. To reiterate, a tech company could be considered convivial if it provides ways for autonomous and creative participation and/or co-creation at the intersection of humans working *with* technology or technology working *with* humans. Conviviality is also when the company is

ultimately steered by an overall goal of enhancing society. Conversely, a tech company could be considered non-convivial if it manipulates people to enhance its technologies at the intersection of humans working *for* technology or technology working *for* humans, as well as if the company is ultimately steered by an overall goal of generating a profit. As I examined the digital convivial business model of the GCI, I aimed to discover if digital conviviality can exist where the public, culture, and technology intersect.

As you will read in the following chapters, *The Starry Night* did not become an iconic masterpiece overnight. However, once digitized and associated with Google and its institute, the painting did help “craft new bridges between tech and culture” (GCI Lab, n.d. Welcome to the Lab, para. 2). According to Sood (2013):

The Internet brings paintings to life and it seems that [The Starry Night](#) by van Gogh is the one that visitors to Art Project admire the most. In the past six months, this was the most viewed painting in [gigapixel](#)—an extremely high resolution painting which allows viewers to zoom in to brushstroke level (para. 2).

Therefore, within only two years of participating in the Google Art Project (GAP), *The Starry Night* became intensely popular within the GAC. The painting is the most included artifact in user galleries, as close to 400 GCI users have included *The Starry Night* in a personal gallery (Sood, 2013). Further, additional artworks by van Gogh represent 4 of the 10 most added artworks to user galleries and collections. Additionally, a plethora of users on Google + and Google Maps have taken photos of the painting and posted their images online.

These forces of consequentiality, which I discovered early in my digital convivial tracking processes, highlighted important questions that the following case study investigated:

RQ1: In what ways is the Google Cultural Institute (GCI) considered a digital convivial company, and conversely, in what ways is it not?

RQ2: What is the business model (i.e., the BMC, which includes the organizational structure, business model, leadership, and technology) of the Google Cultural Institute?

RQ3: How does the Google Cultural Institute’s business model appear to influence the cultural landscape?

RQ4: What is the participatory culture of the Google Cultural Institute network, specifically, to what extent does the institute’s business model and technology appear to participate *with* humans and objects to enhance society (indicating conviviality), as opposed to participating *on*, or *for*, humans and objects to manipulate society for the sake of Google’s technologies (indicating non-conviviality)?

In this way, I set out to describe how the GCI creates “tiny [digital] galleries in this dusty and earthly one” (Latour, 2005, p. 124; digital emphasis added) and how those digital galleries impact technology, culture, interaction, communication, and connection.

CHAPTER 7: DIGITAL CONVIVIALITY, MATERIALITY, AND VALUE

The multifaceted life of *The Starry Night* is a complex story, one that is weaved with the intricate collectives of the painting's physical and digital existence. As acknowledged in the introduction, the painting was first actualized in 1889 from the imaginative genius of Vincent van Gogh. From its conception, the painting's collective life was quite modest due to its limited circulation. In this way, its restricted movement also limited its consequentiality. For instance, from 1889 till 1906, the painting resided only in the care of the van Gogh family, predominately with Vincent's brother, Theo, and Theo's wife, Jo van Gogh-Bonger. Then, from 1906 till 1941, the painting moved in and out of various collectives, and in 1941, the painting entered into the popular art realm when it was acquired by the Museum of Modern Art (MOMA).

Thankfully, *The Starry Night* was not doomed to be hidden among the family heirlooms of densely packed attics, like so many creative pieces. Instead, it was destined to be shared with the world. As it interacted with numerous actors to assemble and reassemble collectives, such as its enactment with the MOMA, it evolved into an icon of art. In this context, and pulling from what Timothy Morton (2015) described as *charisma*, the painting is a dynamic object exuding a life of its own.

In this chapter, I examine the materiality (Gries, 2015) of the painting to describe how it became an art icon. I also shift toward an examination of the digitization of the painting and the ways in which it became consequential in digital space. As explained in Chapter 6, through an investigation of the collectives within Google's Cultural Institute (GCI) ecosystem, I observed how Google organizes digital space. I also examined the conviviality of Google's technologies to understand whether Google designs convivial participatory tools that enhance society as they

work *with* humans to materialize, digitize, and collectivize objects into organized digital information. Using *The Starry Night* as an iconic (Gries, 2015) and important object, which Star and Griesemer (1989) would argue serves as a boundary object across the ecosystem, I followed and traced the associated actor activities (Latour, 2005) of the painting. I employed this process to identify how Google, as Latour (2005) would describe, is reassembling the social of art and culture. These traceable activities helped me to describe what actors, associations, and collectives the GCI's business model uncovers specific to the conviviality (Illich, 1973) of the tech titan Google. Therefore, I now turn toward a description of the materiality of *The Starry Night* to lay the foundation for the GCI ecosystem and its digital conviviality.

Materiality of *The Starry Night*

***The Starry Night* Consequentiality**

According to Vincent van Gogh (1889d), *The Starry Night* was intended to document “exaggerations from the point of view of . . . the rise of the moon and the night effect. . . of a starry sky” (van Gogh letter to brother Theo, 1889; quoted in Bee et al., 1999/2013, p. 34). However, the painting served a variety of other functions as well. For instance, for van Gogh, the painting acted as a tool for religious discovery: “[H]e wrote, several months before the Starry Night was completed,” that he was experiencing ““having a terrible need of – shall I say the word - religion. Then I go out to paint the stars---.”” (MOMA Master Check List, 1941, underlining and dashes in original; quoting Alfred H. Barr, Jr., director of the Museum of Modern Art, 1941). Thus, while its consequentiality (i.e., how an object “generates consequences via its divergent associations and thus becomes meaningful throughout its rhetorical life” [Gries, 2015, p. 124]), was to exaggerate a starry sky, it was also to represent van Gogh's religious quest.

Conversely, for van Gogh's brother, Theo, the painting may have served two very different consequential purposes centered around one distinct function: to serve as an association between light and dark. For example, the painting represented the light of van Gogh's life coupled with his creative talent, which was in direct juxtaposition to his demons and death. Roughly one year after the completion of *The Starry Night*, on July 29, 1890, van Gogh died. Further, this painting also served as a comparison between light and dark, as it was the nighttime companion to van Gogh's daytime counter, *The Olive Trees* (1889c; see Figure 15).

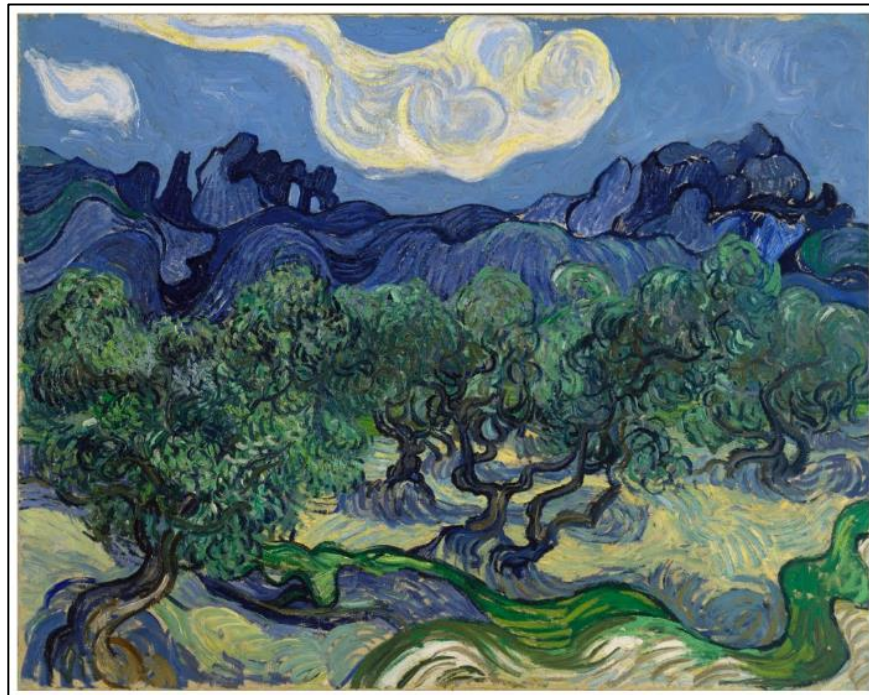


Figure 15. Screen capture of van Gogh's (1889c) *The Olive Trees*. From "The Olive Trees," by V. Van Gogh, 1889c (<https://artsandculture.google.com/asset/the-olive-trees/dQGSvz9nCSYxgw>). In the public domain.

Vincent (1889) stated in a letter to Theo, "I did a landscape with olive trees and also a new study of a starry sky" (quoted in Bee et al., 1999/2013, p. 34), referencing that *The Starry Night* is the night-time companion to his *The Olive Trees* (1889c) painting (referenced in Bee et al., 1999/2013, p. 34). And, once the paintings had dried, van Gogh mailed both artworks to Theo with a letter stating:

The olive trees with the white cloud and the mountains behind, as well as the rise of the moon and the night effect, are exaggerations from the point of view of the general arrangement; the outlines are accentuated as in some old woodcuts (van Gogh quoted in Bee et al., 1999/2013, p. 34).

Therefore, while the consequentiality of *The Starry Night* was to compare and contrast light against dark, it was also to represent van Gogh's life and death; his view on day versus night.

***The Starry Night* Composition**

The Starry Night and *The Olive Trees* were painted during the summer of 1889; however, it is difficult to know which artwork was created first. To illustrate how these two paintings are companions to one another, it is helpful to look at their compositional, "rhetorical design" (Gries, 2015, p. 114) by placing them side-by-side (see Figure 16). In doing so, it is possible to see how the purpose of each painting's design, in addition to the visual design itself, created what Gries (2015) called "the potential for certain identifications, affects, persuasive messages, and/or propaganda to manifest" (p. 114).

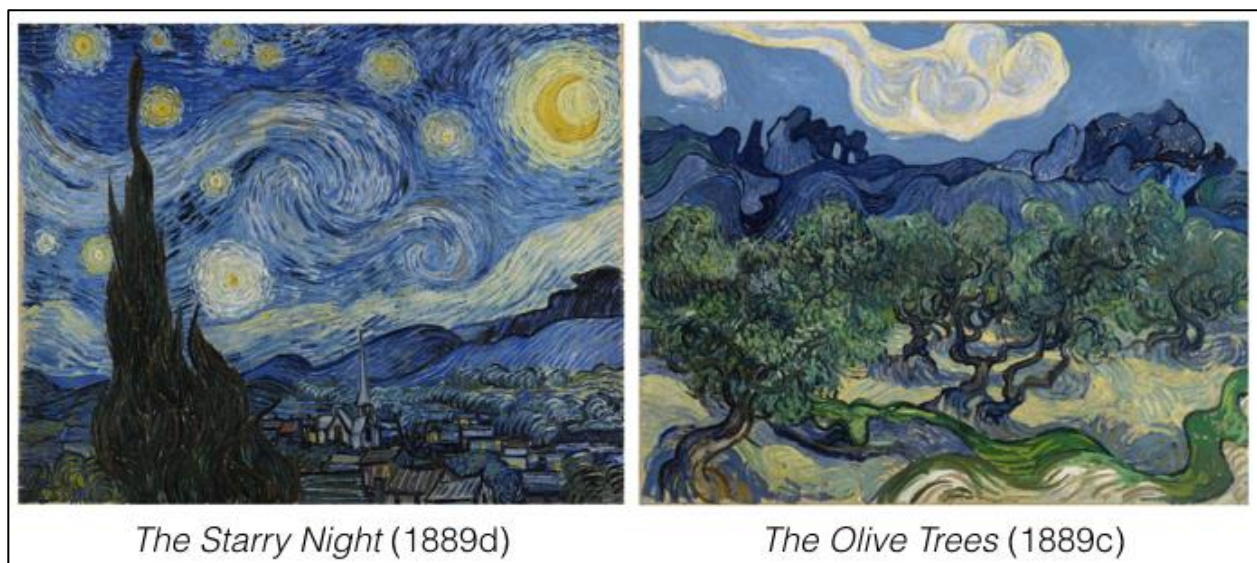


Figure 16. Van Gogh's *The Starry Night* (1889d) and *The Olive Trees* (1889c) side-by-side. From "The Starry Night," by V. Van Gogh, 1889d (<https://artsandculture.google.com/asset/the-starry-night/bgEuwDxel93-Pg>) and "The Olive Trees," by V. Van Gogh, 1889c (<https://artsandculture.google.com/asset/the-olive-trees/dQGSvz9nCSYxgw>). In the public domain.

For instance, the composition of *The Olive Trees* depicts olive trees basking in golden sunlight and blooming on a rolling countryside; whereas, *The Starry Night* illustrates a sleepy village that is blanketed by a night sky adorned with bursting stars. However, upon further examination, the village, church, and cypress tree, which are present in the *The Starry Night*, are missing from *The Olive Trees* landscape; just as the olive trees are missing from *The Starry Night*. As Gries (2015) would say, the composition of these paintings shaped “the potential for certain identifications” (p. 114) and associations within van Gogh’s network. Moreover, I wonder, since he considered these paintings to be complements of each other, how did he decide what to include and exclude from his day version, *The Olive Trees*, and his night version, *The Starry Night*? Was he restricted to painting only what he could see from the window of his hospital room, or did he paint that which he could see deep within his imagination?

To understand why van Gogh considered these two artworks to be complements of each other, it is helpful to consider how he decided what actors to link, as well as not link, together in each painting. In this context, what Latour (2005) might name the tracing of associated activity, van Gogh can be considered a mediator in that he transformed, modified, and reassembled imagery to generate different objects through a collection of “a vast array of entities swarming toward” (p. 46) a production or construction. Thus, in order for these traceable associations to be documented, researchers must identify the collective activities where its “momentary visibility” (p. 80) is heightened. According to Latour (2005):

To be accounted for, objects have to enter into accounts. If no trace is produced, they offer no information to the observer and will have no visible effect on other agents. They remain silent and are no longer actors: they remain, literally, unaccountable (p. 79).

While it may be impossible to know definitive answers surrounding association between these two paintings, thankfully scholars like Bee et al., (1999/2013) have created written

accounts surrounding these artifacts. According to Bee et al. (1999/2013), the village and the church represented in *The Starry Night* were not present in Saint-Rémy, France during the time the painting was created. These scholars claim that the town and the church spire portrayed in *The Starry Night* were invented to evoke “van Gogh's native land, the Netherlands” (p. 35). And, according to van Gogh (1889) in his letter to Theo: “The olive trees with the white cloud and the mountains behind, as well as the rise of the moon and the night effect, are exaggerations from the point of view of the general arrangement” (quoted in Bee et al., 1999/2013, p. 34). Thus, the paintings’ “momentarily visible” (Latour, 2005, p. 80) associations are somewhat traceable as they point toward ideas that van Gogh painted these scenes as exaggerated representations from his viewpoint.

***The Starry Night* Production**

The production network of *The Starry Night* includes the “materials, activities, people, technologies, institutional infrastructures, and bureaucratic forces. . . intra-acting to bring [*The Starry Night*’s] design into actualized form” (Gries, 2015, p. 116). These interactions take place across a variety of actors in an attempt to produce one collective action, in this case, *The Starry Night* painting network. The human actors involved include Vincent van Gogh, his brother Theo, the medical staff at the hospital, and previous impressionist and post-impressionist artists. The contributing nonhuman actors include van Gogh’s vision loss, his mental health, his fascination with death, his longing for his home in the Netherlands, his need for religion, Saint-Rémy in southern France, Saint-Paul-de-Mausole psychiatric hospital, the hospital room, and the hospital room window. Further, intra-acting nonhuman actors include the impressionism and post-impressionism art genre, van Gogh’s earlier paintings on ‘night effects,’ his *The Olive Trees* (1889c) painting, as well as a different array of other objects ranging from the canvas, to paint, to

the stars, and the moon. In this context, Gries (2015) describes this production network, which contributed to the actualization of this painting, as a “complex, emergent ecosystem” (p. 144). In this sense, these actors negotiated relationships with other actors to link together those participating, and leave out those not associated. Collectively, these associations took the once humble exaggeration of the night to create a truly iconic masterpiece, *The Starry Night*.

***The Starry Night* Transformation, Circulation, and Distribution**

Because of *The Starry Night*'s limited circulation, it was not consequential, in a broad sense, upon its creation. In 1941, however, an exchange altered the trajectory of the painting. According to The Museum of Modern Art's (MOMA) Press Release (1941), the MOMA, which is located in New York City, acquired the painting from the Lillie F. Bliss Bequest. Previously, the painting had been in the private collection of G. P. van Stolk of Rotterdam in Holland. Although the painting had moved from the van Gogh family holding, it stayed predominately in private collections. For instance, in 1906, Jo van Gogh-Bonger sold *The Starry Night* to the Oldenzeel Gallery. The painting later moved on to the Paul Rosenberg Gallery (MOMA Provenance Research Project, n.d.), and in 1938, to the Lillie F. Bliss Bequest (MOMA Press Release, 1941).

MOMA's acquisition of *The Starry Night* circulated the privately held family artifact into the public realm, which Gries (2015) might argue sparked the painting's consequentiality: its “journey to becoming a cultural icon, a national symbol, and a dynamic actant with a rich rhetorical life” (p. 135). For instance, at the MOMA, people can see the famous painting, which many art scholars claim depicts an explosive sky of stars twinkling in the night, visualized through van Gogh's vibrant use of color and swirling brush strokes. Now, in the limelight of the

influential art world, exponentially many more can observe and analyze this painting, shifting its networked action beyond its initial associations.

Where it was once a tool van Gogh created to help him seek religion, in addition to a comparison study between day and night; it now sparked a variety of meanings due to its public availability. For example, some art critics, such as Bee et al. (1999/2013) stated that the painting evoked “van Gogh's native land, the Netherlands” (p. 35), demonstrating his longing for acceptance and home. Other scholars claimed that the painting offered a dream-like sadness, which represented van Gogh’s health struggles, including his mental health stability, vision loss, and fascination with death and effects of the night (Shinn-Morris, L. n.d.).

The MOMA has also increased *The Starry Night*’s collective and public life through participatory opportunities with various art systems. For instance, the painting has been displayed in a multitude of art exhibitions, such as “Van Gogh and the Colors of the Night” (MOMA Exhibitions Van Gogh, 2008). It has been discussed in MOMA education programs and products. Additionally, *The Starry Night* is the subject of online modern art classes, as well as the cover art for books focused on modern art, the work of van Gogh, and children and art. *The Starry Night* has also been transformed into various commodity forms, which are available for purchase on *MOMA’s Design Store* (n.d.) website. These include posters, coffee mugs, magnets, umbrellas, zippered pouches, notebooks, tote bags, and coloring books.

In this context, what Gries (2015) would name as the commodification of the image, *The Starry Night*’s “transformation and circulation accelerated as its commodification became rampant” (p. 202). In this way, the commodification of the masterpiece surely increased when the MOMA acquired *The Starry Night*; however, its semiotic exchange (Baudrillard, 1981/2001) did not begin here. In fact, and according to Gries (2015), the painting’s “commodification began

as soon as people realized they could profit from sales” (p. 203) of remixed and transformed versions of the artwork. See Figure 17 to view some of *The Starry Night* merchandise available for purchase on MOMA’s online store.

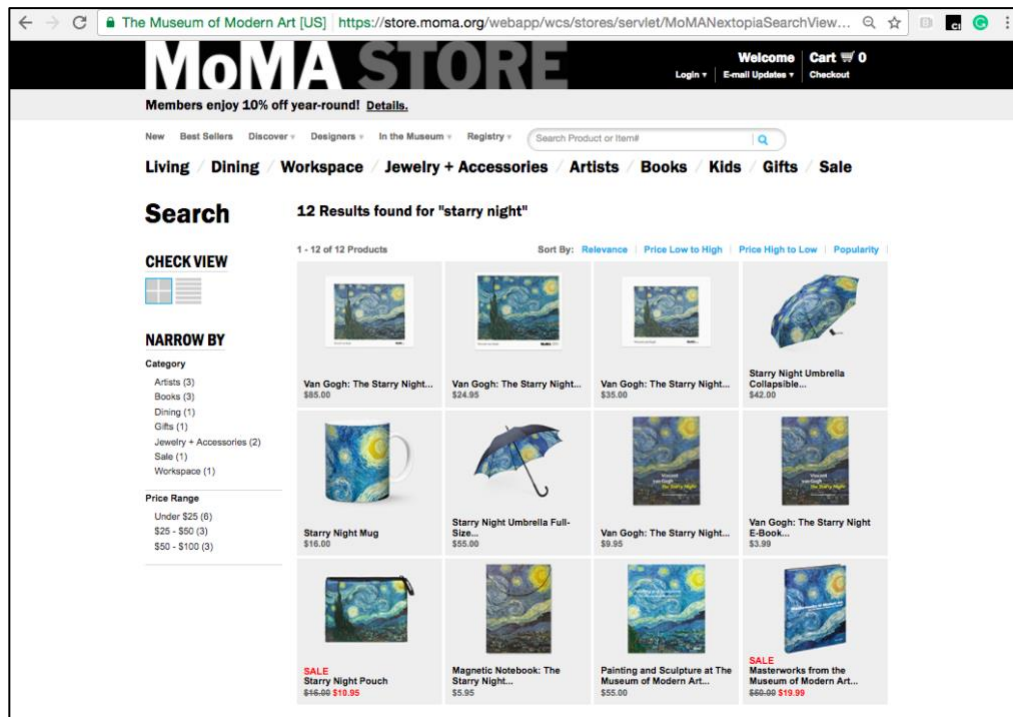


Figure 17. Screen capture of the MOMA Design Store website and its various *The Starry Night* merchandise for sale. From “The Starry Night,” by MOMA Design Store, n.d. (<https://store.moma.org/search-results?q=the+starry+night&lang=default>). Copyright 2018 by Museum of Modern Art (MOMA) <http://www.moma.org/>.

According to Baudrillard (1981/2001), and as discussed in Chapter 3, this form of commodity generation demonstrates how humans have moved beyond a symbolic exchange of objects toward a mass produced semiotic exchange of commodities. Similarly, business researcher Scott Robert Olson (2004) described brand consumption as a form of personal identity development (p. 68). Olson stated that “[m]arketers strive to create a situation in which the typical consumer behaves as though ‘who I am is what I buy’” (p. 68). Thus, in this context, people buying material productions or merchandise of *The Starry Night*, in essence, demonstrates how people wish to appear as or relate to the persona of one who is artsy and high cultured.

Furthermore, over time, the painting has become an emblem of art, influencing a plethora of other creative works. Throughout the “rise of popular culture during the second half of the twentieth century” (Gries, 2015, p. 35), *The Starry Night* attracted tourists, artists, writers and so forth, to the MOMA. Visitors were so transfixed by its aesthetic style, quintessence, and *thing-power* (Gries, 2015), that they wrote poems, songs, and films in response to experiencing the artwork. Additionally, advancements in technology have made it so people can learn about the painting, as well as transform it into different forms. For instance, visitors to the MOMA can use assistive technology to discover aspects of *The Starry Night* as they stand in front of the masterpiece. People can also remix the painting into various renditions (e.g., commodity items, movies, murals, pictures, and so forth) and circulate their transformations broadly across time and space (i.e., share these creations on social media).

In this context, “metacultural activity” (Gries, 2015, p. 122) has driven and increased the movement of the painting. Metacultural activity can be defined as the virtual conversations and activities found online in blog posts, articles, social media, digital comments, memes, and so forth. Gries (2015) also stated:

such metacultural activity, in turn, often stimulates the production of other actualized versions with the same image or derivatives that may resemble it in form, genre, style, content, or function. As these new actualizations begin to take on a life of their own, the recursive process between metaculture and culture begins all over again in divergent ways (p. 122).

Put more simply, the transformations and circulations of the painting have increased the networked associations of *The Starry Night*. In this way, we can see that the multiple forms (e.g., articles, digital artworks, films, murals, paintings, photographs, poems, songs, videos, and commercialized commodity products) of the single object (i.e., *The Starry Night*) are kindled by metacultural activity, which recursively skyrockets the object’s circulation, consequentiality, and

collectivity. Thus, Gries (2015) might argue that these activities have helped the painting acquire “much thing-power through a wide variety of rhetorical encounters” (p. 33).

***The Starry Night* Collectivity**

The collective network of the MOMA-Starry Night can arguably be considered infinitely larger than the original *The Starry Night* network. While the painting’s initial network included relatively local associations across its emergence, the network of the MOMA-Starry Night comprises an entanglement across Vincent van Gogh, *The Starry Night*, the MOMA, the art world, and more. In this way, the network of *The Starry Night* includes all the networks found within it, such as the network of Vincent van Gogh, the Saint-Paul-de-Mausole psychiatric hospital, stars, night effects, and so forth. The network of Vincent van Gogh, however, spans van Gogh’s life and accomplishments across pre-*The Starry Night* (i.e., his previous artworks, mentors, training, family, friends, etc.), as well as post-*The Starry Night* (i.e., his later artworks, his last year of life following his stay at the Saint-Paul-de-Mausole psychiatric hospital, his work with Dr. Gachet, his continued struggle with his mental health, his act of cutting off his ear, as well as the ear itself, his death, his brother Theo, etc.).

Additionally, the network of the MOMA includes the MOMA brand and its building, location, management, employees, board of trustees, art historians, curators, and visitors. In addition, the MOMA network consists of the artifacts in its collection, which include other artworks by van Gogh (e.g., *Portrait of Joseph Roulin*, 1889a; *The Olive Trees [with the Alpilles in the Background]*, 1889c; *Olive Trees in a Mountain Landscape*) and artworks completed by van Gogh’s contemporaries and friends (i.e., art by Cézanne, Gauguin, Seurat, Pissarro, Redon, and Ensor) (MOMA Press Release, 1941). Further, the network of the art world includes art critics, art viewers, teachers, historians, scholars, researchers, students, and so forth. The art

world network also encompasses the monetary value and commodity factor of *The Starry Night*. Therefore, the aforementioned actor-networks, as well as many that I did not mention, interact to drive the replication, transformation, and consequentiality of the painting.

As I have tried to describe, the entanglement process across the MOMA and *The Starry Night* demonstrates what Latour (2005) would describe as ANT's web-like connections across multiple participatory actors of the MOMA-Starry Night network. Therefore, the MOMA can be attributed as a key participatory actor in *The Starry Night*'s network, what Latour (1987) might name as acting as a spokesperson for the collective. And, while the MOMA relationally skyrocketed the fame and visibility of the painting, this dissertation is neither about the MOMA nor *The Starry Night*. **This dissertation it is about the digital conviviality of technology titans and the ways in which they organize and innovate digital space.** Specifically, this dissertation explores Google, a tech titan who arguably considers itself convivial (Illich, 1973).

As discussed in Chapter 6, the identification and tracking of a vital or iconic object across a digital ecosystem allowed me (the researcher) to discover the various collective convivial activities within the GCI (i.e., its business model). It also aided in my discovery of how the institute digitizes, materializes, and affords participation with objects. Therefore, while it is important to consider the humble beginning of *The Starry Night*, as well as how it has entered into associations with other physical actors to form collective assemblages that have contributed to its consequential iconicism, I shift now to an investigation of the painting's consequentiality within digital space. In this way, *The Starry Night* in both its digital and physical form “generates consequences via its divergent associations and thus becomes meaningful throughout its rhetorical life” (Gries, 2015, p. 124). And, this consequentiality is partially thanks to the management of Google, its GCI, and the technologies it creates.

In the rest of this chapter, I attempt to heed John Law's (2009) advice and tells stories about *how* actor relations form or do not form within the GCI ecosystem. Thus, in the description provided, I translate the digital convivial organizational structure of the institute, which includes its business model, leadership, and technology. According to Osterwalder and Pigneur (2010/2013), a business model "describes the rationale of how an organization creates, delivers, and captures value" (p. 258). One way to explore the organizational structure of an organization is by creating a digital convivial business model canvas (DCBMC). A DCBMC generates an illustration of the value proposition, customers, business strategies, technologies, partnerships, participatory culture, digitality processes, and finances of an organization. Together, these processes help investigators see how a company currently makes, or intends to make money (Osterwalder & Pigneur, 2010/2013), as well as how it uses its technologies in society.

Using the DCBMC approach, I use the forthcoming sections to provide a narrative account guided by my research questions. As these questions build on each other, within the next section of this chapter, I share stories that provide an illustration to answer how the GCI's value proposition influences the landscape of art and culture. To create such accounts, I employed the multifaceted mindset of ANT, my "material semiotics" (Law, 2009, p. 141) toolkit, to convey and translate actor relation stories of the institute. First, I offer a basic overview of the GCI, including its mission, establishment, and initiatives. Following this synopsis, I illustrate the value proposition of the GCI, and how these aspects influence the cultural landscape at large. Lastly, I provide a basic sketch of viewing *The Starry Night* on the GCI ecosystem, including how Google's technologies connect the painting with a multiplicity of actors. In the subsequent chapters, I will describe the GCI's customers (Chapter 8), business infrastructures (Chapter 9),

and finances (Chapter 10) to showcase additional ways the organizational structure of the institute impacts culture, technology, and conviviality.

The Google Cultural Institute

Since the beginning, our goal has been to develop services that significantly improve the lives of as many people as possible. Not just for some. For everyone. (Google Our Company, n.d., para. 2-3).

Mission of Google and its Establishment in Paris

Google's mission is to: "Organize the world's information and make it universally accessible and useful" (Google Our Company, n.d., para. 1). Further, its corporate motto is "Don't be evil" (Google Code of Conduct, 2017, Preface, para. 1) and "Do the right thing" (Alphabet Code of Conduct, 2015, Preface, para. 1). When Google's mission and motto are combined, the tech titan has set out to explore innovative ways to create "opportunity for everyone" (Google Our Company, n.d., Our commitments, para. 1) by providing all citizens "the chance to learn, succeed, and be heard" (Google Our Company, n.d., Our commitments, para. 2) through Google's technologies. In this context, what Ivan Illich (1973) might name as conviviality, Google can potentially be considered a convivial corporation because it strives to use its technologies to work *with* humans to enhance society.

As discussed in Chapter 2, since its establishment in 1998, Google has grown tremendously to span a multitude of industries (e.g., publishing, digital communication, advertising, media, and so forth) and countries. Today, one of Google's key locations is its headquarters in Paris, which serves as the headquarters of Google for France and the Southern and Eastern Europe Middle East and Africa (SEEMEA) region (Patarin, 2014). However, the establishment of Google Paris was an arduously long process. Google had its eyes set on opening up a Google office in the city for many years. Google had been in discussions with French

presidents for several years to open up a Paris office working with former French President Jacques Chirac, who served from 1995-2007, and with former French President Nicolas Sarkozy, who served from 2007-2012. Eventually, Google and President Sarkozy reached an agreement that Google could establish an engineering office in Paris.

Part of their agreement included “Nicolas Sarkozy asking for something that was particularly ‘French’ so that it was not easily moved to a different location” (Patarin, personal communication, June 21, 2017). According to my communication with Patarin, engineering manager at GCI, together, Google and Sarkozy:

came up with the idea of creating a Cultural Institute, I think at the beginning it was even called a cultural center. But, it was just a couple of key words, there was no project behind it, no vision, no nothing. And, Larry Page insisted, I mean it could have just [been]. . . a foundation or something. . . but Larry Page insisted that this became an engineering project that would be run by engineers. But they still didn’t know what to do with it [the Cultural Center]. I mean it was just a concept (personal communication, June 21, 2017).

In the fall of 2010, Google announced that it would create a French engineering office in Paris (Patarin, 2014, p. 6). By the following summer (June 2011), Google opened its Engineering Center and Cultural Institute under the direction of Steven Crossan, who served as the co-site lead of Google Paris and founder and head of the GCI (LinkedIn Crossan, n.d.). The innovation hub of the institute, commonly referred to as “The Lab,” was “part of the deal with [Google’s] mission to **‘create, promote and preserve culture online’**” (Patarin, 2014, p. 6, emphasis in original). Yet, as Patarin described, Google “still didn’t know what to do with it [the Cultural Center]. I mean it was just a concept” (personal communication, June 21, 2017). Based on this, if the idea of a Cultural Center was just a concept, I wonder: how did the GCI actually become the organization that it is today?

From ‘Cultural Center’ to the Cultural Institute

Thanks to initiatives designated by Larry Page, Google sought to make its “role in culture publicly recognized” (Patarin, 2014, p. 6), and as such, explored ways to apply its mission to the arts and culture industry. In order for Google to make art universally accessible and useful for everyone, it had to first investigate how people were currently engaging with art and culture. Google spent roughly a year brainstorming Google’s current cultural projects, as well as those outside of Google to understand “what existed and how we could sort of unify that” (Patarin, personal communication, June 21, 2017). According to Patarin (2014), Google examined the work of the Yad Vashem, the World Holocaust Remembrance Center. Yad Vashem is “the world center for documentation, research, education and commemoration of the Holocaust” (GCI Yad Vashem, n.d., Overview, para. 1). Google also explored the beginning stages of its Google Arts Project (GAP), which had mapped 17 museums, one of which was the MOMA, using Google’s Street View 360-degree mapping technology. Lastly, Google examined its Google Maps partnership with the United Nations Educational, Scientific and Cultural Organization (UNESCO). In this partnership, Google’s Street View technology was being used to capture UNESCO sites; Google’s platform allowed users to upload panorama photos of the historic sites.

Based on these investigations, and according to Sood (2016a), Google found that “the act of enjoying art and culture was limited by geography” (para. 1). For instance:

Unless you could visit a museum in person, it would be hard for you to appreciate a work, brushstroke by brushstroke. And to fully understand the legacy of someone like [v]an Gogh, you would have to go from Amsterdam to Chicago to New York to Tokyo to discover and marvel at all of his influences, works and successors (Sood, 2016a, para. 1). Thus, Google realized that participatory art experiences were limited by geographical location.

And, tied to this limitation of geography, was the concept of cultural access and financial expense. According to Sood (2016b):

to illustrate the point of access. . . . We all know that seeing the artwork in person is amazing. But we also know that most of us can't do it, and the ones that can afford to do it, it's complicated (8:40).

Building on these discoveries, Google had even more questions. Specifically, how do those who are eager to see famous cultural institutions and artworks, yet do not have the means to fulfill such desires, actually participate in arts experiences? In this context, what Bourdieu (1994) might describe as social and cultural capital, some people might lack certain resources to participate in cultural space. For instance, in order for a person to learn about and witness the magic of *The Starry Night*, she would have to have the means to travel to New York City to tour the MOMA, as well as have the cultural capital (i.e., education, intelligence, dress, speech, and so forth) to feel comfortable truly experiencing the masterpiece.

Therefore, Google explored how it could close certain cultural capital, knowledge, and access gaps so that everyone could have the opportunity to experience art, culture, and heritage in a visually aesthetic way. Google found that while millions of historical artifacts were situated within cultural spaces across the globe, there was not one place that allowed people to explore the bulk of those artworks in an easy, interactive, and accessible way. Therefore, Google set out to build the CI platform, which its leaders argued, would allow Google to democratize the world's arts and culture and create “magic [which] happens when technology meets culture” (GCI Users, 2015, Experience, para. 1).

The Google Cultural Institute Today

According to the *GCI* website, on its “Partners” webpage, the GCI is:

a not-for-profit initiative that partners with cultural organizations to bring the world's cultural heritage online. We build free tools and technologies for the cultural sector to showcase and share their gems, making them more widely accessible to a global audience (GCI Partners, 2015, GCI, para. 1).

The stated goal of the GCI is “to expose as many people to as much cultural content as possible” (Google CI Chromecast, 2014, 00:38), which helps the institute fulfill its mission of “democratizing access to the world’s culture” (Google CI Chromecast, 2014, 00:44). The GCI and its Lab serve as “a place where tech and creative communities come together to share ideas and discover new ways to experience art and culture” (GCI Lab, n.d., Welcome to the Lab, para. 2). As of July 2016, the GCI became the umbrella organization for Google Arts & Culture (GAC), which was previously known as the Google Art Project (GAP).

The GAP brought “the world's treasures to anyone with an Internet connection” (Sood, 2015, para. 5), affording users the opportunity to “visit dozens of the world’s stages together in one place—across mobile, tablet and desktop at g.co/performingarts and on the Google Cultural Institute website” (Sood, 2015, para. 5). As stated previously, the GAP started out with mapping only 17 museums, and today, has “1,000 amazing institutions, [in] 68 countries” (Sood, 2016b, 9:01). It is worthwhile to note that the GAP was started in a different location, by Amit Sood and a team of marketing people, not by a team of engineers. Patarin stated that the GAP was:

not for marketing purposes, it was done with intent and made sure to make art universally accessible. But it was not engineers. They hired a company to do the website and they were just negotiating with museums the rights to access the collection (personal communication, June 21, 2017).

As mentioned, the GAP changed its name to the GAC in July 2016. The GAC is the home of various creative undertakings aimed at enhancing the Google brand and Google’s innovations (Thompson & Rodley, 2016). Additionally, the GAC is the online web platform where cultural artifacts are digitally preserved and explorable [google.com/culturalinstitute]. Through these outlets, the GCI, and its GAC, explore innovative ways to “craft new bridges between tech and culture” (GCI Lab, n.d. Welcome to the Lab, para. 2), and once these bridging ideas are identified, they are built to provide users innovative ways to participate in cultural exchange. In

this way, Google claims to strive to create ways for *everyone* to experience art, culture, and heritage in a visually aesthetic, immersive, educational, and inspiring way (Beyond GCI, 2013).

According to Seales et al. (2013), over the last seven years, the GCI has established partnerships with cultural institutions to help them digitize their cultural artifacts. In return, the institute uses those objects to tell compelling stories that engage users. Through the GCI's multi-sided approach (i.e., it wants users to view cultural material on its platform and needs partner institutions to provide their artifacts), it targets two central customers: cultural institutions and cultural viewers/users (from now on I will refer to cultural viewers/users as users). And, to reach its customers, the GCI uses a variety of customer channels, including the corporate resources of Google and the institute, as well as the resources of its cultural partners. These channels are used to help the GCI deliver a (potentially) valuable experience and build strong customer relationships, which in return, establishes the GCI as a bridge between technology and culture and the place for cultural customer exchange.

To bridge technology and culture, the GCI has started several creative initiatives. According to Sood (2015) these art activities include the digitization of historic archives (referred to by the institute as historic moments), wonders of the world (referred to by the institute as world wonders), street art, and the performing arts. Additionally, cultural artifacts are made into digital image scans and maps and then placed on the GAC platform where users can view art in an entirely different way (Caines, 2013). For instance, according to Mark Yoshitake, previous head of product management/creation at the GCI, "This [GAC] platform has really helped bring this material to life in a way we [Google] didn't have the opportunity to do before" (quoted in Beyond GCI, 2013, How did we do it, para. 2).

To demonstrate how the GAC has brought material to life, Sood stated:

The difference between this [the GAP website, which is now the GAC website] and a lot of other websites is that every single image is in extremely high resolution, as well as enriched with a whole host of tools and meta data. For example you look at a museum's Vermeer, zoom into it, compare it with another one, and then take a virtual walk through the museum by using our street view technology (quoted in Caines, 2013, Q1, para. 3).

To illustrate Sood's point, while staying within the network of van Gogh, let us examine van Gogh's *The Bedroom* (1888b). Because of partnerships established between the Van Gogh Museum and the GCI, users (like myself) can experience the painting on the GAC platform. See Figure 18, or the following [hyperlink](https://artsandculture.google.com/asset/the-bedroom/KwF-AdF1REQ16w), to view van Gogh's *The Bedroom* (1888b) on GAC.

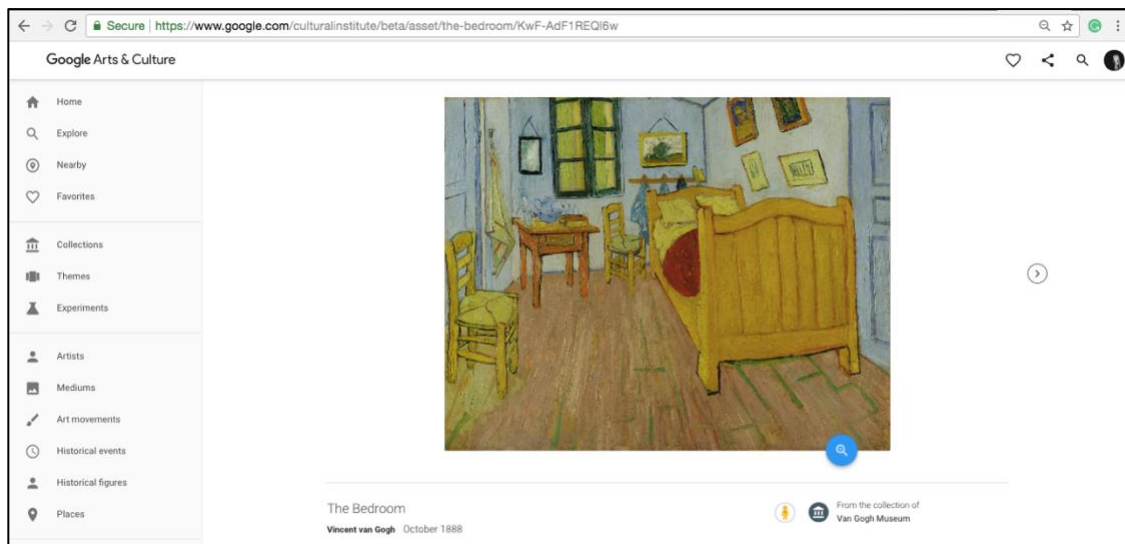


Figure 18. Screen capture of van Gogh's (1888b) *The Bedroom* on the GAC website. From "GAC The Bedroom," by Google Arts and Culture, n.d. (<https://artsandculture.google.com/asset/the-bedroom/KwF-AdF1REQ16w>). In the public domain.

Curators of the Van Gogh Museum used Google's technologies to digitally capture the painting and share it on the GAC website. For instance, while using the gigapixel art camera, curators digitized the painting, and once captured, inserted the digital material into the GCI's digital repository. The curators then used Google's data management tools to manage their digitized collections. For instance, they tagged the painting with pertinent contextualizing information, including the name of painting (*The Bedroom*), artist (Vincent van Gogh), date

created (October 1888), location created (Arles, France), type of artifact (oil painting), rights to artifact (Van Gogh Museum, Amsterdam, the Vincent van Gogh Foundation) (GAC The Bedroom, n.d.). Following this process, the digitized painting and its metadata were transferred into the GCI database and onto the *GAC* website.

The curators also used Google's Street View technology to create a 360-degree virtual tour of the museum, as well as Google Maps, to provide information about the museum (i.e., address, phone number, website, hours, quick facts, reviews, photos, upcoming events, and so forth). According to *Google Play*, Google's application and content website, The Van Gogh Museum also created an institutional mobile app titled "Touch Van Gogh" (Google Play Touch Van Gogh, 2015), and utilized Google Cardboard to create a virtual reality experience called "Virtual Bedrooms" (Google Play Virtual Bedrooms, 2015). According to the application description: "[w]ith this Virtual Reality app you can almost literally enter the paintings Edvard Munch and Vincent van Gogh made of their bedrooms. All you need is your smartphone and a 'Google Cardboard' Viewer" (Google Play Virtual Bedrooms, 2015, para. 1).

Regarding this user experience of viewing *The Bedroom* (1888b) on the *GAC* website, a user can employ various Google technologies that are available on the *GAC* to investigate and learn about the painting. For instance, when I visited the website to explore this painting, I could view it in extremely high-resolution. This gigapixel experience allowed me to study the brush strokes, blend of color, and artistic design on the canvas. See Figure 19 for a zoomed in, high-resolution gigapixel view of *The Bedroom* (1888b). Additionally, on the *GAC* website, I clicked on the yellow, human-shaped icon, which represents Google's Street View technology, and was instantly transported to a digitally mapped representation of the Van Gogh Museum's physical cultural space. However, I was actually still embedded within the *GAC* digital ecosystem. Based

on this, and through the use of Street View, I toured the Van Gogh Museum from the GAC website and saw *The Bedroom* (1888b) as it was displayed on the museum’s wall.



Figure 19. Screen capture of the zoomed-in view of van Gogh’s (1888b) *The Bedroom* on the GAC website. From “GAC The Bedroom Gigapixel,” by Google Arts and Culture, n.d., and V. Van Gogh, 1888b (<https://goo.gl/wXLqLe>). In the public domain.

I could explore the space surrounding the painting, such as the museum’s physical space, wall color, floor, nearby displayed artifacts, and more (see Figure 20).

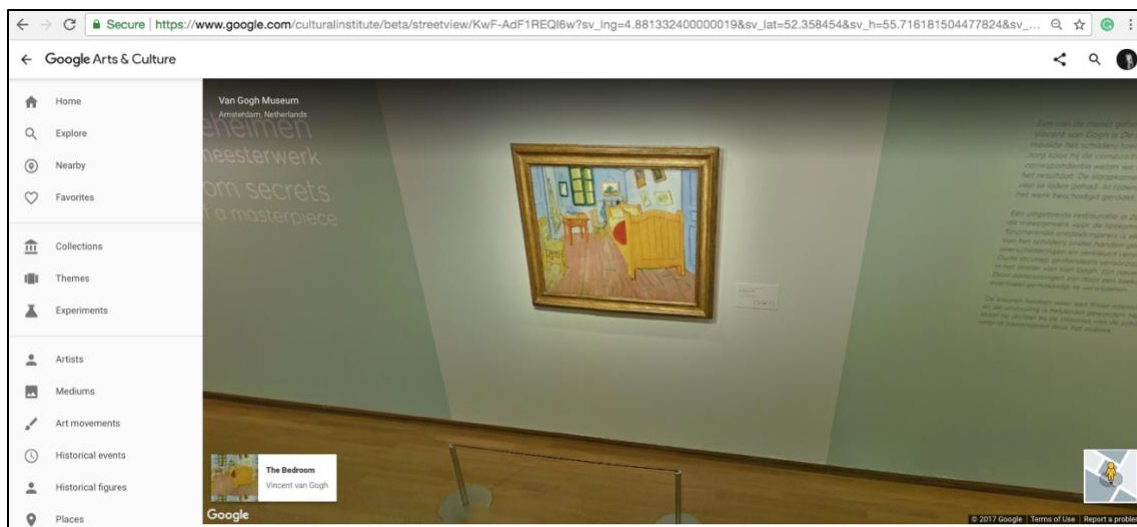


Figure 20. Screen capture of the Van Gogh Museum museum-view displaying van Gogh’s (1888b) *The Bedroom*, accessed via the GAC website. From “GAC The Bedroom Street View,” by Google Arts and Culture, n.d. (<https://goo.gl/Zjhncf>). Copyright 2018 by Google.

Moreover, on the GAC platform, I was able to compare this version of *The Bedroom* (1888b), which is part of the Van Gogh Museum’s collection, to two other, almost identical paintings completed by van Gogh: *Van Gogh's Bedroom in Arles* (1889e), part of the Musée d'Orsay’s collection, and *The Bedroom* (1889b), part of the Art Institute of Chicago’s collection. See Figure 21 to examine the three paintings side-by-side.

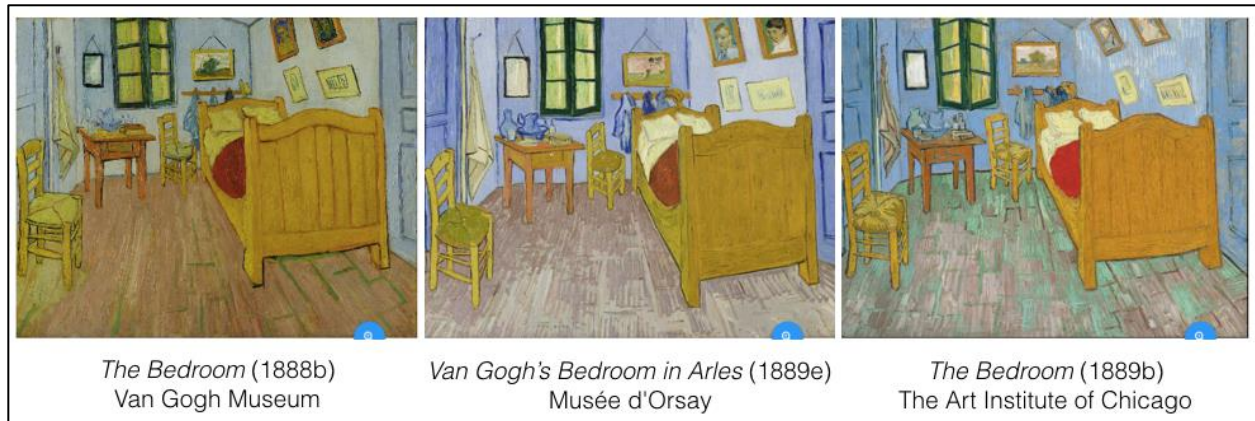


Figure 21. All three versions of van Gogh’s (1888b, 1889e, 1889b) *The Bedroom* located on GAC website. From “The Bedroom,” by V. Van Gogh, 1888b (<https://www.google.com/culturalinstitute/beta/asset/the-bedroom/KwF-AdF1REQI6w>), “Van Gogh’s Bedroom in Arles,” by V. Van Gogh, 1889e (<https://www.google.com/culturalinstitute/beta/asset/van-gogh-s-bedroom-in-arles/kQEugEsNjGDZfw>), and “The Bedroom,” by V. Van Gogh, 1889b (<https://www.google.com/culturalinstitute/beta/asset/the-bedroom/rgHdFPzCeCfnxQ>). In the public domain.

In this context, what Sood (2016a) described as geographical limitations to art viewing before the establishment of the GAC, I did not have to, as Sood was quoted saying earlier, “visit a museum in person . . . to appreciate a work, brushstroke by brushstroke” (2016a, para. 1). To comprehend van Gogh’s legacy surrounding his paintings of *The Bedroom*, I did not have to go to Amsterdam to Paris to Chicago. This viewing experience of examining all three of van Gogh’s (1888b, 1889b, 1889e) *The Bedroom* on the GAC website demonstrates how Google’s technologies are being used to afford online art interaction. Thanks to the cultural partnerships established with the Van Gogh Museum, the Musée d' Orsay, and the Art Institute of Chicago, I

explored all three paintings from the comfort of my home while using the GAC platform (within the GCI ecosystem).

Based on this experience, it can be argued that the GCI's projects are aimed at creating cultural experiences for its customers. To achieve such goals, the institute relies on Google's resources, including its technologies and employees, as well as the relationships it has established with partners and users. To explain this relationship concept more fully, I move to a discussion about the organizational structure of the GCI to illustrate how the GCI, Google, cultural organizations, users, art and culture, and technology are enmeshed.

The Organizational Structure of the Google Cultural Institute

As stated previously, the organizational structure of the GCI encompasses its business model, leadership, and technology. As illustrated in Chapter 6, actor-network theory (ANT) diagrams coupled with the Digital Convivial Business Model Canvas (DCBMC), which is my extension of Osterwalder and Pigneur's (2010/2013) BMC, and the materiality canvas, help to evaluate such structure and actor associations. In these discussion chapters, I describe each of the 11-building blocks of the GCI's BMC, and do so by segmenting them into the four distinct categories (i.e., value proposition, customers, business infrastructure, and finances). Actor-network theory diagrams for each of the 11-building blocks can be found in Appendix E. The remainder of this chapter discusses the first facet of the GCI's DCBMC: its value proposition, including its mission, motto, and value provided to customers. I will describe the other three categories in following chapters.

The Google Cultural Institute Value Proposition

Google claims to use its technological innovations to “[o]rganize the world’s information and make it universally accessible and useful” (Google Our Company, n.d., para. 1). One way

Google tries to increase universal access is by democratizing the world's arts and culture with its GCI. The GCI's stated value proposition is to provide cultural institutions and art users opportunities to "create, promote and preserve culture online" (Patarin, 2014, p. 6). As discussed in Chapter 2, a value proposition is "the reason why customers turn to one company over another. It solves a customer problem or satisfies a customer need" (Osterwalder & Pigneur, 2010/2013, p. 22). In this way, the value proposition is also part of the mission of the organization, as it provides top-sight constraints over the vision, strategy, scope, and scale of the company (Alt & Zimmermann, 2001).

However, a better way of thinking about the GCI's value proposition is to consider how it is actually actor-network specific. Put another way, the institute provides different values to its numerous networked actors (i.e., the GCI provides value to Google and the institute, as well as to its users, cultural partners, and the arts and culture industry at large), and these values differ depending on which actor Google is targeting. In this context, what Mol (2002) would describe as a body multiple (i.e., an object can be both one and many), the GCI's value proposition is "one that has a distinct identity yet also exists in a plethora of different versions that take on various roles" (Gries, 2015, p. 244). For instance, the institute's value proposition is multi-sided. The GCI helps Google fulfill its mission because it organizes the world's art and culture and makes cultural artifacts universally accessible for and useful to everyone. Additionally, the GCI provides value to its users, cultural institutions, and the arts and culture industry landscape.

While it is helpful to consider how the value proposition of an organization is actor-network specific, it is also beneficial to imagine the entire structure of an organization to be a giant actor-network. In other words, the value proposition of an organization, like the GCI, is carried out through multiple potential actors: its technologies, other resources, activities,

partnerships, finances, leadership, and so forth. Based on this, and for the rest of this chapter, I will describe how the institute broadly provides value. Then, in the subsequent chapters, I will illustrate how the GCI delivers this value to its customers, partners, Google, and the arts and cultural landscape through its business model and technologies. In this way, I will paint the collective GCI ecosystem masterpiece.

The GCI's value proposition to its users is to provide innovative technologies that allow them to experience art, culture, and heritage in a visually aesthetic, immersive, educational, and inspiring way (Beyond GCI, 2013). Specific to its partners, the institute's value proposition is to help its partners digitize and organize their collections free of charge, and then use those digitizations to tell unique and "compelling stories" (Seales et al., 2013, p. 71). Additionally, because the GCI's digitization process is free to cultural partners, the partners do not have to bear the cost of digitization. It is also worth mentioning that without the assistance of such a tech titan, access to this type of innovative technology would be financially difficult, if not close to impossible, for cultural institutions. Thus, cultural institutions hope that through a partnership with Google, they will be able to digitize their collections and increase awareness of and possibility more traffic to their collections. For more information on this subject, see Thompson and Rodley (2016). Their report conducts a comparative analysis of GAC partner experiences to determine whether or not the Peabody Essex Museum should partner with the GCI.

The GCI's value proposition to Google is to help Google further fulfill its mission, as well as to help enhance the Google brand and technologies (to be discussed at great length in Chapter 10). Particular to the arts and culture industry at large, the institute's value proposition is the democratization of culture (Seales et al., 2013). The GCI argues that by exposing more people to art and culture, it will spark a passion for art and culture and create a recursive cultural

interest cycle. The act of art democratization through technology, however, does not come without a cost to the arts and culture industry. For example, from the perspective of art scholars, especially those rooted in elitist idealism à la Walter Benjamin (1936/1969), art democratization through digitization evoked troublesome issues for the future of art. Namely, if uneducated and/or common art users were allowed to say something about art, they might be able to influence others through their unqualified opinions. In this context, Benjamin (1936/1969) and his followers might consider the digitization of art through the GCI as destroying the mystic and aura of the world's art, culture, and heritage. Based on this, as well as my takeaway from conversing with Patarin (personal communication, June 21, 2017), cultural partners of the GCI preferred that users not be allowed to provide their opinion regarding the meaning, quality, or value of a specific artwork. This debate sparked many changes to the GCI's platform and leadership, which I will discuss at length in Chapter 9.

As I have briefly illustrated, the GCI's value proposition is multifaceted and its many features will become more apparent throughout the forthcoming chapters. For example, one value proposition facet is the cultural content that is available on the *GAC* website. To help illustrate the value of such content, I will now explain how *The Starry Night* became entangled in the GCI ecosystem. Specifically, I will describe how the painting has knitted itself into a multiplicity of associations. This narrative serves as a foundation for the recursive and collective complexity of the institute to be illustrated later (i.e., the customers of the GCI are reliant on the key activities of the GCI, which are dependent on the key resources, critical partnerships, customers, finances, leadership, technologies, and value proposition of the GCI, and vice versa).

The Starry Night and the Google Cultural Institute

Thanks to the guiding direction of Google and its GCI, as well as its partnership with the MOMA, *The Starry Night* can be examined virtually on the GAC website at the following [hyperlink](https://www.google.com/culturalinstitute/beta/asset/the-starry-night/bgEuwDxel93-Pg?hl=en) (a screen capture of the painting on the GAC website can also be seen in Figure 22). The GCI-MOMA partnership was established to help both entities use Google’s technologies, in combination with cultural artifacts, to tell compelling stories and engage users. The MOMA was one of the original 17 museums that participated in the Google Art Project (GAP) since the beginning in February of 2011. As previously described, the MOMA has vastly expanded *The Starry Night*’s basic network, and the museum’s additional partnership with Google and its technologies created an even more extensive and sophisticated webbed network for the painting.

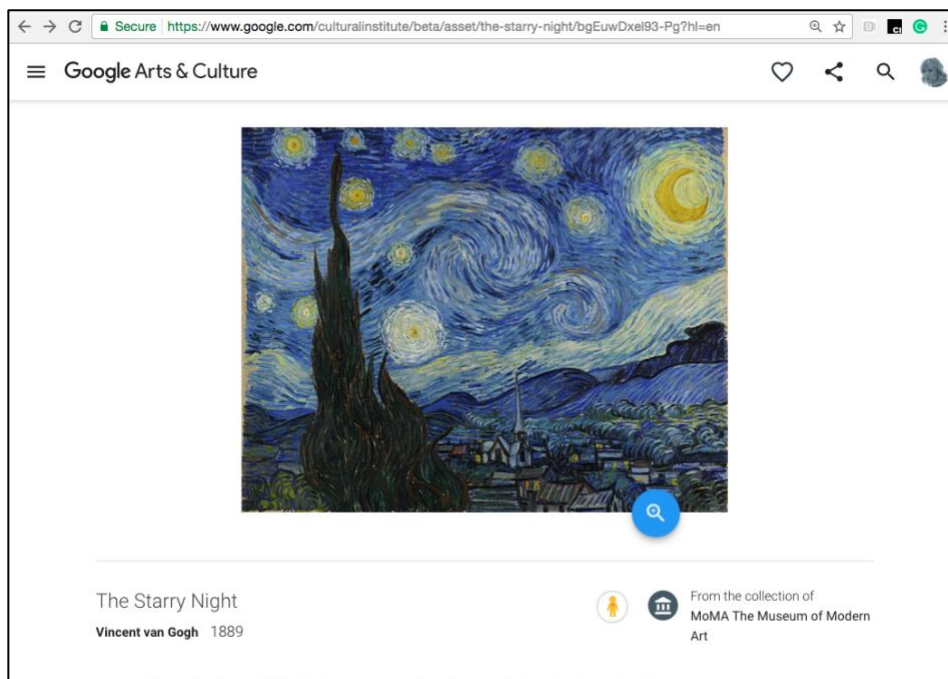


Figure 22. Screen capture of van Gogh’s (1889d) *The Starry Night* located on the GAC website. From “GAC The Starry Night,” by Google Arts and Culture, n.d. (<https://artsandculture.google.com/asset/the-starry-night/bgEuwDxel93-Pg>). In the public domain.

For instance, within the GCI ecosystem, *The Starry Night* engages with a multiplicity of human and nonhuman actors (i.e., it interacts with artworks around the world, other cultural

institutions, global GCI users, Google, Google's technologies, and so forth). And, while some of the painting's collective relationships are new (i.e., the painting is associated with new actors), some of its relationships are old (i.e., the painting is linked with previous actor associations). What helps distinguish these associations and discover underlying differences across these relationships is *how* Google's technologies connect these actors. To explore *how* technology connects *The Starry Night* with a multiplicity of actors, it is necessary to examine Google's technologies and the ways in which they induce assemblage through its digitization and materialization of, as well as participation with, cultural artifacts.

Within the GCI ecosystem, humans and objects collectively work with *The Starry Night* to create and later share the painting with the institute's customers (cultural institutions and users). As I will describe in detail in Chapter 9, the GCI digitizes cultural assets, tags them with digital metadata, creates a large cultural database, and then puts these digitized objects onto its GAC for users to explore. The painting also interacts with users on the GAC website where users can explore it in gigapixel resolution, virtually view it inside the MOMA, and place it inside their own gallery (GCI Users, 2015). Further, users can experience and share the painting through the institute's social media platforms (e.g., Google+, YouTube, Twitter, and Facebook). Also, users can interact with *The Starry Night*, and other works of art, through Google Chrome and Chromecast Background, which presents them with daily art masterpieces (GCI Users, 2015).

These examples are just a couple of ways that *The Starry Night* has interlaced itself across the GCI ecosystem, as well as found itself in additional Google entanglements. As I will describe throughout these chapters, the painting has also participated in virtual reality (VR) experiences with Google Tilt Brush and Google Daydream, as well as surfaced in various cultural mobile applications. It has been used by Google to train artificial neural networks

(ANNs) for artificial intelligence (AI) and found itself in art created by Google technologies (i.e., machine learning and AI). It has participated in machine learning art experiments to explore the potential of technology action to produce self-directed metadata, image classification, tagging, image similarity recognition, data visualization, timeline creation, and interactive 3D landscapes (GAC Experiments, n.d.). The painting has even been considered as a probable monetary tool to entice advertisers and users to the GAC. Thus, the digital life of *The Starry Night* is a complicated story that is rich with nuanced actors. It has “transformed many times over in terms of form and/or function, depending on what associations it [entered] into” (Gries, 2015, p. 40), which has allowed its iconicism to surpass all of its digital transformations.

Concluding Thoughts

Early in this chapter, I presented several materiality factors of Vincent van Gogh’s (1889d) *The Starry Night* to introduce how the consequentiality of an object is the collective activity of actors intra-acting (Barad, 2007) to compose, produce, distribute, transform, and circulate the object into associated collectives. In this context, I tried to illustrate what Morton (2015) described as *charisma*, that an object like *The Starry Night* is not the sum of its parts (i.e., its paint, canvas, paint brushes, etc.) nor is it the totality of its creator (i.e., van Gogh). Instead, an object is *charisma*, “pouring out of anything whatsoever, whether we humans consider it to be alive or sentient or not” (Morton. 2015, para. 24). Based on this, it is more helpful (in terms of understanding) to imagine *The Starry Night* as being alive as it induces web-like connections with other actors to assemble and reassemble the art and culture social (Latour, 2005).

When the painting was acquired by the MOMA in 1941, an association was created to establish, what I like to call, the MOMA-Starry Night network. The MOMA serves a key participatory actor and functions as a spokesperson (Latour, 1987) for *The Starry Night*’s

network. Through MOMA's transformations of the painting into commercialized merchandise, exhibitions, and educational tools, the MOMA catapulted the fame and visibility of the painting to that of iconic status. Then, in 2011, the MOMA partnered with Google and its art project (GAP) to transform the painting into a digitized arrangement. Through relations with the GAP, and later with Google's overarching GCI, *The Starry Night* generated consequential associations across time and space.

However, to understand these interactions, it was imperative that I explore the organizational structure of the GCI. Thus, I followed and traced actor associations within the ecosystem and allowed the actors to present the value proposition within the GCI's overarching business model. I found that the multifaceted nature of the institute's value proposition to both of its customers (i.e., its cultural partners and users), as well as to the arts and culture landscape. For instance, the GCI's value to partners is to freely help them digitize and organize their collections to tell unique and "compelling stories" (Seales et al., 2013, p. 71). The GCI's value to its users is to provide them with art, culture, and heritage experiences in a visually aesthetic, immersive, educational, and inspiring way (Beyond GCI, 2013). Lastly, the GCI's value to art and culture at large is to democratize "access to the world's culture" (Google CI Chromecast, 2014, 00:44).

In the next chapters, I will discuss the other key categories of the DCBMC. For instance, in Chapter 8, I depict the GCI's customers, which encompasses its customer segments, customer channels, customer relationships, and participatory culture. In Chapter 9, I illustrate the GCI's business infrastructure, comprising of its critical partnerships, key resources, key activities, and digitality processes. Lastly, in Chapter 10, I describe the GCI's finances, including its revenue streams and cost structures, as well as present how the institute provides a tremendous value to the overall Google network.

CHAPTER 8: DIGITAL CONVIVIALITY, CUSTOMERS, AND PARTICIPATION

My study so far has broadly focused on *The Starry Night*'s collective physical life, as well as introduced how the painting formed new network relationships with the Museum of Modern Art (MOMA) and the Google Cultural Institute (GCI). As Google's technologies transformed the painting into digitized material, new networked associations were created across the MOMA and Google. The process began with Google's Art Project (GAP) and establishment of Google in Paris. As the GCI's value proposition focused on enhancing cultural experiences for its key customers, as well as for the arts and culture industry at large, techno-culture associations became complex. When the GAP was merged under the GCI umbrella (and later rebranded as Google Arts & Culture [GAC]), the collective life of the artwork became even more entangled.

In this chapter, I build on those imageries to illustrate the customers and participatory experiences available across the institute ecosystem. It is important to note that the following analysis may seem very detailed and highly descriptive. However, this level of detail and description has been provided for a specific reason: to help advance the theory and methodology surrounding digital convivial tracking with a design science (DS) approach and an actor-network theory (ANT) mindset. I will take you on a very detailed journey through the GCI ecosystem, as close description is the point of an ANT approach. Therefore, as this part of the case study will make evident, *The Starry Night*'s materiality (i.e., its circulation, transformation, collectivity, consequentiality, etc.) has not been limited by the MOMA's location in New York or the United States (US). Instead, Google's technologies have helped people around the world to see and interact with the iconic painting from the comfort of their own computer. In this way, *The Starry*

Night, as well as the GCI, have been able to inspire, educate, modify, and “reassemble the social” (Latour, 2005, p. 16) through the use of technology associations.

With an ANT mindset, I explored the customer section of the GCI’s business model canvas (BMC) (Osterwalder & Pigneur, 2010/2013), which includes the customer segments, customer channels, and customer relationships. As I followed customer activities, I was reminded of Zolnowski et al.’s (2011b; 2012) and Zott et al.’s (2011) critiques that customer integration and co-creation of value are practically absent from the BMC. This realization identified controversy surrounding the BMC. Because participation is a key element of conviviality for a technology company, as well as for my digital convivial tracking examination at large, I recognized the need for a *participatory culture* building block within the BMC. Following this discrepancy, I discovered actor relations and the collective activities they create to introduce a new segment to the Digital Convivial BMC (DCBMC): participatory culture.

Together, this collective account is guided by my second, third, and fourth research questions. Seeing that these research questions build on each other, in this chapter, I deliver stories that describe the customers and participatory culture of the GCI. This approach allows the participating actors to describe how the customers of the institute impact culture, technology, and the conviviality of Google. Together, these descriptions help me examine the participatory convivial aspects of the institute ecosystem.

The Customers of the Google Cultural Institute

According to Seales et al. (2013), the GCI’s multi-sided business model (i.e., Google wants users to view cultural material on its platform, yet needs partner institutions to provide the content) presents many challenges. For instance, one challenge involves convincing cultural organizations to partner with the GCI. This process includes demonstrating to museums that the

hassle of digitizing their artifacts will be beneficial (i.e., increased user traffic to museum websites, improved public interest around their collections, expanded public interest in art and culture in general, and so forth). And, once the institute convinces museums to become its partners, it has to ensure that their cultural content is properly digitized, identified, grouped, and transmitted at a large scale. In combination with these partnership problems, the GCI hopes to proliferate peoples' curiosity about art and culture at large; which means, Google must attract cultural users to its *Google Arts & Culture* (GAC; n.d.) website. Once there, the GCI has to engage these users through technology interactions and stories that encourage them to explore, learn about, interact with, and share art (Patarin, personal communication, June 21, 2017).

In this way, the GCI suffers from what is commonly referred to as the *chicken or the egg dilemma*, or in this case, the *artifact or the user dilemma*. Put another way, Google needs cultural artifacts to be digitized in order to secure users, yet needs users to view the cultural content to attract more partners willing to digitize their cultural collections. As the GCI continues to increase its partnerships and digitize more art and culture, it faces a dilemma similar to that of other websites of today. In this context, what Richard Rogers (2013) refers to as the transformation of the web—"instead of websites awaiting content, there is content now awaiting users, like books in libraries awaiting borrowers" (p. 73). In other words, the institute has a vast assortment of digitized artifacts now awaiting users to view and participate with the content (Seales et al., 2013). To navigate the complexity of the GCI's customers, I will describe the key factors that make up the customer category of the BMC. I will also illustrate how these customer aspects intra-act (Barad, 2007) across the customer sections and other areas of the BMC. I now turn toward a description of the customer segments of the institute, including the customer channels employed by the GCI to reach its customers and establish customer relationships.

Customer Segments

As briefly touched on in Chapter 7, the GCI targets two key customer segments: users and cultural institutions. While these segments may, at first glance, seem straightforward, they are actually complex actor-networks, which embody a variety of actors, attributes, needs, and so forth. To explain, I hyper-focus on the user customer segment. Users include human actors, such as educators, students, business leaders, historians, scholars, and parents. However, users are also an assemblage of what I am loosely calling “objects,” such as psychographics (e.g., interest in art and culture, hobbies, Internet habits, values, etc.), demographics (e.g., gender, age, income, etc.), media literacy skills (i.e., ability to use and understand digital media), personal social media accounts, social media usage, and/or data.

Similarly, cultural institution customers can also be seen as compilations of human actors, such as historians, curators, museum visitors, donors, arts management leaders, arts management staff, a board of directors, etc. These institutions are also assembled of objects, such as cultural artifacts, finances, politics, a tangible building, location within an area (i.e., in a city, in a rural area), as well as the institution’s brand, website, social media, technologies, and so on. As demonstrated previously, cultural artifacts like *The Starry Night* are complex actor-networks themselves, which means they are composed of a multiplicity of other actors and actor-networks. In this way, stating that the institute has two customers, users and cultural institutions, is never that simple, because each customer is a complex mesh of actors.

Furthermore, certain cultural partners and users are potentially more important to the GCI, or at least, are more critical to growing the webbed mesh of the institute ecosystem than others. This is because certain cultural partners, such as the Museum of Modern Art (MOMA) in New York City, as well as specific users, such as celebrities, tend to link more actors together

and spread the initiative of the GCI. These partners are considered critical partners, which I address in Chapter 9 when I describe the business infrastructure of the GCI. In this way, the customers of the institute encompass cultural institutions who supply cultural content to the GCI and users who view the cultural content across its ecosystem. To reach its customers, as well as to ensure strong relationships across all of its customers, the GCI employs several channels.

Customer Channels

According to Osterwalder and Pigneur (2010/2013), customer channels can include those provided by the company, such as its storefront or website, as well as those provided by its partners, such as partner distributors or partner websites. Drawing from this, the GCI employs its own channels, plus certain Google channels, to reach its customer segments. The institute also utilizes the channels of its cultural partners. It is important to note that certain channels of a company can also be considered as essential resources. In other words, there can be significant cross-over across customer channels and essential resources within a BMC. However, in this section, I address the key channels that are used by the GCI to reach its customers. Later, in Chapter 9, I reiterate specific channels that participate as essential resources for the GCI to fulfill its mission.

For instance, the institute uses its own actor-network channels, including its Lab in Paris, employees, engineers, artists, and technologies (e.g., the *GAC* website and mobile application, social media platforms and accounts, Google Cardboard) to reach customers. Additionally, the institute employs several Google channels, including Google technologies (e.g., Google Maps, Google Street View, Picasa), Google sub-entities (e.g., Google Tilt Brush, YouTube, Daydream, Brain Team, DeepDream, social media), and the influence of the Google brand. Lastly, the GCI also uses the channels of its cultural partners, including their employees (e.g., curators,

historians, digital media staff), technologies (e.g., museum website, social media accounts, email list), physical space, and cultural artifacts.

Similar to my illustration of the GCI's customer segments above (where I broke these customer channels into distinct company owned categories), it is important to remember that each of these channels is in fact compiled of additional actor-networks. In this way, each actor channel intra-acts across other channels, as well as with additional collectives, which demonstrates how the GCI, Google's technologies, cultural partners, users, and artifacts are intertwined. Put another way, to provide cultural content to be viewed on the GAC platform, the GCI relies on the help of its cultural partners, specifically their curators, to use Google's technologies to digitize cultural artifacts from their collections. The institute relies on users to explore the cultural content to garner data about which cultural experiences users are engaging with, and then, using that data, the GCI encourages its partner institutions to contribute more artifacts, as well as entices more institutions to partner with the institute. To help illustrate this collective entanglement further, the GCI uses various channels to communicate and engage with each segment of its customers (cultural institutions and users). I will now describe the specific channels the GCI uses to reach cultural partners and users.

Channels to Reach Cultural Partners

To reach cultural partners, the GCI employs several channels. For instance, the institute created the *GCI Open Gallery* (n.d.), which allows these partners to access information regarding how to use Google technologies. Within the Open Gallery, partners can use Google's gigapixel art camera to digitize paintings, Street View to create 360-degree virtual tour floor plans of their interior, and Google data management tools to manage their digitized collections. Further, partners can use Google Maps, as well as "easy-to-use tools . . . [such as] a high-res zoom

viewer, expertly narrated videos, [and] viewing notes” (GCI Partners, 2015, Organize, para. 5) to curate online exhibits for the *GAC* website. Partners can also publish their content using a variety of GCI channels: the *GAC* platform, Chromecast Background, Chrome *GAC* browser, Google Cardboard, and Google Now (GCI Partners, 2015). Lastly, they can design a mobile app (i.e., the GCI provides design tools for cultural partners to design an app for the institution without needing to have any developer experience), as well as embed their digitized cultural artifacts onto their website (i.e., the GCI provides embed tools that allow partners to place their digitized artifacts onto their website).

Channels to Reach Users

While the GCI uses a variety of channels to reach its cultural partners, it also utilizes different channels to target its users. For example, the institute provides user “access [to] enjoy culture anytime, anywhere” (GCI Users, 2015, Access, para. 1) through the channels of Google, the GCI, and cultural partners. Users can use Google Chromecast Backdrop or Google Chrome search browser to explore “beautiful artworks. . . every time [they] open a tab on Google Chrome, or on [their] TV screen” (GCI Users, 2015, Access, para. 5). According to Google, “Chromecast is a thumb-sized media streaming device that plugs into an HDMI port on an HDTV” (Google CI Chromecast, 2014, 00:03), and once plugged-in, allows users to “stream music, videos, and apps right to the device and see it on the big screen” (Google CI Chromecast, 2014, 00:11). Additionally, an aspect of Chromecast is Backdrop, which “runs passive content so it becomes a beautiful backdrop for content including artwork” (Google CI Chromecast, 2014, 00:22). However, if users do not have a Google Chromecast, they can select to have *GAC* artworks presented onto their Chrome browser tabs. The artwork displayed “is refreshed every day, or you can change the settings to see a new image every time you open a new tab” (Google

Chrome GAC, 2017, para. 3). In other words, every time users, who installed GAC art tabs onto their computers, open up a new search tab in Chrome, they will experience either the GAC's designated artwork of the day, or a new artwork, depending on their user settings. And, "[i]f an artwork happens to spark [their] curiosity, [users can] click the image description to discover more on Google Arts & Culture" (Google Chrome GAC, 2017, para. 4).

Additionally, the GCI uses institute channels to encourage its users to "get involved . . . [and] . . . create, connect and share. Join the global community" (GCI Users, 2015, Get Involved, para. 1). The global community encompasses users creating their own user gallery on the GAC platform, getting social with the GCI's social media platforms (e.g., Google+, YouTube, Twitter, and Facebook) and personal user social media accounts, and learning about art from art experts (GCI Users, 2015). Lastly, the institute employs its partners' channels to allow users to explore art "in [their] pocket" (GCI Users, 2015, Access, para. 2). By downloading the GCI's partner mobile apps, users can utilize the app as a digital tour guide while exploring a museum or enjoy a virtual visit from their location (e.g., the courtesy of their own home) (GCI Users, 2015, Access, para. 3). Thus, the channels of the institute encompass those provided by the GCI, Google, and cultural institutions. While I have provided a basic description of *the type* of certain channels that the GCI uses to reach its customers, it is also necessary to discuss *how* these channels (and other actors) are used by the institute to foster strong customer relationships built on customer service.

Customer Relationships

The GCI's customer relationships are cultivated through what Osterwalder and Pigneur (2010/2013) call customer service. Using their definition, the institute uses customer assistance, self-service, automated service, customer communities, and co-creation opportunities to nurture relationships with its cultural partners and users. To enhance its relationships with cultural

institutions, the GCI employs direct personal assistance and a customer community (both on- and offline). For instance, according to the *GCI Partners* (n.d.) website, the institute ensures that cultural partners are provided significant information and training, as well as direct contact with GCI employees, to ensure that partners can adequately digitize, contextualize, and organize their collections. Partners also engage with the institute through the *GCI Open Gallery* (n.d.) website, which as described above, allows partners the opportunity to communicate with GCI employees and access technology tools and information regarding how to use those tools to digitize, contextualize, organize, and publicize their cultural content.

Conversely, to develop its relationships with users, the GCI engages self-service and automated assistance. For example, the institute provides online how-to guides, which are designed by Google to provide basic problem solutions. Additionally, users can engage with the GCI through the institute's "global community" (GCI Users, 2015, Get Involved, para. 1), which as described above, allows users the opportunity to experience art and culture in a variety of user-directed ways. In this way, the global community is not based on direct personal assistance and communication like the Open Gallery. Instead, the global community is more self-service/user directed.

Lastly, relationships across both institutions and users are cultivated through co-creation and participation opportunities provided by Google and the GCI. However, and as previously discussed in Chapter 2, the customer relationships segment of the BMC only briefly discusses communities and co-creation. In this context, what Zolnowski et al. (2011b, 2012) might describe as a missed opportunity, customer integration and co-creation of value are practically absent from the BMC. Further, and as described in Chapter 6, when conducting a digital convivial examination, it is necessary to explore the participatory culture and co-creation nature

of an organization. Based on this, I created a new segment of the BMC, which I call the *participatory culture* building block.

The Google Cultural Institute Participatory Culture

In a broad sense, the participatory culture of an organization is how it provides participatory exchanges across actors (e.g., humans, organizations, creators, users, technologies, art, other objects). According to Jenkins's (2012), "a participatory culture is also one in which members believe their contributions matter, and feel some degree of social connection with one another" (p. 3). Further, Potts (2014) stated that participatory exchanges can occur between "any actor within a given network— a person, technology, organization, website, document, event, and so on—or any combination of these actors" (p. 25). In this context, participatory exchanges can occur across humans and objects, such as "between people and technologies" (p. 25). Similarly, Ivan Illich (1973) would describe participatory exchanges as a central component to *conviviality*: the "autonomous and creative intercourse among persons, and the intercourse of persons with their environment" (p. 18). Thus, to understand the conviviality of an organization, it is necessary to explore how the organization provides collective participation across humans and objects.

Specific to technology companies, such as Google and its GCI, participatory exchanges include the tools designed to provide participation (i.e., digital technologies), as well as the types of exchanges that these tools provide (i.e., exchanges between human-to-human, human-to-object, object-to-human, object-to-object). In this way, these tools can be convivial as they encourage participation (i.e., humans working *with* technology), and/or non-convivial as they do not encourage participation (i.e., humans making technology work *for* them or technology *acting on* humans). And, in the case of the GCI, its participatory culture is two-fold because it allows

customers to engage in personal art and culture experiences, as well as share these interactions with others. In this way, participatory culture is defined to include humans participating *with* art and culture, as well as humans participating *with* other humans. Put another way, the participatory culture of the GCI encompasses how humans participate *with* technology to experience and share art and culture.

As discussed in Chapter 6, to analyze the participatory culture and cultural participation exchanges of the GCI, Henry Jenkins's (2009, 2012) evaluations of digital participatory culture and James Bau Graves's (2005) steps necessary for culture to remain vital and participatory were combined. Based upon this combination, I created a seven concept mnemonic *CULTURE*, which stands for how the digital ecosystem provides ways to: Create, Use, Locate, Teach, Unite, Reason, and Expose actors socially and culturally. *CULTURE* can be used to analyze whether the GCI ecosystem provides social participatory exchanges (i.e., actors can participate across other actors, such as human-to-human) and cultural participation (i.e., actors can participate across culture, such as humans-to-objects). In the next section, I discuss each of these participatory processes in relation to the GCI, its technologies, and its customers.

CULTURE: Create

Does the GCI ecosystem and its GAC platform provide support for content creation for both the participant and producer?

The first concept explores how the GCI platform provides, as well as supports, content creation across both of its customers: cultural partners (i.e., those that predominately produce the content) and users (i.e., those that predominately participate with the content). While, the institute does provide support and opportunities for content creation across both customers, there

are significantly more opportunities available for cultural partners. I will describe these opportunities for each customer segment, using *The Starry Night* and the MOMA as my guide.

Create Opportunities for Cultural Partners

There are several ways that content creation and/or co-creation is provided and supported for cultural institution partners. For instance, cultural partners, such as the MOMA, have individualized partner pages on the GAC website (see Figure 23). On these partner pages, institutions showcase museum details, art collections, exhibitions, digital stories, and more.

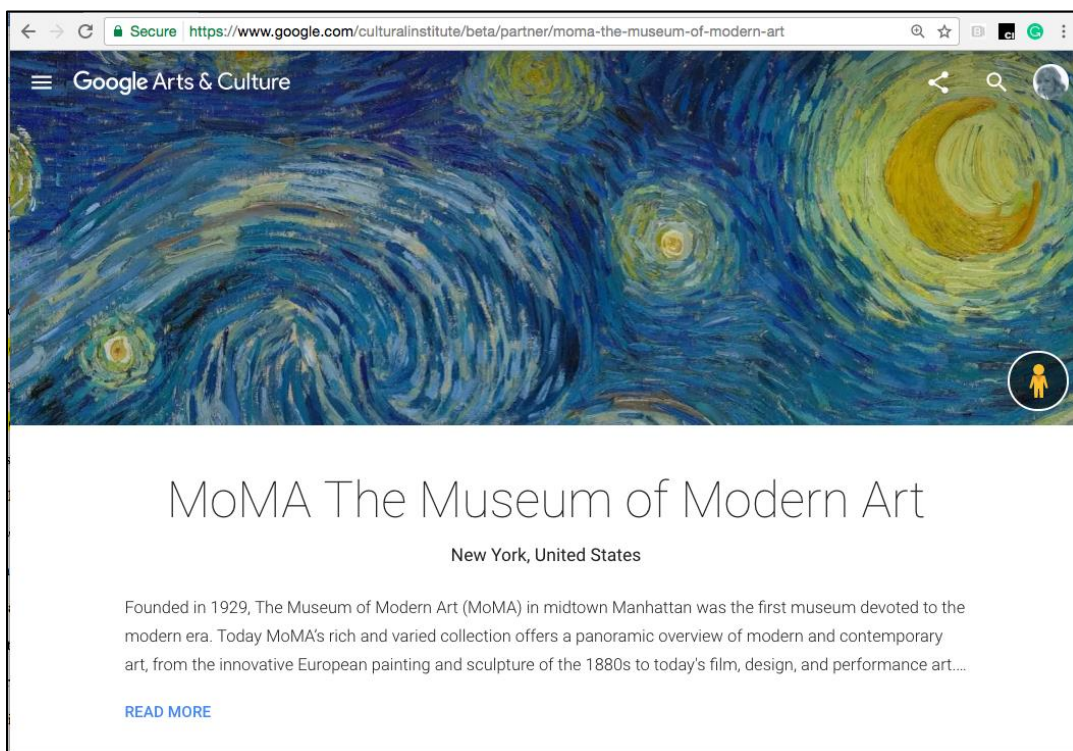


Figure 23. Screen capture of the MOMA partner page on the GAC website. From “MOMA, The Museum of Modern Art,” by Google Arts and Culture and the MOMA, n.d. (<https://artsandculture.google.com/partner/moma-the-museum-of-modern-art>).

These pages serve as, what Richard Rogers (2013) would describe, “public displays of connections” (p. 44) across the GCI and its cultural partners. Specific to the MOMA, its “GAC MOMA” (n.d.) webpage displays the GCI’s relationship with the MOMA. This relationship is exhibited through the content created and inputted onto the “GAC MOMA” (n.d.) webpage (by

MOMA curators), as well as through the support offered by the GCI (in the form of sharing the content for others to see). Content on GAC partner pages includes information about the museum and its art, such as an overview about the museum, digital stories, collections, museum view tour, exhibits, location map, address, website, and hours of operation. I will now describe the ways that institutions, the MOMA in particular, can create content.

On the “GAC MOMA” (n.d.) partner webpage, the overview of the MOMA features a 288-word description of the museum’s collective life. It covers MOMA’s beginning, how it was established in 1929 as “the first museum devoted to the modern era” (para. 1), to MOMA’s present, how it is an institution that “welcomes approximately 3 million visitors every year and has more than 130,000 members” (para. 2). The overview also details key collection highlights, such as “Claude Monet’s *Water Lilies*, Vincent van Gogh’s *The Starry Night*, and Pablo Picasso’s *Les Femmes d'Alger (O.J.)*, along with more recent works by Andy Warhol, Elizabeth Murray, Cindy Sherman, and many others” (para. 1).

Digital stories about the MOMA consist of one narrative exhibit titled “Sophie Taeuber-Arp” (GCI Sophie Taeuber-Arp, n.d.). Designed and created by Nancy Lim (curatorial assistant) and Cara Manes (assistant curator) of the MOMA’s Department of Painting and Sculpture (GCI Sophie Taeuber-Arp, n.d.), this digital story is a 25-page slideshow consisting of images and short text descriptions about artist and designer Sophie Taeuber-Arp (1889-1943) and her work. According to the *GCI Partners* (n.d.) website, the GCI provides its partners “story telling tools and platforms” (Organize, para. 4) so that they can transform “artworks and artifacts to life and create beautiful stories” (Organize, para. 5). These user-friendly tools “include a high-res zoom viewer, expertly narrated videos, viewing notes, and maps . . . [which allows partners to] curate online exhibitions to preserve their story” (Organize, para. 5).

Regarding the MOMA's collection, MOMA curators provide information about the museum's collection on the *GAC* website. On the "GAC MOMA" (n.d.) webpage, there are 129 artifacts, from the MOMA collection, available to view. Further, on this webpage, as well as other museum webpages, the GCI provides tools that allow both partners (producers) and users (participants) to organize and view a museum's artifacts by popularity, time, and color. When I used these tools to see where *The Starry Night* painting surfaced, I discovered the following. When MOMA's artifacts are organized by popularity, *The Starry Night* is one of the first displayed. Similarly, when MOMA's artifacts are organized by time (MOMA's artifact timeline goes back to 1876), *The Starry Night* is also one of the first to be presented. Interestingly, when organized by color (the GAC provides 13 color options), *The Starry Night* only appears under the color choices blue and green; it does not appear when I select gold, yellow, orange, or black. However, its daytime companion, *The Olive Trees*, appears when I select dark gray, light gray, blue, and green. This information may prove useful when exploring how the GCI digitizes material artifacts (which I discuss in Chapter 9).

The MOMA collection can also be broken into 57 (non-mutually exclusive) categories, such as oil painting, contemporary art, modern art, and so forth. For instance, *The Starry Night* is included in the following: modern art (which has 26 items in total in this category), canvas (24 items), oil paint (24 items), post-impressionism (16 items), neo-impressionism (6 items), and Vincent van Gogh (3 items). The number of items provided in parentheses is the total amount of MOMA artifacts, including *The Starry Night*, within that category.

Moving on to the museum view option on the "GAC MOMA" (n.d.) partner webpage on the *GAC* website, the MOMA only provides one museum view. It is important to note: certain items that were not given permission to be seen in the digital museum tour (which could be due

to copyright, ownership, endowment, bequest, etc.), are blurred out (i.e., they are unrecognizable, however, if you zoom in very close, it is sometimes possible, although incredibly fuzzy, to see the title and artist name of the artwork as the display plaque is not blurred out). When exploring the MOMA through museum view, only the 129 artifacts provided by the MOMA to the GCI can be seen as they are displayed inside the museum. The artifacts that are not included in the 129 objects are blurred out during the tour of the museum. I will describe the museum tour viewing when I discuss the usability of the GCI below.

Underneath the museum view content, on the “GAC MOMA” (n.d.) webpage, is a section titled “What's on.” This section displays various exhibits at the MOMA, which are presented in the form of an information hyperlink button. Once clicked, the user is transported to the exhibits page on the *MOMA* website. Below this section, at the bottom portion of the “GAC MOMA” webpage, is a Google Map of MOMA’s location, as well as pertinent museum information for visitors (e.g., MOMA’s physical address, hours of operation, and website link). It is important to note: when I click on the Google Map of the MOMA, I am transported from the GAC platform to the Google Maps platform. While I have just detailed some of the ways that partner institutions can create content on the GCI and GAC, I now turn to how users can create content on, as well as find support from, the institute.

Create Opportunities for Users

The opportunity for users to create content on the *GAC* website is extremely limited. Based on my discussion with Patarin, and my personal use of the *GAC* website, users were previously allowed to create content in the form of a personal user galleries (personal communication, June 21, 2017). In this way, users could add an artwork, such as *The Starry Night*, to a digital gallery that they created on the *GAC* website. Users cannot, however, create or

co-create new content surrounding cultural artifacts, such as upload their own cultural artifacts to the GAC, or create media that remixes, transforms, or tells stories about cultural content. Based on this, it can be reasoned that this limited user participation approach is a shift away from the GCI's initial purpose (i.e., scaled user participation to business partnerships). According to my conversation with Seales, visiting scholar at the GCI for the 2012-2013 academic year, the institute was originally conceived of by Steven Crossan, engineer and initial founder of the GCI, as a space for anyone who wanted to share their cultural creations (Seales, personal communication, June 15, 2017). From discussion with Seales, I gathered that the GCI was originally designed as being available for different types of art content, such as artifacts of antiquity from cultural institutions as well as amateur artists (i.e., a grandmother's quilting project or an art student's creative work (personal communication, June 15, 2017). I will touch on this controversy more in Chapter 9.

While the GAC platform does not provide opportunities for users to create and co-create content, the GCI ecosystem does (remember, the GCI is the umbrella organization for the *GAC* website and GAC initiatives, which means the GCI ecosystem is much larger than just the GAC). For example, Google Maps is a key partner to the GCI. And, as stated above, when I click on the Google Map of the MOMA on the "GAC MOMA" (n.d.) webpage, I am transported from the GAC platform onto the Google Maps platform. On the *Google Maps MOMA* (n.d.) website, I can find and explore additional information that was not on the "GAC MOMA" (n.d.) webpage. I can read reviews of the MOMA that are posted by museum visitors, in addition to being able to post my own MOMA review. Additionally, I can participate with the MOMA map, such as "suggest an edit" (Google Maps MOMA, n.d.). Furthermore, there are over a hundred photos of the MOMA, which were taken and uploaded by Google users. I can add my own pictures, yet I

cannot tag or confirm my uploaded photos. I can read about upcoming MOMA events, which includes a vast amount more than what MOMA provides on its “GAC MOMA” (n.d.) partner webpage. Additionally, at least two other Street View options of the MOMA, including an outside and courtyard view, are available.

In sum, I found that cultural partners have several ways they can create content for the GAC website and mobile application. Through the use of Google technologies, they can digitize artifacts and their institution space, as well as use such digitizations to tell cultural stories and engage users. However, I found that on the GAC website and mobile application there was a lack of content creation and co-creation opportunities for users. For instance, while users can create content in the form of a personal user galleries, such as add *The Starry Night* to a personal digital gallery created on the GAC website, users cannot create or co-create new content surrounding cultural artifacts, such as upload their own cultural artifacts or creations to the GAC website. In this way, it can be argued that the GCI does not equally provide, as well as support, content creation across both of its customers: cultural institutions (i.e., those that predominately produce the content) and users (i.e., those that predominately participate with the content).

CULTURE: Use

Is the platform easy to use (user-friendly) and accessible (available with low barriers for participatory engagement)?

The second concept assesses if the platform is user-friendly and accessible to everyone with low barriers for participatory engagement. While the GAC platform is somewhat easy to use and widely accessible to users, it has some access limitations. For instance, users can access cultural content via the GAC website, as well as by downloading the GAC mobile app and several cultural partner mobile apps. While these digital routes are significantly more convenient

and less expensive than traveling to see cultural works of art, users still need access to technology, such as a computer, the Internet, Google Cardboard, and a smartphone. And, while everyday GCI users are encouraged to participate and “join the global community” (GCI Users, 2015, Get Involved, para. 1) of the institute, as well as invited to use the GCI platform to act as curators to digitally “create, connect, and share” (GCI Users, 2015, Get Involved, para. 1) their own artifact collections, users are restricted in how they can participate and access information. Invitation-only safeguards on certain GCI digital spaces provide cultural institutions access to what is ironically called the Open Gallery (GCI Open Gallery, n.d.), yet, excludes access to the Open Gallery to the average “culturally curious” (GCI About, 2015, para. 2) user.

Based on this discrepancy, I wonder if the GCI could potentially be more accessible to its partners than its public users. Currently, I do not have any specific answers. I have observations (informed by my position as a posthumanist digital scholar using an ANT mindset) that the institute provides its partners with an abundance of information and opportunities to digitize, organize, and talk about art. During my interview with Patarin, I asked if I could access the Open Gallery. He informed me that because of development changes underway on the platform, I could not access the Open Gallery (personal communication, June 21, 2017). Therefore, because I could not gain access and see the exact partner opportunities available, I am not able to describe the GCI’s Open Gallery other than those details that I previously mentioned in this chapter. I will, however, provide a detailed narrative of my user experiences navigating the GCI ecosystem and interacting with *The Starry Night*.

User Experience of Google Cultural Institute

As mentioned, users can explore a multiplicity of artworks and institutions on the GAC platform. They can experience culture through gigapixel images, museum-view tours, digital

exhibits, and Google Cardboard VR experiences. When I visited the GAC platform to view *The Starry Night* (GAC The Starry Night., n.d.), I interacted with almost all of these techno-cultural opportunities. For instance, on the “GAC *The Starry Night*” (n.d.) webpage, I selected the blue magnifying glass-icon (located on the bottom right of the painting, as showcased in Figure 24) to zoom into the painting.

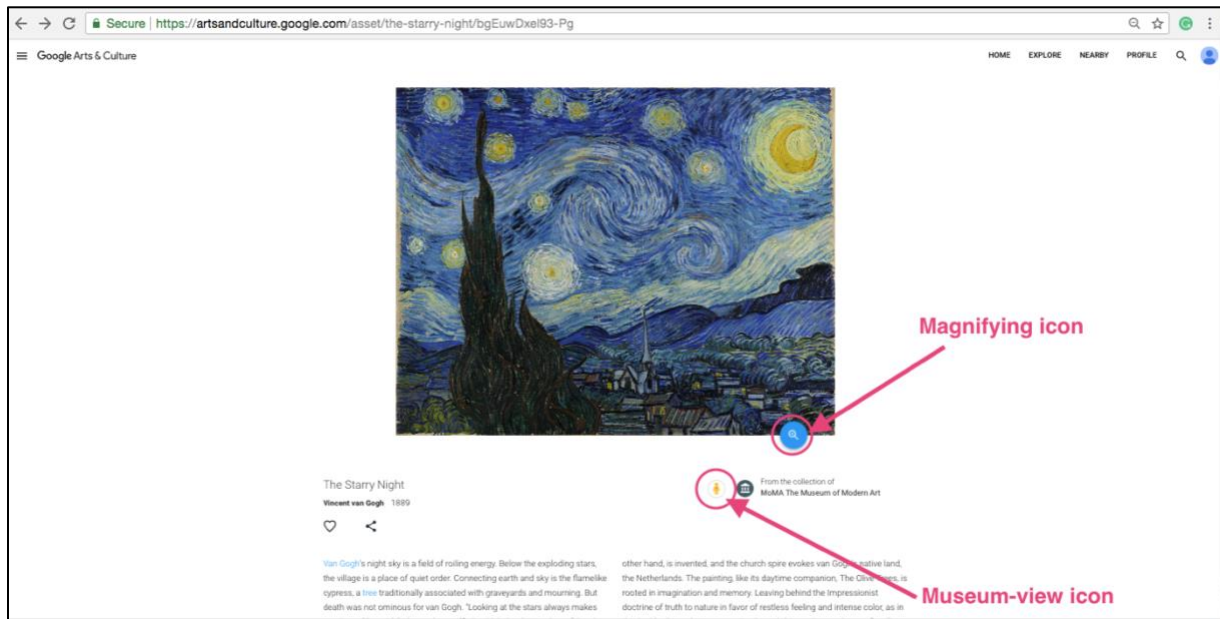


Figure 24. Screen capture of van Gogh’s (1889d) *The Starry Night* and Google’s magnifying and museum-view icons on the GAC website. From “GAC *The Starry Night*,” by Google Arts and Culture, n.d. (<https://artsandculture.google.com/asset/the-starry-night/bgEuwDxeI93-Pg>). In the public domain.

When I zoomed-in, I could examine the painting in such high-resolution that individual brush strokes and untouched areas of the canvas (which would normally be impossible to see), were visible (see Figure 25). According to the *GCI Partners* (n.d.) website, this high-resolution viewing experience is available because of the art gigapixel camera created by Google.



Figure 25. Screen capture of the zoomed-in view of van Gogh’s (1889d) *The Starry Night* on the GAC website. From “GAC The Starry Night Gigapixel,” by Google Arts and Culture, n.d., and V. Van Gogh, 1889d (<https://goo.gl/wXLqLe>). In the public domain.

Further, on the “GAC *The Starry Night*” (n.d.) webpage, I could *favorite* the painting (i.e., by clicking on the heart-icon displayed in Figure 24, which is under the title, artist, and year display of the painting). By clicking this icon, I could share the artwork with others (i.e., by clicking on the sideways v-shaped-icon, also in Figure 24, to the right of the heart-icon, which is also under the title, artist, and year display of the painting). I could also read a small description about the creation and key details of the painting (i.e., title, artist, year created, and so forth). Further, I could watch three videos that detailed the creation and iconicism of the painting (note: two of the videos were actually the same—one was in French and the other in English).

In addition to being able to see the painting in gigapixel resolution, I could *favorite* and *share* the painting, as well as learn more about its creation, I could also view the painting inside the MOMA. For instance, a 360-degree museum-viewing experience was available on the “GAC *The Starry Night*” (n.d.) webpage. Museum-view allowed users to see the painting exactly as it was displayed inside the MOMA, or at least how the painting was displayed when Google’s

Street View technology captured the inside of the museum. As demonstrated in Figure 24 above, the option to view the painting using museum-view was presented in the form of a yellow-human-icon (also shown in Figure 26 in the lower, right-hand-corner, just left of the name of the museum). If users were not familiar with Google’s Street View technology, they may not know that this yellow-human-icon represents Street View. Once I clicked on the museum-view icon, I was instantly transported to the physical space of the MOMA, where *The Starry Night* was (and still is) exhibited (see Figure 26).

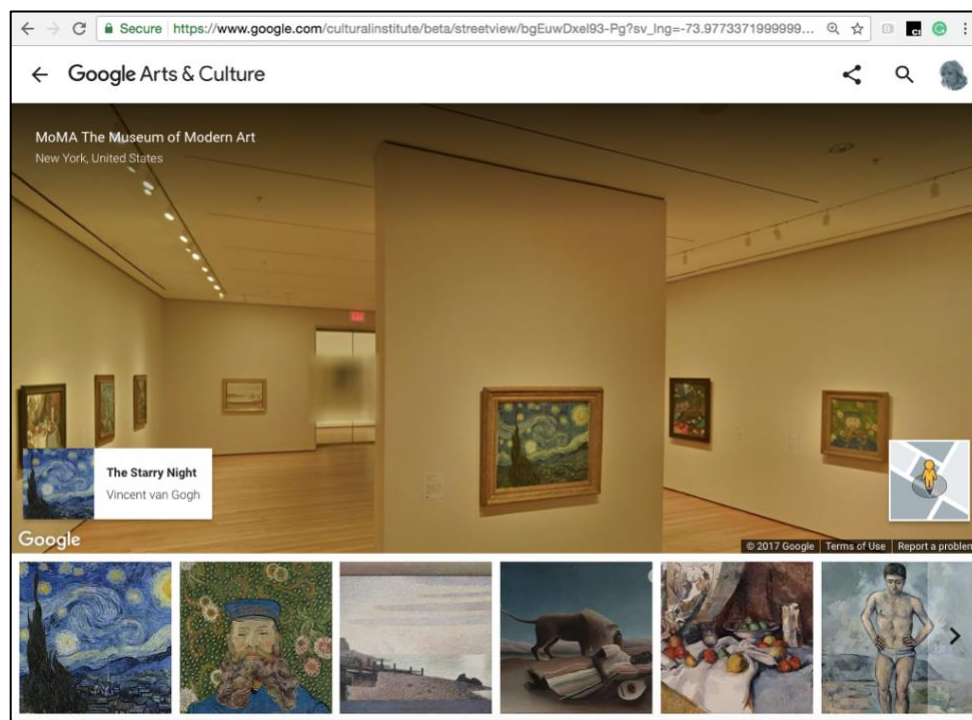


Figure 26. Screen capture of the MOMA museum-view displaying van Gogh’s (1889d) *The Starry Night*, accessed via *The Starry Night* asset page on the GAC website. From “GAC The Starry Night Street View,” by Google Arts and Culture, 2017 (<https://goo.gl/3tCqSm>). Copyright 2017 by Google.

The painting is located in the Mercedes T. and Sid R. Bass Gallery room, Collection Galleries, on the fifth floor (GAC The Starry Night Street View, 2017). In this room, I could see two other artworks by van Gogh (e.g., *The Olive Trees*, 1889c, and *Portrait of Joseph Roulin*, 1889a), as well as paintings by Cézanne, Gauguin, Klimt, Redon, Rousseau, and Seurat.

Additionally, two paintings were blurred out (*Masks Confronting Death*, 1888, by James Ensor, and *The Storm*, 1893, by Edvard Munch). However, while I was virtually inside the MOMA, I was also still embedded within the GAC platform.

In this context, what Laurie Gries (2015) would describe as “emplacement” (p. 124), where “actualized images [objects] land” (p. 124), can greatly impact the “meaning” (p. 124) of an object. Thus, when *The Starry Night* appears on the GAC website (or Google Maps or the MOMA website), this materialization, or emplacement, shapes how others respond to and interact with the painting. This emplacement also shifts the “purpose of that place where it temporarily appears” (p. 125). In this way, *The Starry Night*’s emplacement is both inside the MOMA physical space, as well as embedded within the GAC digital space. Because the painting appears within the ecosystem of Google, this can shape how others respond to the painting, such as apprehension or excitement that Google is participating in art and culture. This Google emplacement can also change the the “purpose of that place where it temporarily appears” (p. 125), in this case, shifting the purpose of both the MOMA and GAC Street View. And, regarding the user-experience of viewing *The Starry Night* in museum-view from the “GAC *The Starry Night*” (n.d.) webpage, the experience was relatively smooth, convenient, and fluid. Additionally, the GCI’s interface concealed the network complexities that were necessary to make this user-experience possible. This virtual museum viewing experience demonstrates what Laurie Gries (2015) defined as “transformation” (p. 117), as Google’s technologies changed the “design, form, medium, materiality, genre, and function” (p. 117) of *The Starry Night*.

Returning to the “GAC *The Starry Night*” (n.d.) webpage, I could also select to visit the MOMA partnership GAC page (GAC MOMA, n.d.) (see Figure 23 above). As I mentioned in the “Create, Cultural Institution Partners” section in this chapter, the MOMA also provides a

museum-view option on its “GAC MOMA: (n.d.) webpage, which allows users to see various artifacts inside the museum, including *The Starry Night*. I will describe this viewing experience because it was quite different, in terms of user-friendliness, compared to the museum-view on the “GAC *The Starry Night*” (n.d.) webpage, When I selected the museum-view option from the “GAC MOMA” (n.d.) webpage, I was transported to the second floor of the MOMA, specifically, in the room of Dieter Roth’s (1997/1998) *Solo Scenes*. Underneath the museum-view-display, I could scroll through additional artworks that were available to virtually experience inside the MOMA. However, these artifacts were not in order relative to my location within the museum, other than by the floor in which they were on display (i.e., the second floor versus the fifth floor).

Additionally, in the lower-right-corner of the museum-view-display, was a small image of a human-icon over a map. Once clicked, the display changed to a floor-plan-view of the museum (i.e., a basic birds-eye-view floor plan without museum labels, such as no room numbers, names, or descriptions). It was here that I discovered (as it was not available anywhere else) that I could select (from an almost invisible drop-down menu) to see artifacts on the second and fifth floors of the MOMA. And, this option to select different floor viewings, was an accidental discovery. For instance, I only noticed the drop-down menu because I saw the words “second floor” above the floor plan, and when I clicked on those words, the option to select second floor or fifth floor appeared. When I selected the fifth floor, my human-icon moved its location on the floor-plan-view to where artifacts on the fifth floor were available (see Figure 27). Further, when I clicked on the museum-view-icon, which is located in the lower right-hand corner of the street view display (in order to return to the museum-view display), I was transported in front of van Gogh’s *The Starry Night*.

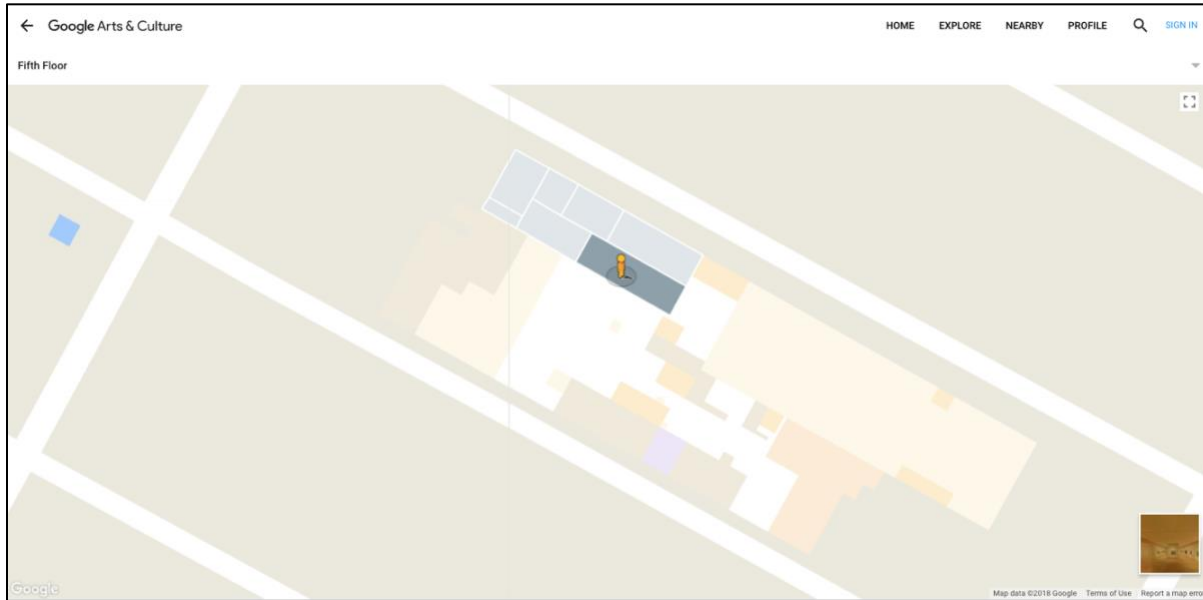


Figure 27. Screen capture of the floor-plan-view of the MOMA’s fifth floor selection (where *The Starry Night* is located) on the GAC website. From “GAC MOMA Fifth Floor,” by Google Arts and Culture, 2018 (<https://goo.gl/jEjd2Y>). Copyright 2018 by Google.

Based on this experience of trying to find *The Starry Night* via the “GAC MOMA” (n.d.) webpage, I found the museum-view to be fun, yet frustrating. For instance, when I tried to use Street View arrows to change rooms and find more artifacts within the MOMA (an action I did not attempt when just viewing *The Starry Night* within the Mercedes T. and Sid R. Bass Gallery room), I found myself constantly lost. Further, these arrows positioned me awkwardly adjacent to artifacts. For instance, I would not be looking at objects straight-on, instead I would be at a weird, often sideways, angle (i.e., this meant I had to move back and forth in the museum-view to reposition myself so that I could see the art more clearly).

And, while *The Starry Night* can be viewed via the GAC using its museum-view option from both the “GAC *The Starry Night*” (n.d.) webpage and the “GAC MOMA” (n.d.) webpage, the painting can also be explored using museum-view on another Google platform: Google Maps. Further, and according to Niccolai (2017), Google Maps recently launched (in May of

2017) museum guide annotation buttons (which are placed next to artworks) to provide “key insights” (para. 1) about the artifacts. For instance:

You can visit hundreds of museums around the world right from your laptop with Google Maps and Google Arts & Culture. And starting today your virtual Street View tour is more informative on desktop and in the Chrome browser on mobile. Now as you walk through the rooms of the museums on Google Maps you’ll see clear and useful annotations on the wall next to each piece. Clicking on these annotations will bring you to a new page with more information provided by hundreds of the world’s renowned museums. You’ll also be able to zoom into high-resolution imagery—getting you closer to these iconic works than you ever thought possible (Niccolai, 2017, para. 4).

To be clear, these annotation buttons are not available when users begin their art exploration journey from the GAC platform. These buttons are only available when users “walk through the rooms of the museums on Google Maps” (Niccolai, 2017, para. 4). Further, these buttons are not included on every artwork (yet). To help illustrate the difference between seeing a painting via the GAC platform versus seeing it on the Google Maps platform, I viewed *The Starry Night* on each platform. And, seeing as Niccolai’s (2017) article came out May 31, 2017 (and my initial screen capture of *The Starry Night* inside the MOMA via the GAC was taken on May 10, 2017), I revisited the viewing experience of the painting via each platform from February 23-24, 2018. From this comparison study, I found the following.

When using museum-view on both the “GAC *The Starry Night*” (n.d.) webpage and the “GAC MOMA” (n.d.) webpage, *The Starry Night* did not have an annotation button (Figure 28).

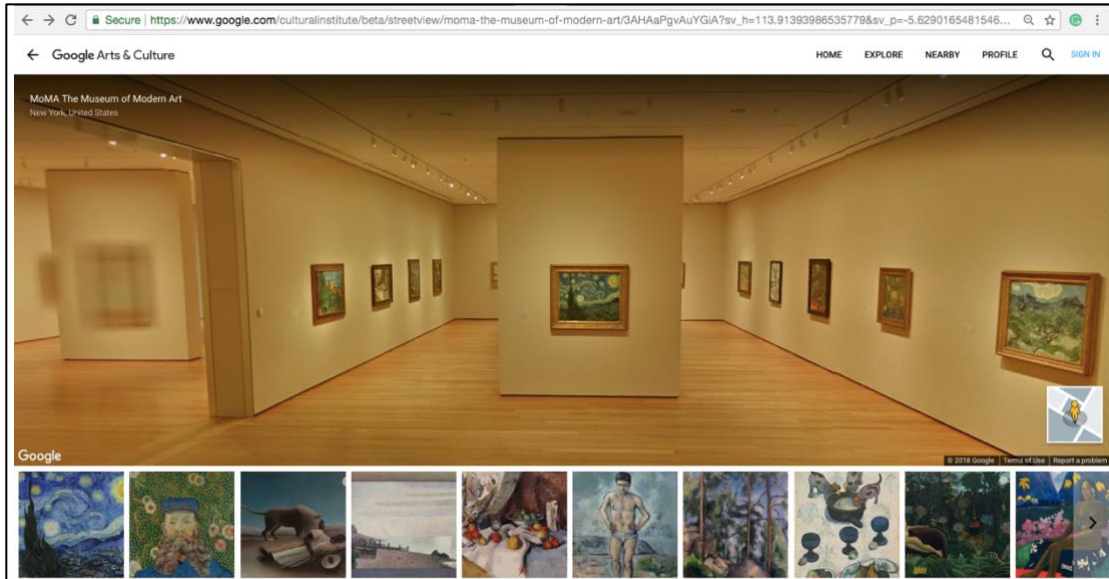


Figure 28. Different screen capture of the MOMA museum-view displaying van Gogh’s (1889d) *The Starry Night*, accessed via *The Starry Night* asset page on the GAC website. From “GAC The Starry Night Street View,” by Google Arts and Culture, 2018 (<https://goo.gl/3tCqSm>). Copyright 2018 by Google.

However, when using the *Google Maps* website to see inside the MOMA, it appears that *The Starry Night* does have an annotation button (see Figure 29).

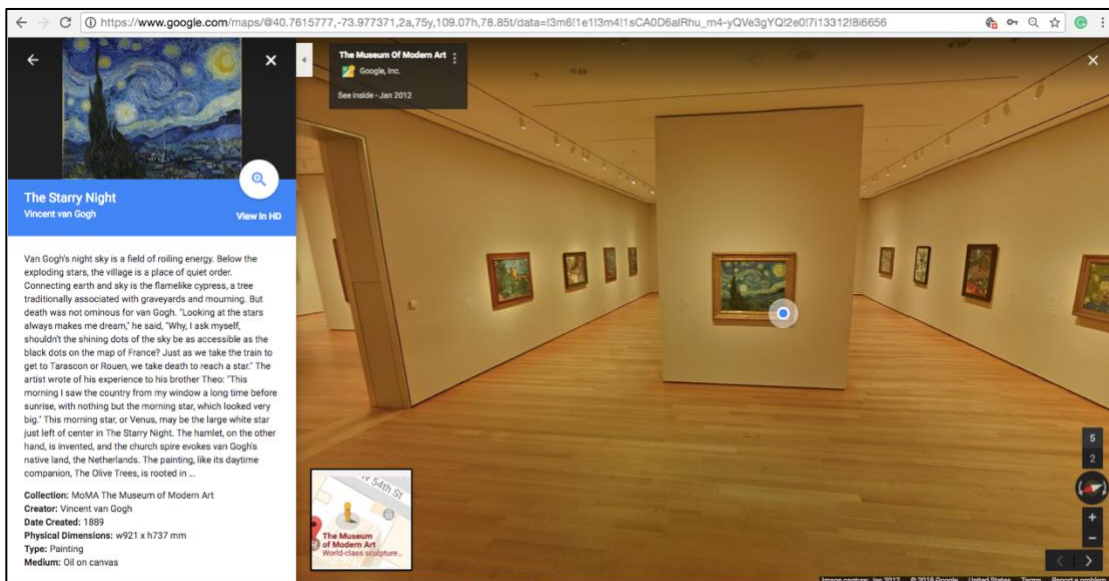


Figure 29. Screen capture of the MOMA museum-view displaying van Gogh’s (1889d) *The Starry Night*, accessed via Google Maps museum-view on the *Google Maps* website. From “Google Maps MOMA Starry Night,” by Google Maps, 2012/2018 (<https://goo.gl/maps/XZzCoK1tY482>). Copyright 2018 by Google.

And, while *The Starry Night* does have an annotation button (see Figure 29 above) when it is viewed via Google Maps to see inside the MOMA, actually finding the painting was incredibly complex. Let me explain. While on Google Maps [google.com/maps], I typed “MOMA” into the search box. When I did so, a map of the MOMA in New York City appeared. Further, when I dragged the Street View human-icon onto the map, specifically, directly on top of the MOMA, I was transported to inside the museum. However, while dragging the human-icon onto the MOMA was easy, dragging the icon onto the MOMA at the exact location of a specific artifact (i.e., *The Starry Night*) was challenging.

For example, to identify the correct position where *The Starry Night* is displayed inside the MOMA, which ensured that I dropped-into the museum at the correct spot, was incredibly difficult and frustrating. As you can see in Figure 30, when the human-icon was dragged over Google Maps, several small blue circles appeared. These circles represent areas where Street View has been captured (i.e., the circles are specific digital museum-view drop-in locations).

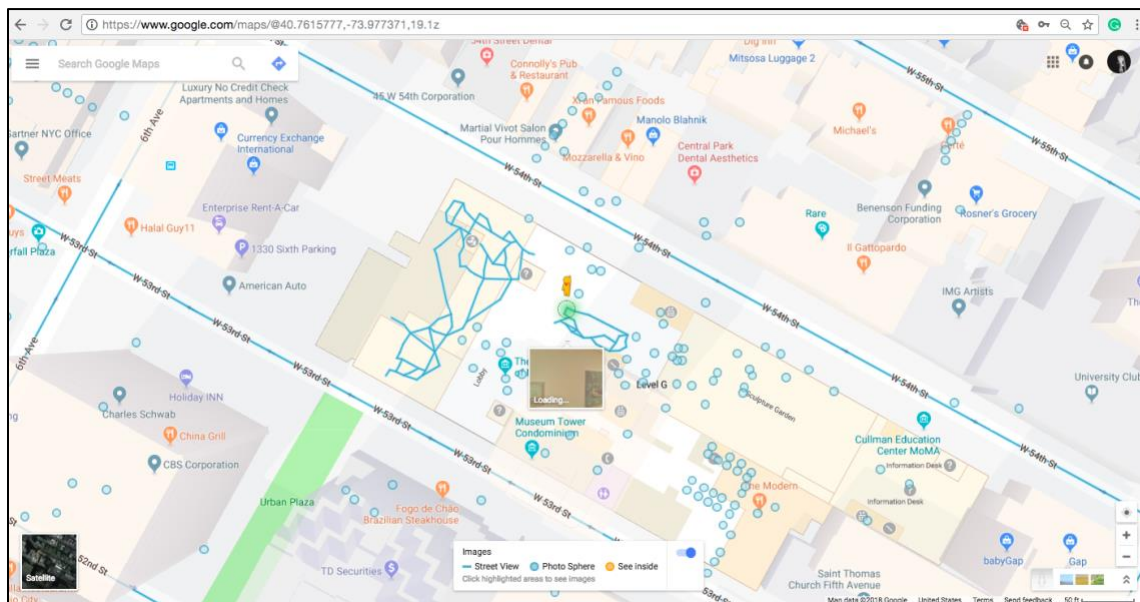


Figure 30. Screen capture of the MOMA map location and museum-view drop-in zones on the Google Maps website. From “Google Maps MOMA,” by Google Maps, 2018 (<https://goo.gl/maps/SBvQghaTZK52>). Copyright 2018 by Google.

However, these circles are not labelled, other than by a very small image (which, as you can see in Figure 30, is somewhat difficult to identify). This lack of labels made it difficult to know the exact location of each drop-in spot. Further, these circles are isolated viewing spots, which made it challenging (if not impossible), to move from one viewing location to another. I would also like to point out that Google Maps' museum-view process is different from the GAC museum viewing experience. The GAC museum-view provides users the option to use arrows to propel forward throughout the areas of the museum that have been digitally scanned, whereas, the Google Maps' museum-view does not.

By navigating my way through this complex digital maze, I learned that in order to drop-in to the exact spot on the MOMA where I could see *The Starry Night*, I needed to return to the "GAC MOMA" (n.d.) webpage and select its museum-view option. Further, I had to click on the floor-plan-view, and then, select to view the fifth floor. As previously described, once the fifth floor was selected, the human-icon is moved across the floor-plan-view to the location of the Collection Galleries, Mercedes T. and Sid R. Bass Gallery room (See Figure 27). Once I knew an approximate location of *The Starry Night* within the MOMA, I returned to the "Google Maps MOMA" (n.d.) webpage and moved the human-icon accordingly. Thankfully, this approach dropped me into the Mercedes T. and Sid R. Bass Gallery room. And, it was in this gallery, that I could see the annotation button next to *The Starry Night* painting as shown in Figure 29. For more information about Google Maps annotation buttons and to understand how to complete this museum viewing process further, go to [<https://youtu.be/65NJfQyWuUs>] to see a promotional video provided by Google (Google GAC YouTube, 2017).

While I have just taken us on a virtual museum-viewing journey across the GAC and Google Maps platforms, I will now return to the "GAC *The Starry Night*" (n.d.) webpage, to

discuss one more user-experience: the creation of user galleries. According to my conversation with Patarin, I discovered that “on the original platform—I mean the previous platform, not the very last one—you [users] could create what we [the GCI] called user galleries. [Through this option], users could add text sort of options” (personal communication, June 21, 2017).

However, to maintain strong relationships with museums (a topic I discuss at great lengths in Chapter 9), the GCI made changes to its user galleries in June of 2016 (Patarin, personal communication, June 21, 2017). The institute removed the ability for users to make comments about art, and instead, on the new user gallery option, users are able to “create a collection of things” (Patarin, personal communication, June 21, 2017). Based on this context, I will explain my experience creating a user gallery on two different occasions, roughly 10 months apart.

When I first tried to create a user gallery, in May of 2017, I ran into complications. First, the option to make a user gallery was difficult to find on the GAC. Under the three-line menu-icon, located in the upper left-hand corner of the GAC site, were several clickable options: home, partners, projects, favorites, experiments, artists, and so forth. However, none of these options was labelled with a straightforward title to direct me toward where to go to create a user gallery (such as, profile, user gallery, create gallery, etc.). When I selected the heart-icon option titled *Favorites*, I was taken to a GAC Favorites page, and it was here I was able to create a user gallery. However, on this page, instructions to assist in the creation of a user gallery were nonexistent, or at least, incredibly well-hidden.

In May of 2017, I could create a new user gallery collection and give it a title and description, as well as select its level of privacy (i.e., public or private). To actually create my gallery, I had to go back to the GAC (n.d.) main website and select individual artifacts as *favorites* (which, as I previously mentioned, was done by clicking the heart-icon to tag the

artwork as a favorite). Once artifacts were *favorited*, I had to return to my page of favorites to create a user collection out of my chosen art. However, I could not include direct comments about certain paintings (either underneath or directly above the paintings). I found this limitation interesting, as earlier user galleries have comments about individual paintings underneath the painting in reference. It is important to note that on the bottom of every user gallery post, the GCI provides the following statement: “This user gallery has been created by an independent third party and may not always represent the views of the institutions, listed below, who have supplied the content” (GAC Barney Gallery, n.d., Credits: All Media, para. 1). This statement was followed by the logos of, and hyperlinks to, all partnering institutions credited in the post (i.e., supplied the artifact within the user gallery).

However, my explorations that took place February 23-25, 2018, indicate that the GAC platform underwent some changes since May 2017. For instance, the GAC main website now has a profile selection within its menu drop-down, and interestingly, the favorites option is no longer available. To create a profile, a user must sign-in to Google with their Google ID, such as their Gmail account. If a user does not have a Google account, and wishes to create a profile on the GAC, he/she must create an account. Once signed-in, the user can go to his/her profile page, which displays two options: favorites and galleries. However, to create a gallery, he/she must have *favorited* certain artworks in order for them to show up on the profile (which is similar to the problem I had before). It is important to note: there are still no guides on how to create a user gallery within the user profile.

Following the favorite tag process, as described previously, I could select specific artifacts that I wanted to place in my gallery, as well as choose whether I wanted the gallery to be private (i.e., only visible by me) or public (i.e., only visible by anyone that had the direct

hyperlink). I set my privacy setting to public and its hyperlink is [<https://www.google.com/culturalinstitute/beta/favorite/group/MwICxCN3jAIGLg>]. I could give my gallery a title (up to 150 words) and a description (up to 800 words). Based on my public privacy setting, both the title and description were available to be viewed by others. The description section was a text box directly underneath the title and above the artworks (i.e., the description was not located underneath any works of art). As such, my user gallery is titled, *Leah Stone Dissertation Gallery*, with the description, “Vincent van Gogh's *The Starry Night* (1889) and *The Olive Trees* (1889)” (GAC Stone Gallery, 2018/n.d., para. 1). Similar to my experience in May of 2017, I could not include direct comments about certain paintings (either underneath or directly above the paintings). Yet, within the description section, I could write my feelings about the works of art, just not under or above the artwork that I was referencing. Additionally, these comments had to be within the allotted 800-word limit.

Further, I found it interesting that user galleries had become more difficult to find. For example, in May of 2017, it was quite easy to find user galleries, as they were located at the bottom of the majority of GAC pages. When I conducted my first user-experience research in May of 2017, the “GAC *The Starry Night*” (n.d.) webpage presented, at the bottom of the page, various collections and user galleries that contained the iconic painting. However, when I returned to conduct a second user-experience study in February 2018, these collections and user galleries sections had been removed. In their place was a section labelled “Recommended,” which displayed artwork suggested by the GCI. For instance, specific to the “GAC *The Starry Night*” (n.d.) webpage, recommended artwork included the following: art by the same artist, such as van Gogh’s *The Bedroom* (1889b); art created around the same time, such as van Gogh’s *Starry Night* (1888d); art from the same movement, such as van Gogh’s *Undergrowth with Two*

Figures (1890); and so forth. These recommendations were presented with a hyperlinked picture of the suggested object (i.e., a picture of van Gogh's *The Bedroom*, that once clicked, would take the user to *The Bedroom*'s GAC page). I found some of *The Starry Night*'s recommended artifacts to be curious suggestions. For example, Claude Monet's *Wisteria* (1925), which is a painting of a pond reflecting a blooming wisteria tree, was listed as depicting the same object as van Gogh's *The Starry Night*, a painting of a night sky.

With the disappearance of user galleries moving toward the bottom of certain GAC pages, such as that of the "GAC *The Starry Night*" (n.d.) webpage, user galleries almost appeared to be hidden. For example, potentially one of the only ways I could find user galleries was by searching for "user gallery" within the GAC search box. When I did this, I was taken to a "GAC User Gallery Search" (n.d.) webpage, which still presented 383 stories created by partner institutions, 1,107 cultural items supplied by partner institutions, and 5 related cultural material categories (all of which were of content supplied by partner institutions and organized by the GCI's meta tagging process) *before* the 1,962 user galleries presented at the very bottom of the page. When I selected "view all" of the user galleries, I was directed to the "GAC User Gallery" (n.d.) webpage, which displayed the 1,962 galleries in no particular order (e.g., alphabetical, genre, topic, or artist), which made it very difficult to find my user gallery.

And, when I searched within the 1,962 user galleries for "Leah", one result returned: a gallery by Leah Sindelar titled, *The Ultimate Remover of Obstacles*. I also searched for Stone, dissertation, and the full title, *Leah Stone Dissertation Gallery*, on different computers and on different days, with no returns. Based on this, my user gallery seems to be hidden even though its setting is public. Importantly, however, the galleries created before the interface change (i.e., user galleries that included comments and descriptions underneath specific paintings) are still

available to explore. This makes me wonder: why are the 1,962 user galleries, predominately those made *before* major interface changes in June of 2016 (i.e., user galleries that included comments and descriptions underneath specific paintings), hard to find on the *GAC* website?

In sum, I found that the user experience of the *GAC* website and mobile application to be relatively straightforward and easy-to-use, as well as incredibly frustrating. For example, while there were several ways across the GCI ecosystem that I could use Google's Street View technology to explore *The Starry Night* inside the MOMA, each virtual viewing experience was not only different but also presented unique challenges and results. Viewing the painting via the "GAC *The Starry Night*" (n.d.) webpage on the *GAC* website was the easiest. Further, finding the painting via the "GAC MOMA" (n.d.) webpage was more cumbersome and required changing floors on the museum-view. Lastly, examining the painting via the "Google Maps MOMA" (n.d.) webpage was incredibly complex and frustrating (yet, it was the only option that provided the museum guide art annotation button was next to *The Starry Night*).

I also found the process of creating a user gallery to be quite complex and not user intuitive. After I managed to create a user gallery (i.e., through "favoriting" artifacts I liked and then adding them to a gallery within my user profile), I discovered that I could not include direct comments about certain paintings either underneath or directly above those I wished to describe. Additionally, while I set my user gallery to be available to the public, it appeared hidden on the *GAC* website. In this way, the GCI's platforms can be considered somewhat user-friendly and accessible but with potentially high (instead of low) barriers for participatory engagement.

CULTURE: Locate

Does the platform provide a prominent place for demonstrating and encouraging ideas about art and culture?

The third concept explores whether the digital system provides a prominent and public platform for displaying, as well as encouraging, users to think about art and culture. In other words, is the GCI the digital location that people go to demonstrate and learn about art and culture? This concept includes observing whether the platform is popular, such as if people (both partners and users) know it exists and widely use it. This concept also involves exploring how the platform encourages users to think about art and culture. As previously described, the GCI is a prominent platform for partner institutions, such as the MOMA, because the institute provides sound tools for partners to display arts and culture. However, the GCI may not be the leading platform for cultural organizations (yet), as these entities still tend to post more cultural content and news on their own websites and social media than they do on the GCI. Specific to the GCI's users, the institute is currently not a leading platform for its users to demonstrate their art and culture knowledge (which I discuss in detail under the *Unite* section below).

Nevertheless, the GCI may be shifting toward a location that does encourage users to think about art and culture. For instance, its Chrome art tabs and backgrounds present art daily to users. Additionally, its recently launched "art selfie" feature (which I describe under the *reason* section) helps encourage its users to think about art, as this application skyrocketed the GAC's fame over the last several months. Based on this, the GCI could potentially benefit from finding additional ways it could become the prominent and public platform for displaying, as well as encouraging, users to think about art and culture.

CULTURE: Teach

Does the platform provide mentorship instruction for novices and access to mentorship from art masters?

The fourth concept investigates whether the GCI (and its GAC platform) provides novices access to mentorship instruction from art masters. Online mentorship instruction can come in many forms including one-sided information tools (e.g., videos, articles, images, VR) or two-sided interaction experiences (e.g., digital events that allow participants to engage and ask questions of the instructors). While the GCI used to provide instruction via both types of tools (one-sided and two-sided), today, it primarily engages users through one-sided tools.

One-Sided Information Tools

As mentioned, the institute provides its users an assortment of art and culture information. From digitized collections to instructional videos, online articles to digital stories, museum-view (Street View) tours and 360-degree virtual reality (VR) experiences, and mobile apps to Chrome art backgrounds, the GCI and its partners are creating informative and engaging cultural content. However, this type of information does not provide the same access to mentorship that two-sided participatory experiences, such as its previous Art Talks, once did.

Two-Sided Participatory Tools

The GCI used to provide a “live-streamed #ArtTalks program” (GCI Art Talks, n.d., para. 3) in partnership with cultural entities and Google. According to the *GCI Art Talks* (n.d.) website: “Art Talks are live-streamed videos that are broadcast on our Google+ page. Viewers are welcome to ask questions in real time and share their comments with the community” (para. 4). “Each month we invite leading curators, historians, artists and educators to share their insights and take your questions in lively conversations” (para. 3). These events were targeted

toward users who “[I]ove art and culture. . . . [and] [w]ant to hear and learn more from cultural experts” (para. 3).

According to Lucy Schwartz’s (2013) Google blog post, “Introducing Art Talks on Google+,” as well as the *Google+ Events* (n.d.) website, the first *Art Talk* event was on March 6, 2013. This online event titled, *Art Talk with the Museum of Modern Art, New York*, was hosted by the MOMA (conducted by Deborah Howes, MOMA’s director of digital learning, and a group of artists and students) and focused on “how to teach art online” (Schwartz, 2013, para. 2). Conversely, according to the *GAC Google+ Art Talks* (n.d.) website, the last *Art Talk* event was hosted on June 10, 2015. This online event titled, *Art Talk - Women & STEM Education: Conduit to Opportunity*, was in partnership with the National Women's History Museum and explored women and STEM education. The cancelation of the series eliminated two-sided participation across the GCI, as well as stopped mentorship opportunities for art novices. In this way, the GCI could consider new ways to provide mentorship instruction to its users.

CULTURE: Unite

Does the platform help unite participants through social connections to other participants, as well as to art and culture?

The fifth concept explores whether the GCI (and GAC platform) unites participants through social connections to other humans surrounding cultural experiences, as well as to objects (i.e., art and cultural artifacts, technology). Social connections include being able to share creations and information across the ecosystem. According to Michelle Luo (2017), product manager at GAC: “At Google Arts & Culture, our software engineers are always experimenting with new and creative ways to connect you with art and culture” (para. 6). Thus, the GAC wants to connect humans with objects, such as art and culture, but what about connecting humans with

other humans surrounding art and culture? Further, if the GCI and GAC want to connect humans with other humans through shared art experiences, are these linking opportunities equally distributed across all of its customers (cultural institutions and users)?

As I investigated connection opportunities for the GCI's cultural institution partners, several ways that partners have opportunities to experience a social connection to humans, as well as to art, surfaced. For instance, as mentioned in the customer relationships section above, the institute employs direct personal human assistance, including direct contact across curators and GCI employees, which helps to foster social connections across humans. Further, the GCI provides state-of-the-art technological tools (at no cost to institutions) so museums can digitize their artifacts and advance their (as well as others') connection to art and culture objects. Conversely, opportunities for GCI users to experience relationships were limited in forming human connections, but substantial in providing art and culture connections. For instance, the institute engages self-service and automated user assistance (i.e., the GCI does not provide direct human-to-human assistance), which does not foster a social connection across humans.

Further, within the walls of the GAC platform, there are limited ways that users can experience a social human-to-human connection. An example of human-to-human social interaction across the GAC includes how users can share Editorial Features, such as "10 Things You Might Not Know About Vincent van Gogh" (Shinn-Morris, n.d.), digital stories, such as "Vincent van Gogh up close" (Pizonka, Lehtreck, Lüttichau, & Daners, 2016), as well as personal galleries, such as "Leah Stone Dissertation Gallery" (GAC Stone Gallery, 2018/n.d.), with other humans. This cultural content can be shared by selecting the v-shaped-icon (the same icon shown in Figure 24) and selecting among the various social media platforms (e.g., Email, Google +, Facebook, Twitter, Tumblr, Pinterest, and Classroom) to share the post. However,

while users can share GAC content to other humans via various Google provided social media platforms, users cannot make comments on any of the content within the walls of the GAC (i.e., such as on a user gallery to generate a discussion about art). And, while users were previously able to be involved in culture by curating a personal art collection and learning from art experts via Art Talks (which have not happened since June 10, 2015), these participatory user options are now limited. For instance, they may no longer be available, such as the discontinued Art Talks series, or difficult to use, such as the creation of a user gallery.

Thus, within the walls of the *GAC* (n.d.) website, users can only view and share cultural content without social interaction, debate, or contribution. In this context, the *GAC website* facilitates “single, one-to-one actions between users and individual tools” or “static notion of early web implementations” (Potts, 2014, p. 7), and therefore, must implement more interactive technologies. And, while the GAC platform does not provide a space where users feel a social connection to other humans, the ecosystem of the GCI does. As previously stated, the GCI ecosystem spans beyond the GAC, including other areas of the GCI (such as GAC and GCI social media accounts, as well as the GCI Lab) and other subsidiaries of Google. For instance, other Google platforms, such as Google+, YouTube, and Google Maps, provide users opportunities to participate with other humans and cultural objects surrounding art. Further, the GAC has its own social media accounts (e.g., Google +, Twitter, Facebook, and YouTube) where users can participate with other humans.

These examples demonstrate how the GCI (and its *GAC* website and mobile app) is doing a nice job uniting its human users to objects, such as to art and cultural artifacts and technology, which helps to establish human-object (human-art or human-technology) interaction. However, the GCI could provide more ways to unite its users through social connections to other humans

surrounding cultural experiences, such as providing ways for users to share art creations and information across the GCI ecosystem.

CULTURE: Reason

Does the platform provide a space where participants believe that their contributions matter?

The sixth concept observes whether the platform provides a space where participants believe that their contributions matter. According to Jenkins's (2012) white paper for the MacArthur Foundation, participants believe that their contributions matter when their efforts help them to "master skills, collect materials, or put things in their proper place in anticipation of a payoff down the line" (p. 23). In this context, what Jenkins (2012) would describe as "engagement" (p. 23), people feel their contributions matter when they feel engaged in the process. Jenkins's (2012) describes this engagement process as follows:

The key is that this activity [engagement] is deeply motivated. The individual is willing to go through the grind because there is a goal or purpose that matters to the person. When that happens, individuals are engaged, whether that be the engagement in professional lives or the learning process or the engagement that some find through playing games. For the current generation, games may represent the best way of tapping that sense of engagement with learning (p. 23).

Based on this, I define the concept of contributions mattering when people seem to do something (i.e., post content) with a specific "goal or purpose" (Jenkins, 2012, p. 23). Therefore, when looking at the GCI through the lens of posting content for a specific goal or purpose, it appeared that partnering institutions believed that their contributions mattered. For instance, hundreds of partners had created vast exhibits and stories on the *GAC* website. In this way, cultural institutions create content with a goal or purpose to have others view their cultural collections, which may encourage more interest in their collections, visits to their website and museum, and an interest in art and culture in a broad sense.

When exploring the GCI from the users' vantage point, while also through the lens of posting content for a specific goal or purpose, it was challenging to identify whether users believed that their contributions mattered because user-generated content is almost nonexistent. As noted, one of the only ways users could contribute to the GAC was through their creation of user galleries. However, in January of 2018, user engagement with GAC took a drastic shift due to the GAC's launch of its "Search with your selfie" mobile experience (GAC Selfie, n.d.). As described by the GAC, you can "discover portraits from museums and get face to face with art" (GAC Mobile App, n.d./2018, Home, Search with your selfie, para. 1). Michelle Luo (2017), product manager of GAC, stated in an article on Google's blog *The Keyword*:

To make it [exploring art across museums around the world] easier, we dreamt up a fun solution: connect people to art by way of a fundamental artistic pursuit, the search for the self ... or, in this case, the selfie (para. 1).

In essence, within the GAC mobile experience, users can take a picture of themselves (i.e., a selfie), and through advanced image recognition, the GAC "matches [their] selfie with art from the collections of museums on Google Arts & Culture" (Luo, 2017, para. 2). Put more simply, a user can download the GAC mobile app, click on its "Search with your selfie" experiment, take a picture of herself, and voila, find her art doppelgänger. The engagement process does not end there: once the "art look-alike[s]" (para. 2) are returned, the user can click on these art twins to explore the GAC website and learn more about the art and the museums in which they reside.

In 2017, Luo reported that the GAC "art selfie" experiment *went viral*: "over the past few days, people have taken more than 30 million selfies" (para. 2). According to Gries (2015), the concept of something *going viral* can be described as "a common means of explaining how ideas, trends, objects, videos, and so forth spread quickly, uncontrollably, and unpredictably into, through, and across human populations" (p. 2). Arguably, and drawing from Jenkins's definition,

users felt their contributions mattered as they were participating with a specific “goal or purpose” (p. 23). And, while the goal or purpose of user contribution is difficult to judge in this sort of analysis, the sheer magnitude of the number of “art selfie” participants indicate the possibility that users believe that their contributions mattered.

Luo (2017) further describes the user engagement process by stating:

We're [GAC] so happy people are enjoying their selfie matches, but we're even happier that people haven't stopped with the selfie. They've jumped—face first—into the 6,000 exhibitions hosted on Google Arts & Culture, from more than 1,500 museum partners [from 70 countries](#), to explore their artwork and learn about their stories (para. 3).

To illustrate how this process works, which might help illuminate why so many users shared, I will describe my user-experience with the *GAC* mobile app “art selfie” feature (see Figure 31).

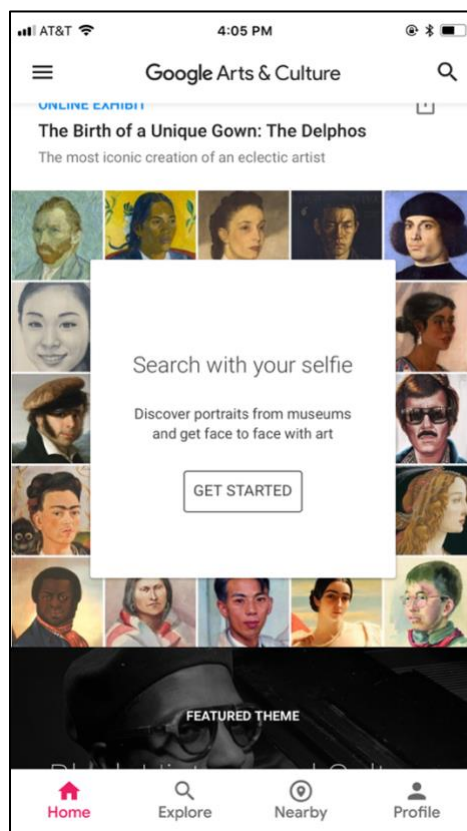


Figure 31. iPhone screen capture of *GAC* mobile app feature: “Search with your selfie.” From “*GAC* Mobile App,” by Google Arts and Culture, n.d./2018 (<https://play.google.com/store/apps/details?id=com.google.android.apps.cultural&hl=en>). Copyright 2018 by Google.

Since I already had the *GAC* mobile app on my iPhone, I opened up the app and scrolled down till I saw the “Search with your selfie” feature (Note: at the time of this analysis [February 26, 2018], this feature was located on the home page of the app). I clicked on “Get Started,” which took me to a “Terms of Service” user page (see Figure 32).

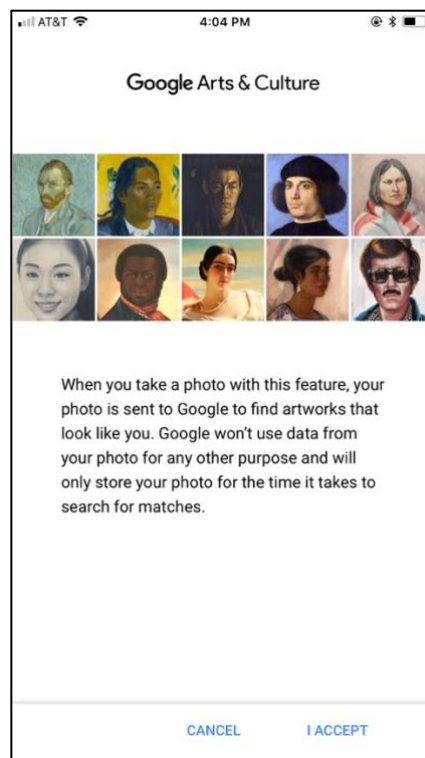


Figure 32. iPhone screen capture of *GAC* mobile app feature: “Search with your selfie” and its “Terms of Service.” From “*GAC* Mobile App,” by Google Arts and Culture, n.d./2018 (<https://play.google.com/store/apps/details?id=com.google.android.apps.cultural&hl=en>). Copyright 2018 by Google.

This page presented the following information:

When you take a photo with this feature, your photo is sent to Google to find artworks that look like you. Google won’t use data from your photo for any other purpose and will only store your photo for the time it takes to search for matches (*GAC* mobile app, n.d./2018, Selfie feature, terms, para. 1).

On this page I had the option to select “CANCEL” or “I ACCEPT” (para. 2). After I selected “I ACCEPT,” a camera page appeared within the app, and it was on this page that I was to take my selfie. In other words, I had to take my picture within the *GAC* mobile app and could not upload

a previous photo of myself. Further, the camera within the “art selfie” feature worked similarly to iPhone’s current (i.e., 2018 version) camera, and the camera lens was already turned toward the user (i.e., in selfie mode). I played around with several head angles (i.e., no tilt, left tilt, right tilt, chin down, chin up) and smiles (i.e., no smile, little smile with no teeth, big smile with teeth, crazy big smile with all of my teeth, and yes, even a kissy face).

Ultimately, I decided that a non-tilted head position with no smile was a good stoic choice, as I did not know if those things would influence the art match process. I clicked on the camera button to capture my selfie, and watched as the computer took over scanning the features of my selfie face. Within seconds, several art matches were presented, with some artworks having a 53% match (the highest percentage) (see Figure 33).

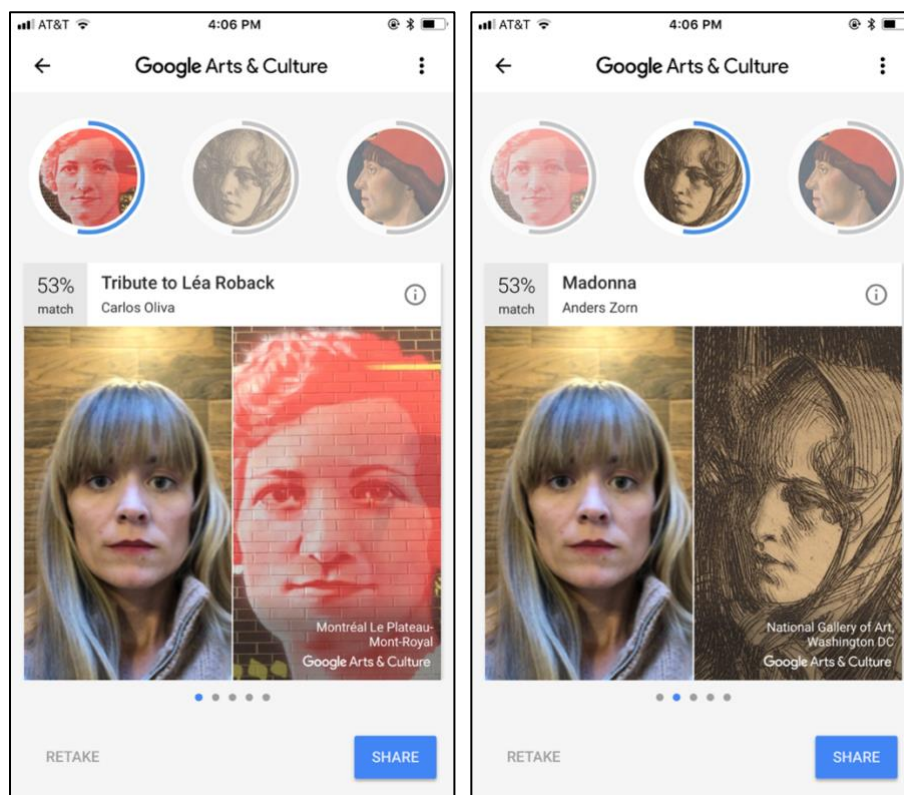


Figure 33. iPhone screen capture of Leah Stone’s GAC “art selfie” look-alikes, within the GAC mobile app feature: “Search with your selfie.” From “GAC Mobile App,” by Google Arts and Culture, n.d./2018 (<https://play.google.com/store/apps/details?id=com.google.android.apps.cultural&hl=en>).

When I tried different lighting, a slight head tilt, and a little smile with no teeth, I received an even stronger pairing—a 58% match with Frank W. Benson’s (1890) oil painting titled, *Summer*, from the collection of the Smithsonian American Art Museum (see Figure 34).

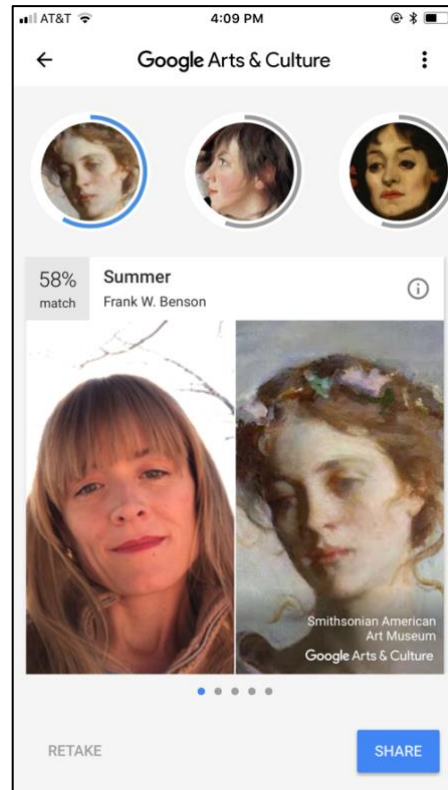


Figure 34. iPhone screen capture of Leah Stone’s GAC “art selfie” 58% match to Frank W. Benson’s (1890) *Summer*. From “GAC Mobile App,” by Google Arts and Culture, n.d./2018 (<https://play.google.com/store/apps/details?id=com.google.android.apps.cultural&hl=en>).

Additionally, the “art selfie” feature allowed me to click on any of my art doppelgängers, such as *Summer* (1890), and view the artwork on the GAC website (as shown in Figure 35). I could also share my favorite matches through AirDrop, iMessage, Gmail, iCloud photo sharing, as well as save the image to my iPhotos and then upload to any social media accounts (Facebook, Pinterest, Instagram, Twitter, Google+, SnapChat, and so forth). The GAC art “selfie feature” (Luo, 2017, para. 6) is “available for users in parts of the U.S. and in Canada, Australia, New Zealand, India” (para. 6) only on the GAC app, which supports iOS and Android. To learn more

about and experience the GAC “art selfie” feature for yourself, go to [<https://youtu.be/jERGXnQT9W0>] to see a promotional video provided by GAC (GAC Art Selfie, 2018).

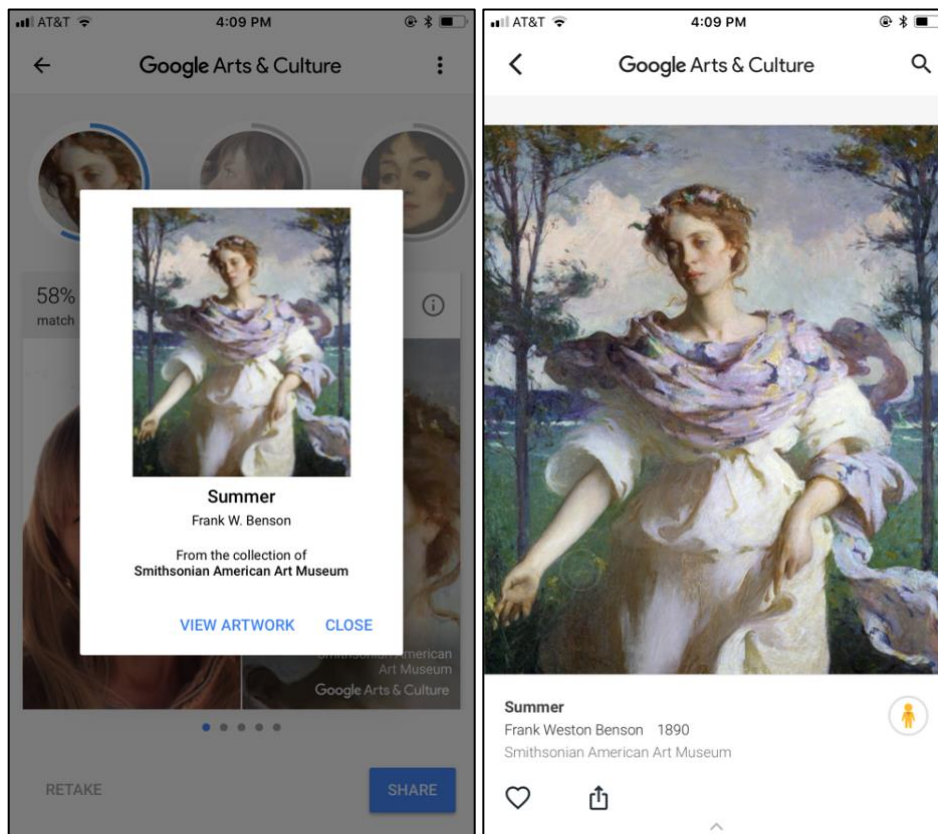


Figure 35. iPhone screen capture of how Frank W. Benson’s (1890) *Summer* can be explored on the GAC website. From “GAC Mobile App,” by Google Arts and Culture, n.d./2018 (<https://play.google.com/store/apps/details?id=com.google.android.apps.cultural&hl=en>).

I would like to point out that the GAC “art selfie” feature has great potential to engage human-to-human connection surrounding art experiences. While I did state, in the “Unite” section above, that the GAC does not offer opportunities for users to potentially connect with other human users, I believe the GAC “art selfie” experiment could encourage human-to-human connection. An example of this connection across humans, technology, and art is found within a multigenerational interaction between a daughter, mother, and great-grandmother. According to Elizabeth Semko’s (2018) digital article in the *Riverfront Times*:

Kate Stewart was having fun with her six-year-old daughter last weekend when they decided to try the [art selfie feature on the GAC] app while making silly faces. Oddly enough, it was then that a painting of Stewart's own great-grandmother, *Emma in the Purple Dress*, popped up as a match (para. 2).

See Figure 36 for the match of Kate Stewart to *Emma in the Purple Dress*. This example demonstrates how technology can generate engagement across human-to-human (i.e., Stewart interacting with her daughter) and human-to-object (i.e., Stewart interacting with her smartphone, the GAC, and art).



Figure 36. Kate Stewart's match to George Bellows's (1919) *Emma in the Purple Dress* found on the *Riverfront Times* website (image courtesy of Kate Stewart). From "Google Arts app matches St. Louis woman with portrait of her own grandmother," by E. Semko, 2018 (<https://www.riverfronttimes.com/artsblog/2018/01/19/google-arts-app-matches-st-louis-woman-with-portrait-of-her-own-grandmother>).

CULTURE: Expose

Does the platform provide continued exposure to other content and ideas (i.e., such as to other art, culture, and technology)?

The seventh concept observes whether the platform provides continued exposure to other arts, cultures, and technologies, for its customers. In the case of the GCI, this includes exploring how the institute provides exposure to its cultural partners and its users. Specific to its cultural partners, the GCI continues to enhance its technologies (which is discussed in detail in Chapter 9), such as its Google Cardboard, Tilt Brush, Chromecast, gigapixel camera, Street View, Google Maps, to provide new ways for institutions to digitize culture and create immersive art experiences. Additionally, the GCI creates multi-institution initiatives, such as its #WeWearCulture exhibit (GAC We Wear Culture, 2017), which was launched June 8, 2017, showcasing more than 400 fashion stories curated by 183 partners, including the MOMA.

Specific to its users, those who download and use the *GAC* mobile app, follow the GAC on social media, and embed Google art tabs onto Chrome, are continually exposed to other content and ideas surrounding art and culture. For instance, users can interact with art, such as *The Starry Night* painting through gigapixel resolution images, MOMA Street View and VR experiences, and stories posted by MOMA curators and GCI employees. Further, users can see new artwork every time they open a new tab on Google Chrome, as well as see new institute activities posted on Twitter, Instagram, Google+, YouTube, etc.

The GCI continually updates its *GAC* website and mobile app with new cultural exhibits. As mentioned, its #WeWearCulture exhibit (GAC We Wear Culture, 2017), included VR immersive viewing experiences of various fashion artifacts and collections via Google Cardboard. Additionally, exposure comes in the form of cultural themes and stories. For

example, during the month of February, which was Black History Month in 2018, the GAC partnered with various influencers, such as Yara Shahidi (@YaraShahidi), and media companies, including *Darling Magazine*, to share powerful narratives about Black History and Black women (Darling Instagram, 2018; GAC Black History, 2018; GAC Instagram, 2018;). The GAC also partnered with the British Library to bring its exhibition “Harry Potter: The History of Magic” (GAC Harry Potter, 2018) to users digitally. And lastly, exposure comes through new image recognition tools such as GAC’s “art selfie” feature.

In sum, these examples demonstrate how the GAC is providing continued exposure to other arts, cultures, and technologies on both the *GAC* website and mobile application for both its cultural partners and users. The GCI has created several participatory tools to provide innovative ways for its customers to be exposed to art. These tools include products such as Google Cardboard, Google Tilt Brush, Google Daydream, Google Chromecast, Google Chrome art tabs, Google gigapixel art camera, Google Street View, Google Maps, and so forth. The GAC has also established multi-cultural stories and themes in collaboration with a multiplicity of art institutions to provide continued cultural experiences to its customers.

Concluding Thoughts

The Google Cultural Institute (GCI) targets two key customer segments: users and cultural institutions. To reach each of these segments, it is necessary for the GCI to use various channels to foster relationships with its customers. And, when these relationships are cultivated successfully, customers can extend their cultural involvement through experiences and exchanges afforded by the GCI. For instance, the institute provides cultural experience activities on the *GAC* website, which allows all types of actors (e.g., people, art, institutions, algorithms, data) the opportunity to interact online. As will be made apparent in the following chapters, these

customer activities are supported by the business infrastructure of the GCI (i.e., its critical partnerships, essential resources and technologies, and key activities), as well as the finances of the GCI (i.e., its cost structures and revenue streams).

As advancements in technology have enabled experience architects to create sophisticated web spaces, such as the GCI and its GAC, it is important to understand how Google has attempted *googlization* of the art and culture industry. One way to enhance understanding is through an examination of the tools the GCI provides to its participants as a means to understand whether these tools work *with* humans and do not manipulate humans to increase their technological power, as they attempt to enhance art and culture experiences. These systems encompass various technologies that encourage collective participatory exchanges across users and the world's arts and culture. I will discuss these technologies in greater detail in the subsequent two chapters; however, I wish to briefly address how some of these technologies pertain to the participatory culture of the institute's ecosystem.

As my analyses through the *CULTURE* mnemonic help to demonstrate, customer participants are vital to the success of the GCI. I investigated how the CI's digital ecosystem provided ways for others to: Create, Use, Locate, Teach, Unite, Reason, and Expose cultural content to actors through social and cultural interactions. I found that the actors of the GCI ecosystem presented how the institute provides participatory (convivial) exchanges, as well as certain areas lacking in cooperative and collaborative (non-convivial) exchanges. And, while I will explore and describe the findings from the *CULTURE* mnemonic investigation when I answer my fourth research question (RQ4) in Chapter 11, I wish to provide the following basic summary.

Based on this analysis, the GCI's participatory experiences focus on the various ways people and art can interact online. Specifically, these experiences include the ability for viewers to: **create** online user galleries that allow participants the option to share their own virtual art collections with others; **use** Google's Street View technology to virtually explore cultural buildings and the artworks they display; **locate** and access art experiments (GAC Experiments, n.d.) to play around with different art forms (i.e., to examine the degrees of separation between artworks); **unite** and compare artworks with other works of art found within the GCI database; and be **exposed** to art and culture as well as admire diverse art forms displayed in high-resolution gigapixel. Additionally, participatory exchanges include online analytics gathered by Google to observe how the GCI enhances the ways in which people access art. These analytics allow Google to understand the types of art people examine, as well as the amount of time visitors spend searching, viewing, curating, and sharing particular art online. The GCI employs these activities to encourage participation and co-creation of content, and when these approaches are applied to art and culture, the institute is also enhancing Google's sophisticated technology. In the next chapter, I revisit the infrastructure of the GCI and explore how this infrastructure influences the landscape of art and culture.

CHAPTER 9: DIGITAL CONVIVIALITY, LEADERSHIP, AND DIGITALITY

The previous two chapters explored the establishment, value proposition, customers, and participatory culture of the overarching digital convivial business model canvas (DCBMC) of the Google Cultural Institute (GCI). In this chapter, I build on those imageries to illustrate the business infrastructures of the GCI, comprised of its critical partnerships, essential resources, and key activities. I also introduce how this business model led to the digitality and materiality of *The Starry Night*. Based on this, I describe the GCI's digitality process, which includes the entire process from digitization to online collective sharing, and use *The Starry Night* to demonstrate this activity.

Following Latour's (2005) advice, I "[fed] off controversies" (p. 25) surrounding the leadership and technology of the GCI-Starry Night to explore how the organizational structure of Google and its institute supports the collectivity of actor assemblage. I tried to allow the participating actors enough freedom to describe how the business infrastructure of the GCI impacts the culture, technology, and the conviviality of Google. As I followed and traced these controversies, I discovered the GCI's divisive leadership change in 2013, as well as how Google was using the digital cultural material to enhance its technologies. In the subsequent chapter, I explore the GCI finances to illustrate how the institute provides value to Google, as well as impacts the cultural landscape.

The Google Cultural Institute Business Infrastructure

Users of the GCI can virtually visit hundreds of museums, historical places, world wonders, and performing arts centers, thanks to the institute's mission focused on "democratizing access to the world's culture" (Google CI Chromecast, 2014, 00:44). To ensure

that these and other GCI activities are possible, the institute relies heavily on its critical partnerships (i.e., established with Google and outside entities), essential resources (i.e., its leadership, employees, and technologies), key activities, and digitality of artifacts. I will explain how each of these business aspects recursively influences one another.

Critical Partnerships

The critical partnerships of the GCI are the alliances formed across various actors to help the institute fulfill its mission and provide value to its customers. For instance, one of the GCI's initial critical partnerships includes Google's agreement with President Nicolas Sarkozy, which allowed Google to establish Google Paris and create the Cultural Institute (Patarin, personal communication, June 21, 2017). Additional early and vital partners to the GCI encompass entities that were previously associated with Google for other cultural projects and initiatives. For example, the United Nations Educational, Scientific and Cultural Organization (UNESCO) was, and still is, an essential GCI partner. UNESCO was already linked with Google Maps to scan 360-degree Street Views of World Heritage Sites, thus, making Google Maps another fundamental institute partner. Further, the Google Art Project (GAP) became another necessary partner, and according to Patarin, roughly 18 months after the GCI opened, the GAP was merged onto the institute's platform (personal communication, June 21, 2017).

Another preliminary and beneficial partner is the Israel Museum of Jerusalem. Together, the GCI and the Israel Museum created *The Dead Sea Scrolls Digital Project* to bring "some of the oldest known biblical manuscripts online" (GCI Dead Sea Scroll, n.d., Overview, para. 1).

According to the GCI, this project:

allows users to examine and explore these most ancient manuscripts at a level of detail never before possible. Five complete scrolls from the Israel Museum have been digitized for the project at this stage. These offer critical insight into Jewish society in the Land of

Israel during the Second Temple Period, the time of the birth of Christianity and Rabbinic Judaism (GCI Dead Sea Scroll, n.d., Overview, para. 1).

An additional early partner was the World Holocaust Remembrance Center, Yad Vashem. Collectively, the GCI and Yad Vashem have digitally archived “more than 140,000 images” (GCI Yad Vashem, n.d., Overview, para. 1). They have brought the Center’s “collections of photographs and documents to the web” (GCI Yad Vashem, n.d., Overview, para. 1).

Building on these early yet vital partnerships, the GCI relies heavily on cultural organization partnerships, whether previously fostered or newly formed. For instance, Lauren Nemroff, head of digital content at The Metropolitan Museum of Art (The Met), used to work for the GCI as a program manager (LinkedIn Nemroff, n.d.). According to Patarin, The Met has been a great supporter of GCI initiatives, and Nemroff has been a critical actor in helping establish the GCI-Met relationship (personal communication, June 21, 2017). Additionally, cultural partnerships have helped develop and enhance several creative initiatives, such as the digitization of cultural artifacts and using Google technologies to tell stories in immersive and unique way (Caines, 2013).

While partnerships with cultural entities are pivotal to the success of the GCI, its association with Google is also vital. The GCI relies heavily on Google and its other departments, projects, technologies, and so forth. These interdepartmental relationships include Google Arts Experiments, Google Research, Google Brain Team (i.e., including Google DeepDream), YouTube, Google +, Google Play, Google Chromecast, Google Chrome, Google Blog, Google Maps, and so forth.

The GCI also recognizes the importance of its association with artists and with Google. For instance, in partnership with 89plus, the institute hosts an artist in residency program to bring “young artists from all over the world to develop their creativity by collaborating with engineers

from the Google Cultural Institute” (GCI Lab, n.d., Welcome, para. 3). According to the *89plus* website, “89plus is a long-term, international, multi-platform research project co-founded by Simon Castets and Hans Ulrich Obrist, investigating the generation of innovators born in or after 1989” (89plus About, n.d., para. 1). See 89plus Events (n.d.) at <http://www.89plus.com/events/> for more information. Further, the GCI hosts the Tilt Brush Artist in Residence (AiR) program where “various artists, painters, cartoonists, dancers, designers, and other creators. . . [are] given the chance to work with Tilt Brush – a new virtual reality tool that let’s you draw and create in 3D space” (Google Tilt Brush, n.d., para. 1). The institute uses these programs to work closely with artists to further develop Google technologies, including the Google Tilt Brush (n.d.), Google VR Cardboard (n.d.), Google augmented reality ARCore (Google AR Experiments, 2017), and more. These programs also allow Google and the GCI to “better understand the potential of this new form of art creation” (Google Tilt Brush, n.d., para. 2). Therefore, to keep and grow all of its partnerships, the GCI relies heavily on its essential resources, specifically, its leadership and technology, as well as the power of the Google brand.

Essential Resources

The essential resources of the GCI include the most important actors that are required for the institute to function and meet its value proposition. These actors include humans, such as Google and GCI employees (e.g., leadership, management, engineers, researchers), and cultural partner employees (e.g., curators, historians, digital media staff). These actors are also comprised of physical objects, including the GCI Lab, as well as the cultural spaces and artifacts of cultural partners. Further, these actors encompass financial objects, such as the money provided by Google to pursue the GCI’s value proposition. I will talk more about finances in Chapter 10.

It is imperative to understand that within technology companies like Google, the organization's essential resource actors are highly comprised of intellectual material. According to Osterwalder and Pigneur (2010/2013), intellectual resources include objects such as brands, customer databases, patents and copyrights, partnerships, and proprietary knowledge. Thus, in the context of the GCI, its intellectual material encompasses the Google brand, its Open Gallery platform, and data management tools for partners, and copyright agreements with museums that allow the institute to show the cultural content. The intellectual material also consists of the GCI's proprietary objects, such as its algorithms and customer data (i.e., machine learning image database and information regarding how users use the *Google Arts & Culture* [GAC] website). Further, the intellectual material includes technologies, such as Google's gigapixel camera, as well as Google Maps and Google Street View. Intellectual material technologies also involve Google Now, Google Cardboard, Chrome browser art tabs, and Chromecast art background. Lastly, these technologies also encompass the GCI's digitization system (e.g., digital repository, inference engine, knowledge database, scale), *GAC* website, and social media platforms.

As I explored the essential resources of the GCI, controversy surrounding the transformation of leadership became apparent. While following and tracing this controversy, additional actors and associations were identified. To understand the essential resources of the GCI in more detail, I must describe its leadership controversy. As mentioned briefly in Chapter 7, in the summer of 2013, the leadership of the GCI changed from Steven Crossan, engineer and the initial founder of the GCI, to Amit Sood, marketer and former head of the Google Art Project (GAP). Moreover, to explain why this shift was controversial, it is helpful to understand the background of Crossan and Sood.

According to Crossan's LinkedIn profile (n.d.), he has a background in computer science and Artificial Intelligence (AI). Crossan started at Google in October of 2005 working as the first product manager for Europe, Middle East, and Africa (EMEA) market, as well as launched and expanded Google Maps in EMEA into the number one mapping product. In 2009, he worked for Gmail in Mountain View, California, enhancing Gmail's monetization by establishing a transition from content ads to Message Ads. In 2011, he was selected to be the co-site lead for Google Paris, as well as the founder of the GCI. During his time at the institute, he expanded the engineering office, as well as developed the GCI team to launch culturalinstitute.google.com.

Conversely, as stated by Sood on his LinkedIn profile (n.d.), he has a background in marketing and management. Sood started at Google in 2007, serving as head of GEO marketing for Google Maps and Google Earth, and developer of Gmail marketing teams for the EMEA market. In 2009, he became the head of marketing for Android, and later in 2009, he became the manager and art project lead for the Google Art Project (GAP). In the summer of 2013, (although Sood lists October 2012 on his profile), he became the director of the GCI, where he still works.

Additionally, under the direction of Crossan, the original design of the GCI was targeted toward user participation and scale to help Google reach the democratization of art and culture (i.e., similar to YouTube's business model) (Seales, personal communication, June 15, 2017). Thus, the GCI was initially designed by a team of engineers to be a participatory user platform (Seales, personal communication, June 15, 2017). For instance, Seales et al. (2013) stated:

The CI platform will enable scale-up through a democratized approach to ingestion and storytelling. Any user interested in using the platform is enabled through a simple terms-of-use agreement to provide content and supply digital exhibits (p. 75).

Also, during my conversation with Seales, I discovered that Crossan originally conceived of the GCI as a space for anyone who wanted to share their cultural creations, such as grandmother's quilting projects or an art student's creative works (personal communication, June 15, 2017).

My conversation with Patarin also illuminated participatory problems for the GCI, specifically, how cultural partners "often have questions that [were] difficult to address" (personal communication, June 21, 2017). For instance, cultural museums did not like "the idea of having people [users] leave comments on artwork on the Cultural Institute. . . . [as cultural partners did] not want people to comment on their artwork" (Patarin, personal communication, June 21, 2017). Based on this, it appears that the cultural partners were not happy with previously designed user participatory aspects of the GCI platform, such as the initial user gallery, which allowed users to make comments about art.

In this way, it seemed that cultural partners were nervous that the digitization of art, coupled with the participatory aspects of the GCI platform, would impact the public's view of art. Specifically, cultural institution partners felt that regular people should not have the opportunity to make public statements about famous artworks on the GCI (e.g., regarding the quality or value of the art). In this context, what art history scholar Carol Duncan (1995) would argue are elitist rituals, it could be reasoned that the GCI was helping to further perpetuate these art ideologies. For instance, and according to Duncan (1995), "art museums offer up values and beliefs – about social, sexual, and political identity – in the form of vivid and direct experience" (p. 2). These art experiences are also embedded in rituals that continue to define the creation, exhibition, and experience of art, all while imposing social control centered on elite interests. Using this line of reasoning, it could be argued that as long as the GCI allows its partnering

cultural entities to dictate how users can experience and participate in art and culture, the institute is continuing the elitist standards surrounding art.

However, blaming Google and its GCI as helping to enforce such elitist rituals is not the complete answer, because the elitist-art problem is significantly more complicated. For instance, if the GCI wants famous artifacts on its *GAC* website and mobile app, which arguably, will entice users to visit the *GAC* website, the institute has to placate its cultural partners. This bending to the needs of the partners is necessary because museums are the ones that provide the cultural content. Further, and according to Patarin, if a museum decides to leave the GAC, the GCI must remove all of that institution's cultural content (personal communication, June 21, 2017). And, while the leaving of a smaller museum from the GCI might prove to be not too problematic, the withdrawal of a large institution (e.g., the Museum of Modern Art [MOMA], The Met, or Musée d'Orsay) could result in major ramifications. These complications might include a trickle-down-effect of other institutions leaving, as well as the removal of the museum's (prominent) cultural content. Given these potential problems, the GCI must "manage good relationships with museums" (Patarin, personal communication, June 21, 2017).

According to arts manager and cultural researcher James Bau Graves (2005), this problem of placating large cultural institutions (the elite) has led to a cultural crisis. In this way, corporations and the elites have been able to control access to the arts. This elitist control is because of their access to the resources necessary for arts promotion, such as money, connections, and social and cultural power. This domination has allowed corporations and the elites the continued advantage of promoting their narrowly skewed perceptions of culture. According to Graves (2005), for culture and heritage to survive, changes in arts management and funding must take place. He argued that arts managers must learn how to become facilitators of

culture by aiding collaborative efforts across artists, communities, donors, and other cultural actors. He also stated that the funding for culture must change from being almost solely provided by the elites toward being provided by the people. For example, government agencies must begin to fund traditional and grassroots cultures. Moreover, and as I mentioned in Chapter 6, for this shift to happen, as well as to ensure that culture will remain vital and meaningful, Graves cites four opportunities that must take place. These include: (1) routine and predictable access to masters, (2) a prominent public platform for demonstrating and abstracting heritage, (3) constant exposure to other cultures, and (4) comprehensive and long-term support for culture.

Because the GCI appeases its cultural partners, the institute's focus has arguably moved from scale and user participation toward dedication focused on business partnerships (Seales, personal communication, June 15, 2017). This shift challenged both the initial design of the institute platform, as well as its leadership. As mentioned in Chapter 7, Patarin stated that "Larry Page insisted that this [the Cultural Institute] become an engineering project that would be run by engineers" (personal communication, June 21, 2017). Moreover, as Patarin revealed during our conversation, the Google Art Project (GAP) was not started by a team of engineers. Instead, the GAP was launched at a different location (not at Google Paris) by Sood and a group of marketing people. According to Patarin, the GAP was:

not for marketing purposes, it was done with intent and made sure to make art universally accessible. But it was not engineers. They hired a company to do the website, and they were just negotiating with museums the rights to access the collection (personal communication, June 21, 2017).

In this way, how the GAP was started by marketing people instead of engineers could suggest a tension that is present within the GCI (this tension may also exist in other Google departments). This tension could be described as discrepancies between the business side (marketing, partnerships, sales, etc.) and the engineering side (development, user experience,

creative, products, innovation, etc.) at Google. To further illustrate this potential discord, Patarin also mentioned that it took almost a year to integrate the GAP onto the GCI platform (personal communication, June 21, 2017) and Seales informed me that engineers were crucial to the participatory creation of the GCI (personal communication, June 15, 2017). Thus, the fact that both Patarin and Seales (who both happen to be computer engineers), stressed the importance of engineers to the institute may potentially highlight this tension between the engineering team and the business/marketing team of the GCI.

Given this controversial tension, several questions surface. For instance, would the GAP have been easier to integrate onto the GCI platform if the GAP had been designed and constructed by Google engineers? Alternatively, perhaps it is not so much that the GAP-onto-GCI integration would have been any easier, but that Google engineers believed they could have designed a better GAP platform? Also, because Page insisted that the GCI was to be an engineering project run by engineers, is it possible that the GCI employees were angered by the 2013 leadership shift (i.e., moving from an engineer to a marketer at the helm of the institute)? Lastly, did this transference of leadership also shift the user participation aspects of the platform, and if so, how? And, while following this leadership controversy may have brought forth more questions than answers, I want to change gears and discuss the critical activities of the GCI to describe how the different aspects of the institute's business model work together.

Key Activities

Today, users of the GCI can visit hundreds of museums, galleries, UNESCO World Heritage Sites, National Parks and Monuments, historic places, and performing arts centers, all from the comfort of their home computer, mobile phone, or tablet. Users can admire various forms of art displayed in gigapixel resolution, curate and share online user galleries, compare

multiple artworks available within the GCI database, use Google's Street View technology to virtually explore cultural institutions and the artworks on display, and employ Google Cardboard with their smartphone to experience art in a truly immersive way. In this context, what Osterwalder and Pigneur (2010/2013) would describe as the most relevant actions necessary for a company's success, these cultural experiences are provided because of the GCI's principal activities. These activities may include producing a particular product and generating solutions for customer problems, as well as specific platform activities that are necessary for the digital platform to stay running.

Therefore, one of the most critical activities of the GCI is its digitization of cultural artifacts. However, this process does not end once cultural artifacts are digitized, as these artifacts have to be labeled, placed onto the *GAC* website, organized into collections, weaved into digital stories, and then shared with users. Further, how users interact with the art and culture must be observed (i.e., by tracking the patterns of user behavior) to identify ways the institute can improve and innovate its product and scope (i.e., additional opportunities). For instance, the GCI gathers and analyzes how people access art to understand further the types of art that people examine, as well as the amount of time that people spend searching, viewing, curating, and sharing particular artworks online. Google then aggregates this information and uses it to make future art and culture decisions.

It is imperative to investigate how the GCI digitizes cultural artifacts to gain an understanding of the collective resources and associations that are required for the institute to fulfill its initiatives. The entire process—from digitization to sharing across an ecosystem—can be described as the GCI's digitality process. However, to discuss the GCI's digitality process, I must first explain the technological challenges the institute faced when it first began capturing

artifacts. For example, the GCI realized that advancements in technology had made it so machine learning (ML) could be used to classify and categorize digital material. The GCI also recognized that a vast amount of digitized cultural content was necessary to ensure it had a massive cultural database (i.e., ML requires training data that matches the data distribution characteristics of the test data; for more information, see Furht & Villanustre, 2016). In the case of the GCI, it needed thousands of digitized cultural images to use ML to categorize the cultural material. However, a vast database compiled of such images did not exist at the beginning of the GCI. Put more simply—for the institute to be able to use ML, it needed thousands of art images to train its algorithms, which it did not have. Hence, the use of ML to classify and categorize cultural material was initially limited.

The GCI recognized, however, that it could use the process of transfer learning (TL) to classify and categorize cultural material. TL involves transferring data from one related domain to another domain, which I will explain. For example, image classification includes the process of tagging, providing descriptive metadata, and using similarity recognition tools to identify an image, all of which are forms of TL. To teach image recognition software what an image is, such as having it recognize that an image of a horse is, in fact, an image of a horse, these systems were trained with thousands of horse images. Thus, if I want to teach image recognition software that an image of a horse is, in fact, an image of a horse, I have to manually meta tag a horse picture as ‘horse.’ Further, I would want to provide additional descriptive attributes, such as the color of the horse, how many legs it has, that it has a tail, a mane, a long nose, etc. Then, I would use reinforcement signals to transfer the data from one related dataset to another by teaching the algorithm specific actions (i.e., show the computer a picture of a horse and tell it that it is a horse), and then, reward the algorithm when those actions have been achieved (i.e., show it a

different picture of a horse, and if the computer tags it as ‘horse’, reward the computer for getting the image correct).

Based on this understanding of TL, the GCI realized a vast opportunity: through partnering with cultural entities, the institute could create a database filled with cultural images, which could enhance TL and ML technologies. Further, and with the help of curators from cultural organizations, the GCI could build up its art image database by employing TL to train its algorithm to categorize cultural material. The GCI also recognized that once an extensive image database was established, it could use these images to employ ML to train its technologies. With this realization, the institute developed its cultural data repository and the process of digitizing cultural objects was born.

Therefore, the GCI realized that it needed to digitize cultural objects and ingest the material into its data repository so that it could be categorized and organized (i.e., descriptive attributes or metadata tags could be added by curators, as well as also digitally extracted from the asset). According to Seales et al. (2013), the GCI used three technological activities to successfully collect, identify, preserve, and manage cultural content. These activities included the institute’s extraction, knowledge, and scale tools, which collectively worked together to contextualize content “at the interplay of assets and their descriptors” (Seales et al., 2013, p. 72). However, for the GCI to use cultural artifacts to tell compelling stories, it had to first figure out how to “[position] assets within their correct knowledge context in order to support the construction of compelling stories” (p. 71). Moreover, while the institute only defines three activities to transform artifacts and share across digital space, its first activity involved the digitizing of artifacts and inputting them into the GCI database. Based on this, the GCI’s transformation process consisted of four elements: the ingestion, extraction, knowledge, and

scale of cultural content, and each phase had to be “well-managed and mutually supportive, which [was] a major challenge” (p. 72).

Ingestion involved having a curator or archivist of cultural institutions use various GCI technologies, such as Google’s gigapixel camera, to digitally capture a cultural artifact and then utilize the GCI Open Gallery platform to upload the object data into the institution’s repository. Once uploaded, the curator would provide accurate metadata about the object, specifically its title, description, and artist name (Seales et al., 2013, p. 72). Because the GCI relies on non-Google employees during this ingestion phase, curator inaccuracy is entirely plausible. For example, the curator may use Google’s technologies incorrectly or not tag content thoroughly. After the asset was digitized and ingested into the repository, Google’s “inference engine” (p. 73) would begin the extraction process. In other words, the GCI’s sophisticated algorithm searched the provided object metadata to extract features and attributes from the asset. These features were compared to the characteristics of previously ingested assets within the repository to identify similarities across objects. If similarities were found across objects, the algorithm provided additional feature metadata for the newly ingested asset. This extraction process improved as the number of assets within the repository increased because more assets were available to scan for similarities.

For instance, if the curator used the gigapixel camera to capture a painting of a brown horse in a meadow, she would then upload this digitized material into the institute’s repository. Further, she would meta tag it as “brown,” “horse,” “meadow,” as well as the title of the painting, the year it was created, and who painted it. Then, Google’s inference engine would use these meta tag labels and look for other assets in the repository that were also tagged as “painting,” “horse,” “brown,” “meadow,” and so forth. If, for example, the inference engine had

found that the same artist who painted this painting had done an entire series of horse paintings, say, during the post-impressionist period, the algorithm could link these paintings together into a collection, as well as label this painting as post-impressionist.

Following the extraction process, the artifact is then placed into the GCI's knowledge database. According to Seales et al. (2013), the institute's knowledge database is a "large fact database, made of entities (person, place, thing) which have attributes and relationships" (p. 74). The knowledge database also includes the GCI digital platform (which is now the *GAC* website and mobile application). Further, the knowledge database aids the contextualizing of ingested artifacts in three unique ways. First, it can identify similarity associations across the ingested asset and previously ingested artifacts. Second, it uses an inference algorithm to extrapolate relationships between objects and their metadata. Third, the knowledge database involves human participation to help tag, label, correct previous annotations, and fill in information gaps. Seales et al. (2013) refer to this process as "human-driven crowdsourcing for entity annotations and corrections" (p. 75).

By using the GCI's knowledge database (*GAC* website and mobile app), users can see cultural artifacts online as well as create digital personal art galleries. Thus, this primary participatory culture established within the institute's platform (i.e., allowing certain humans, such as museum curators and historians, to crowd-source information and create digital galleries) aids the GCI in being able to expand its asset collection and its "digital exhibits to a very large scale" (p. 75). Scalability involves the GCI platform increasing in cultural partnerships and cultural assets, as well as expanding the number of users who can connect with the content. Therefore, the *GAC* affords participatory features to "engage users and attract them to the place

where they can view, evaluate, and supply more information about assets” (p. 75). Scalability also allows the GCI to democratize more art and culture for more people.

As the GCI’s technologies improve, its information, knowledge, education, and storytelling capabilities are strengthened, which in return strengthens its technologies (Seales et al., 2013). For example, as the amount of cultural content increases, the GCI’s inference engine improves, and this cyclical process, in return, aids in the ingestion, extraction, and knowledge database of cultural assets. Additionally, this referential improvement chain is apparent in the GCI’s creation of innovative technologies, which affords participants multiple ways to engage with and interact across arts and culture experiences. As just described, the GCI uses asset ingestion, metadata extraction, knowledge database creation, and scale toward democratization (Seales et al., 2013) to circulate cultural objects across its ecosystem. While exploring this process through following actor abstractions and tracing associated activity, I realized that the GCI’s ingestion-to-scale approach had some nice parallels to my digitality process. Therefore, I incorporated the GCI’s ingestion-to-scale into the digitize-to-transmit progression, and wish to describe this integration within the new segment of the DCBMC: the digitality process.

The Google Cultural Institute Digitality Process

The entire process from the GCI’s digitization of objects to its collective sharing of arts and culture to generate art experiences can be described as the institute’s digitality process. As described in Chapter 5, digitality is the process of objects residing in a digital rather than physical form, and how this digital form shapes, creates, distributes, and associates information online. The digital form can be materials that are digitized, as well as material that is “natively digital” (Rogers, 2013, p. 19). Thus, an object’s digitality involves the creation of its digital form(s), as well as the ways its digital materials are assembled and organized into collectives. In

other words, digitality includes how material is digitized, identified, grouped, and transmitted (*DIGT*) across digital space. In this way, the mnemonic tool *DIGT*, which I created, can be used to examine how an ecosystem transforms physical material into a digital material and then contextualizes that digital material into information so it can be transmitted across a network. *DIGT* can help researchers observe how technology companies (e.g., the GCI) form collectives during the digitality process of objects (e.g., *The Starry Night*).

To help explain this *DIGT* process more clearly, including how the GCI's ingestion-to-scale activities were weaved within, I wish to describe the digitality procedure of *The Starry Night*. Unique to the experience of viewing van Gogh's *The Starry Night* on the GAC website, I explored how the GCI supported participation by shifting content from digitized material, to contextualized information, to shared knowledge. While conducting an examination using this systematic approach, several actors surfaced within the GCI's digitality process. I will explain this investigation in greater detail as I walk the reader through each of the institute's *DIGT* processes, which I define as follows:

1. **Digitize:** Physical artifact material is transformed into a digital material and ingested into the GCI repository.
2. **Identify:** The final steps of artifact ingestion are completed, which includes contextualizing digital material using metadata, tagging, coding, and so forth so that the extraction of data can happen.
3. **Group:** The contextualized digital material is validated as accurate and then moved from the repository to the knowledge database where similarities are examined and grouped across all assets in the database.

4. **Transmit:** The contextual digital material is transmitted across the GCI ecosystem, including on the *GAC* website. The GCI uses its resources to increase its customers and scale its content.

Digitize Phase: *The Starry Night*

Digitize is the first step of *DIGT*, including the ingestion of artifacts into the GCI repository. In this case, the employees of the GAP, specifically Sood, negotiated partner relationships with the MOMA to digitize *The Starry Night*. In return, members of the MOMA, such as its board, executive management, and creative directors and curators, negotiated MOMA's participation with the GCI. MOMA's internal actor negotiations might have included discussing the GCI's partnership agreement to address MOMA's willingness to partner with the GAP. Additionally, actors argued MOMA's copyright agreement with the painting to decide if the MOMA could, in fact, upload van Gogh's famous masterpiece into the GCI platform.

In this case, GCI employees initially trained the MOMA curator on how to accurately use the institute's technology tools. Next, the MOMA curator used the GCI's gigapixel camera to digitally capture *The Starry Night*, as well as Google's Street View technology to digitally capture the physical museum space surrounding the artwork's display. Lastly, the curator utilized the GCI platform to upload the object data into the institute's repository system. The original digitization actors of *The Starry Night* included the following: the GCI; Amit Sood, head of the GAP; Google's precursory technologies, such as Picasa, App Engine, and Google Street View; Steve Crossan, original founder of the GCI; Google's technology researchers, creators, and engineers (e.g., Brent Seales, Mark Yoshitake, Sertan Girgin, and Simon Patarin); GCI's Partnership Agreement (GCI Sign Up, n.d.); the MOMA, which displays van Gogh's *The Starry Night* in its permanent collection; and the MOMA curators.

During this phase, Sood and the GCI's ingestion repository technology could be considered anchor actors as they helped "organize and distribute this content either within one space or across an ecosystem" (Potts, 2014, p. 64). Additionally, the curator of the MOMA could be considered the obligatory passage point, as his/her role was to "validate content by connecting disparate pieces of data and verifying them with evidence" (p. 64). For example, the role of the MOMA curator was to use the technologies provided by the GCI to digitally capture both the artifact and the space surrounding the artifact. Additionally, the curator was responsible for ingesting this data into the GCI repository.

Identify Phase: *The Starry Night*

The next activity within *DIGT* is identify, which includes the final steps of artifact ingestion within the GCI repository and the entire process of data extraction. During the identify phase, the anchor actor encourages other actors to participate in the community through the negotiation of various actor roles. In this case, Sood negotiated help from Google engineers and employees to train MOMA curators to accurately ingest assets into the GCI repository, as well as use the institute's meta tagging tools. Also, during this phase, decisions surrounding who or what would serve as the anchor actor and as helpers, as well as where the data would be verified, was decided. Based on this, the permanent place to verify information about *The Starry Night* digital material included the GCI repository system, and the identification and verification processes required the assistance of MOMA curators.

Therefore, to begin the identification process, the MOMA curator had to ingest the digital material (i.e., the gigapixel capture and Street View scans of *The Starry Night*) into the GCI repository. Next, MOMA curators would add contextual information surrounding the ingested material (in the form of changeable/mutable material), including specific metadata about the

object, its title, description, and name of the artist (Seales et al., 2013, p. 72). In this case, the MOMA curator would input something like: “*The Starry Night* created in 1889 by post-impressionist painter Vincent van Gogh.” Additionally, the curator might have described the image as the night sky, blue, green, modern art, canvas, oil paint, post-impressionism, neo-impressionism, and Vincent van Gogh (see Chapter 8, CULTURE: Create, cultural institution partners to review these tags).

Once the MOMA curator properly loaded this asset and its context, Google's “inference engine” (Seales et al., 2013, p. 73) algorithm searched the provided metadata to extract precursory attributes from *The Starry Night*. These features were then compared to other objects in the repository to identify object similarities. If similarities were found, possible additional feature metadata were provided in the form of “early annotations” (p. 74). According to Seales et al. (2013), the extraction algorithm described *The Starry Night* as “a ‘mostly blue’ ‘post-impressionist’ ‘oil painting’ by ‘Vincent van Gogh’ depicting a ‘night’ ‘sky’” (p. 73).

Group Phase: *The Starry Night*

The next stage of *DIGT* is the group phase, which includes the verification of asset metadata and the establishment of the GCI's knowledge database. During the group phase, various actors work together to establish actor associations, and as these actor relationships are strengthened, the viewing of the digital material is made available on the *GAC* website (and mobile application). Additionally, when other actors can view the cultural content on the *GAC* website, more actors are encouraged to participate and join the collective. In this case, MOMA actors (e.g., curators, *The Starry Night* painting) and GCI actors (e.g., the inference engine, employees, knowledge database, technologies, and *GAC* website) collectively grouped the digital material of *The Starry Night* into verified information.

For instance, *The Starry Night* was moved from the GCI repository and placed into Google's cultural knowledge database. This knowledge database included the GCI ecosystem's back-end (e.g., its algorithm and online system) and its front-end (e.g., the visual display of the painting on the website). Put another way, visitors to the GAC website were able to view *The Starry Night* and the associational connection between the GCI and the MOMA through the front-end of the knowledge database. Within the back-end of the knowledge database, *The Starry Night* was examined using the inference engine algorithm to look for further asset similarities and asset relationships. The inference engine algorithm first looked for asset similarities. It is important to note: this similarity examination was initially completed during the extraction phase. During the group phase, the knowledge database similarity examination compared the information asset to all other information assets. *The Starry Night* was analyzed across the entire knowledge database to look for similarities with other objects. If *The Starry Night* was found to be similar to previously ingested assets, it inherited some of the same contextual information from its doppelgängers.

For example, a knowledge database similarities search might have identified van Gogh's (1888a) *Starry Night Over the Rhone* as a match to *The Starry Night* (1889d). It could be argued that these two paintings share similarities. Therefore, both could be meta-tagged as "a 'mostly blue' 'post-impressionist' 'oil painting' by 'Vincent van Gogh' depicting a 'night' 'sky'" (Seales et al., 2013, p. 73). Additionally, van Gogh's (1888c) *The Cafe Terrace on the Place du Forum* could also be tagged similarly to *The Starry Night*, with the additions of "yellow," "terrace," and "café" added to *The Cafe Terrace on the Place du Forum*'s metadata. Other similar artifacts include Edvard Munch's paintings *Starry Night* (1893) and *Starry Night* (1922/1924), as both

paintings could be tagged as a “mostly blue” “melancholy” “landscape” “expressionist” “oil painting” by “Edvard Munch” depicting a “night” “sky.”

Next, the inference engine algorithm identified relationships between knowledge artifacts by examining the provided metadata. In this case, the inference engine explored the metadata initially supplied by the MOMA curators, as well as the extrapolated metadata or precursory attributes pulled from *The Starry Night* during extraction. For example, the inference algorithm may have used the knowledge database to see what other artifacts were meta-tagged as “late nineteenth century,” “Vincent van Gogh,” “starry night,” “post-impressionism,” “oil painting,” and or “blue.” This approach differed from the similarity search, as instead of just incorporating the metadata of previously ingested similar artifacts, it examined the metadata to look for associations. These connections might include other paintings created by van Gogh or other post-impressionist oil paintings. Further, these asset relationships may have been based on date, artist, title, subject, genre, medium, composition, and so forth.

Below are several key linked group associations to van Gogh’s (1889d) *The Starry Night* on the GAC website and mobile application.

1. **Subject:** Other works that depict a starry night (e.g., van Gogh’s *Starry Night Over the Rhone*, 1888a, and *The Cafe Terrace on the Place du Forum*, 1888c; and Edvard Munch’s *Starry Night*, 1893, and *Starry Night*, 1922/1924).
2. **Artist:** Other artistic works created by Vincent van Gogh.
3. **Title:** Other paintings titled *Starry Night*, such as Edvard Munch’s *Starry Night* (1893) and *Starry Night* (1922/1924).
4. **Composition:** Other works that display similar design, color, likeness, brush strokes.

5. **Period:** Other works painted during the same period, such as van Gogh's other artworks produced around the time of *The Starry Night* (e.g., *The Olive Trees*, 1889c).
6. **Genre:** Other works labeled as impressionism, post-impressionism, neo-impressionism, and expressionism.
7. **Key influencers:** Other works that either influenced van Gogh's *The Starry Night* or were influenced by van Gogh's *The Starry Night*.

Lastly, human participatory actors executed an action to confirm, add to, and or correct meta-tagged labels or mutable mobile definitions (e.g., "blue," "post-impressionist," "painting," "oil," "night sky") that were previously annotated. While labels created during the previous identification phase were considered changeable, in this phase, the actors worked together to authorize these labels into designated unchangeable/immutable mobiles. For example, curators and historians may have decided that *The Starry Night* should be labeled as "post-impressionist" instead of "impressionist." They may have also added the meta tags "swirling brush strokes," "night effects," "cypress tree," and "village" to the description of *The Starry Night*. In this way, humans worked with the technology to finalize labels. Once an artifact was annotated and confirmed as information, it was placed online to be shared as knowledge.

Put another way, during the group phase, the identification of material was finalized, which helped to shift the digital material into contextualized and verified information. This shift was completed through the creation of unchangeable, definitive data labels (e.g., immutable mobiles). It is important to note that according to Potts (2014), if the information shared as knowledge ever becomes mutable again, such as all meta tags for *The Starry Night* were to be changed, the entire network system could potentially break down. In other words, it is crucial that systems have a place/space where official validation streams, such as immutable mobiles,

work together with participatory actors to move content from material to information to shared knowledge. Furthermore, during the group phase, the various actors of the MOMA (e.g., curators, *The Starry Night* painting) and actors of the GCI (e.g., the inference engine, employees, knowledge database, technologies, and *GAC* website) worked together to establish actor associations. As these actor relationships were strengthened, the viewing of the artwork became available on the *GAC* website. The process of allowing other actors to view the cultural content on the website encouraged other actors to participate and join the collective.

Transmit Phase: *The Starry Night*

The last stage of *DIGT* is transmit, which includes the establishment of the artifact on the *GAC* website to help fulfill the scale component of the GCI. During the transmit phase, the digitality network can become fully established if it produces an action (i.e., the digitality of *The Starry Night*) greater than the individual actions of each contributing phase (i.e., the digitization, identification, grouping, and transmission of the painting). Based on this, the *GAC* website provides several features that “engage users and attract them to the place where they [could] view, evaluate, and supply more information about assets” (Seales et al., 2013, p. 75). Further, the *GAC* website allows users to view cultural artifacts online, as well as to create personal digital art galleries. Together, these opportunities help the GCI expand its asset collection and “digital exhibits to a very large scale” (p. 75).

The scalability of *The Starry Night* on the institute’s network platform is demonstrated throughout the experiences available for the GCI customers. According to Seales et al. (2013):

The CI platform embraces and embodies the desire to preserve, organize, and share our collective human cultural experience. Through the mechanism of self-serve and click-to-accept service agreements, the platform allows broad participation from groups who can ingest assets and build exhibits. Ingestion and exhibit tools are built to be accessible by average, non-expert cultural lovers. These might include researchers, teachers, independent artists, historians, and virtually any group or individual working with assets

in the cultural sector. Their collective goal was to share assets and grow the repository toward a truly large-scale system that is diverse and representative of almost all areas of human cultural experience (p. 72).

These customer experiences provide an assortment of information, knowledge, educational tools, and storytelling capabilities, which aid the production, transformation, circulation, and collectivity of art networks. For example, one aspect of the painting's production, "the techno-human labor involved in bringing a design into material construction" (Gries, 2015, p. 114), enmeshes how Google's technologies assist curators in digitizing *The Starry Night*. Google's technologies include its gigapixel camera, the GCI's repository platform, inference engine, knowledge database, and the *GAC* website and mobile application.

To investigate scale, it is necessary to explore the participatory culture of the GCI, which includes how humans participate with the technology to experience art and culture and how humans use technology to participate with other humans surrounding art and culture experiences. As discussed in Chapter 8, the GCI's participatory culture is multifaceted and provides an assortment of information, knowledge, educational tools, and storytelling capabilities for users and cultural institutions. For instance, I could examine the painting in high-definition gigapixel resolution, read and explore historical facts about the painting, and watch videos focused solely on *The Starry Night*. I could also click on various user galleries and collections that contained the iconic painting, as well as explore artworks that were considered associates of *The Starry Night* (i.e., other paintings by van Gogh, paintings about stars in the night, and so forth). Further, I could take a Street View tour of the MOMA and see the painting hanging inside the museum, as well as visit the MOMA partnership page within the GCI platform. In this context, what Geisler (2011) would refer to as extending reality, the GCI provides "more opportunities for readers and writers to become immersed in a virtual experience beyond what is familiar to them—not, however, to escape their embodied reality but to extend it" (p. 253).

Another aspect of the transmit phase is how particular actors became spokespersons for the group. For example, GAP director Sood acted as group spokesperson, sharing information about the GCI and its MOMA partnership, spreading knowledge across both the institute network and other networks. Further, during the GCI's digitality of *The Starry Night*, the formation of a black box, or the hiding of the network's complexities behind a simple network interface, was attempted. The GCI was able to black box its "networks within networks" (Potts, 2014, p. 43; see also Latour, 1999) and hide the complexities of its actor associations, linkages, and actions behind its simple network appearance. An example of this black box can be seen in the way that the GCI circulates *The Starry Night*, as well as other objects, across its ecosystem. Circulation, from a new materialist perspective, is defined as "trying to account for how something flows" (Gries, 2015, p. 120) throughout an ecosystem. While actor associations are always in constant flux, when looking at circulation throughout a sociotechnical system, it is important to consider how "the Internet and computer infrastructures" (p. 120) impact circulation. In this context, the circulation of *The Starry Night* throughout the GCI ecosystem was dependent on Google's back- and front-end infrastructure, including its algorithms, software, and technologies, as these black boxed processes influence the painting's movement. Based on this, various Google networks, such as its political, technical, and institutional systems, contributed to how *The Starry Night* circulated across the GCI website and mobile app, the GCI ecosystem, and the Google network.

Concluding Thoughts

The business infrastructure of the institute, including its critical partnerships, essential resources, key activities, and digitality processes, is fundamental to its overall strategy of "democratizing access to the world's culture" (Google CI Chromecast, 2014, 00:44). Since 2010,

Google has established essential partnerships with political leaders, cultural institutions, artists, and divisions of Google, to bring its GCI initiatives to light. For instance, Google's relationship with French President Nicolas Sarkozy aided in the formation of Google Paris and the Cultural Institute. Following the development of Google Paris and its initial progress toward the creation of the GCI, Google formed affiliations with UNESCO, the Israel Museum of Jerusalem, and the World Holocaust Remembrance Center of Yad Vashem to begin the digital cultural collection for the GCI platform. Additionally, the GCI established connections with other Google divisions, such as Google Maps and the Google Art Project (GAP), to merge content from these divisions onto the institute's platform. Lastly, the GCI formed associations with artists, which led to the creation of the Google Tilt Brush, the Tilt Brush Artist in Residence (AiR) program, Google Cardboard, Google ARCore, and more.

To further its critical partnerships and enhance its arts democratization efforts, the GCI relied heavily on its essential resources. These resources included its human actors (i.e., Google and GCI employees as well as cultural partner employees), physical objects (i.e., GCI Lab, museums, cultural artifacts), digital objects (i.e., digitized artifacts), intellectual material (i.e., Google brand, algorithms, customer data, digital platforms), and finances. The assemblage of these essential assets was greatly influenced by the leaders and managers who oversaw and guided the entire strategy of the GCI umbrella. Controversially, during the summer of 2013, the GCI changed its leadership from Steven Crossan, a computer engineer and initial founder of the CI, to Amit Sood, marketer and former head of the GAP. This shift notably impacted initiatives and directives of the GCI. For instance, it caused the GCI to move from being led by engineers to being directed by marketers. Potentially, this change also caused the GCI to develop a new focus centered around business partnerships over scale.

While the essential resources of the GCI assisted its vital partnerships, they also supported the institute's key activities that were centered around the digitization and democratization of arts and culture. In this way, the initiatives of the GCI included the innovation of new technologies, the generation of solutions for customer problems, the digitization of new cultural content, the continuation of digital platform support, and everything in between. To illustrate these activities, it is helpful to summarize the GCI's digitality process.

To adequately upload and circulate new cultural content across the GCI ecosystem, the institute used asset ingestion, metadata extraction, knowledge database creation, and scale toward democratization (Seales et al., 2013). Based on this, the GCI realized that when its technologies were improved, and the amount of its digitized cultural content was increased, its ability to distribute information, knowledge, education, and stories was also strengthened. In turn, this referential improvement chain enhanced the GCI's technologies, as well as its digitality process (Seales et al., 2013). In this way, the activities of the GCI have made it so users can visit hundreds of museums, galleries, UNESCO World Heritage Sites, National Parks and Monuments, historic places, and performing arts centers, all from the comfort of their home computer, mobile phone, or tablet.

As I mentioned, a key activity of the GCI is its digitization of cultural objects. However, once an object is captured digitally, it must also be identified, grouped, and transmitted across an ecosystem. The process of digitally capturing an object to transmitting it across digital space can be referred to as what I have coined the digitality process, or the *DIGT* approach (i.e., digitize, identify, group, and transmit). Using *The Starry Night* as an example of the GCI's *DIGT* method, various actors and collectives emerged when exploring its digitality process, which I outline in each phase below.

1. **Digitize:** *The Starry Night* physical painting, Google’s precursor technologies (e.g., Picasa, App Engine, and Google Street View), Google’s new technologies (e.g., gigapixel camera, enhanced Street View, GCI ingestion repository system), Google employees, and MOMA employees and curators.
2. **Identify:** *The Starry Night* digital painting; the digital artifact’s metadata (i.e., its title, description, and artist; Seales et al., 2013, p. 72); Google's inference engine algorithm; similar digitized cultural material within the GCI repository; Google employees; and MOMA curators,
3. **Group:** GCI’s knowledge database; *GAC* website and mobile app; Google’s inference and extraction algorithms; similar digitized cultural material within the GCI knowledge database; and human participation (e.g., curators, historians, GCI employees) with technology to solidify metadata tags.
4. **Transmit:** Amit Sood, former GAP director and current director of the GCI; *GAC* website and mobile application; *GAC* social media tools; Google technologies; and participatory user experiences (e.g., user galleries, gigapixel camera, Street View).

Based on the above, the collective digitality process of the painting could be considered fully established. For instance, it produced an action (i.e., the digitality of *The Starry Night*) greater than the individual activities of each contributing phase (i.e., the digitization, identification, grouping, and transmission of the painting). In this context, what Clay Spinuzzi (2008) would describe as “material assemblages” (p. 168) of transformations, the GCI-Starry Night digitality collective was a “heterogeneous, adequately linked, transformative, and blackboxed” (p. 168) sociotechnical network. Thus, the GCI-Starry Night digitality collective was heterogeneous as it was composed of both humans (e.g., MOMA curator, Google tech

engineers, Amit Sood) and objects (e.g., Google inference engine algorithm, *The Starry Night*, MOMA). It was multiply linked as it connected the network of the MOMA, to the network of the GAP, to the network of the GCI, to the network of the GAC, to the network of other cultural institutions, to the network of cultural users. It was transformative as it shifted material, to data, to information, and finally, to knowledge. Lastly, it was black boxed as it hid the complexities of the GCI's associations and asset ingestion, extraction, knowledge, and scale components behind a simple user experience.

Furthermore, the actors that participated in the digitality process include the following:

- **Human actors** such as Amit Sood, head of Google Art Project (GAP), who Sood acted as a spokesperson for the network by helping to shape key actor associations as he focused on cultural institution partnerships. Human actors also involved Steven Crossan, founder of GCI; Google technology researchers, creators, and engineers (e.g., Dr. W. Brent Seales, Mark Yoshitake, Sertan Girgin, Simon Patarin); and MOMA curators.
- **Google object actors** such as Google's precursory technologies (e.g., Picasa, App Engine, and Google Street View); Google's gigapixel camera; Google's repository and inference engine algorithm; the *GCI* website, *GAC* website, *GAC* mobile application, and *GAC* social media sites (e.g., YouTube, Twitter, Instagram, Facebook, Google +); and the GCI partnership agreement.
- **MOMA object actors** such as the physical MOMA, where van Gogh's *The Starry Night* is displayed in its permanent collection; and paintings similar to *The Starry Night*, such as van Gogh's (1888a) *Starry Night Over the Rhone*, van Gogh's (1888c)

The Cafe Terrace on the Place du Forum, and Munch's *Starry Night* (1893) and *Starry Night* (1922/1924) paintings

- **Boundary objects** such as Google's technologies and knowledge database, including its inference engine.

See Figure 37 for an ANT diagram showing relationships among GCI-The *Starry Night* actors of Google Arts & Culture.

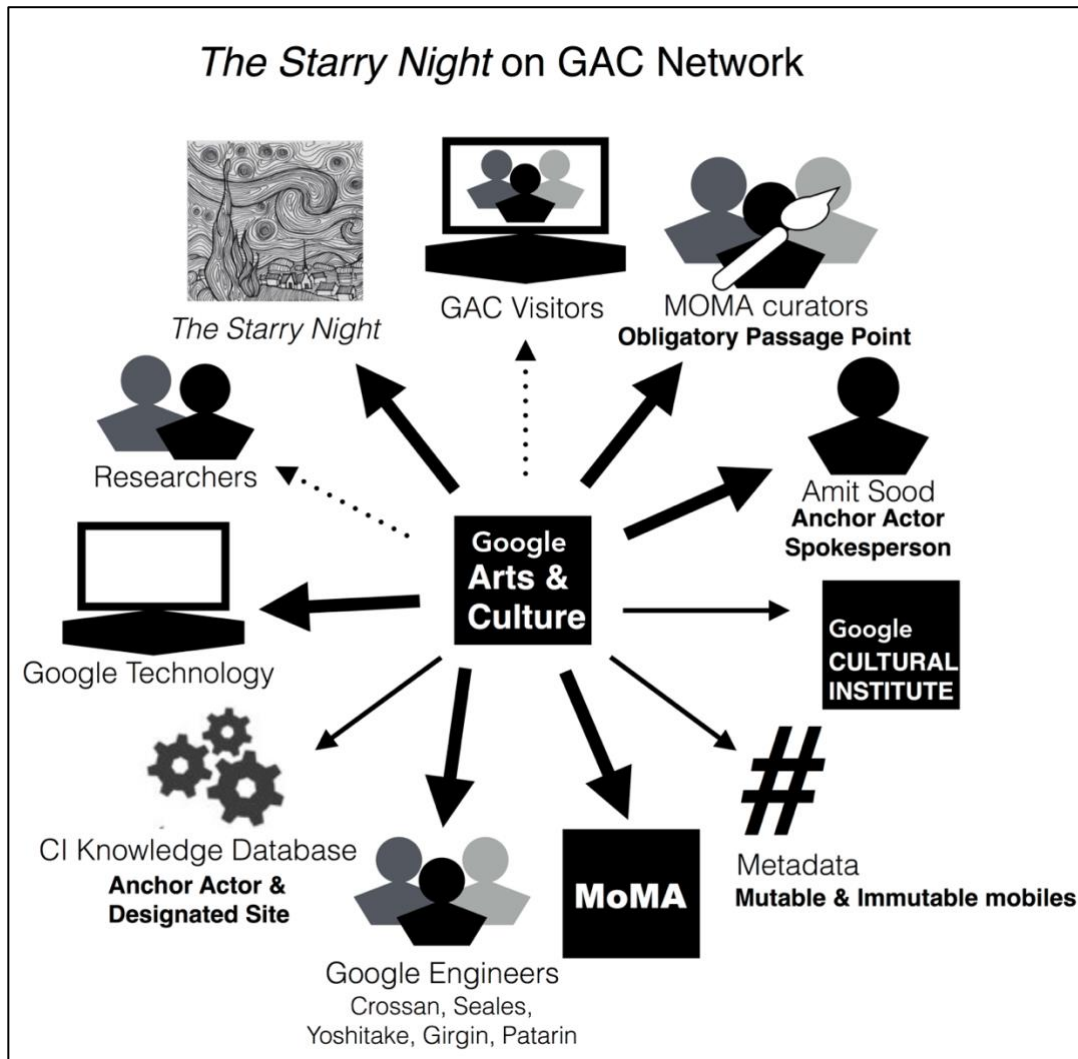


Figure 37. Actor-network diagram showing GCI-The *Starry Night* actor relationships.

Based on this diagram (i.e., Figure 37), it can be argued that as more networks are linked together, the web of associations becomes more complicated. Therefore, one system embedded in the web-association can potentially be just as important as another network. In this sense, a smaller system, within a more extensive network, has the potential to be equally as crucial to the overall network assemblage that larger networks have (what differs between a large and small network is the number of linked actors and the complexity of each linked system). However, and as Potts (2014) mentioned, while these networks can be linked and stabilized, they have the potential to become unlinked and destabilized. An example of this destabilization was demonstrated in the GCI's leadership shift from Crossan to Sood in the summer of 2013. In this context, new network materializations and actor associations were formed. The business infrastructure of the GCI is vital to its overall business model. However, its financial support and strategy are equally as necessary for "democratizing access to the world's culture" (Google CI Chromecast, 2014, 00:44). Based on this, and to demonstrate how the finances of an organization impact its collective associations, I use Chapter 10 to discuss the GCI's finances in particular.

CHAPTER 10: DIGITAL CONVIVIALITY, FINANCES, AND TECHNOLOGY GAIN

In the narrative below, I detail and translate actor relations relative to the financial resources and activities embedded within the Google Cultural Institute (GCI) ecosystem. I fed off the controversies (Latour, 2005) found within the money and value of the GCI to describe its cost structure and revenue model. To do this work, I employed a kaleidoscopic actor-network theory (ANT) mindset while I followed and traced such controversies, unearthing ways that Google may be using digital cultural material to enhance its technologies. In this way, I repeated the process used in the previous chapters to ensure I communicated and translated the actor relation stories of the GCI.

The Google Cultural Institute Finances

The GCI's finances, specifically its cost structures and revenue streams, impact the overall collective activities of the institute. In this context, what Osterwalder (2004) would call "how an enterprise earn[s] money" (p. 9), it is important to investigate the revenue streams of the GCI. According to Osterwalder and Pigneur (2010/2013), a company's revenue streams may include monetary gain from various subscription, usage, license, lease, and broker fees, as well as from the selling of products, data, services, and ad space. Revenue can be achieved by a company's economies of scope (i.e., the advantage it creates over its competitors due to the other areas and markets in which it has entered or plans to participate) and economies of scale (i.e., the advantage a company generates as it increases and expands the number of people it reaches).

And, while revenue streams are important to explore, the other half of a company's revenue model is its costs. In this context, what Osterwalder and Pigneur (2010/2013) would name as a company's cost structure, a company is either predominately cost-driven (i.e., focused

on minimizing costs without extra frills) or value-driven (i.e., concentrated on creating and providing value for the customer). Further, a company's costs can be fixed (i.e., costs that remain the same, such as overhead expenses including salary or rent), as well as variable (i.e., costs that change according to production, such as promotion or packaging materials). These costs help a company fulfill its economies of scope and economies of scale.

Based on this understanding of a company's financial model, it was necessary to explore the cost structures and revenue streams of the GCI to help illuminate the digital conviviality of Google. In this case, the digital convivial focus was particular to the value that the GCI provides to Google, its customers, and the arts and cultural industry at large. To carry out these examinations, I followed *The Starry Night* throughout the GCI ecosystem, linking the money associations and controversies in which the painting participated. Therefore, in this chapter, I will first describe the controversies located within the GCI's revenue streams. These variations in revenue may point toward potential direct, semi-direct, and/or indirect ways that the institute may make money. Next, I will describe the controversies surrounding the GCI's cost structures. These controversies may illuminate potential reasons that Google funds the institute. In this way, I will translate a sense of the value that Google receives from the GCI.

Revenue Streams

The revenue streams of an organization “represents the cash a company generates from each Customer Segment (costs must be subtracted from revenues to create earnings)” (Osterwalder & Pigneur, 2010/2013, Canvas, 9 Building Blocks, 5 Revenue Streams, para. 1). To explore an organization's revenue streams an investigator must ask the following questions: “For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream

contribute to overall revenues?” (Osterwalder & Pigneur, 2010/2013, Canvas, 9 Building Blocks, 5 Revenue Streams, para. 4). When I asked these questions, while tracing the money associations that *The Starry Night* and the GCI enter into across customer segments (as described in Chapter 8), it became apparent that the institute’s revenue streams differ from Google’s service-for-profile (Elmer, 2004; Lyon, 2007) model. Let me explain.

As discussed in Chapter 2, Google provides free online web services in exchange for user profile data. Google then uses this acquired data to generate a profit from company advertisements, as well as to enhance Google technologies. Conversely, the GCI does not display ads on its *Google Arts and Culture* (GAC) website or mobile application (app). According to the “Frequently asked questions” section of the GCI’s platform help website:

Google will neither directly monetize the content nor charge users a fee to access the content. We will not show ads on the website www.google.com/culturalinstitute and always display the content in connection to the Google Cultural Institute (GCI FAQ, n.d., 10th FAQ, para. 1).

In this context, what Osterwalder and Pigneur (2010/2013) would describe as “fees for advertising a particular product, service, or brand” (Canvas, 9 Building Blocks, 5 Revenue Streams, Advertising, para. 1), the GCI does not monetize its data in a similar fashion as other Google divisions. Put more simply, the institute does not make money from selling advertisement space.

During my discussion with Seales, I learned that some leaders of the GCI explored ways that key artworks could provide monetization, such as placing advertisements on *The Starry Night* webpage on the GAC website, within the GCI ecosystem (personal communication, June 15, 2017). This financial strategy, however, must have proven challenging, as currently (as well as previously) there are no advertisements displayed on the GAC website. Yet, this question of how to generate revenue via the GCI’s cultural content has been controversial. For instance,

according to an article by Eric Pfanner (2011) in *The New York Times*, Steve Crossan, the previous founder and director of the GCI, stated: “Google was providing its services to the cultural institutions at no cost, with no immediate expectation of a financial return” (as paraphrased by Pfanner, 2011, para. 20). In this context, the GCI does not make money from its customers as it provides its services for free. In other words, and according to Osterwalder and Pigneur’s (2010/2013) list of potential revenue streams, the institute does not generate a profit through the sale of assets, subscriptions, usages, licenses, leases, and broker fees, or from the selling of products, data, services, and ad space.

During my analysis, I recognized that making assumptive statements about how the GCI does or does not make money could be problematic, as then, I would be providing a God-like point-of-view, which is the opposite of Latour’s (2005) translation. Based on this, I returned to Latour’s (2005) advice that I must “feed off controversies” (p. 25), and as such, followed the divisive activity surrounding the GCI’s revenue model. While tracing *The Starry Night* across the institute’s ecosystem, I found discord concerning the GCI’s finances in statements made by both directors, Steven Crossan and Amit Sood. In this way, I discovered controversy regarding how the GCI makes money.

For instance, and as previously mentioned, in the Pfanner (2011) article, Crossan stated that the GCI freely provides its cultural partners access to GCI technology, with no expectation of financial return. However, when Pfanner asked Crossan why the institute was digitizing the world’s art and culture, Crossan stated:

There’s certainly an investment logic to this. . . . Having good content on the Web, in open standards, is good for the Web, is good for the users. If you invest in what’s good for the Web and the users, that will bear fruit (quoted in Pfanner, 2011, para. 21).

Conversely, in an interview with Matthew Caines (2013) of *The Guardian* newspaper, Sood claimed something different about the GCI's revenue strategy. Specifically, Sood stated:

We created the Google Cultural Institute and the Art Project as a completely non-commercial [endeavor], so it's legally in the contract that we can't make any money out of any of the content (quoted in Caines, 2013, para. 8).

These statements offer some perspective on the GCI's financial model. Specifically, the GCI cannot make money out of any of the content it collects. Based on this, I cannot help but wonder to what type of fruit Crossan was referring. Thus, my curiosity surrounding the institute's financial model enigma grew. If the GCI does not generate revenue from its customers, nor does it seem to transparently utilize any of Osterwalder and Pigneur's (2010/2013) revenue stream approaches, could there be some black boxed (Latour, 1999; Potts, 2014; Rogers, 2013; Spinuzzi, 2008) initiatives embedded with the GCI's revenue streams?

Building on this curiosity, I pondered whether the GCI could make money through semi-visible and direct, as well as fully-hidden and indirect, revenue streams. Thus, I continued to follow the money associations of *The Starry Night*, and several *potential* revenue streams for the GCI surfaced. For example, semi-visible and direct revenue streams for the institute *might* include products linked to the GCI (i.e., through product generation, testing, use of cultural content, and so forth). In this context, products that propel Google within the virtual reality (VR) market, such as Google Cardboard, Google Daydream, GAC VR mobile application, and Google Tilt Brush, appeared. Additionally, fully-hidden and/or indirect revenue/benefit streams for the GCI *might* encompass the ways in which cultural data are being used to increase Google technologies within the GCI, as well as across the entire Google ecosystem. Based on this, artificial intelligence (AI) technologies that use CI data include machine learning (ML), such as computer visualization, and deep learning (DL), such as neural networks (NN) and/or artificial

neural networks (ANNs). These technologies have created AI art projects including arts experiments (GAC Experiments, n.d.), art style transfer (Mordvintsev, Olah, & Tyka, 2015), and art visualization generation (Dumoulin et al., 2016, 2017; Google Research Brain Art, n.d.; & Mordvintsev et al., 2015).

To illustrate how these products *may possibly* generate some form of revenue for the GCI, I will explain each of these products and how they entangle with *The Starry Night*. In the section below, I discuss potential semi-direct revenue streams, including Google Cardboard, Google Daydream, GAC VR mobile application, and Google Tilt Brush. Conversations surrounding hidden revenue/benefit streams, such as arts experiments, art style transfer, and art visualization generation, will be discussed within the subsequent “Cost Structures” section.

Potential Semi-Direct Revenue: Google Cardboard

The Google Cardboard virtual reality (VR) viewer was created by the GCI to allow users a relatively inexpensive way to virtually explore the physical space of cultural entities (GCI Lab, n.d.). According to the *GCI Lab* (n.d.) website, engineers working at The Lab stated:

Wouldn't it be awesome if we could allow the entire world to virtually visit places in an immersive experience, as if they were really there? That's how [Cardboard](#) first came about at The Lab (Tech experiments, Prototyping Cardboard, para. 1).

Presented in the quote above is a hyperlink over the word ‘Cardboard.’ Therefore, clicking-on this “natively digital” (Rogers, 2013, p. 19) hyperlink, which ensures I follow actors and their associations across the GCI ecosystem, directs me to the *Google VR Cardboard* (n.d.) website [<https://vr.google.com/cardboard>].

The *Google VR Cardboard* (n.d.) website contains multiple subpages. For instance, its “Get Cardboard” page displays a variety of VR viewers that are available for further examination and purchase. Interestingly, while some VR viewers are made by and products of Google, an

assortment of VR viewers are designed and owned by a plethora of companies. Let me explain. When I selected to purchase Google's 'Cardboard,' I was directed to the *Google Store* (n.d.) website where I could buy this product (i.e., the cost of one Cardboard was \$15, whereas the cost of two Cardboards was \$25). On *Google Store*, I had the option to purchase a multiplicity of Cardboard compatible apps, which was available through a hyperlink to *Google Play* (n.d.) (i.e., Google's application store). Upon further examination, I observed that these Cardboard apps were not solely designed by Google. Instead, they were developed by a variety of tech makers. Additionally, the "Get Cardboard" page displayed instructions for how a user could build her own cardboard VR viewer. "To build your own viewer all you need are a few everyday items you can find in your garage, online, or at your local hardware store: cardboard, lenses, magnets, velcro and a rubber band" (Google VR Get Cardboard, n.d., Build it Yourself, para. 1).

I could have continued to follow the abstractions and trace actor associations down a rabbit-hole of Google connections. However, I resurfaced to demonstrate how this basic investigation displays what Rogers (2013) would describe as the "public displays of connections" (p. 44) within the GCI ecosystem. In this way, the institute is linked to Google VR, Google Play, Google Store, as well as outside VR distributors and app developers. Further, because the Google "[Cardboard](#) first came about at The Lab" (GCI Lab, n.d., Tech experiments, Prototyping Cardboard, para. 1), revenue from the sales of Cardboard products, including other VR viewers and Cardboard compatible mobile applications, may potentially benefit the GCI.

Potential Semi-Direct Revenue: Google Daydream and GAC VR Application

Branching out from Google Cardboard, yet also within the VR tech space, is another Google product that is also associated with the GCI: Google Daydream. Google Daydream is a VR headset device that is linked to the institute through the art of van Gogh. In November of

2016, “The Lab team brought Google Arts & Culture to [Daydream](#)” (GCI Lab, n.d., Latest Highlights, Daydream, para. 1). In the following quote, a hyperlink appears over the word “Daydream” when clicked on, it directed me to the “Apps & Experiences” page of *Google Daydream*’s website (Google VR Daydream Experiences, n.d.). Google Daydream partnered with The Lab to create a GAC VR application that transported users to the inside of famous galleries. Specifically, Google Daydream helped users:

step inside a virtual gallery and view masterpieces from over 50 world-renowned museums. Whether it’s Vincent van Gogh’s landscapes from the Metropolitan Museum of Art, Rembrandt’s works from the J. Paul Getty Museum, or a collection of the Most Beautiful Cats from RMN-Grand Palais, you can zoom in to see brushstroke-level details (GCI Lab, n.d., Latest Highlights, Daydream, para. 1).

As mentioned in the above quote, one virtual gallery tour available on this app is the RMN-Grand Palais in Paris. Here, users can examine van Gogh’s first starry night painting, *Starry Night over the Rhone* (1888a). See Figure 38 for an example of the painting on the GAC VR app.

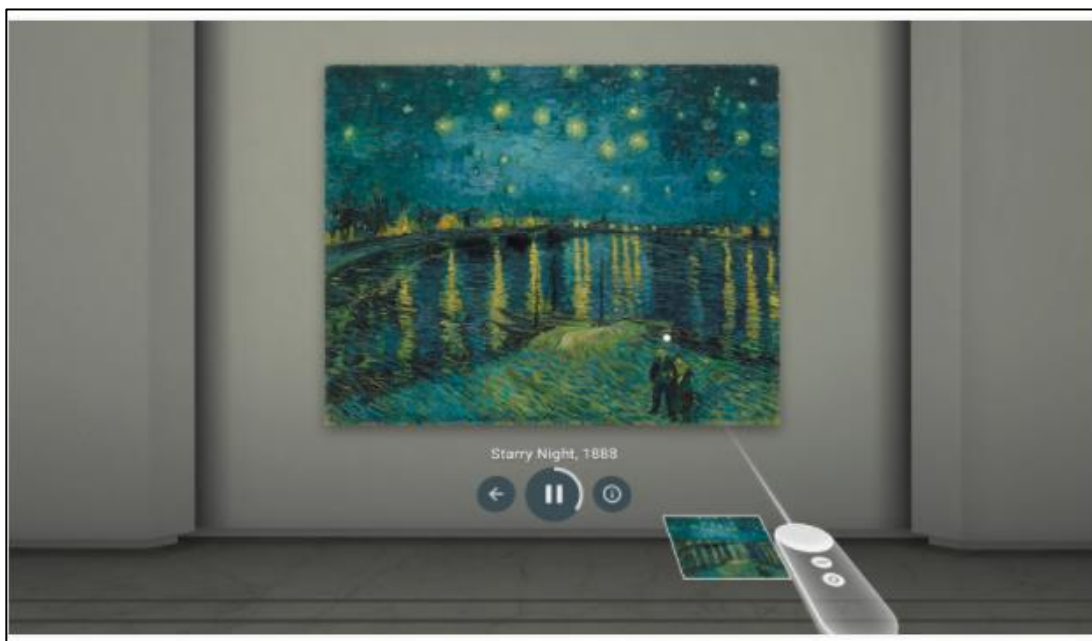


Figure 38. Screen capture of van Gogh’s (1888a) *Starry Night over the Rhone* located within the virtual reality tour of the RMN-Grand Palais museum. From “Google Arts & Culture VR,” by GAC VR App, 2017 (<https://play.google.com/store/apps/details?id=com.google.vr.museums>). Copyright 2017 by Google.

Users can also explore “Vincent van Gogh’s landscapes from [the Metropolitan Museum of Art](#)” (Doronichev, 2016b), such as *Wheat Field with Cypresses* (1889f). According to the GAC VR application (2017) on the *Google Play* website, in order for users to use this app, they must have a “Daydream-ready headset such as Daydream View and a Daydream-ready phone such as Pixel. Learn more at <http://g.co/daydream>” (para. 2). Through following the “daydream” hyperlink presented in the quote, which directed me to the main page of *Google Daydream’s* website (Google VR Daydream, n.d.), I discovered that only certain smartphones are Daydream-ready. I also found it interesting that the iPhone is not listed as a Daydream-ready or Daydream-supported phone. Based on this finding, it appears that Google Daydream and its GAC VR app may potentially benefit the GCI.

Potential Semi-Direct Revenue: Google Tilt Brush

Another Google VR tool is the Google Tilt Brush. Google Tilt Brush is a three-dimensional (3D) painting brush that was created and tested through its relationships with the GCI. To illustrate such connections, I would like to return to the *GCI Lab* (n.d.) website. According to the site, under “Latest Highlights,” The Lab partnered with Google Tilt Brush (i.e., a Google three-dimensional [3D] painting brush) on several occasions and for multiple reasons. For instance, in April of 2016, The Lab partnered with Tilt Brush to host:

a virtual reality residency, the [Tilt Brush Creative week](#) . . . [where] . . . the most talented street artists on the international stage. . . . [were invited to] . . . the Lab in Paris to perform & create artworks in virtual space with the new Virtual Reality tool Tilt Brush by Google” (GCI Lab, n.d., Latest Highlights, Tilt Brush Creative week, para. 1).

Displayed in the quote above is a hyperlink over the words ‘Tilt Brush Creative week.’ However, when clicked, this link transported me to the main page of Google’s blog, *The Keyword*. In this way, this hyperlink could be considered incomplete because it did not take me to a specific article on *The Keyword* about the Tilt Brush Creative week (i.e., instead it directed me to the

main page of *The Keyword*). Based on this discovery, I searched within *The Keyword* database for “The Lab Tilt Brush.” Fortunately, this search returned one article written by Andrey Doronichev on April 5, 2016. Because the creation date and content found in this article matched the information found on the *GCI Lab* website, I decided it must be investigated.

As explained in Doronichev’s (2016a) post, Google product architects were curious about the ways in which artists could create art and “paint in three-dimensional space” (Doronichev, 2016a). Acting upon their curiosity, they designed a technology paint brush that allows artists and creatives to paint in three-dimensions (3D) and generate virtual reality (VR) spaces. They called this innovation the Google Tilt Brush. According to Google designers, all artists had to do to paint the Tilt Brush was “[j]ust select [their] colors and brushes and get going with a wave of [their] hand” (Doronichev, 2016a, para. 2). In this way, the room surrounding the artist becomes “a blank slate. [They] can step around, in and through [their] drawings as [they] go. And, because it’s in virtual reality, [they] can even choose to use otherwise-impossible materials like fire, stars or snowflakes” (Doronichev, 2016a, para. 2).

Following the design and creation of this innovative tech brush, Google product architects wanted to explore the user experience and potentialities of their new invention. They:

Brought Tilt Brush to [The Lab](#) at Google Cultural Institute—a space in Paris created to bring tech and creative communities together to discover new ways to experience art. Since then, artists from around the world and from every discipline have come to explore their style in VR for the very first time (Doronichev, 2016a, para. 3).

One artist that participated in the Google Tilt Brush Creative week, and was Tilt Brush Artist in Residence (AiR) member, was George Peaslee (Melchione, n.d.; Peaslee, 2016). Using Tilt Brush, Peaslee recreated van Gogh’s *The Starry Night* (1889d) into a 3D, VR space (Melchione, n.d.; Peaslee, 2016). Following its completion, users could employ Google Cardboard, Google Daydream, or a different VR viewer, to explore the painting through an immersive VR

experience (Melchione, n.d.; Peaslee, 2016; SoulPancake, 2017). See Figure 39 for a screen capture of Peaslee’s masterpiece, which is presented in a video on SoulPancake’s (2017) *YouTube* page. Through these examples, I have illustrated how Google Tilt Brush is enmeshed with the GCI and GAC. In this way, the institute is linked to the GAC and to Google Tilt Brush and AiR. And, while the Google Tilt Brush was not created by the GCI Lab, the Tilt Brush’s associations with the GAC through its AiR program may potentially benefit the GCI (whether monetarily or in some other way).

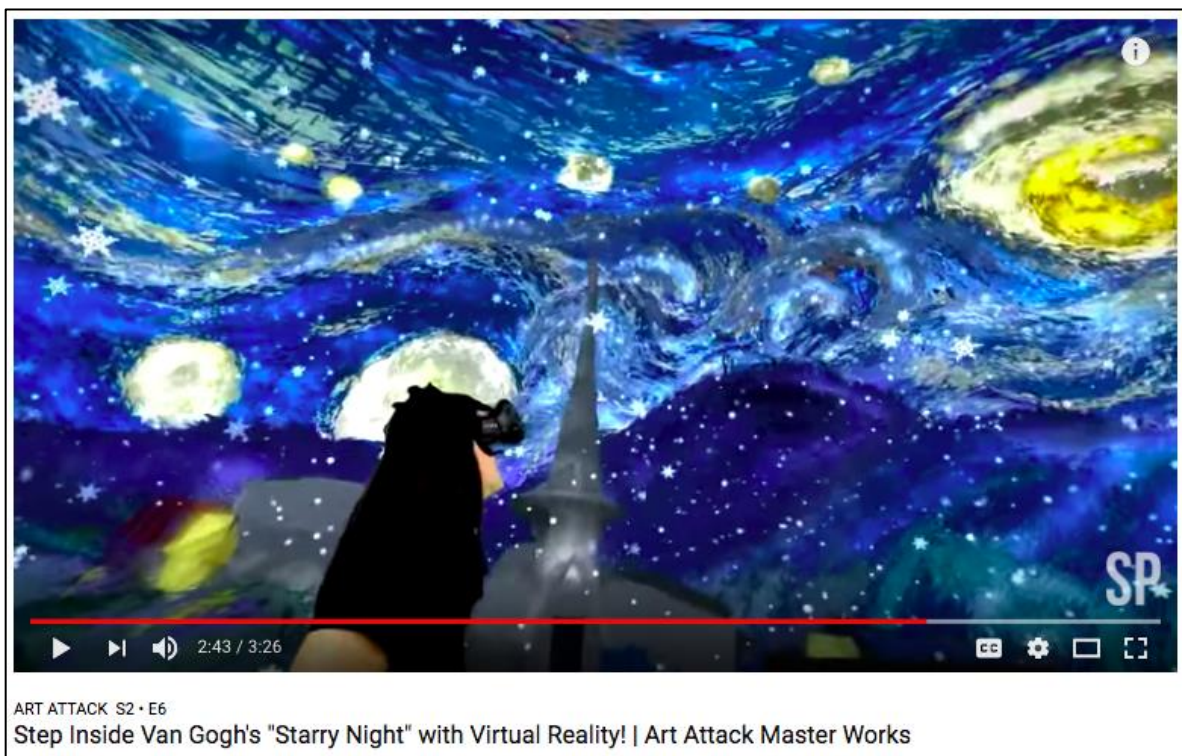


Figure 39. Screen capture of Peaslee’s 3D recreation of van Gogh’s (1889d) *The Starry Night*. From “Step inside van Gogh’s ‘Starry Night’ with virtual reality!,” by SoulPancake, 2017 (<https://youtu.be/Woc0GZkDa7k>).

I have just described several potential direct revenue streams for the GCI. Through the institute’s linked associations with several Google entities, such as Google VR, Google Cardboard, Google Play, Google Store, Google Daydream, and Google Tilt Brush, it may be able to generate profit. I have also demonstrated how the GCI is connected to outside VR viewer

distributors and VR application developers, which may also prove financially rewarding. Using these cases as exemplars, it is possible to see how *The Starry Night* serves as a potential boundary object to bridge GAC and the GCI Lab. Further, the painting spans the networks of the GAC VR application (through other van Gogh works, such as *Wheat Field with Cypresses*, 1889f, and *Starry Night Over the Rhone*, 1888a), as well as those of Google Daydream, Google Tilt Brush, Tilt Brush AiR, Google Cardboard, etc.

Nonetheless, I recognize that the GCI's networked connections do not end with these select potential revenue sources. To further translate the institute's networked entanglement, as well as to identify additional indirect revenue/benefit streams, I looked at other associations across *The Starry Night* and technology. I wondered whether an indirect revenue stream for the GCI *might* include the various ways its cultural data potentially benefit certain divisions of Google and their technologies. To explain this concept of indirect benefits in more detail, I now move toward a description of the GCI's cost structures and how these *might* bring value to Google, cultural institutions, art viewers, and the overall cultural landscape.

Cost Structures

As mentioned, Osterwalder and Pigneur (2010/2013) stated that the cost structure of an organization is predominately either cost-driven (i.e., focused on minimizing costs without extra frills) or value-drive (i.e., focused on creating and providing value for the customer). Using this conceptualization and the money associations of GCI-The Starry Night ecosystem as my guide, the cost structure of the GCI is centered around finding ways to create and provide value for its customers. Specifically, its goal is to democratize the world's art and culture at no cost to its users and cultural institutions (GCI Users, 2015; Google CI Chromecast, 2014; Seales et al.,

2013). In this context, Osterwalder and Pigneur (2010/2013) would describe the institute's cost structure as "value-driven" (p. 41).

To further understand how the GCI operates using a value-driven cost structure, it is helpful to define such a model in more detail. According to Osterwalder and Pigneur (2010/2013), a value-driven model is when a company is:

less concerned with the cost implications of a particular business model design, and instead focus[es] on value creation. Premium Value Propositions and a high degree of personalized service usually characterize value-driven business models. Luxury hotels, with their lavish facilities and exclusive services, fall into this category (p. 41). Based on this definition, and as described in Chapter 8, the GCI does offer "a high degree of personalized service" (Osterwalder & Pigneur, 2010/2013, p. 41), as well as "lavish facilities and exclusive services" (p. 41) to its customers, especially to its cultural institution partners.

As I investigated other aspects of the GCI's cost structure, including its fixed and variable costs, and economies of scope and scale, I began to wonder how cultural data could provide value in other ways, such as potentially aiding in the enhancement of Google technologies. During my interview with Simon Patarin, engineering manager at GCI, I learned that other departments at Google can access the GCI's digitized cultural artifact data only if museums agree to this condition in their use agreement (personal communication, June 21, 2017). Therefore, if cultural entities agree to cultural content sharing and technological innovation, it might not be outside the realm of possibility that other areas of Google are using the knowledge database of the GCI to train and enhance various Google technologies.

For example, I discovered the *GAC Experiments* (n.d.) website, which displays art and technology experiments designed by the GCI, GAC, and other entities of Google. These arts experiments illustrate that cultural data are being used to enhance Google's machine learning (ML) and computer visualization (CV) techniques (GAC Experiments, n.d.). Further, in

Dumoulin, Shlens, and Kudlur's (2017) research, (who are affiliated with Google Brain Team), they explored the use of artistic style in computer vision and machine learning. Dumoulin et al. (2017) stated the following in the acknowledgments: "we would like to thank the Google Cultural Institute, whose curated collection of art photographs was very helpful in finding exciting style images to train on" (p. 9). Using these initial discoveries as a foundation, I wondered: if Google could improve its technologies through cultural data supplied by the GCI, could these innovations lead to potential (indirect) revenue streams for the institute? In this context, what Osterwalder and Pigneur (2010/2013) would define as economies of scope and scale, the cost structure of the GCI may point toward conceivable indirect revenue streams for the institute due to its benefits to Google technologies.

Based on this, it was necessary to understand the cost of the GCI (as paid for by Google) versus the benefit that the GCI provides (to Google), in order to comprehend the institute's cost structures more fully. For instance, despite sizeable costs (i.e., the cost for technology, tool innovation, employees, overhead), which are paid for by Google, the GCI provides cultural experiences to both its users and partners free-of-charge. Yet, while these costs might appear significant, when they are compared to the potential technological benefits that the GCI brings Google, these costs might actually be quite minimal. In order to comprehend such cost-benefit negotiations, I set out to observe what value the institute brings to Google (considering that Google is its predominate source of funding). Therefore, the remaining pages of this chapter will focus on the GCI's economies of scope and scale to demonstrate how the institute provides value to Google (which may point toward how the GCI also makes money).

Value of the Google Cultural Institute to Google

To translate the GCI's value to Google, I asked digital actors (as well as myself) several questions surrounding the GCI-Google relationship. For instance, why does Google continue to fund the institute with no obvious anticipation of financial return? While Google's good organization focus is to provide cultural entities free access to its technology (i.e., such as its high definition camera, 360-degree mapping tools, and GAC digital platform), what type of gain does Google receive from the GCI? Is Google's motive based on gains rooted in financial, philanthropic, data collection, Google branding and reputation, or enhanced technological advantages? Or, perhaps, could Google's intention be something else entirely?

Building on these questions, as well as to get at the idea of value, I followed and traced the collective activity of *The Starry Night* within both the GCI ecosystem and Google at large. While doing so, the actors of the institute revealed that the GCI's value proposition for Google acts similarly to the GCI's value proposition for its customers. In this context, the GCI's value propositions further demonstrate what Mol (2002) would describe as a body multiple (i.e., an object can perform both one and many roles). For instance, the institute's value proposition for Google is a single-multiple network: it has both a distinct and singular role to fulfill Google's mission, "yet also exists in a plethora of different versions that take on various roles" (Gries, 2015, p. 244). In other words, the GCI advances the mission of Google when it organizes and makes the world's arts and culture universally accessible and useful. And, it is through the process of organizing the world's art and culture that the institute also collects millions of digitized cultural images. In this way, these digitizations may prove to be of use (whether positively and/or negatively) to the GCI and additional departments of Google.

To investigate this idea further, I must discuss certain technologies where *The Starry Night* has surfaced. The painting has appeared within a multiplicity of Google AI projects that employ machine learning (ML) to art, including computer vision (CV), transfer learning (TL), reinforcement learning (RL), clustering, deep learning (DL), and so forth. While these tech terms, specifically, artificial intelligence (AI), machine learning (ML), and deep learning (DL), are all the buzz in movies, news, tech blogs, and so forth, it is helpful to provide a succinct depiction of each to ensure translation.

Often the terms AI, ML, and DL are used interchangeably. And, while they all share some similarities, they are also quite different. As I mentioned in Chapter 1, the term AI (which was originally coined by American computer scientist John McCarthy, 1955) is the technological process of making “machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves (McCarthy et al., 1955, p. 1). In other words, through the generation of sophisticated computer algorithms, computer scientists and engineers have designed technologies that can think and act like humans. Specifically, AI can “learn to solve any complex problem without needing to be taught how” (DeepMind About, n.d., para. 1-2). And, one way that AI shifts toward being able to think and act like humans, is through the practice of machine learning (ML).

To review, ML is the process of training and teaching an algorithm to help it learn how to do something in a manner as intelligent as humans, such as identify or tag images. To achieve ML, several approaches can be used: transfer learning (TL), “decision tree learning, inductive logic programming, clustering, reinforcement learning, and Bayesian networks,” (McClelland, 2017, para. 9), and deep learning (DL). And, while each of these processes are unique, I want to discuss how TL and DL can be used to achieve ML.

As described in Chapter 9 (within the description of the CI's key activities), TL involves transferring data from one related domain to another domain. For instance, image classification includes the process of tagging, providing descriptive metadata, and using similarity recognition tools to identify an image, all of which are forms of TL. Based on this, the GCI used TL to teach its technologies computer vision techniques. Specifically, the institute took physical material (i.e., a cultural artifact, such as a painting) and captured it into digital material (i.e., used some form of technology, such as the Google gigapixel art camera, to digitize the physical cultural artifact). The GCI then used humans, such as museum curators, to contextualize the digital material using descriptive metadata (i.e., information about the artifact, such as the title, name of the artist, and the year the artwork was created).

Following this process, the GCI used technology to extract information about the painting, as well as to create a cultural database where digital artworks could be stored and displayed. For example, artifacts could be viewed by users on the *GAC* website, as well as be utilized to help identify other digitized art. In this way, the institute developed key resources that could be used in a variety of ways for a variety of purposes, including a cultural content database that could assist in advancing AI capabilities (i.e., ML, DL, ANN). Specifically, acquired cultural data were used to train Google technologies to achieve computer vision, such as image recognition and identification. This initial training process was achieved through TL and RL. (See Chapter 9, GCI's key activities, for further review).

Another approach to machine learning is deep learning (DL). DL is the process of understanding the "structure and function of the brain" (McClelland, 2017, para. 10), and then applying these biological and neurological dimensions to machines. Based on this, algorithms called Artificial Neural Networks (ANNs) are designed to "mimic the biological structure of the

brain” (McClelland, 2017, para. 10). For instance, within the human brain, DL involves neurons that can connect to other neurons to create neural networks (NN). The formation of NN allows human intelligence to build knowledge upon itself. In other words, as a human learns information, she can build off that information to learn even more. In this way, if she understands the fundamentals of the English language, such as letters, sounds, and word structure, as well as that reading across a word or page goes from left-to-right and top-to-bottom, she can learn how to read and write. Further, she also has the foundation for being able to learn and understand other languages (e.g., French, Spanish, Russian).

Therefore, DL is all about scale. For instance, the larger the neural network (NN), the greater the performance. In the case of the human brain, the human’s ability to consume and learn expands as the amount of information consumed and learned increases. Similarly, in the case of machines, the performance of the machine (i.e., its ability to learn more and more things) proliferates as the amount of data within its database increases (i.e., there are more things for the machine to learn from). Put more simply: in both human neural networks (NNs) and machine artificial neural networks (ANNs), the level of performance develops when the level of data input grows.

I have offered a brief description of AI, ML, TL, and DL. Building on this understanding, it might be helpful to think of AI as the overarching umbrella of ML, and to achieve ML, different approaches (i.e., TL and DL) can be used. A bit later in this chapter, I showcase several examples of these actors at work, specifically, how Google’s AI is entangled with the GCI’s art and culture data. However, to help illustrate the entangled web of these processes, I want to pause for a moment, and paint a picture of the complexity of Google’s approach to art and culture. Precisely, how its initiative to democratize art and culture (i.e., the GCI and GAC) shares

similarities across Google's method to digitize literature (i.e., Google Book Search Project). In doing so, I offer a brief description of what Illich (1973) might say about these processes in relation to "conviviality" (p. 18) and "manipulation" (p. 21).

In 2004, Google launched its Google Book Search Project (GBSP) and set out "to copy millions of copyrighted books from university libraries and offer them in low-quality formats to a broad market of readers" (Vaidhyanathan, 2011, p. 10). In this way, the GBSP helped fulfill Google's mission, as it organized and made accessible the world's information, which was once only available inside university libraries and their books. According to Band's (2006) dissertation on the GBSP, Google's digitization of university books was highly controversial due to several laws surrounding copyright and fair use. In this way, the GBSP sparked lawsuits toward Google, as well as public debates surrounding the legal definition of creative fair use. (See Band, 2006, for more information surrounding the overall controversy and resolution).

Further, according to Vaidhyanathan (2011), while Google was publicly fighting the controversies surrounding its book project battle, it was also privately working on a different initiative to benefit its technologies (Vaidhyanathan, 2011). Specifically, concealed behind its good organization focus, Google was scanning and reading millions of books for another purpose: to enhance its "semantic search" (Vaidhyanathan, 2011, p. 22). Vaidhyanathan (2011) claimed that Google wanted to enhance its semantic search so that Google's search query could actually answer questions for users (instead of only supplying hyperlinks to webpages with possible answers). In other words, Google wanted its algorithm to be able to "take account of the contextual meaning of the search terms" (p. 22) supplied by users. In this context, Google was successful in teaching its algorithm the process of semantic search.

To illustrate this concept, imagine if I were to type in “what is the capital of France” into a Google search box. Before the Google Books project, I would have received a search return of links, each one directing me to different websites, blogs, news articles, and so forth, about France and its capital. However, after the Google Books Search Project, as well as Google’s training of its semantic search algorithm, this same search returns an actual answer to my question: Paris is the capital of France. See Figure 40 for a screen-shot of my search on January 18, 2018. Based on this example, when a Google user types *what is the capital of France* into a Google search box, she receives an actual answer to her question: *the capital of France is Paris*.

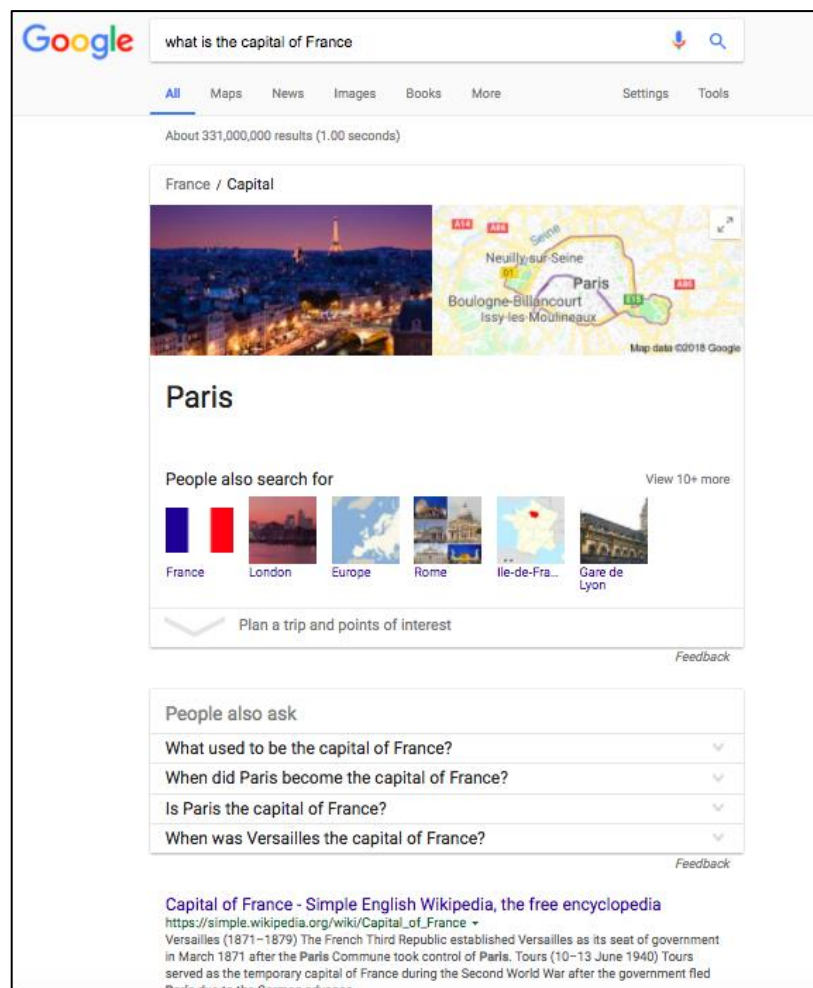


Figure 40. Screen capture of Google semantic search: “what is the capital of France?” From “Google search: ‘what is the capital of France,’” by Google Search France, 2018 (<https://goo.gl/L3yBvh>). Copyright 2018 by Google.

I realize, however, that this conceptualization is complex and possibly confusing. To illustrate these parallels more clearly, I break down the basic initiatives of each project. The GBSP, according to Vaidhyathan (2011), digitizes university library books to make information more accessible. Simultaneously, this project also provides language content (i.e., multiple languages written in proper semantic form) to assist Google technologies. Specifically, it affords Google the ability to teach its algorithms the process of “natural language” (p. 23), which in turn, enhances Google’s semantic search capabilities. Similarly, and according to GAC Experiments (n.d.), the GCI digitizes the world’s art and culture to make it more accessible. Concurrently, this project also provides visual content (i.e., thousands of digital cultural images) to assist Google technologies. Particularly, it allows Google to teach its AI algorithms aspects of ML, including computer vision technology, such as visual recognition and identification (GAC Experiments, n.d.), as well as DL, including the creation and advancement of ANNs (Dumoulin et al., 2016; Google Research Brain Art, n.d.; and Mordvintsev et al., 2015).

Based on this understanding, it could be argued that there may be some similarities between the initiatives of the GBSP and the GCI/GAC. Specifically, how Google publicly presents a technology initiative that it claims is aimed at enhancing society, while privately using the initiative to also enhance Google technologies. In this context, what Vaidhyathan (2011) might characterize as Google hiding behind its good organization focus, the initiatives behind both of Google’s projects (i.e., the digitization of university books and of arts and culture) could *potentially* be serving “several engineering and commercial goals as well” (p. 10).

Further, Illich (1973) might consider that Google is acting in a non-convivial way, specifically, through a “manipulation of people for the sake of their tools” (p. 21). However, I am not convinced that Google only set out to manipulate society to enhance its tools. This

abstraction, however, is difficult, as conferring on one side or the other is in contradistinction to Latour's (2005) ANT conceptualization of translation. Therefore, to remain true to ANT and not provide a God-like point-of-view regarding research findings, I will continue to present enough empirical evidence and data visualizations to help the reader reach her or his interpretation of Google's digital conviviality and/or non digital conviviality.

I now turn toward a translation of how the GCI's cultural data may create value that positively influences Google and the arts industry, and/or how the GCI's cultural data may potentially generate problems that negatively impact Google and the cultural landscape. Specifically, I offer a description of how Google is using cultural data to enhance its AI processes, specifically its ML capabilities (including clustering, inductive logic programming, and DL). I shift now to my examination of the Google AI projects in which *The Starry Night* and its associations have appeared.

Artificial Intelligence and Machine Learning: Art and Computer Visualization

The Starry Night has been used throughout Google's art experiments (GAC Experiments, n.d) to help enhance Google's machine learning (ML) capabilities. As previously mentioned, ML can be used to enhance AI as it helps machines learn how to think and act like humans. Google has been applying art and culture to assist this process. Building on this, and to describe the complexities involved in ML and art, I first explore the connections of *The Starry Night* with Google Experiments (n.d.), specifically, art experiments (GAC Experiments, n.d) that are focused on employing Google's technology to the GCI's cultural data. I aim to illustrate how the GCI's association with Google Experiments (n.d.) might provide value, and potential indirect revenue to the GCI, Google, cultural institutions, and the cultural landscape.

According to the *GCI Lab* (n.d.) website, in November of 2016:

A group of Google engineers along with artists and creative coders collaborated at the Lab in Paris to apply a little Machine Learning magic to art and culture. They created the [Google Arts & Culture Experiments](#), which are research projects that investigate how technology can help people unlock the world of arts and cultures (Latest Highlights, Machine Learning, para. 1).

In other words, Google teamed up with artists to figure out how they could employ ML technology to the art and culture data collected by the GCI/GAC. To further understand this process, I followed the hyperlink presented over the words “Google Arts & Culture Experiments” within the above quote. Once clicked, this link connected me to the *Google Arts & Culture Experiments* (GAC Experiments, n.d.) website found at experiments.withgoogle.com/arts-culture. This webpage, however, is actually a subpage of the *Google Experiments* (n.d.) website found at experiments.withgoogle.com. To understand these art and culture experiments, we must first examine Google Experiments.

According to the *Google Experiments* (n.d.) website:

Since 2009, coders have created thousands of amazing experiments using Chrome, Android, AI, WebVR, AR and more. We're showcasing projects here, along with helpful tools and resources, to inspire others to create new experiments. Here are collections of experiments to explore, with new ones added every week. Have fun (para. 1).

Additionally, on the *Google Experiments* (n.d.) website, users can find links to experiments that involve voice, arts and culture, augmented reality (AR), web virtual reality (VR), artificial intelligence (AI), Android, and Chrome. At the bottom of the *Google Experiments* (n.d.) website, Google states: “We encourage open sourcing projects as a way of learning from each other. Our [submission page](#) is always open, so consider sharing your amazing work with fellow creators” (para. 2). In this context, what Ivan Illich (1973) would describe as “conviviality” (p. 18), which he defines as the “autonomous and creative intercourse among persons, and the intercourse of persons with their environment” (p. 18), it could be argued that Google

Experiments is attempting to provide a digital convivial space for users and creators to share their “amazing work with fellow creators” (para. 2).

Returning now to the *GAC Experiments* (n.d.) webpage, users can “[t]ry out experiments at the crossroads of art and technology, created by artists and creative coders with collections from [Google Arts & Culture](#) partners” (para. 1). It is important to note: the hyperlink presented over the words ‘Google Arts & Culture’ within this GAC Experiments quote, connects to the *Google Arts & Culture* (GAC, n.d.) main webpage found at artsandculture.google.com. On the *GAC Experiments* (n.d.) webpage, users can interact with big datasets of cultural data “from Google Arts & Culture, shared by museums and archives around the world” (para. 2) to explore various applications of ML technology. For instance, users can examine how ML can be used to classify and tag images, recognize image similarities, visualize data, create timelines, identify the degrees of separation between two artifacts, and generate interactive 3D landscapes (GAC Experiments, n.d.). The current art and culture experiments found on the webpage include the following: “MOMA & Machine Learning,” “Art Palette,” “Life Tags,” “Tags,” “Curator Table,” “XY-FI,” “T-SNE Map,” “X Degrees of Separation,” and “Free Fall” (GAC Experiments, n.d., Browse Tags, groups 1-9).

To further describe this process, as well as to continue tracing *The Starry Night*, I will discuss the *MOMA & Machine Learning* exhibit (as the MOMA is a key associated actor to *The Starry Night*). When I clicked-on the “MOMA & Machine Learning” experiment, I was directed to an exhibitions page on MOMA’s website titled “Identifying art through machine learning: A project with Google Arts & Culture Lab” (MOMA Identifying Art, n.d.), which can be found at moma.org/calendar/exhibitions/history/identifying-art. According to *MOMA Identifying Art* (n.d.) website, the Digital Media team at MOMA collaborated with The Lab at the GCI and GAC

to create a way to classify 30,000 non-identified and non-tagged photos within MOMA's new digital collection. Using "machine learning and computer vision technology" (para. 1), the GAC's algorithm scanned MOMA's online collection, which included more than 65,000 artifacts, to identify potential matches of the artifacts within the 30,000 photos.

According to *MOMA Identifying Art* (n.d.), matches were identified when the GAC algorithm declared a "confident" (para. 5) match. However, the "algorithm has strengths and weaknesses" (para. 5). Namely, it "is very good at identifying static, two-dimensional images" (para. 5), while it struggles when images are of "text-based artworks" (para. 5) and/or when "multiples and editions of the same or very similar images" (para. 5) are presented. Based on this, the algorithm does a good job recognizing sculptures, as well as "moving image, installation, and sound works" (para. 5). However, it could not "always tell one soup can from another" (para. 5), and it "incorrectly match[ed] photographs when the work on view was actually a different print of the same (or a very similar) image" (para. 5).

Overall, 20,000 artworks were recognized within the photos, and the MOMA "used those results to create a vast network of new links between [its] [exhibition history](#) and [online collection](#)" (para. 2). In this context, what Latour (1987) would describe as a "network" (p. 180), the results from the algorithm connected and transformed the MOMA's "scattered resources into a net that may seem to extend everywhere" (p. 180). The MOMA furthers this idea of networks by eloquently illustrating how technology can aid in connecting the boundless art and culture networks. According to *MOMA Identifying Art* (n.d.) website:

Now [a photo from a 1929 painting exhibition](#) opens a window into an iconic work by Paul Cézanne; a [1965 shot of Robert Rauschenberg prints](#) connects you to [those same works](#) in MoMA's 2017 Rauschenberg retrospective; and [one corner of a 2013 design exhibition](#) becomes a portal into poster art across two centuries. While hardly comprehensive, it's a great start—and a remarkable feat given the sheer volume of information involved (para. 3).

And, while the MOMA recognizes that technology can significantly benefit the cataloging of artworks, it also realizes that humans are still necessary to ensure the accuracy of such identifications (MOMA Identifying Art, n.d.).

Further, the MOMA welcomes human visitors to the MOMA's newly categorized collection to help crowd-source the metadata created from the GAC's ML algorithmic processes. Specifically, it states:

As this project has shown, technology provides us with quick and efficient tools, but it cannot replace human eyes and minds. (Well, not yet, anyway.) Despite a cautious approach that prioritized accuracy over quantity, we expect there will be a small number of errors. So if you notice something amiss, please let us know by emailing digital@moma.org. Your input can help us offer an even more accurate resource in the future (MOMA Identifying Art, n.d., para. 6).

In this context, what I described in Chapter 8 regarding digital ecosystems providing a participatory reason, visitors to this MOMA digital collection may feel that their contributions matter. And, this feeling of reason may potentially extend to the GAC due to the associated relationship the GAC had with this project.

Moving on from the "MOMA & Machine Learning" experiment, I returned to the *GAC Experiments* (n.d.) website to explore other arts experiments. After a close examination of other GAC experiments, I soon realized that Google claims to use the GCI's acquired cultural data to enhance its other Google technologies (GAC Experiments, n.d.). Based on this, I wondered whether an indirect revenue stream for the institute might include the various ways that its acquired cultural data may potentially benefit Google (in a broad sense), as well as divisions of Google (in a narrow sense).

To further explore this idea, I continued to trace *The Starry Night* across the ecosystem. The painting appeared in a Google *YouTube* video titled, "Google Arts & Culture Experiments" (Google GAC Experiments, 2016). Through descriptions provided by Google employees and

associates, this video explains the importance of ML in relation to art and culture. Google Code Artist, Mario Klingemann, stated: “Machine learning enables us to find patterns in complex data that hopefully open up new pathways to explore it” (Google GAC Experiments, 2016, 00:32). In a similar fashion, Digital Interaction Artist, Cyril Diagne, remarked:

Machine learning is incredibly valuable because it brings these unexpected ways to look at the content, to make it available, to connect the audience to the content, or to even help museums to organize and analyze their content (Google GAC Experiments, 2016, 00:39).

The video also illustrated different types of ML art and culture experiments, such as “X Degrees of Separation,” “Tags,” and “T-SNE Map” (Google GAC Experiments, 2016). According to Klingemann:

X degrees of separation tries to answer the question: ‘What is the connection between any two artworks?’ You just ask it: ‘What is the path between [The] *Starry Night* and some 5,000-year-old clay sculpture?’ And, it actually finds a connection which is usually surprising, interesting, and opens up this chance for discovery (Google GAC Experiments, 2016, 1:02).

Building on this video, as well as the links across *The Starry Night* and Vincent van Gogh, is another *YouTube* video titled, “Every piece of art you've ever wanted to see – up close and searchable” (Sood, 2016b). This video, which is a recording of Sood’s (2016b) TED Talk, presents the multiple ways the GCI’s ML algorithm can be applied to the cultural artifacts within the GCI database. In other words, Sood (2016b) described how ML is being applied to art in the form of “experiments” (12:05), which can be found on the *GAC Experiments* (n.d.) website.

Within this TED Talk, Sood (2016b) discussed the various art and cultural connections that can be found by using the metadata of objects. For instance, he demonstrated that through *GAC Experiments* (n.d.), users can explore all three of van Gogh’s paintings of *The Bedroom* (1888b, 1889b, 1889e) (see Figure 41). Sood (2016b) stated the following about these paintings:

This is an artwork where three copies exist – one at the Van Gogh Museum in Amsterdam, one at the Orsay in Paris and one at the Art Institute of Chicago, which,

actually, currently is hosting a reunion of all three artworks physically, I think only for the second time ever. But, it is united digitally and virtually for anybody to look at in a very different way, and you won't get pushed in the line in the crowd (6:06).

Sood explained how connections across artifacts, such as van Gogh's *The Bedroom* (1888b, 1889b, 1889e) paintings found on the GAC, can be identified through the use of technology.

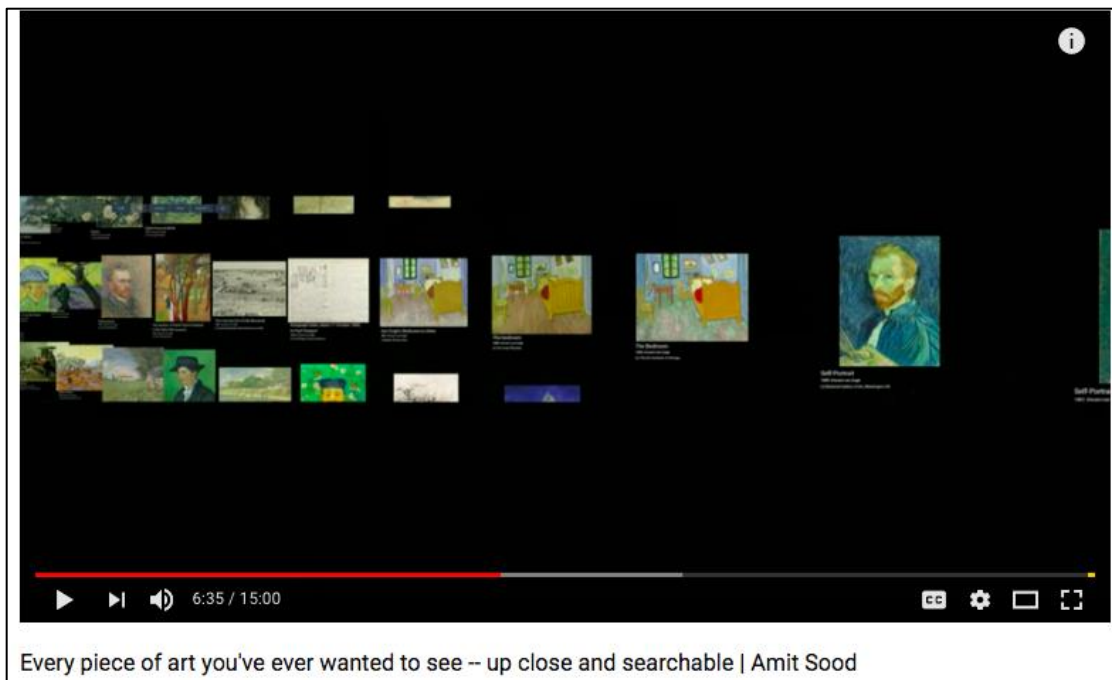


Figure 41. Screen capture of Sood's (2016b) TED Talk discussing how the metadata of van Gogh's (1888b, 1889b, 1889e) *The Bedroom* can be used to link the three paintings. From "Every piece of art you've ever wanted to see -- up close and searchable, Amit Sood," by A. Sood, 2016b (<https://youtu.be/CjB6DQGalU0>). Licensed by TED Talk under a [CC BY-NC-ND 4.0 International](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Based on this, Sood (2016b) specified: "All that we've shown you so far uses metadata to make the connections" (9:46). However, "here, is something a little bit more technical and more interesting. . . . machine learning" (9:44). And, to see exactly what the computer can identify by itself, Sood (2016b) indicated, "let's strip out all the metadata, let's look at what machine learning can do based purely on visual recognition of this entire collection" (9:50). Put another way, the user must remove all metadata surrounding cultural objects, which in turn, will allow the computer to autonomously find associations across artifacts.

According to Sood (2016b), when metadata are stripped, interesting visualizations of art clusters can appear (see Figure 42). Specifically:

What we ended up with is this very interesting map, these clusters that have no reference point information, but has just used visuals to cluster things together. Each cluster is an art to us by itself of discovery. But one of the clusters we want to show you very quickly is this amazing cluster of portraits that we found from museums around the world. . . . Just to show you, you can just travel through portraits. And essentially, you can do nature, you can do horses and clusters galore (Sood, 2016b, 10:00-10:44).



Figure 42. Screen capture of Sood’s (2016b) TED Talk discussing how ML created interesting maps and clusters of art. From “Every piece of art you’ve ever wanted to see -- up close and searchable, Amit Sood,” by A. Sood, 2016b (<https://youtu.be/CjB6DQGalU0>). Licensed by TED Talk under a [CC BY–NC–ND 4.0 International](https://creativecommons.org/licenses/by-nc-nd/4.0/).

In this context, what Zeynep Tufekci (2015) would describe as “computational agency” (p. 207), the computer of the GCI can autonomously (i.e., without the help of humans) make connections across the institute’s cultural database through the use of visual recognition. And, while employing visual recognition, the computer creates art clusters (see Figure 42).

Following this demonstration of art clusters, Sood (2016b) continued to discuss how ML can tag images *without* the help of humans or human supplied metadata. In this way, Sood

(2016b) further reiterates Tufekci's (2015) discussion of "computational agency" (p. 207). As now, not only can the computer categorize art but it can also "automatically tag them [art images], using no actual metadata" (Sood, 2016b, 12:15). And, for Sood's (2016b) last art experiment, he demonstrated the value of ML and tagging by stating:

We show you clusters, visual clusters, but what if we could ask the machine to also name these clusters? What if it could automatically tag them, using no actual metadata? So what we have is this kind of explorer, where we have managed to match, I think, around 4,000 labels. And we haven't really done anything special here, just fed the collection. And we found interesting categories. We can start with horses, a very straightforward category. You would expect to see that the machine has put images of horses, right? And it has, but you also notice, right over there, that it has a very abstract image that it has still managed to recognize and cluster as horses. We also have an amazing head in terms of a horse. And each one has the tags as to why it got categorized in this (12:00-12:58).

See Figure 43 for a screen capture of how the computer categorized images of horses.



Figure 43. Screen capture of Sood's (2016b) TED Talk discussing how the computer categorized images of horses. From "Every piece of art you've ever wanted to see -- up close and searchable, Amit Sood," by A. Sood, 2016b (<https://youtu.be/CjB6DQGalU0>). Licensed by TED Talk under a [CC BY-NC-ND 4.0 International](https://creativecommons.org/licenses/by-nc-nd/4.0/).

While I have described how the GAC is applying ML to cultural data, I wish to further demonstrate both the autonomous and collective nature of ML. For instance, according to Sood (2016b), he wanted to impress his mother with his new job at the GCI. Knowing that his mother loved gold, he decided to show her all of the gold that can be discovered on the *GAC* website. Using this example, he addressed the independent, yet also somewhat participatory, learning potential of ML technology. Specifically, he illustrated how a computer can learn new things in relation to what it already knows about current social and cultural norms. For instance:

Coming back to gold very quickly, I wanted to search for gold and see how the machine tagged all the gold. But, actually, it doesn't tag it as gold. We are living in popular times. It tags it as 'bling-bling.' . . . Essentially, here you have all the bling-bling of the world's museums organized for you (Sood, 2016b, 13:26-13:47).

See Figure 44 for an image of computer tagging gold as “bling-bling” (Sood, 2016b, 13:33).

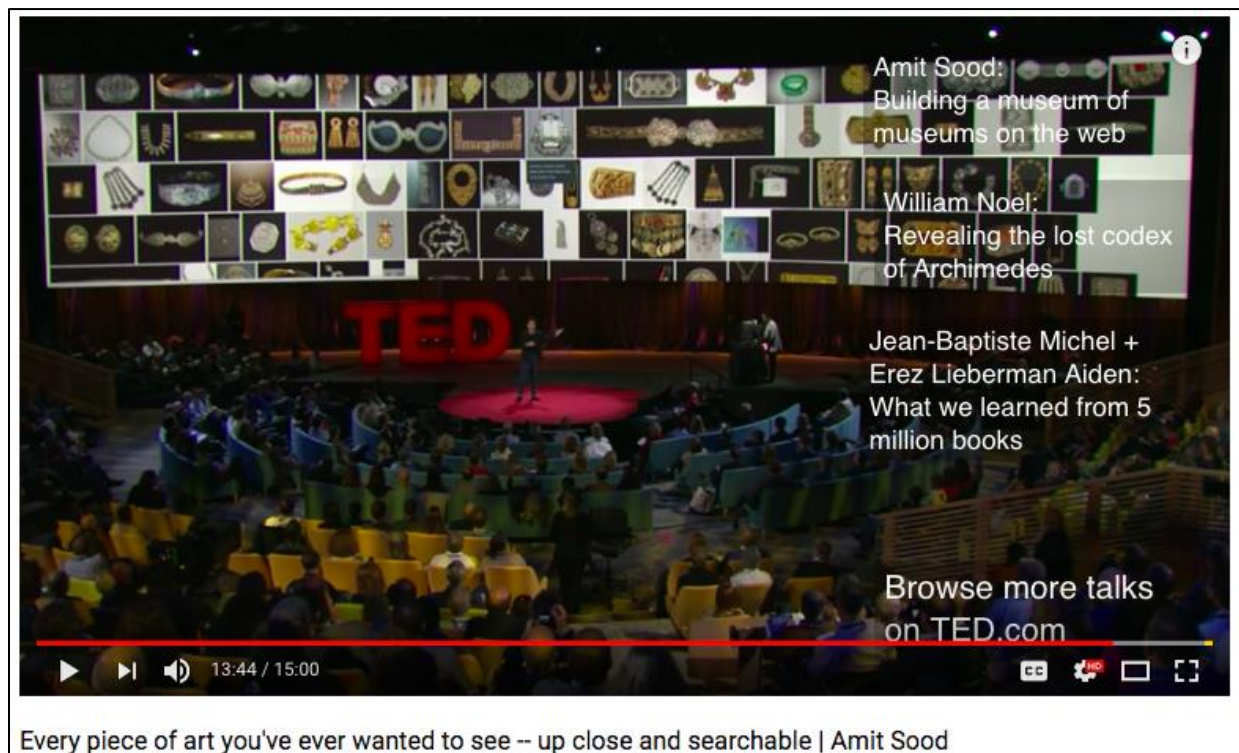


Figure 44. Screen capture of Sood’s (2016b) TED Talk discussing how the computer tagged gold as “bling-bling.” From “Every piece of art you've ever wanted to see -- up close and searchable, Amit Sood,” by A. Sood, 2016b (<https://youtu.be/CjB6DQGalU0>). Licensed by TED Talk under a [CC BY–NC–ND 4.0 International](https://creativecommons.org/licenses/by-nc-nd/4.0/).

In describing ML and art, it is somewhat difficult to illustrate these processes in terms of Illich's (1973) notion of "conviviality" (p. 18). As discussed in Chapter 1, the process of interpreting convivial experiences may depend on a person's theoretical orientation. For example, Illich (1973) might argue that ML, specifically the concept of tagging the gold as "bling-bling" (Sood, 2016b, 13:33), is a convivial process of computers exploring the human supplied data. Thus, the computer's word choice of tagging gold as "bling-bling" (Sood, 2016b, 13:33) is demonstrative of the convivial process of computers learning from humans, or as Sood (2016b) stated, displays that "[w]e are living in popular times" (13:26-13:47).

However, it can also be argued that once ML is being used, a human's participation in the process is actually several steps removed from the human-technology interaction process. For instance, ML happens when a large dataset to look for similarities is available. TL (which as previously discussed, is a convivial process of humans working *with* technology to teach the computer algorithm certain things) is one way a large dataset can be created. However, once the process of TL has been completed, the participatory role of the human within the ML process is, in essence, extremely limited. According to Sood's (2016b) presentation, the humans at the GCI just "fed the collection" (12:31) to the computer and "ask[ed] the machine to also name [the] clusters" (12:10). Put another way, humans do not really participate in ML other than to say: *hey computer, look through this data and tell me what you see*. In this way, what Tufekci (2015) would describe as "computational agency" (p. 207), the human essentially just hits the start button and the computer exerts an autonomous, ML action.

I have just described how the GCI is using its collected cultural data (i.e., digitized images of art objects) to explore the potential of ML. For instance, ML can interact with big cultural datasets to explore what can happen when technology meets culture (i.e., such as

machine learning can help improve image classification and tagging, image similarity recognition, data visualization, timeline creation, degrees of separation between two artifacts, and interactive 3D landscape) (GAC Experiments, n.d.). Additionally, I have explained several approaches to ML, including computer vision technology, clustering, and inductive logic, among others. I have also conferred on how ML, once it has moved past TL, may no longer be a convivial (Illich, 1973) process across humans and technology. Moving on, I turn toward a translation of how Google is using art and culture to enhance its DL capabilities.

Artificial Intelligence and Machine Learning: Art and Deep Learning

Based on my understanding of how Google has been using art and culture to enhance ML through computer vision technology, I wondered if other forms of ML were being used to enhance Google's AI. Specifically, if other Google technologies were benefiting from GCI data. To understand more, I investigated whether Google's DL, including ANNs, *might* be using GCI data to advance ML, and therefore, AI processes. I explored whether certain innovations within Google AI are proliferating due to relationships across Google and the GCI. Specifically, I observed particular AI divisions of Google (i.e., Google Brain Team and DeepDream) where *The Starry Night* appeared and art initiatives were performed.

To illustrate this journey, the remainder of this chapter is structured as follows: First, I will discuss Google's Brain Team (GBT) and how it is transforming art through its partnerships with DeepDream. Second, I will describe Google Research initiatives that use art to enhance DL through the training of ANNs to generate visualizations. Third, I will translate DeepDream's generation of art using AI. And fourth, I will conclude this chapter with a summary of key descriptions surrounding the GCI's finances and value to Google.

According to the *Google Research Brain Team* (n.d.) website, Google Brain Team (GBT) is a division of Google, as well as part of the Alphabet umbrella, that aims to: “Make machines intelligent. Improve people’s lives” (Google Research Brain Team, n.d., Google Brain Team, para. 1). And, as a research division of Google, GBT “has resources and access to projects impossible to find elsewhere” (Google Research Brain Team, n.d., Google Scale, para. 1). In this way, GBT’s “broad and fundamental research goals allow [it] to actively collaborate with, and contribute uniquely to, many other teams across Alphabet who deploy [its] cutting edge technology into products” (Google Research Brain Team, n.d., Google Scale, para. 1).

Research areas of GBT include “computer systems for machine learning” and “machine learning algorithms and techniques,” as well as “genomics,” “healthcare,” “music and art generation,” “natural language understanding,” “perception,” and “robotics” (Google Research Brain Team, n.d., Research Areas 1-8). While each of these areas is conducting fascinating research surrounding ML and AI, I wish to discuss the work specifically focused on using machines to generate art. According to Google Research Music and Art (n.d.), GBT has two projects that are centered on technology, music, and art: DeepDream and Magenta. DeepDream is a method used “to visualize what deep neural net models [are] learning” (Google Research Music and Art, n.d., para. 1). DeepDream also inspired the establishment of the project Magenta, which “explores content generation and creativity” (para. 2) while asking the overarching question: “Can machines be creative?” (para. 2). It is out of these projects that DL initiatives surrounding art and ANNs really flourished. Specifically, tools such as art style transfer, including processes such as “inceptionism” (Mordvintsev et al., 2015) and “pastiche” (Dumoulin et al., 2016, para. 3), have led to the creation of Google’s DL art creation device: The DeepDream Generator (n.d.).

To explain these processes more clearly, I first want to describe how ANNs are being used in DL to train algorithms in art visualization. As mentioned, ANNs are “algorithms that mimic the biological structure of the brain” (McClelland, 2017, para. 10). Therefore, within ANNs, are neurons that form connections to other neurons to create neural networks (NN). Further, these neurons have “discrete layers. . . . [that pick] out a specific feature to learn, such as curves/edges in image recognition” (McClelland, 2017, para. 11). In this way, this layering process is what “gives deep learning its name, depth is created by using multiple layers as opposed to a single layer” (McClelland, 2017, para. 11).

I realize that to thoroughly understand the complexity of DL and ANNs, more information and some descriptive examples might be needed. Thus, I discuss Google’s approach to DL and present some visual examples. Google’s ANNs training process is as follows:

We train an artificial neural network by showing it millions of training examples and gradually adjusting the network parameters until it gives the classifications we want. The network typically consists of 10-30 stacked layers of artificial neurons. Each image is fed into the input layer, which then talks to the next layer, until eventually the “output” layer is reached. The network’s “answer” comes from this final output layer (Mordvintsev, Olah, & Tyka, 2015, para. 2).

Put more simply, the process of training ANNs is accomplished by presenting a plethora of samples of what it is that the NN are supposed to learn.

To illustrate this process, if I want a ANN to learn what exactly is a horse, I would show the network thousands of horse images. The ANN is then supposed to “extract the essence of the matter at hand,” as well as “learn to ignore what doesn’t matter” (Mordvintsev et al., 2015). For example, if many of the horse images presented to the network are of brown horses that are standing upright and eating grass in a meadow, the system is supposed to recognize that a horse has a mane, hair on its body, four legs, four hooves, and a long nose. Further, the ANN might want to believe that a horse is always the color brown, as well as always standing, and always

eating grass in a meadow. However, when the network can ignore the features that do not matter, it will be able to disregard these limitations, and realize that a horse can be an assortment of colors and shapes, as well as be positioned in a variety of orientations.

Also, when training ANN, Google researchers (i.e., Alexander Mordvintsev, Google Software Engineer, Christopher Olah, Google Software Engineering Intern, and Mike Tyka, Google Software Engineer) were surprised when they discovered: “neural networks that were trained to discriminate between different kinds of images have quite a bit of the information needed to generate images too” (Mordvintsev et al., 2015, para. 5). Based on this, they discovered that ANNs can actually demonstrate what it has learned; in essence, ANNs can create a visualization. To create these visualizations, ANNs trainers can either tell the network what features to demonstrate in its visualization or they can allow the network to decide what features it wants to highlight and express (Mordvintsev et al., 2015). See Figure 45 for what Mordvintsev et al. (2015) describes as art visualization “examples across different classes” (para. 5).

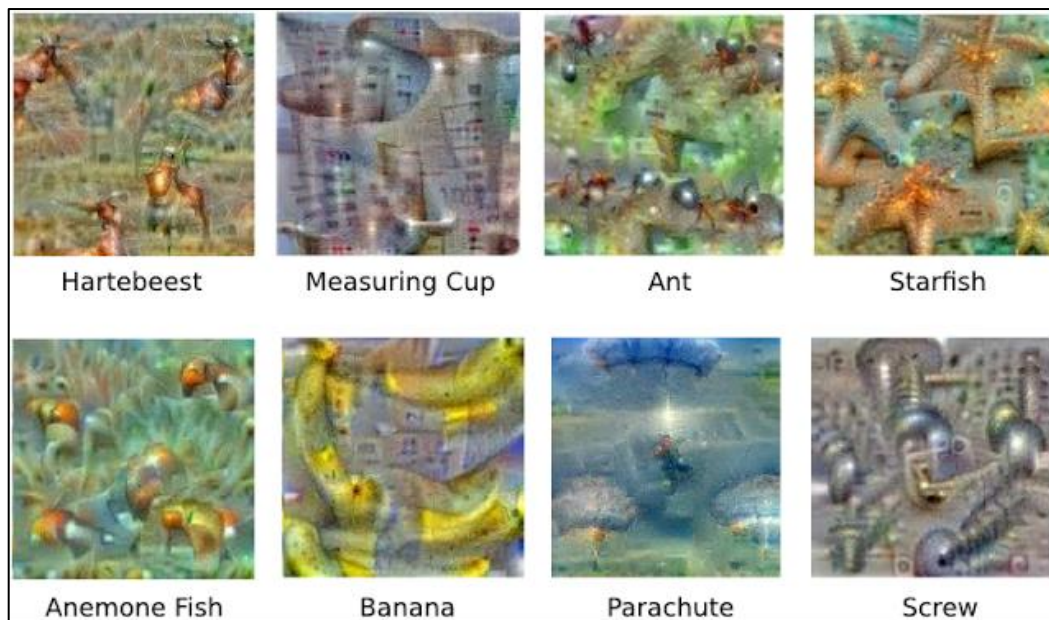


Figure 45. Google’s neural network image generation examples. From “Inceptionism: Going deeper into neural networks,” by Mordvintsev et al., 2015 (<https://ai.googleblog.com/2015/06/inceptionism-going-deeper-into-neural.html>). Licensed by Google under a [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/).

Based on this description from Mordvintsev et al. (2015), if I return to my horse example, the ANNs would be able to generate a visualization of a horse based on how I told the network to demonstrate certain features. For instance, I could show the ANNs an image of a horse and “let the network analyze the picture” (Mordvintsev et al., 2015, para. 9). I would need to remember that a NN consists of “stacked layers of artificial neurons” (para. 2). Based on this understanding, I can select different levels of layers within the horse image (i.e., lower-level layers and/or higher-level layers) and “ask the network to enhance whatever it detected” (para. 9) in those layers. This approach works because “[e]ach layer of the network deals with features at a different level of abstraction” (para. 9).

Put another way, the intricacy of the features that are generated from the network is dependent upon the layers that I select for the network to enrich. Therefore, I can select lower-level or higher-level layers for the NN to analyze and enhance. As this idea is quite complex, I will also describe how each of these levels influences the interpretation and output generated by the network. Returning to my horse image example, if I select the lower-leveled layers of the horse image, the network will focus on simple patterns in the design. This is because “lower layers tend to produce strokes or simple ornament-like patterns, because those layers are sensitive to basic features such as edges and their orientations” (Mordvintsev et al., 2015, para. 9). An illustration of this process is provided in Figure 46, which shows the selection of lower-level layers within Georges Seurat’s (1884) *A Sunday on La Grande Jatte*.

However, if I select higher-level layers of the horse image, the network will focus on the emergence of new objects or the complexity within the image. This is because higher-level layers “identify more sophisticated features in images, complex features or even whole objects tend to emerge” (Mordvintsev et al., 2015, para. 10). Thus, when using high-level layers, I am

practically saying to the network: “Whatever you see there, I want more of it!” (para. 10). This approach “creates a feedback loop” (para. 10) within the networked layers, which reiterates whatever the network sees in the first layer by integrating it over and over again, and finally, generating a highly detailed image of whatever the network has interpreted.

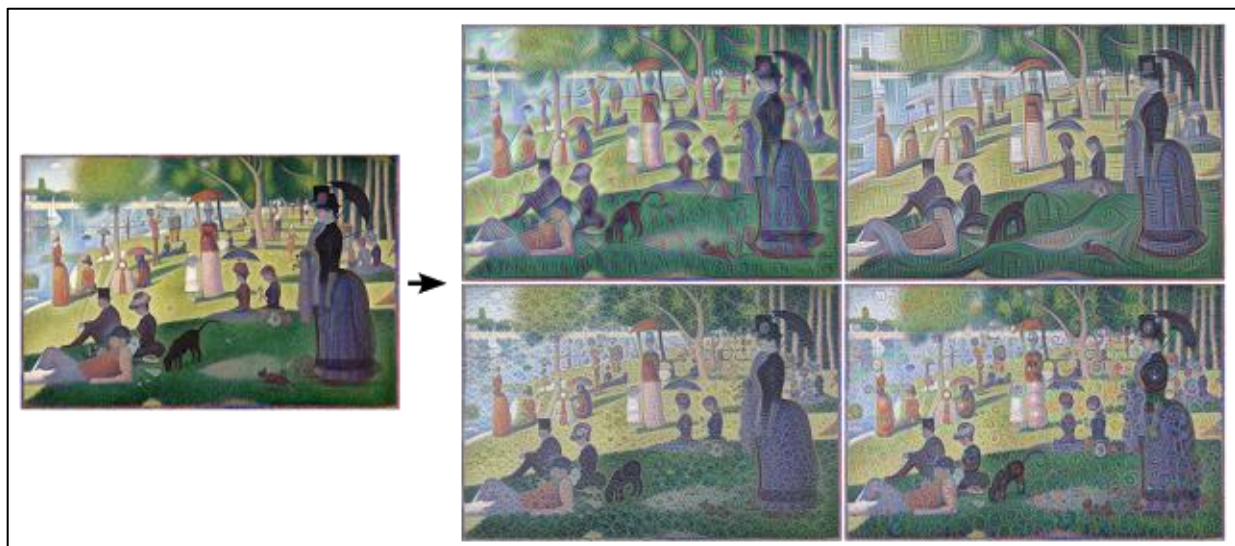


Figure 46. On the left: a painting by Georges Seurat's (1884) titled: *A Sunday Afternoon on the Island of La Grande Jatte*. On the right: images created by Matthew McNaughton, which were processed using the painting. From “Inceptionism: Going deeper into neural networks,” by Mordvintsev et al., 2015 (<https://ai.googleblog.com/2015/06/inceptionism-going-deeper-into-neural.html>). Licensed by Google under a [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)

For instance, when I select high-level layers within the horse image, some aspect within those layers might look a little bit like something else. Based on this, the computer would highlight what it interprets that it sees. For example, if the hair on the horse's face were to resemble some aspect of a dog, the network would make that part of the horse's face look more like a dog. In turn, the network would recognize the dog “even more strongly on the next pass and so forth, until a highly detailed [dog] appears, seemingly out of nowhere” (Mordvintsev et al., 2015, para. 10). Put another way, if in the face of the horse, the network interprets “something that kinda looks like a dog in the lines of [its] faces, it turns that part of [its] face into a dog” (Metz, 2016, para. 9). According to Steve Hansen, an intern at Google's DeepMind AI

lab in London, “It’s almost like the neural net is hallucinating. . . .It sees dogs everywhere!” (quoted in Metz, 2016, para. 9). An illustration of this high-level layer interpretation process is exemplified in Figure 47, which shows the selection of higher-level layers within three separate images: a mountain on the horizon, trees, and leaves of a sunflower.

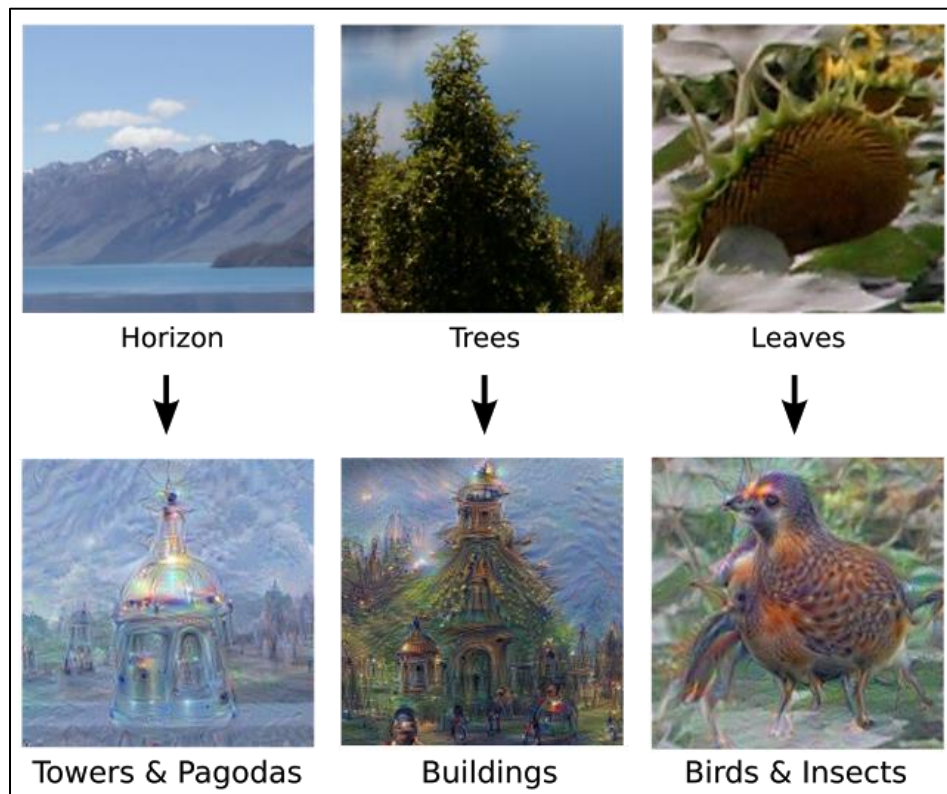


Figure 47. Google’s neural network high-level layer selection and its image generation. From “Inceptionism: Going deeper into neural networks,” by Mordvintsev et al., 2015 (<https://ai.googleblog.com/2015/06/inceptionism-going-deeper-into-neural.html>). Licensed by Google under a [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)

In this way, the “*original image influences what kind of objects form in the processed image*” (Mordvintsev et al., 2015, para. 11, emphasis in original); a process the Google researchers, Mordvintsev et al. (2015), call “inceptionism” (para. 11). And, Mordvintsev et al.’s (2015) “inceptionism” (para. 11) technique is what formed the foundation to initiate Google’s DeepDream (n.d.) software process. Further, DeepDream’s style transfer process was enhanced by Gatys, Ecker, and Bethge’s (2015, 2016) deep convolutional neural network (CNN)

methodology, as well as Google researchers Dumoulin, Shlens, and Kudlur's (2016, 2017) pastiche process. I will describe each of these approaches.

Gatys et al.'s (2015, 2016) study used deep convolutional neural network (CNN) methodology to pair a photograph with style representations to generate a pastiche (i.e., works of art that imitate the style of other artworks). Specifically, Gatys et al. took a photograph taken by Andreas Praefcke, which was of the Tübingen Neckarfront, located in Tübingen, Germany, and paired it with "the style representations of several well-known artworks taken from different periods of art" (Gatys et al., 2015, p. 4) (see Figure 48).

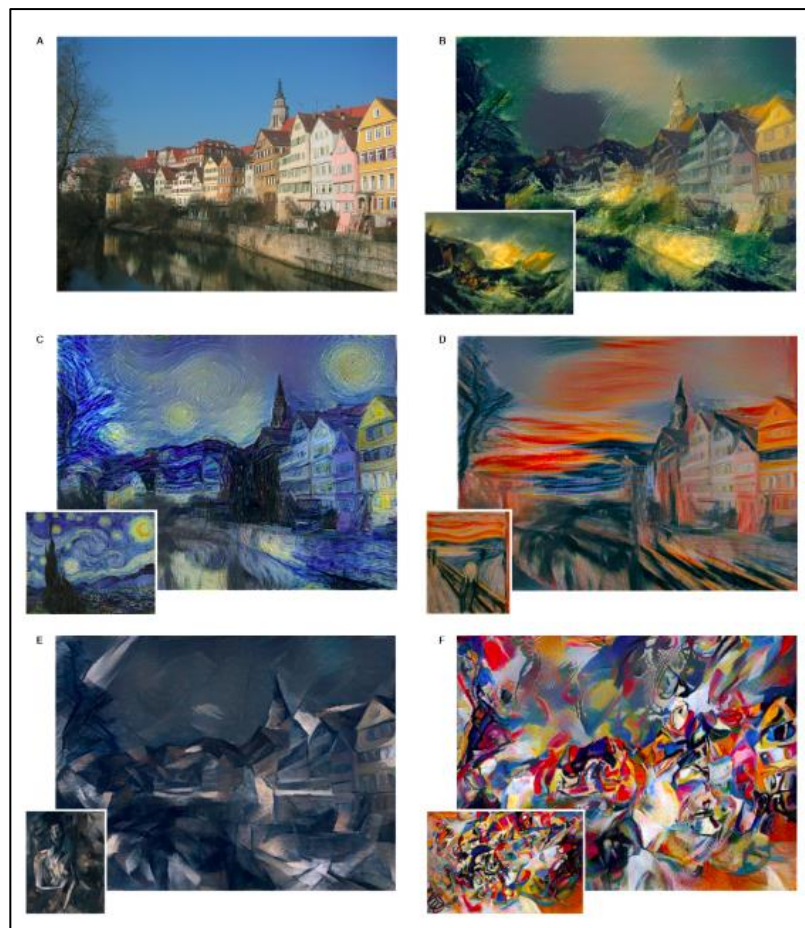


Figure 48. Photograph of the Neckarfront in Tübingen, Germany, by Andreas Praefcke, in the style of several well-known artworks. From "Image style transfer using convolutional neural networks," by Gatys et al., 2016, *IEEE Conference on Computer Vision and Pattern Recognition*, p. 2418. Copyright 2016 by IEEE.

The photograph was paired with the artistic styles of: J.M.W. Turner's (1805) *The Shipwreck of the Minotaur*, Vincent van Gogh's (1889d) *The Starry Night*, Edvard Munch's (1893) *The Scream*, Pablo Picasso's (1910) *Femme nue assise (Seated Nude Woman)*, and Wassily Kandinsky's (1913) *F Composition VII*. Following, Gatys et al. (2016) generated a transfer of artistic style onto the "Neckarfront" photograph (as demonstrated above in Figure 48).

Building on Gatys et al.'s (2015, 2016) research, Google Brain Team researchers Dumoulin, Shlens, and Kudlur's (2016, 2017) designed a "method of modeling multiple styles at the same time" (Dumoulin et al., 2016, para. 13), which they called "pastiche" (para. 3). For instance, Dumoulin et al. (2016) looked at painting styles, such as brush stroke patterns and color palettes, that were found in specific art genre periods, such as the impressionist period. Then, they "trained a single system that is able to capture and generalize across many Monet paintings or even a diverse array of artists across genres" (para. 11). From this training, they produced their own version of "pastiche" (para. 11), which are works of art that imitate the style of other artworks and originate from "the *same style transfer network*" (para. 11, emphasis in original). Google's pastiches can be seen in Figure 49.

To illustrate this process more clearly, Dumoulin et al. (2016) stated that:

Unlike previous approaches to fast style transfer, we feel that this method of modeling multiple styles at the same time opens the door to exciting new ways for users to interact with style transfer algorithms, not only allowing the freedom to create new styles based on the mixture of several others, but to do it in real-time (para. 13).

Based on this, style transfer algorithms provide a way for humans, and potentially for technology, to generate imitative "pastiche" (para. 11) of art in the style of other artworks. In this context, what Lawrence Lessig (2004, 2008) would describe as remix culture, Google's style transfer algorithm can be considered a dynamic remixing tool. And, as Marcia Stepanek (2009) stated in her "Remix Culture" post on *Stanford Social Innovation's* blog: "Broadly defined,

remix is collage, a recombination of existing, reference images or music or video clips from popular digital culture, elements of which are mashed up into something new” (para. 1). Further, Gries (2015) argued that “while remix is not particular to digital culture, digital technologies are escalating the sharing of mashups and remixes online and accelerating the speeds at which ideas and images spread across genres, networks, and forms” (p. 191).

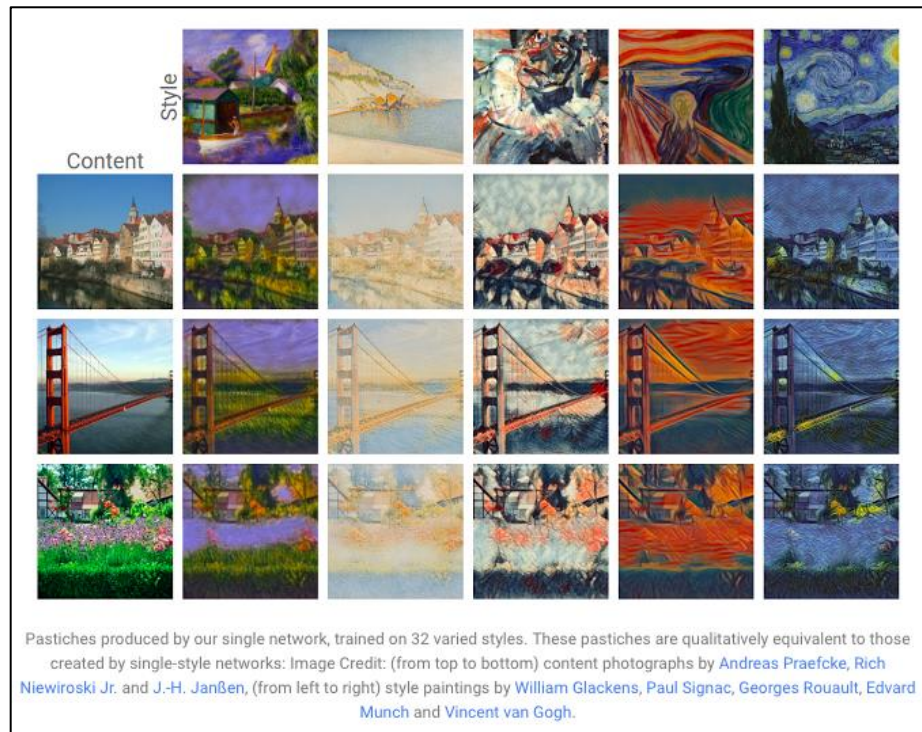


Figure 49. Google’s ML algorithm transforms artworks into pastiches. From “Supercharging Style Transfer,” by Dumoulin et al., 2016 (<https://ai.googleblog.com/2016/10/supercharging-style-transfer.html>). Licensed under [Google Brain Team open source projects](#).

In this perspective, Google’s style transfer algorithms can be considered a type of digital technology that speeds up the remixing of imagery into new visual designs. For instance, Mordvintsev et al. (2015) wondered: “whether neural networks could become a tool for artists—a new way to remix visual concepts—or perhaps even shed a little light on the roots of the creative process in general” (para. 15). Based on this, Google’s remixing style transfer algorithm provides a unique way for humans and technologies to freely “create new styles based on the

mixture of several others. . . in real-time” (Dumoulin et al., 2016, para. 13). And, as I mentioned, Mordvintsev et al.’s (2015) “inceptionism” technique and Dumoulin et al.’s (2016) “pastiche” process led to the creation of Google’s DL art creation device: The DeepDream Generator.

Google’s DeepDream Generator was created by Google engineer, Alexander Mordvintsev. It is an art generator that uses ANNs to alter various images into the style of famous artworks. According to the *Google DeepDream Generator* website, located at deepdreamgenerator.com, the DeepDream Generator:

Is a set of tools which make it possible to explore different AI algorithms. We focus on creative tools for visual content generation like those for merging image styles and content or such as Deep Dream which explores the insight of a deep neural network (Google DeepDream Generator, n.d., Deep Dream Generator, para. 1).

In other words, the DeepDream Generator allows humans to input an image into its software, select an art style, and allow the algorithm generator to transfer the selected art style onto the uploaded image. This process is also referred to as style transfer (Dumoulin et al., 2016; Gatys et al., 2015, 2016).

Based on this, style transfer can be accomplished using the DeepDream Generator and selecting different types of style, such as “deep style,” “thin style,” and “deep dream” (Google DeepDream Generator, n.d., Tools, Styles 1-3). For instance, “deep style” (Style 1) is a technique that “is a much more advanced version of the original Deep Dream approach. It is capable of using its own knowledge to interpret a painting style and transfer it to the uploaded image” (Google DeepDream Generator, n.d., Tools, Style 1). See Figure 50 for an example of “deep style” presented on the *Google DeepDream Generator* (n.d.) website.

I have just described how ANNs can create visualizations to demonstrate what they have learned. Additionally, I have illustrated how Google’s DeepDream Generator can apply style transfer onto images. And, as I have previously argued in this chapter, as well as in Chapter 2,

ML involves humans working *with* machines to teach it how to recognize images. In this context, what Ivan Illich (1973) describes as convivial technologies, Google’s DeepDream Generator could be thought of as a convivial tool that works *with* humans to create art. However, certain technologies may *potentially* evolve to create images *without* the help of humans. Based on this and to build on my previous descriptions, I will now illustrate how Google’s technologies are being used to create art.



Figure 50. Example of “deep style” by DeepDream Generator. From “Tools: Deep Style,” by Google DeepDream Generator, n.d. (<https://deepdreamgenerator.com>). Copyright 2018 by DeepDream Generator, yet all images and derivatives thereof in [DeepDream Generator repository](#) are licensed under [CC BY 3.0](#).

At a San Francisco art event, *DeepDream: The art of neural networks*, 29 artworks created by Google’s AI were auctioned off for charity. This “special gallery show of artworks made using artificial neural networks” (Gray Area Event, 2016, para. 1) was hosted in partnership with Gray Area Foundation for the Arts and Research at Google. Gray Area Foundation for the Arts is a San Francisco based nonprofit organization whose mission is to “apply art and technology to create social and civic impact through education, incubation and public events” (Gray Area About, n.d., para. 1).

This event was a pinnacle showing of how Google’s DL technology has evolved. For example, on the “DeepDream Event” webpage of the *Gray Area Foundation for the Arts’s* (Gray Area Event, 2016) website, the exhibition overview was defined as follows:

The art works in this exhibition are made using artificial neural networks (NN). NNs are a biologically inspired form of computing which, unlike classical computer algorithms, aren’t programmed directly by human operators but instead learn from large amount of example data. The networks used in this work are trained with natural images from the environment and learn to distinguish objects and parse them into high level features. Their usual application is that of image classification or object recognition.

Once trained, these networks can then also be used to generate new imagery, essentially ‘imagining’ images based on the learned rules and associations (Gray Area Event, 2016, Exhibition Overview, para. 2-3).

Paradoxically, Gray Area stated that DeepDream is not “programmed directly by human operators but instead learn[ed] from large amount of example data” (Gray Area Event, 2016, Exhibition Overview, para. 2). However, Gray Area counters its statement when it describes the process of DeepDream as follows:

DeepDream is one technique for generating new images using a trained artificial neural network. The process works as follows. A[n] initial picture or simply random noise is shown to the network which will then visually parse and interpret it. We then calculate how to change the picture incrementally in order to enhance that initial interpretation. The process is repeated until an image appears.

The complexity of the interpretation that the neural network obtains varies where in the network this interpretation is intercepted. Neurons that are closer to the input image will respond to simple features while neurons deep in the network will respond to more complex ones. Thus depending on the depth of the neural network layer that’s targeted, different forms and features are obtained often leading to interesting new recombinations of knowledge elements the network has learned. Many different forms are possible from simple geometric patterns to psychedelic looking combinations of entire concepts (Gray Area Event, 2016, Exhibition Overview, para. 4-5).

Based on Gray Area’s description of how precisely the DeepDream process works, I was curious what Gray Area meant when it used the term *we*. Specifically, the statement: “we then calculate how to change the picture” (Gray Area Event, 2016, Exhibition Overview, para. 4). In

this context, could *we* be referring to humans and how human engineers or human artists calculate ways to change the picture. Or, could *we* refer to objects and how the algorithm makes such decisions. Or perhaps, *we* might be in reference to an interaction across humans and objects. Therefore, to help find clarity in the syntax use of the word *we*, I looked for more information.

According to Hilary Brueck's (2016) online article about the event, she alluded that DeepDream required the participation of both humans and computers in order to generate art. Specifically, Brueck (2016) stated:

The computers weren't working completely alone though. A team of researchers and artists from Research at Google fed them images to produce the art. . . . Then the computers set to work, creating pictures of spiraling vortexes and psychedelic-looking towers, morphing animal faces, and colorful landscapes (para. 3-4).

Additionally, as described in an online article by Cade Metz (2016) on *Wired*, the art event was kicked-off by "Google graphics guru" (para. 1) Blaise Agüera y Arcas. During Agüera y Arcas's presentation, he discussed how humans have used "technology to create art for centuries—that the present isn't all that different from the past" (para. 3). Following, this introduction, Agüera y Arcas discussed how DeepDream can be used to generate art. According to Metz (2016), this event demonstrated how "[t]echnology has now reached the point where neural networks are not only driving the Google search engine, but spitting out art for which some people will pay serious money" (para. 4). And, speaking of money, this event raised roughly \$84,000 for the Gray Area Foundation for the Arts. The most expensive piece of art made by Google DeepDream sold for \$8,000.

And, while this additional insight provided by Brueck (2016) and Metz (2016) surrounding how AI has evolved was helpful, it also stirred up more questions than answers. For example, "[i]f art is what makes us human, how come Google's bots can do it too?" (Brueck, 2016, para. 1). And, as Metz (2016) described, advancements in technology, such as Google's

DeepDream AI, are: “careening [society] towards a new world where machines are more autonomous than they have ever been, where they do even more of the work, where they can transport us to places beyond even our own analog imaginations” (Metz, 2016, para 5). Based on this, the need for human participation in the process of new technological advancements may be shifting and becoming quite limited. In this context, Ivan Illich (1973) might argue that Google’s DeepDream Generator is a dynamic tool that works *with* human users to shape how information is generated and distributed across digital space. However, Tufekci (2015) might argue that DeepDream demonstrates the non-convivial aspects of tech titans, as their algorithms actually employ “computational agency” (p. 207) to *act on* humans.

Examples of DeepDream generator artwork are below (Figures 51 and 52). Both were inspired by van Gogh’s (1889d) *The Starry Night*.



Figure 51. DeepDream’s interpretation of van Gogh’s (1889d) *The Starry Night*. From “Our Gallery: Deep Dream,” by Google DeepDream Generator, n.d. (<https://deepdreamgenerator.com>). Copyright 2018 by DeepDream Generator, yet all images and derivatives thereof in [DeepDream Generator repository](#) are licensed under [CC BY 3.0](#).

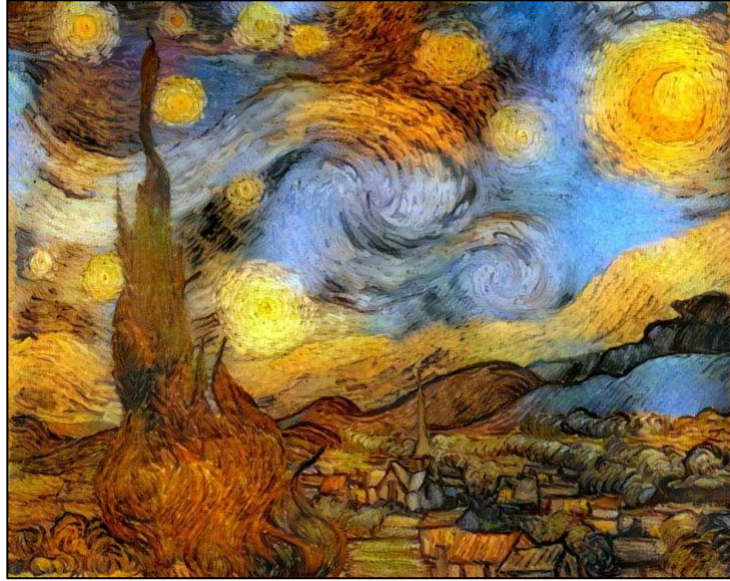


Figure 52. DeepDream’s creation: *The Starry Day*, inspired by van Gogh’s (1889d) *The Starry Night*. From “Our Gallery: Deep Style,” by Google DeepDream Generator, n.d. (<https://deepdreamgenerator.com>). Copyright 2018 by DeepDream Generator, yet all images and derivatives thereof in [DeepDream Generator repository](#) are licensed under [CC BY 3.0](#).

Concluding Thoughts

As discussed in this chapter, an investigation into GCI’s finances sheds light on several controversies surrounding revenue streams, cost structures, and value added to Google. For instance, when I translated actor relation stories surrounding money associations with the institute’s ecosystem and *The Starry Night*, potential revenue streams for the GCI surfaced. These associated actors included products linked to the GCI (i.e., through product generation, testing, use of cultural content, and so forth). Specifically, technologies designed to drive Google into the VR market, such as Google Cardboard, Google Daydream, GAC VR mobile application, and Google Tilt Brush, appeared. Additionally, fully-hidden and/or indirect revenue and/or benefit streams for the GCI included how cultural data are being used to increase Google technologies within the GCI, as well as across the entire Google ecosystem.

Examinations in the GCI’s “high degree of personalized service” (Osterwalder & Pigneur, 2010/2013, p. 41), as well as “lavish facilities and exclusive services” (p. 41) for its

customers, demonstrated how the institute operates using a value-driven cost structure. Building on this, investigations into the GCI's economies of scope and scale displayed how the institute provides a tremendous value to Google. For example, through the GCI's cultural partnerships, it is able to supply Google with access to millions of digitized art images and art data. The GCI's digitality of art and culture (i.e., digitized material and its metadata) has generated a database with massive scope applicability (i.e., can be used for many other Google projects). As Google continues to digitize art and culture, it has and will continue to be able to use that data to teach its technologies (e.g., algorithms, AI, ML, DL, ANN) how to accomplish certain tasks.

For instance, Sood (2016b) has discussed how Google has enhanced its ML tools through GCI/GAC data. Google has created GAC Experiments (n.d.) to showcase advancements in computer vision techniques, such as how to identify, classify, tag, code, cluster, organize, find similarities, visualize data, create timelines, and design interactive 3D landscape aspects (see also MOMA Identifying Art, n.d.; Sood, 2016b). Google has also communicated various ways that it has used art to enhance its DL tools. Specifically, Google has taught its ANNs how to create and transform art and culture through processes such as “inceptionism” (Mordvintsev et al., 2015), “pastiche” (Dumoulin et al., 2016, 2017), and art style transfer (DeepDream Generator, n.d.). Further, Google Brain Team's research (Dumoulin et al., 2017), explored the use of artistic style in computer vision and machine learning, and stated: “we would like to thank the Google Cultural Institute, whose curated collection of art photographs was very helpful in finding exciting style images to train on” (p. 9). In at least this instance, Google stated that ML and CV advancements stem from working with GCI data.

Based on the analyses conducted in this chapter, the process of training Google's AI technologies through ML processes, has in fact, enhanced Google's technologies. Arguments can

be made that these technologies are beginning to shift away from working *with* humans, to possibly working *without* humans. As discussed by Vaidhyathan (2011), what if the GCI is acting similarly to the GBSP and hiding behind its good organization focus (i.e., democratizing the world's art and culture) to ultimately be serving "several engineering and commercial goals" (p. 10) instead. Or, as Patarin (2014) discusses: "[t]echnology is the content's digital frame" (p. 13), and based on this, Google tries to "[h]ide the technology behind an innovative user experience" (p. 13).

In this way, Google could potentially be acting in a non-convivial way, specifically, through a "manipulation of people for the sake of their tools" (Illich, 1973, p. 21). However, understanding Google's intent with its art digitization is impossible to know, at least in regard to my present investigation. Therefore, I am not convinced that Google only set out to manipulate society to enhance its tools. For instance, Google states that: "Since the beginning, our goal has been to develop services that significantly improve the lives of as many people as possible. Not just for some. For everyone" (Google Our Company, n.d., para. 2-3). In this way, Google claims to be using its technology to enhance society. And, there is something to be said about Google's technologies and the ways that they have potentially enhanced society. For example, due to the GBSP and the GCI/GAC, a vast number of people have the ability to access art, culture, books, and ideas in a way that was previously unavailable.

In the next chapter, I will answer the research questions that this case study set out to investigate. Moving from those answers, I will discuss this study's limitations, as well as point toward future research. Lastly, I will illustrate the potential future of technology as I conclude this dissertation.

CHAPTER 11: ART AND TECHNOLOGY COLLECTIVES, A CONCLUSION

Runaway objects have the potential to escalate and expand up to a global scale of influence. They are objects that are poorly controlled and have far-reaching, unexpected effects. Such objects are often monsters: They seem to have a life of their own that threatens our security and safety in many ways. Runaway objects are contested objects that generate opposition and controversy. They can also be powerfully emancipatory objects that open up radically new possibilities of development and well-being (Engeström, 1987, p. xxxvi).

I understand Yrjö Engeström's (1987) quote about runaway objects as not only applicable to this study but also a comprehensive tool for concluding my dissertation. For example, my dissertation could arguably be considered a runaway object as it opened up drastically new possibilities in thinking about technology and research. It also turned into a monster, questionably, exerting a life of its own. My dissertation escalated from four mini-digital studies of Google's Cultural Institute (GCI) to a massive document supporting the design of an innovative digital method. Based on the wisdom of my committee, I gathered together, synthesized, and then augmented, a new methodological strategy to study the conviviality of technology organizations. I called this method digital convivial tracking with a design science (DS) approach and actor-network theory (ANT) mindset.

In this way, this dissertation escalated into significantly more pages than I ever believed I could, and quite frankly, ever wanted to write about one topic. However, when I examined Google and its GCI to demonstrate an application of this theoretical and methodological approach, an array of "radically new possibilities of development" (Engeström, 1987, p. xxxvi) appeared. For example, when I explored how the organizational structure of the GCI influenced the conviviality of Google's technologies, a controversy surrounding the continued goal for Google to remain a convivial organization surfaced. With a mission to "Organize the world's

information and make it universally accessible and useful” (Google Our Company, n.d., para. 1), and a goal “to develop services that significantly improve the lives of as many people as possible. Not just for some. For everyone” (Google Our Company, n.d., para. 2-3), it was reasonable to believe that a spirit of conviviality has always been at the core of Google and its technologies. The GCI’s continued initiative to “expose as many people to as much cultural content as possible . . . [by] democratizing access to the world’s culture” (Google CI Chromecast, 2014, 00:38-00:44), was arguably one way that Google was attempting conviviality. Moreover, while this investigation was predominately focused on the tech titan Google, it could have easily been replaced with any of the other tech titans, such as Amazon, Apple, Facebook, and Microsoft. It is possible that each tech company utilizes and approaches conviviality differently, and an investigation into their digital conviviality may have returned surprisingly similar, or strikingly different, results.

I now return to the research questions that motivated my study and attempt to illustrate answers based on Latour’s (2005) notion of “translation” (p. 196) and “matters of concern” (p. 114). In this sense, I recognized the role I played in choosing the networks to study and attempted to remain “one reflexive loop behind” (p. 33) the actors in the study. As I translated the network, I looked at the relational associations “*between* loci rather than the loci themselves” (p. 196, emphasis in original). I constantly reminded myself of Latour’s (2005) advice that I should not act as divine revealer depicting cause and effect within the network, but instead, act as descriptive storyteller translating actor-network associations. Using this approach, I briefly address each question by providing a descriptive summary of relational associations presented in the four-part case study, instead of explaining or inferring causality from actor relationships.

Research Questions Revisited

Engeström's (1987) quote about runaway objects also broadly serves as a helpful tool to answer all four of my research questions, as well as conclude my study. It conveys the complexity surrounding the innovation and entanglement of objects, as well as the interactions that such runaway objects can spark. In this way, it demonstrates how Vincent van Gogh's (1889d) oil painting, *The Starry Night*, served as a runaway object across the Google Cultural Institute (GCI) ecosystem, weaving in and out of actor associations. Once tracked, the artwork disclosed several aspects of the GCI's business model and how this model has influenced the cultural landscape. These ideas were addressed in my second and third research questions (RQ2 and RQ3). Engeström's (1987) words also allow me to make a final comment about what *The Starry Night* paints about the conviviality of the GCI ecosystem, as well as what it broadly communicates about the digital conviviality of tech titans. These ideas were addressed in my first and fourth research questions (RQ1 and RQ4). I would like to point out that I will answer my first research question last. This decision was made intentionally. This was because my first research question not only served as the overarching question for my other three questions, but it also functioned as the guiding question for my entire study.

***The Starry Night* as a Runaway Object**

Based on the scholarship of new materialism and relational material assemblage—specifically, the research of Laurie Gries (2015), Bruno Latour (2005), and John Law (2009)—it can be argued that the associated Museum of Modern Art (MOMA) and *The Starry Night* network (i.e., the MOMA-Starry Night collective) was established when the MOMA acquired the masterpiece in 1941. Later, the MOMA and Google Art Project (GAP) network (i.e., the MOMA-GAP collective, which evolved into the MOMA-GCI collective with the merging of the

GAP under the GCI umbrella), as well as GCI and *The Starry Night* network (i.e., GCI-Starry Night collective) were founded when the MOMA partnered with the GAP in February of 2011. Together, these collectives digitized and circulated *The Starry Night* across digital space, which generated several consequential associations.

Drawing from Engeström's (1987) line of reasoning, *The Starry Night* was arguably a runaway object across the MOMA and GCI ecosystems as it induced "far-reaching, unexpected effects" (p. xxxvi). For instance, when the painting became a part of the MOMA's permanent collection, it was "transformed many times over in terms of form and/or function, depending on what associations it [entered] into" (Gries, 2015, p. 40). It was composed, produced, and distributed across the extensive art and culture network, intra-acting (Barad, 2007) with a multiplicity of collectives. It was also transformed into commercialized merchandise, exhibitions, and educational tools. And, when the artwork became a part of the GCI network, it was transformed yet again into a digital arrangement. The digitized version of the art piece became the most popular artifact among global GCI art viewers (Sood, 2013). It also served as a boundary object to bridge information from the MOMA to the GCI and the GCI to the MOMA, as well as from the GCI to Google, and the GCI to art explorers.

In this way, the painting's associations allowed it to "expand up to a global scale of influence" (Engeström, 1987, p. xxxvi) due to its linking ability to assemble a variety of actors. Based on this, *The Starry Night* continually transformed, as it intra-acted with a multiplicity of human and nonhuman actors, and together this entanglement created an enmeshed techno-culture experience for the GCI, Google, cultural institutions, art users, and the art and culture industry. See Figure 53 for the Materiality Canvas of *The Starry Night* across the GCI ecosystem.

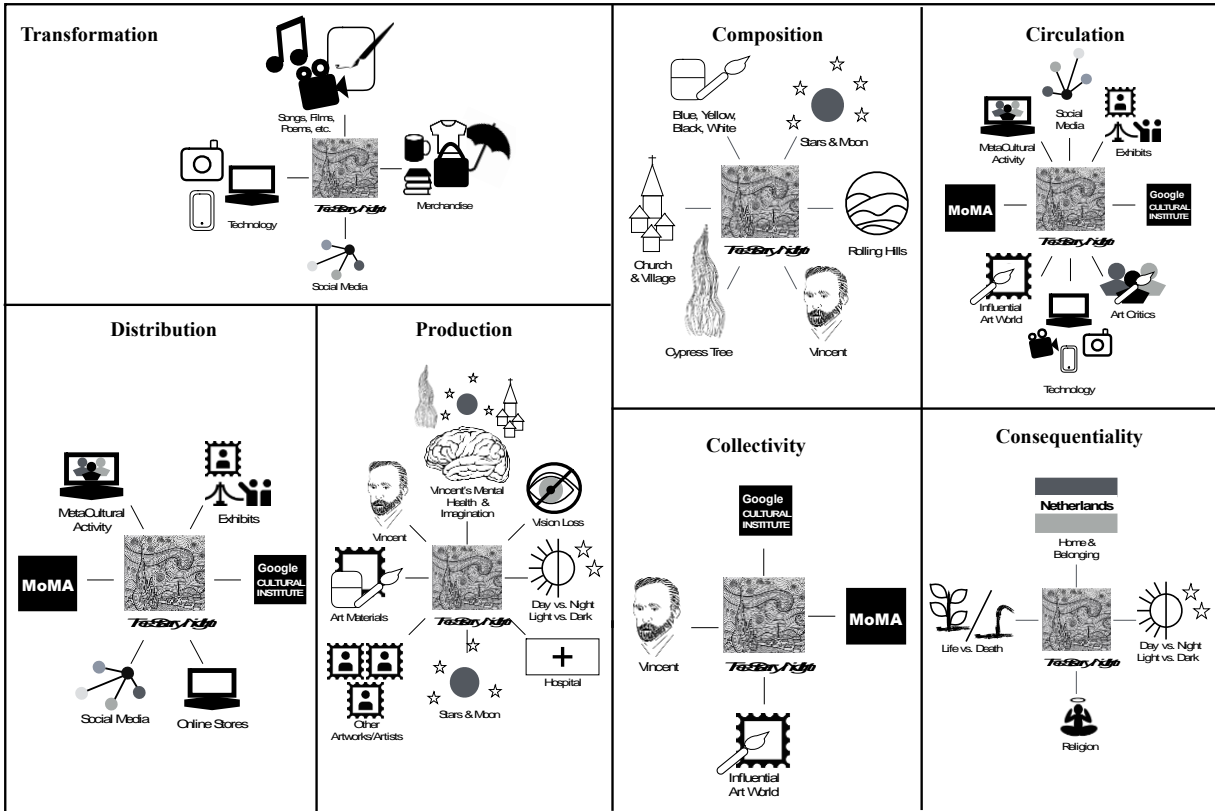


Figure 53. The Materiality Canvas of *The Starry Night* across the *Starry Night*-Google Cultural Institute ecosystem.

Building on this information regarding the transformations of the painting and its webbed network of associations created through its influence, it is worthwhile to consider what this painting depicted surrounding the conviviality of the GCI’s overall business model. Therefore, I will examine my second research question (R2) surrounding the business model of the GCI.

Research Question 2 Answer

RQ2: What is the business model (i.e., the BMC, which includes the organizational structure, business model, leadership, and technology) of Google’s Cultural Institute?

The business model of the GCI is one that is multi-sided, value-driven, and focused on open innovation toward technology and culture collaborations. The business model is multi-sided in that it targets users to view cultural material on its platform (GAC website and mobile

application), yet, also needs cultural institutions to provide their cultural content so that users have art to experience. In this way, the GCI focuses on two key customer segments, users and cultural institutions. To reach these critical customers, however, the institution also associates with artists, creative initiatives, and Google departments and technologies. It is important to note that the GCI is not multi-sided in the context of generating profits through advertisement revenue, much like Google's overall business model does.

The business model of the GCI is also value-driven in that it aims "to expose as many people to as much cultural content as possible" (Google CI Chromecast, 2014, 00:38). This value-driven goal also helps the institute fulfill its mission of "democratizing access to the world's culture" (Google CI Chromecast, 2014, 00:44). In this sense, it offers "a high degree of personalized service" (Osterwalder & Pigneur, 2010/2013, p. 41), as well as "lavish facilities and exclusive services" (p. 41) to its customers. For example, the institute helps cultural institutions digitize and organize their collections, at no extra cost, so that these art curators can tell unique and "compelling stories" (Seales et al., 2013, p. 71) with their objects. Moreover, through the use of the cultural institution pieces, the institute provides its users with art, culture, and heritage experiences in a visually aesthetic, immersive, and inspiring way (Beyond GCI, 2013).

While the business model of the GCI is multi-sided and value-driven, it is also focused on open innovation (Chesbrough, 2003, 2006). Specifically, the institute uses an inside-out open innovation pattern to provide "external parties with ideas or assets . . . [from] within the firm" (Osterwalder & Pigneur, 2010/2013, Patterns, Open Business Models, para. 1). According to Henry Chesbrough (2003, 2006), an organization and innovation scholar, an inside-out approach to an open business model is one where an organization enhances its value by sharing its resources with outside entities. This inside-out open innovation approach allows the company to

generate new ideas, innovations, products, services, knowledge, and technologies through its implementation and sharing of actors located within its collective resources. In this way, the business can generate revenue by monetizing its resources through various means, such as establishing joint ventures and new technologies with outside partnerships.

Specific to the GCI, it has partnered with cultural institutions to create a digitality of art and culture (i.e., digitized material and its metadata). In this way, the institute has generated a database with massive scope applicability, such as supplying other entities of Google with access to millions of digitized art images and art data. Further, these inside-out exchanges are used to enhance Google's technological innovations in areas such as algorithmic processes, artificial intelligence (AI), deep learning (DL), machine learning (ML), virtual reality (VR), and new technology products. For example, the institute has helped generate several technologies using an inside-out open innovation approach across various Google departments. These technologies include those designed to drive Google into the VR market, such as Google Cardboard, Google Daydream, GAC VR mobile application, and Google Tilt Brush, among others.

The GCI database has also been used to increase Google technologies within the institute, as well as across the Google ecosystem. For example, Google has enhanced its ML tools through various knowledge databases. Google has created the *Google Experiments* (n.d.) website, which showcases open-sourced projects that involve the creative use of computer code and various data (voice, arts and culture, text, images, etc.) to create different technologies (machine learning [ML], computer visualization [CV], augmented reality [AR], virtual reality [VR], artificial intelligence [AI], etc.). And, one of the subsets of the Google Experiments initiative is the application of technology to art and culture to create Google Arts & Culture Experiments (GAC Experiments, n.d.). GAC Experiments showcase advancements in CV techniques through

applying ML to cultural data. For example, the *GAC Experiments* (n.d.) website demonstrates how Google can identify, classify, tag, code, cluster, organize, find similarities, visualize data, create timelines, etc. using cultural content (see also MOMA Identifying Art, n.d.; Sood, 2016b).

Further, Google has communicated various ways that it has used art and cultural data to enhance its DL, ML, and CV tools. Specifically, Google has taught artificial neural networks (ANNs) how to create and transform art through processes such as “inceptionism” (Mordvintsev et al., 2015, para. 11), “pastiche” (Dumoulin et al., 2016, para. 11), and art style transfer (DeepDream Generator, n.d.). Together, these processes have led to the creation of Google’s art creation device: The DeepDream Generator. Building on these advancements, artists and Google’s DeepDream generated artworks for the *DeepDream: The art of neural networks* event, raising roughly \$84,000 for the Gray Area Foundation for the Arts (Metz, 2016). Moreover, researchers at Google Brain Team—Dumoulin, Shlens, and Kudlur’s (2017)—explored the use of artistic style in CV and ML. In their article, “A learned representation for artistic style” (2017), within the acknowledgements section, they stated: “we would like to thank the Google Cultural Institute, whose curated collection of art photographs was very helpful in finding exciting style images to train on” (p. 9). In at least this instance, Google stated that ML and CV advancements stem from working with GCI data.

As I have demonstrated, *The Starry Night* helped identify the value propositions, customers, business infrastructures, and finances surrounding the digital conviviality of the GCI network. Based on these explorations, as well as within the four-part case study, the Digital Convivial Business Model Canvas (DCBMC) of the GCI is illustrated in Figure 54. While examining this canvas, it is possible to see how each section of the GCI’s DCBMC work

cultural landscape. Google's relationship with French President Nicolas Sarkozy aided in the formation of Google Paris and the Google Cultural Institute (GCI). The GCI's establishment within Paris induced ideas surrounding those considered to be "particularly 'French'" (Patarin, personal communication, June 21, 2017), demonstrating how Paris was considered a hub for art and culture. Further, with the institute's establishment, Google discovered that "most of the time, the world's population is living without real access to arts and culture" (Sood, 2016b, 00:24). Based on this, the GCI changed how people could access art by trying to remove the limitation of geography. This approach helped users explore and compare millions of artifacts situated within cultural spaces across the globe all from "one place—across mobile, tablet and desktop at g.co/performingarts and on the Google Cultural Institute website" (Sood, 2015, para. 5).

The value proposition of the GCI also influenced the cultural landscape. Particular to the arts and culture industry at large, the institute's value proposition was the democratization of culture (Seales et al., 2013). In this way, the institute believed that by exposing more people to art and culture, it could spark a passion for art and culture and create a recursive cultural interest cycle. The act of art democratization through technology, however, did not come without a cost for the arts and culture industry. For example, from the perspective of art scholars, especially those rooted in elitist idealism à la Walter Benjamin (1936/1969), art democratization through digitization evoked troublesome issues for the future of art. Namely, if uneducated and/or common art users were allowed to say something about art, they might be able to influence others through their unqualified opinions. In this context, Benjamin (1936/1969) and his followers might consider that the digitization of art through the GCI is destroying the mystique and aura of the world's art, culture, and heritage. Additionally, many of the cultural partners of the institute preferred users not be allowed to provide their opinion regarding the meaning,

quality, or value of a specific artwork. To appease these demands, the GCI shifted its initial user participatory platform design toward a dedication focused on business partnerships (Seales, personal communication, June 15, 2017). And, with this move away from participation and scale, came a change in leadership from Steven Crossan (engineer focused) to Amit Sood (partnership focused).

As demonstrated in Chapters 8 and 9, the GCI's business model helped to generate new ways for human-art experiences. For instance, cultural partnerships with institutions, technical partnerships with artists, and open innovation partnerships with Google, helped the institute and Google technology innovators design advanced techno-culture products that enhanced art experiences. Further, these GCI-artist-technology associations also led to the creation of the Google Arts and Culture (GAC) platform (website and mobile application), Google gigapixel camera, Google art experiments, Google Tilt Brush, the Tilt Brush Artist in Residence (AiR) program, Google Cardboard, Google ARCore, and more. Through the use of these tools, users can admire diverse art forms displayed in high-resolution gigapixel, as well as compare artworks with other artifacts found within the institute's database. Lovers of culture can also utilize Google's Street View technology to virtually explore cultural institutions and their artworks on display. Art explorers could employ Google's Art Experiments (GAC Experiments, n.d.) to explore different ways that technology and art intersect, such as the degrees of separation between artworks as well as the creation timeline of specific artifacts.

As explained in Chapter 10, the business model of the GCI influenced the use of cultural data to enhance Google technologies. These advancements in technology, such as the use of artificial intelligence (AI) to create art, or machine learning (ML) to identify and tag thousands of images, says something about the role that humans play within art creation, appreciation,

identification, classification, and so forth. For instance, Google's gathering of online analytics specific to how people explore art has helped the GCI to identify not only the types of art that people examine but also the amount of time visitors spend searching, viewing, curating, and sharing particular art online. Based on this data, questions have emerged surrounding what Google could do with this information. For example, if computers can now discover the type(s) of art that people like, as well as create art, is it possible that computers could begin to design art based on aggregate appeal? In this way, could a computer generate art that could be sold for millions? Alternatively, could computers somehow influence the auction of famous, or not-so-famous, artworks?

While I do not have answers to these questions, I can highlight other ways in which Google's technologies have influenced the cultural landscape. For instance, and as demonstrated by MOMA Identifying Art (n.d.) and other art experiments (GAC Experiments, n.d.), Google's technologies have aided the historical and curatorial duties previously reserved for humans. In this way, Google's enhanced ML technologies are drastically reducing the human labor time spent identifying and tagging artworks. Google technologies have also helped people find their art doppelgängers (GAC Selfie, n.d.), which may encourage more conversations and excitement surrounding art, culture, history, and technology.

***The Starry Night* and the Digital Conviviality of the Cultural Institute Ecosystem**

Building on the information presented through tracing *The Starry Night* across the GCI and how its webbed connections illuminated the business model of the institute and its impacts, I investigated how the digitization of the artwork helped Google and the GCI expand its convivial (Illich, 1973) technologies. To understand what types of convivial opportunities were presented by Google, I explored how the GCI's technologies either encouraged and/or discouraged

participation. In this way, I examined the participatory nature of the institute's ecosystem, which was addressed in my fourth research question (R4).

Research Question 4 Answer

RQ4: What is the participatory culture of the Google Cultural Institute (GCI) network?

Specifically, to what extent does the institute's business model and technology appear to participate with humans and objects to enhance society (indicating conviviality), as opposed to participating on, or for, humans and objects to manipulate society for the sake of Google's technologies (indicating non-conviviality)?

The participatory culture of the GCI network can be described as both convivial and non-convivial based on certain technologies and participatory experiences with data. Examples of convivial and non-convivial connections were presented in the four-part case study, especially, within Chapters 8, 9, and 10. Weaved throughout Chapter 8, specifically within the "Participatory Culture" section, were ways that the institute provides its customers social (i.e., *with humans*) and cultural (i.e., *with cultural objects*) art experiences through convivial and non-convivial technologies.

Google Cultural Institute Participatory (Convivial) Exchanges

Regarding how that the GCI affords convivial participation, several interactions were observed. As presented in Chapter 8, two key participatory opportunities surrounding how the institute provides ways for customers to experience a *reason* for participating with art, as well as how they are *exposed* to art and culture are worth discussing. The first convivial opportunity was found within the sixth concept of *CULTURE: reason* (i.e., the platform provides a space where participants believe that their contributions matter). In the context of public users of the GCI/GAC, I argued that they might feel that their contributions matter when they were actively

contributing (such as posting content) with a specific “goal or purpose” (Jenkins, 2012, p. 23). Based on this, one example of the institute providing a *reason* for user contribution emerged through its GAC’s “Search with your selfie” (GAC Selfie, n.d.) mobile experiment.

The GAC’s “Search with your selfie” mobile application (GAC Selfie, n.d.), which was launched in January of 2018, allowed users to “discover portraits from museums and get face to face with art” (GAC Mobile App, n.d./2017, Home, Search with your selfie, para. 1). Users could employ the GAC mobile application to take a picture of themselves (i.e., a selfie), and through advanced image recognition capabilities, the GAC “matche[d] [their] selfie with art from the collections of museums on Google Arts & Culture” (Luo, 2017, para. 2). I would like to point out that certain aspects surrounding the advancement in computer visualization, which encompass image recognition, were achieved because of Google’s use of data from the GCI database. In this way, Google used cultural data to train its machine learning computer visualization tools, as seen in its arts experiments (GAC Experiments, n.d.) and can be further explored via the *GAC Experiments* (n.d.) website and Sood (2016b) “Ted Talk.”

Once “art look-alike[s]” (Luo, 2017, para. 2) were provided to users, the users could also click on their famous art matches to explore the GAC website and learn more about the art, the museum in which the artifact is/was displayed, the artist who created the artwork, the art movement in which the art piece resides, and so forth. Further, when it launched in (year), the GAC art selfie project *went viral*: “over the past few days, people have taken more than 30 million selfies” (Luo, 2017, para. 2). In this context, what Jenkins (2012) would describe as “engagement” (p. 23), it could be argued that people felt engaged in the process. And, while this experiment was fun, interactive, and educational, it was also convivial as it linked humans, technology, and art across time and space. An example of this convivial linking was

demonstrated in how the experiment knitted people together across multiple generations, such as connecting a daughter with her mother and intertwining them with their great-grandmother. To be specific, and according to Semko (2018), Kate Stewart (a mother) was employing GAC's art selfie feature while playing with her six-year-old daughter. As they took fun pictures of each other, Kate's selfie was matched to a painting titled, *Emma in the Purple Dress* (Bellow, 1919), which happened to be a portrait of Kate's great-grandmother. Based on this example, as well as the sheer enormousness of the number of art selfie participants, I wonder: could it be argued that users did believe that their contributions mattered? Further, could this belief that their contributions did matter *potentially* be one of the *reasons* that they chose to participate? Alternatively, perhaps people contributed because of curiosity or wanting to share in the viral excitement? Therefore, I speculate, can it be argued that participants did believe that their contributions mattered?

The second convivial opportunity was found within the seventh concept of *CULTURE: expose* (i.e., the platform provides continued exposure to other arts, cultures, and technologies, for its customers). The GCI/GAC continues to expose its cultural institution partners and users to arts, culture, and technologies through its convivial tool innovations (Illich, 1973), as well as its multi-institution initiatives and collections. For example, the institute has created several convivial tools to provide innovative ways for institutions to digitize culture and create immersive art experiences for users. These tools include products such as Google Cardboard, Google Tilt Brush, Google Daydream, Google Chromecast, Google Chrome art tabs, Google gigapixel art camera, Google Street View, Google Maps, and so forth.

In addition to convivial technologies, the GCI has also established convivial digital experiences, such as multi-cultural stories and themes in collaboration with a multiplicity of art

institutions. These art experiences include exhibitions, such as the GAC's *#WeWearCulture* exhibit (GAC We Wear Culture, 2017), as well as cultural themes, such as its *Harry Potter: A History of Magic* (GAC Harry Potter, 2018), and *Black History and Culture* (GAC Black History, 2018) experiences. Through these exhibits, users can use convivial technologies, such as Google Cardboard, to experience various cultural activities in VR. Further, these examples are just a tip of the iceberg of the multi-cultural, multi-generational, and multi-contextual art experiences on the GAC website and mobile application. To check out these and other interactive convivial tools and curated themes, go to artsandculture.google.com/project (GAC Themes, n.d.).

Google Cultural Institute Non-Participatory (Non-convivial) Exchanges

Through explorations into convivial opportunities, it became apparent that potentially more participatory occasions were available for partnering cultural institutions than for public users. Privileged partner opportunities included tools designed to help institutions tag content, label relevant information, and communicate with user participants and Google developers. Cultural institutions could also demonstrate their knowledge about art, as well as interact socially with other humans surrounding art and culture. In this context, institutions were afforded ways to recognize that their contributions mattered. These collaborative initiatives for cultural partners, however, unearthed the lack of tools and opportunities available for public users to employ the GCI's technology to participate with humans and objects across the institute's ecosystem in a convivial way. Potential user participatory problems included how users engaged with Google's technologies to *create, use, locate, teach, unite, and reason* social and cultural experiences surrounding art and culture. Let me explain.

The first convivial problem area was specific to the concept *create* (i.e., the platform provides, as well as supports, content creation across its customers). I found that there was a lack of content creation and co-creation opportunities for users. The opportunity for users to create content on the GAC website was not available, or at least, was extremely limited. For instance, users could create content in the form of personal user galleries, such as, they could add *The Starry Night* to a personal digital gallery created on the GAC website. However, users could not create or co-create new content surrounding cultural artifacts, such as, upload their cultural artifacts to the GAC and/or create media that remixed, transformed, or told stories about cultural content. And, as mentioned in the case study, Seales stated that this limited user participation was a shift away from the GCI's initial purpose designed by its initial founder, Steven Crossan (personal communication, June 15, 2017). Specifically, Crossan originally envisioned the institute as a space where *anyone* who wanted to share their cultural creations could do so (Seales, personal communication, June 15, 2017).

The second convivial problem area was specific to the concept *use* (i.e., the platform was user-friendly and accessible to everyone with low barriers for participatory engagement). Specifically, while there were several ways across the GCI ecosystem that a user could use Google's Street View technology to explore *The Starry Night* inside the MOMA, each virtual viewing experience was not only different but also presented unique challenges and results. For instance, when I used the museum-view on *The Starry Night's GAC webpage* (GAC The Starry Night., n.d.), I was immediately transported in front of *The Starry Night*. However, when I enacted the museum-view on the *GAC MOMA* (n.d.) partnership webpage to see the painting, the process was considerably more challenging. I had to change floors from the initial second-floor view to the fifth-floor view, and while this concept might seem somewhat straightforward,

recognizing that I needed to change floors (and discovering how to change floors) was cumbersome. Further, the process of viewing *The Starry Night* via museum-view on both *The Starry Night's GAC* webpage and the *GAC MOMA* webpage demonstrated that the painting did not have one of the latest Google identification technologies: the museum guide art annotation button (Niccolai, 2017). According to Niccolai (2017), in May of 2017, Google Maps launched the museum guide art annotation buttons (which are placed next to artworks) to provide “key insights” (para. 1) about the artifacts.

Moreover, when I utilized the museum-view option found on Google Maps to see *The Starry Night*, the process was incredibly complicated and frustrating. This process required me to figure out exactly where *The Starry Night* was located within the MOMA, according to a birds-eye-view of the MOMA building floor-plan. Once the location of the artwork was relatively identified, I had to continually try different drop-in locations that were available on Google Maps to eventually see the painting on the walls inside the MOMA. However, when using Google Maps to see inside the MOMA, I inferred that a museum guide art annotation button was next to *The Starry Night*.

Building on these user experience challenges, I also found the process of creating a user gallery to be quite complex and not user intuitive. The overall gallery creation process, however, has improved from my initial observation in May of 2017 to my second exploration in February of 2018. And, once I succeeded in creating a user gallery (i.e., through favoriting artifacts I liked and then adding them to a gallery within my user profile), I learned that I could not include direct comments about certain paintings either underneath or directly above those I wished to describe. According to Simon Patarin, the ability to add comments on user galleries under artwork was removed in June of 2016 (personal communication, June 21, 2017). I could, however, write my

feelings about the works of art within my allotted 800-word user gallery description, just not under and/or above the artwork under discussion. Further, I set my user gallery to be available to the public, however, I could not find it when searching for my gallery on the *GAC* website or mobile application. For instance, on both platforms, I searched using different variations of my name (Leah, Stone, and/or Leah Stone), as well as the title of my gallery (*Leah Stone Dissertation Gallery*). Interestingly, none of these searches displayed my gallery.

It is important to note: I did use two different laptops to search the *GAC* website (but did go to the website using Google Chrome). Further, I employed two different phones to search the *GAC* mobile application (however, both phones were iPhones). Lastly, I found that over the last 10 months, any user gallery has become more difficult to find. For example, during my May 2017 observation, a link to user galleries was located at the bottom of several *GAC* webpages; whereas, during my February 2018 examination, user galleries were buried, more difficult to find, or altogether, missing from *GAC* webpages.

Moving on from convivial problems within *create* and *use*, I also discovered participatory difficulties within the concept of *locate* (i.e., the platform provides a prominent and public platform for displaying, as well as encouraging others to think about art and culture). For instance, it became apparent that there were limited ways users could demonstrate their arts and culture knowledge on the *GAC* website or mobile app. In this context, it can be argued that the *GAC* (both its website and mobile platforms) is not a leading space for users to demonstrate their art and culture knowledge. However, the *GCI* may be shifting toward becoming a location that does encourage users to think about art and culture. For instance, its Chrome art tabs and backgrounds present daily artifacts to users. Additionally, as discussed earlier, the *GAC* recently launched its art selfie portrait matcher, which may help encourage users to think about art, as this

application has helped to skyrocket the GAC's recognition over the last several months.

However, these tools currently do not afford users the ability to share information about their arts and culture knowledge.

Another example of a lack of participatory exchanges was found when I observed the fourth concept of *CULTURE: teach* (i.e., the platform provides novices access to mentorship instruction from art masters). I learned that the institute predominately provides instruction via one-sided information tools (i.e., such as videos, articles, images, Street View, VR, mobile apps, Chrome art backgrounds). Yet, the GCI used to provide instruction via two-sided interaction experiences (i.e., such as its Art Talks series, which included digital events that allowed participants to engage and ask questions of the instructors). The Art Talks series ran from March 6, 2013 to June 10, 2015.

For instance, as discussed in Chapter 8, the GCI uses a variety of channels to reach its customers. However, some of its user channels may be considered as practically non-participatory between the user and the GCI's technologies. In this context, what Illich (1973) would describe as non-convivial, some channels either *act on* the user or are *acted on* by the user, instead of being *participated with* by the user. For instance, with regard to mobile applications for cultural partners, which are downloadable through the GCI, the institution tells the user which cultural apps are available to download. In this way, the user makes the technology work *for* him/her without a participatory back-and-forth between the user and the technology. Further, regarding the artwork backdrops available via Google Chromecast and GAC Chrome art tabs, it could be reasoned that Google's technology *acts on* the user in a non-convivial way. Specifically, the technology pushes passive artwork content to the user without

real user participation, (except for the initial step taken by the user to download Chromecast Backdrop, or GAC Chrome art tabs).

Moreover, in order to participate *with* Google's Chromecast technology, the user must have a Google phone (such as the Pixel). If a user wants to inquire about an artwork presented on Chromecast, she can use her Google phone to ask: "okay Google, what's on my Chromecast?" (Google CI Chromecast, 2014, 1:00). Following this inquiry, Google will show the user "more information about the artwork that is on the screen, as well as links to additional information on the Cultural Institute website" (Google CI Chromecast, 2014, 1:06). Similarly, users who engage the GAC Chrome art tabs on their search browser can learn more about the art images presented on their tabs by clicking on the artwork. This experience, however, is more passive, and could potentially be argued as not a truly participatory human-to-human, or human-to-technology exchange. In this context, what Tufekci (2015) might describe as "computational agency" (p. 207), the computer could potentially be *acting on* the user without human participation.

These examples of one-sided information tools also do not provide users the same access to mentorship that could be afforded through two-sided participatory experiences, such as the GCI's previous *Art Talks* series once did. According to the *GCI Art Talks* (n.d.) website: "Art Talks are live-streamed videos that are broadcast on our Google+ page. Viewers are welcome to ask questions in real time and share their comments with the community" (para. 4). "Each month we invite leading curators, historians, artists and educators to share their insights and take your questions in lively conversations" (para. 3). According to the *GAC Google+ Art Talks* (n.d.) website, the last *Art Talks* event was hosted on June 10, 2015. In this way, while it could be argued that the GCI/GAC previously afford users access to and mentorship from arts and culture masters, the cancelation of the "live-streamed #ArtTalks program" (GCI Art Talks, n.d., para. 3)

has made it so two-sided participation across the GAC has almost vanished. Further, the GAC had not supplemented the #ArtTalks opportunity with something else.

The fifth participatory problem across the GAC and the GCI ecosystem surrounds the concept of *unite* (i.e., the platform unites participants through social connections to other humans surrounding cultural experiences, as well as to objects such as art and cultural artifacts, and technology). For instance, it became evident that there was a lack of opportunities for users to socially connect with other humans surrounding arts and cultural artifacts and exhibits. And, while the GAC stated that it wanted to connect humans with objects, such as humans to art and culture, I wondered to what degree the GAC is also connecting humans with other humans surrounding art and culture.

Furthermore, the *GAC* website provided “single, one-to-one actions between users and individual tools” (Potts, 2014, p. 7), or “static notion of early web implementations” (p. 7). Specifically, users could only view and share cultural content without social interaction, debate, or contribution. An example of this limited interaction was found in the ways that users could share GAC content (i.e., such as digital stories and editorial features). Users could share GAC content with other humans via various Google-provided social media platforms (e.g., Email, Google +, Facebook, Twitter, Tumblr, Pinterest, and Classroom), however, users could not make comments on any of the content within the walls of the *GAC* website (i.e., such as on user galleries or digital stories to generate a discussion about art).

And, while the *GAC* website and mobile application may not provide a space where users feel a social connection to other humans, the ecosystem of the GCI does. As mentioned, the institute’s ecosystem spans beyond the GAC, including other areas of the GCI, such as GAC, GCI and GAC social media accounts, as well as the GCI Lab, and other subsidiaries of Google.

For instance, other Google platforms, such as Google+, YouTube, and Google Maps, provide users opportunities to participate with other humans and cultural objects surrounding art. Further, the GAC has its own social media accounts (e.g., Google +, Twitter, Facebook, and YouTube) where users can participate with other humans.

Lastly, the sixth observation of participatory limitations within the GCI ecosystem, involved the sixth concept of *CULTURE: reason* (i.e., the platform provides a space where participants believe that their contributions matter). Specifically, before the launch of the GAC's art selfie application, the GAC lacked opportunities for public users to demonstrate that their GAC contributions mattered. However, user engagement with GAC took a drastic shift thanks to the GAC's launch of its "Search with your selfie" mobile application (GAC Selfie, n.d.). The GAC art selfie feature has great potential to engage human-to-human connection surrounding art experiences, which were evident both in the case study results and my description above. Building on this, the GCI and GAC must do more research to discover in what ways users believe that their contributions matter and offer more of these initiatives across its GAC website and mobile applications.

In sum, the participatory culture of the GCI network can be seen as convivial, as well as non-convivial. These participatory exchanges were discovered through *The Starry Night's* entangled activities across the MOMA, GCI, Google, and arts and culture collectives. Based on these convivial descriptions, I would like to translate the broader implications that *The Starry Night* communicates about the digital conviviality of tech titans.

***The Starry Night* and the Digital Conviviality of Technology Titans**

My exploration of *The Starry Night* across the GCI ecosystem demands the need to think more intently about what conviviality in digital space means. It also encourages us to develop

acuity when thinking about how things generate associations and form collectives across digital and physical space. We must become more aware of these concepts when thinking about technology, communication, business models, culture, participation, and digitization. Building on these demands, I return to my first research question (RQ1) to help me draw parallels with the digital conviviality of other technology giants.

Research Question 1 Answer

Overarching Question, RQ1: In what ways is the Google's Cultural Institute (GCI) considered a digital convivial company, and conversely, in what ways is it not?

As previously mentioned, the first thing that *The Starry Night* challenges us to reconsider is what is meant by the term conviviality and how we can think about the business models of technology organizations through the mindset of a posthumanist perspective. As I have described throughout this dissertation, the global search engine corporation Google, which is under the umbrella of the technology giant Alphabet, has predominately portrayed itself as a convivial organization. Based on Google's goals, it could be argued that this tech titan continually strives for Illich's (1973) conviviality through its continued promotion of enhancing society through its participatory tools. However, I wondered if the process of identifying a digital convivial organization is really as simple as trusting what the company says that it does. I wanted to know if behind Google's black box (Latour, 1999; Potts, 2014; Rogers, 2013; Spinuzzi, 2008), Google was actually living up to its convivial declarations. **Based on this, and to get at this notion of digital conviviality (i.e., whether or not a technology company is convivial), I had to explore not only how Google *claims* to be doing the right thing for humanity but also how it is *actually helping* society.**

I wondered if a technology organization could be placed into one of the following two dichotomous categories linked to digital conviviality. As discussed at length in this dissertation, and based on Illich's (1973) conviviality, the first classification of digital conviviality states that a technology company is considered convivial when it provides means for autonomous and creative participation and/or co-creation at the intersection of humans working *with* technology, or technology working *with* humans. And, while a digital convivial company is motivated to make a profit, it is ultimately steered by an overall goal of enhancing society. Juxtaposed to this convivial description is the second distinction of digital conviviality, which states that a technology company is considered non-convivial when it manipulates people to enhance its technologies at the intersection of humans working *for* technology or technology working *for* humans. A non-convivial company is ultimately steered by an overall goal of generating a profit, which it achieves by enhancing its technologies at the expense, or manipulation, of society.

Based on these two dichotomous categories, when I examined them more closely throughout this investigation, I questioned if perhaps there could be additional classifications for conviviality. For instance, perhaps a non-convivial company does not have to manipulate society to enhance its technologies. Maybe a non-convivial company is just one that creates tools that function at the intersection of humans working *for* technology or technology working *for* humans. In other words, possibly a non-convivial company just builds technological tools that could arguably be considered non-convivial, or non-participatory (regardless if manipulation of society for the sake of its tools is present). Alternatively, perhaps if a company does use manipulation to enhance its tools, regardless if the technologies it designs are participatory or not, the organization would always be considered non-convivial. In this way, a company does not have to manipulate society as well as create non-participatory tools to be considered non-

convivial. A company could be non-convivial when it manipulates society yet creates participatory devices, just as it could be non-convivial when it manipulates society and designs non-participatory tools.

In the context of this study, the GCI exudes several convivial and non-convivial aspects. For example, humans can convivially interact *with* Google's technologies to explore cultural objects through a variety of digital means (i.e., on the *GAC* website, mobile application, through virtual reality, movies, interactive stories, and so forth). In this way, any human "with an Internet connection" (Sood, 2015, para. 5) can work *with* technology to explore "the world's treasures" (Sood, 2015, para. 5). Further, it could be argued that these digital interactions across humans, technology, and cultural objects can also be seen as enhancing society in a convivial way. For instance, Google claims that: "Since the beginning, our goal has been to develop services that significantly improve the lives of as many people as possible. Not just for some. For everyone." (Google Our Company, n.d., para. 2-3). In this way, Google asserts that it is using its technology to enhance society.

According to the *Google Products* (n.d.) website, potential improvements to society can be seen through a multiplicity of Google technologies and innovations. Google Search has allowed people to receive "instant answers on the web and on [their] phone" (Google Products, n.d., Get Answers, Search, para. 1). Google Maps has made it so people can find directions to a location in an easier and more visual way through "GPS navigation, traffic alerts, traffic directions and more" (Google Products, n.d., Get Answers, Maps, para. 1). Google Translate affords people the ability to "[s]peak, scan, type or draw to translate in over 100 languages" (Google Products, n.d., Get Answers, Translate, para. 1). Google Chrome ensures that people

have access to a “fast, simple and secure browser for the modern web” (Google Products, n.d., Get Answers, Chrome, para. 1).

Further, the *Google Products* (n.d.) website demonstrates that Google products help people view media entertainment through YouTube, Google Play Music, Chromecast, Google Play Movies and TV. Google products also help people stay connected through Gmail, Hangouts, Allo, Duo, and Google+. Moreover, Google helps people stay organized and be productive through products such as Google Photos, Contacts, Calendar, Docs, Sheets, Slides, Drive, and so forth. Lastly, Google initiatives that were discussed in this dissertation, such as Google Books and Google Arts & Culture (GAC), can help people access books, ideas, knowledge, and art and culture in an inexpensive and democratized fashion.

And, while these examples illustrate how the GCI can be considered convivial, other aspects of the institute can also be viewed as non-convivial. This can include how the institute tries to “[h]ide the technology behind an innovative user experience” (Patarin, 2014, p. 13), as well as conceal its “engineering and commercial goals” (Vaidhyanathan, 2011, p. 10) behind its good organization focus (i.e., democratizing the world’s art and culture while training Google technologies). Non-convivial aspects include how certain Google technologies either *act on* the user or are *acted on* by the user, instead of *participating with* the user. For instance, and as previously mentioned, Google Chromecast and GAC Chrome art tabs pushes passive artwork content to the user without user participation, (except for the initial step taken by the user to download Chromecast Backdrop or GAC Chrome art tabs). In this context, what Tufekci (2015) might describe as “computational agency” (p. 207), the computer is just *acting on* the user without human participation.

Another example of non-convivial technology concerning manipulation for the sake of technology is how the GCI's database is being used to train Google's machine learning (ML) and deep learning (DL) processes. GAC Experiments (n.d.) have been able to train computers on computer visualization (CV) techniques so that computers can autonomously identify, classify, tag, code, cluster, organize and find similarities within image data. Further, ML has made it so computers can independently (i.e., without the help of humans) visualize data, create timelines, and design interactive 3D landscape aspects (see also MOMA Identifying Art, n.d.; Sood, 2016b). In this way, the role of the humans within the GCI is just to "fe[e]d the collection" (Sood, 2016b, 12:31) to the computer and either ask the technology to do something, such as "name [the art] clusters" (12:10), or allow the computer to act autonomously. Further, it can be argued that humans do not participate in advanced ML processes other than to say: *hey computer, look through this data and tell me what you see*. In this way, what Tufekci (2015) would describe as "computational agency" (p. 207), the human essentially just hits the start button and the computer exerts an autonomous ML action.

Finally, advancements in technology, such as Google's DeepDream Generator are "careening [society] towards a new world where machines are more autonomous than they have ever been, where they do even more of the work, where they can transport us to places beyond even our own analog imaginations" (Metz, 2016, para. 5). Based on this, the need for human participation in the process of new technological advancements may be shifting and becoming quite limited. In this context, however, Ivan Illich (1973) might argue that Google's technologies, such as its DeepDream Generator, are actually dynamic tools that work *with* human users to shape how information is generated and distributed across digital space. This is because humans still input the art into the technology. However, arguments can be made that

these technologies are beginning to shift away from working *with* humans, to possibly working *without* humans. Based on this, Tufekci (2015) might argue that these technologies actually demonstrate the non-convivial aspects of tech titans as their algorithms actually employ “computational agency” (p. 207) to *act on* humans. In this context, what Metz (2016) describes as machine autonomy, we may arguably be now living in, or are moving toward, “a new world where machines are more autonomous than they have ever been” (para. 5).

Based on these descriptions, it could be reasoned that Google could *potentially* be acting in a non-convivial way through a “manipulation of people for the sake of their tools” (Illich, 1973, p. 21). While Google does not completely bury certain information that it uses cultural data to enhance its technologies, it does not come out and transparently state all of the uses for its art and culture data across its technologies and open innovation business model. Conversely, it could be argued that Google is acting in a convivial way, as it generates participatory technologies that allow people to experience art and culture in new and exciting ways. Therefore, in response to the overarching research question, it appears that Google and its GCI, as a digital convivial company, is perhaps best located somewhere in between—it is neither entirely non-participatory or manipulative driven (non-convivial) nor is it entirely participatory (convivial). Drawing from these relational associations, it is possible to see how the GCI not only influences its customers, but it also impacts the art and culture industry and other technological developments.

While *The Starry Night* challenges us to think about digital conviviality with regard to technology titans, it also encourages us to develop creative methodologies to help account for the connected and innovative dimensions found within a technology organization’s business model. This complexity brings me to one of the reasons I started this chapter with Engeström’s (1987)

quote about runaway objects—to illustrate how this project turned into a monster as it took on a life of its own. This study opened up drastically new possibilities in thinking about digital research, technology, conviviality, agency, art, culture, participation, and digital space. As I was drawn toward the weaved object collective that embodied how humans create, collect, share, and view art and culture, both online and with the use of technology, I investigated how art and culture, as well as technology and digital space, influenced conviviality. Specifically, I examined how techno-culture intersections demonstrate the intricate aspects of human experiences, such as the creation and sharing of information and culture.

Therefore, the purpose of this dissertation was to establish a unique approach to studying, what Illich (1973) named, the “conviviality” (p. 18) of technology titans, and the ways in which they organize digital space. I investigated how their business models affected how humans and objects reciprocally participated with one another through techno-culture interactions. Based on this conceptualization, in Chapters 2-4 of this dissertation, I employed a bricolage approach to interlace a broad range of theories, philosophies, and research approaches. This interweaving helped me: (a) discuss how the organizational structure of major technology corporations is shaping how information is circulated across and participated with humans and objects; (b) argue why objects are vital to this collective information process; (c) examine how research can be conducted to capture information that is digitized, as well as that which is natively or born digital; and (d) introduce a new research method to discover the organizational structure of digital space and the business models of tech corporations that design such tools.

Further, and based on the theories that were presented, in Chapters 5 and 6, I outlined six principles that I believed were indicative of the thought style (Fleck, 1979) of ANT digital conviviality. These principles include the following: the principles of (1) conviviality,

(2) participation, (3) digitality, (4) materiality, (5) agency, and (6) collectivity. Based on these principles, I gathered together, synthesized, and then augmented a new methodological strategy to study the conviviality of tech titans, which I called digital convivial tracking with a design science (DS) approach and actor-network theory (ANT) mindset.

Moreover, digital convivial tracking employs traditional qualitative methods, as well as innovative digital methods, to trace vital actors throughout a digital ecosystem. This process allows researchers to identify an organization's complex and entangled business model, as well as its technological innovations. In Chapter 6, I offered a detailed illustration of how this method can be used within a posthumanist ANT mindset. Throughout these descriptions, and similar to Laurie Gries (2015), I encouraged readers to be flexible and inventive in using the approach, recognizing that they may need to change or alter specific steps when conducting their research.

In Chapters 7-10, I offered up a four-part case study to display how digital convivial tracking can be applied in practice to account for the digital convivial network of the Google Cultural Institute (GCI). I tracked Vincent van Gogh's (1889d) *The Starry Night* painting across the institute's ecosystem. This approach helped me discover the organizational structure of the GCI, including its mission and business model, as well as how this structure influenced Google's technologies. Investigating how the painting flowed across the GCI network helped me observe how Google digitizes artifacts, identifies information, groups artifacts, and transmits knowledge with other actor-networks. I remained vigilant in recognizing how my researcher presence influenced this translated account, a process Latour's (2005) defined as "matters of concern" (p. 114). I described how Google and its GCI created "tiny [digital] galleries in this dusty and earthly one" (Latour, 2005, p. 124; digital emphasis added). I illustrated how those digital galleries influenced technology, innovation, culture, interaction, and connectivity.

Lastly, Chapter 11, I shifted toward description to convey the relational association across techno-cultural collectives. In a practical sense, I tried to both discuss the digital convivial business model of the GCI ecosystem, as well as demonstrate the potentialities of digital conviviality for technology organizations at large. This study provides preliminary evidence toward the applicability of digital conviviality, as well as a new digital research methodology. This study also demonstrates an initial discovery concerning whether Google can be considered a digital convivial company. Such findings can span beyond Google to other technology titans by offering a more wide-ranging sense of the capabilities of digital conviviality. And, while I am confident in the approach and methods I have developed and executed, and believe that these findings may improve scholarship in areas such as sociotechnical systems, conviviality, business models, digital methods, and actor-network theory (ANT), it is necessary to recognize and highlight potential limitations of my study.

Research Limitations

Methodology Limitations

It is important to note that employing digital research as my primary method may have potentially limited my understanding of digital conviviality and this GCI phenomenon. For instance, and according to Gries (2015):

Case studies that rely on digital research are especially limited by filter bubbles produced by search engines such as Google and Facebook and various coded infrastructures that constrain research findings beyond a researcher's awareness (p. 92).

Based on this, research that employs digital methods can have limitations that I may not have realized were taking place. Further, the use of *The Starry Night* as the consequential object that I tracked throughout the institute's ecosystem could have been limiting to this investigation. That is, this painting may have only demonstrated one aspect of the institute's business model. Given

that, and in relation to my overarching research question, the use of *The Starry Night* may have made it so I could not fully uncover the digital convivial nature of the GCI.

To confirm that I approached this study with a range of open possibilities, I can look to Clay Spinuzzi's (2011) discussion surrounding how to conduct research using runaway objects. Based on Spinuzzi's (2011) work, I can ask myself several questions to determine if I approached object tracking throughout an ecosystem in a flexible and suitable manner. For instance, I can ponder whether I stayed situated within the data for enough time to recognize a particular object that surpassed its media, genre, function, form, and so forth. In the context of my study, I was embedded within the institute's data for the last two years. I also conducted an independent study with my dissertation committee member Dr. Timothy Amidon during the spring of 2017, where I evaluated the GCI ecosystem in-depth for almost five months. It was at the end of these five months that I determined that *The Starry Night* had surpassed all of its various media and digital reformations to become an iconic object. Based on this, I determined that the painting had "transformed many times over in terms of form and/or function, depending on what associations it [entered] into" (Gries, 2015, p. 40), and from this examination, decided that I would trace *The Starry Night* across the GCI ecosystem for my dissertation study.

The next question I can ask myself based on Spinuzzi's (2011) work is whether I recognized a variety of collectives where the object materialized and became a participating actor. In the context of this dissertation, and as displayed in the four-part case study, I identified a multiplicity of collectives in which *The Starry Night* appeared and participated. To combat against additional methodological limitations, I can also explore whether I found specific activities in which the object interacted and participated across networks. In the context of my dissertation, I determined that *The Starry Night* participated in the digitality process of the GCI

(i.e., *DIGT* process to digitize, identify, group, and transmit cultural objects across the institute's ecosystem). The painting also served as a tool for virtual reality (VR) production, machine learning (ML) training, and deep learning (DL) art production.

Further, using Spinuzzi's (2011) ideas, I can determine whether I identified certain trends across the object's entangled actions, as well as vital participatory actors that took part in such activities. In the context of my dissertation, I identified specific trends across *The Starry Night*'s enmeshed actions, such as trends in the GCI's Digital Convivial Business Model Canvas (DCBMC) across its value propositions, customers, business infrastructures, and finances. I also identified several key participatory actors in such activities, including the MOMA, Amit Sood, Google technologies, and similar artworks.

Lastly, Spinuzzi (2011) stated that I can ponder whether I described the roles that the object played in collaborating with a multiplicity of assemblages. In the context of my dissertation, I tried to translate the role that *The Starry Night* played within various networks across the institute's ecosystem. For instance, the painting served as a boundary object as it spanned across multiple collectives bridging information from the MOMA to the GCI, the GCI to the MOMA, the GCI to Google, and the GCI to art explorers. Based on these guidelines and my answers, I can design a foundation for understanding the limitations of my digital tracking of an object throughout the institute's ecosystem. In this way, I feel confident in stating that *The Starry Night* was an excellent runaway object to follow.

Generalizability Limitations

With regard to generalizable findings, potentially one of the most notable limitations to my study was my posthumanist actor-network theory (ANT) mindset. As my study set out to design a new digital method for exploring the organizational structure and digital conviviality of

technology titans, I only examined one tech giant, Google, in my analysis. Therefore, the findings are limited in scope. However, because the goal of this study was to create a new digital methodology, this lack of generalizable data is not so much a problem as it is part of the initial process of generating a new approach and then applying it in practice. Based on this, I view this project as laying the foundation for pondering, discovering, mapping, and illustrating innovative business models across nascent technology startups to established technology titans. That said, future projects to examine the digital conviviality of technology organizations are essential to strengthening the generalizability of not only my Google Cultural Institute (GCI) findings but also my digital convivial tracking approach.

Researcher Limitations

Chapter 5 and 6 addressed how my role as a researcher could potentially impact my description of the GCI digital convivial business model. To briefly summarize what was discussed in these chapters, I recognized the lack of complete control I had over where this study ended up. For instance, because a network, such as the GCI ecosystem, was multiply linked, it was also made up of other networks. Based on this, each network had the ability to participate in other networks, and together these networked interactions created a sort of boundlessness. In this way, the limitlessness of networks posed challenges when I used an ANT mindset, because linked network connections were constantly moving, shifting, and reorganizing.

However, I was able to combat the messiness of ANT research by heeding Latour's (2005) advice regarding "matters of concern" (p. 114) and embracing the uncertainty within my data discovery. I also followed his advice concerning translation and tried not to over-explain the organizational structure and experience architecture of the GCI. Based on this, my willingness to embrace uncertainty helped me not to use an *a priori* mindset in my study. In this way, and as

the researcher, I was embedded within the institute's ecosystem network, and as such, I set initial boundaries around an examination. Further, I selected central actors to investigate. I did all this while recognizing that additional networks existed within, as well as spanned across, the GCI ecosystem. In this context, Latour (2005) claimed that these self-defined boundaries helped me establish an adequate study with a scope limited by my research questions. And, while I placed boundaries around my study, these boundaries were somewhat fluid. In this way, these boundaries flexibly changed according to various actor associations that emerged.

I believe that I met the requirement set forth by Latour (2005) to follow actor abstractions, trace associations, embrace uncertainty, and translate descriptions of relational assemblage. In this way, I reason that my translations were powered more by the voices of the participants than by my interpretations. I feel that I exercised flexible "matters of concern" (p. 114) throughout my research endeavor.

Significance and Future Research

By applying an ANT mindset to the GCI ecosystem, I analyzed the actors of the GCI-*The Starry Night* network as demonstrated by Google. This study contributes to the field of convivial studies by providing information on Google's good organization (convivial) focus and the various ways it is attempting to bridge the gap between technology and culture. This study also helps uncover how the GCI is trying to fulfill its goal to create a space where technology and creativity can come together to generate innovative experiences across the world's arts and culture (GCI Lab, n.d.). Additionally, this study contributes to how researchers can investigate the digital conviviality (i.e., the organizational structure and participatory nature) of Google and its technologies, and in a broad sense, of tech titans at large. This study adds to the understanding of how the back- and front-end of a digital system work together to form a black boxed user

experience. Descriptions of how the GCI ingests cultural artifacts, extracts metadata from those artifacts, displays artifacts online for others to view, while it created a knowledge database to store and analyze artifact relations digitally, ultimately highlights the institute's 2013 goal to scale its collection and perhaps democratize access to the world's arts and culture (Seales, et al., 2013). Building on this goal, this study also demonstrates how the focus of a company can shift drastically, depending on those in leadership positions.

While this study provides significance to the field, it also serves as a substantial, foundational step for my research trajectory to explore the intersections of human-technology interaction, business model innovation, convivial participatory systems, and digital research methods. My research interests have grown organically from more than a decade's worth of time spent studying and working in entrepreneurial technology efforts learning how and what it means to work and communicate with society and technology. Based on this, and because technology titans like Google continue to infiltrate our lives through services and products that humans have decided they cannot live without, the findings presented herein may also be useful in developing future studies in and around the conviviality of digital space.

Future studies could involve a digital scraping approach to aggregate a large dataset of the GCI's collection, and then, through a more quantitative approach, explore correlations across computer visualization and art. For instance, this approach could be done examining the GAC art selfie feature, and the types of users that it engaged and the kinds of artworks that it matched. Through digital scraping tools, I could scrape Instagram or Facebook to see what artworks people were matched with, as well as how these posts were tagged (i.e., such as through an examination of hashtags). This approach could potentially offer more generalizable findings.

Another approach could try tracing different object(s) across the GCI ecosystem, such as Leonardo da Vinci's (1503) *Mona Lisa* (which is part of the Louvre Museum collection), to see what it uncovers about the business model and technologies of Google and the institute. It is important to note that the Louvre is currently not a partner of Google Arts & Culture (GAC), however, remixes of the iconic painting are found within the GCI ecosystem. Alternatively, I could follow Sandro Botticelli's (1483-1485) *The Birth of Venus*, which Sood (2013) stated was the second most popular artifact in the institute's database, to see what it returned regarding convivial technologies. Further, a primary focus for additional research should investigate the 2013 shift in leadership of the GCI, as perhaps this change may help describe if and how the goals of the institute have pivoted. If main actors around this decision and change would be willing to be interviewed (i.e., Amit Sood, Steven Crossan, Larry Page, Mark Yoshitake, Sertan Girgin, and more), the DCBMC maps I designed, as well as my understanding of the GCI's data digitality process, could be used as interview discussion materials during conversations with these critical ecosystem participants.

Moreover, I would like to point out another AI research lab, DeepMind (n.d.), that is associated with Google. DeepMind was acquired by Google in 2014, but is now housed under the Alphabet umbrella (i.e., it is no longer an entity of Google). While DeepMind's research may potentially be more focused on neuroscience AI and ML research, with somewhat different projects from the studies being conducted at Google's Brain Team (GBT), DeepMind does collaborate with Google on projects from time-to-time. According to *DeepMind's* (n.d.) website, the previous AI business was a London based startup, also called DeepMind, that was founded in 2010 (DeepMind About, n.d.). Further, and on the "About us" page on *DeepMind's* website:

DeepMind is the world leader in artificial intelligence research and its application for positive impact. We're on a scientific mission to push the boundaries of AI, developing

programs that can learn to solve any complex problem without needing to be taught how (DeepMind About, n.d., para. 1-2).

I would like to draw attention to one aspect of DeepMind's company description.

DeepMind states that it is trying to develop “programs that can learn to solve any complex problem without needing to be taught how” (DeepMind About, n.d.). In this context, what Tufecki (2015) would describe as “computational agency” (p. 207), DeepMind is attempting to move beyond Illich's (1973) convivial human-technology participation concept (i.e., humans working *with* technology) toward human-technological consumption driven by autonomous technological action (i.e., technology working *without* humans). Put another way: DeepMind is striving to make its algorithms employ “computational agency” (Tufecki, 2015, p. 207), to act *without* the assistance of humans.

The reason I bring up DeepMind is two-fold. One, to discuss various ways that AI is being used, and two, to highlight a connection across the GCI, Google, and AI. Intriguingly, and according to Crossan's LinkedIn profile (n.d.), after Crossan left the GCI, he stayed at Google for an additional two years. However, Crossan does not list a specific job title or department he worked for at Google to account for his two years of work post the GCI (i.e., all Crossan lists is product manager at Google). However, Crossan lists that in June of 2015, he was:

Recruited from Google to co-lead DeepMind-for-Google, an applied group bringing DeepMind's technology into Google products including DataCenters (15% improvement in Power Usage Effectiveness), Google Play, Assistant/Home plus others. Also co-lead for DeepMind's Protein Folding work (LinkedIn Crossan, n.d., Experience, Product DeepMind, para. 1).

Further, after Crossan left the GCI, he worked for DeepMind, which at the time was part of Google. And, with Google's AI now creating art, this discovery gave me pause and caused me to wonder if there is a connection between DeepMind, Google's AI advancements, Crossan, and the GCI? However, to make an *a priori* statement, which Latour (2005) would describe as acting

God-like, would not only be unproductive but also damaging to an ANT approach. Therefore, to investigate this intrigue further, additional research into associations and controversies across Crossan, the GCI, Google, and DeepMind would be needed.

Moreover, while I do not know the inner workings of Google, I would like to present a couple of suggestions for future participatory ideas based on my notion of digital participation and *CULTURE*. The GCI might benefit from fixing problems associated with how it helps users *teach, unite, and reason* with art and culture in social and cultural ways. Specific to enhancing its *teach* (i.e., the platform provides novices access to mentorship instruction from art masters), the institute could either reinstate the *Arts Talks* series or establish new ways to bring arts mentorship to users. Future research could investigate how the GCI could provide its public users more exposure to art masters. While I did not uncover why the *Arts Talks* program was canceled, I can offer potential possibilities that could be investigated in future research. For instance, perhaps these events were canceled due to a lack of attendance or other participatory reason. Conversely, maybe its cancelation was due to a limitation of resources by both the institute and cultural partners, or some combination. Or, maybe the cancellation was due to something else entirely. Either way, the GCI needs additional two-sided convivial tools to engage its users in a truly interactive way.

Second, with regard to increasing both its *unite* (i.e., the platform unites participants through social connections to other humans surrounding cultural experiences, as well as to objects such as art and cultural artifacts, and technology) and *reason* (i.e., the platform provides a space where participants believe that their contributions matter) initiatives, the GCI could continue to do more projects like its GAC art selfie feature. Future research could investigate

how the GCI might provide users participation with the institute across social human-to-human interaction, as well as discover in what ways users believe that their contributions do matter.

Concluding Thoughts: The Future of Technology

In conclusion, the process of weaving this dissertation together has taught me new things about myself, as well as about Google, technology, and digital research. For instance, I discovered more about the importance of remaining flexible and comfortable with the messiness of actor-network theory (ANT) research than I thought possible. I also learned that as the Google Cultural Institute (GCI) continues to democratize art and culture through its technology, it has the ability to use its acquired data to enhance its technologies. In this way, the GCI could truly be defined as “a place where tech and creative communities come together to share ideas and discover new ways to experience art and culture” (GCI Lab, n.d., Welcome to the Lab, para. 2).

I also realized that in order to understand the conviviality of tech titans, researchers must ask questions about the methods used to explore such things. As Laurie Gries (2015) pondered, I too, wonder: “what other methods might we invent to study how those things [convivial and non-convivial technologies] come to rhetorically matter to collective life?” (p. 295). Building on Gries (2015) wisdom, I recognize that as scholarship in science and technology “takes a nonhuman turn and as our lives becomes more and more entangled with digital images, smart technologies, robots, GPS, AR technologies, persuasive technologies, and so forth” (p. 295), we must explore the digital conviviality of technology organizations and the tools they create. Thus, we must ask questions of our methods, as well as how we can explore digital conviviality.

Specifically, we must ask how our data are being used to improve technologies and whether or not these enhancements fall under convivial participation, non-convivial manipulation, or alternatively, something in between, or entirely different.

In other words, the whole point of this large document was to spark ideas, debate, and questions surrounding the rapid advancements that are being made in technology, especially, within machine learning (ML), deep learning (DL), and other forms of artificial intelligence (AI). And, while research within the nonhuman turn has afforded the computer, or nonhuman object, just as much participatory agency in the network as that of humans, I wonder whether or not computers are actually employing “computational agency” (Tufekci, 2015, p. 207)? Based on this, some researchers have postulated that the computer has moved beyond “functioning as a virtually immaterial and transparent channel through which human agents exchange messages” (Gunkel, 2009, p. 63). Instead, this scholarship has surmised that “the computer participates in and contaminates the process. . . . [as] [i]t acts on messages, significantly alters them, and delivers information that was not necessarily selected, composed, or even controlled by human participants” (p. 63).

Building on these ideas, I inquire if society and its technologies have now moved to a place where computers are (or arguably have already been) *acting without* the assistance of humans? And, if so, what does this mean for society? Do we face Elon Musk’s doomsday prophecy of robots killing people? Or, perhaps, will we experience Mark Zuckerberg’s utopia and realize that AI makes the world a better place? Moreover, and given that on April 10-11, 2018, Zuckerberg went before the United States (US) Congress for a two-day congressional-hearing surrounding Facebook’s handling of data, privacy, transparency, accountability, manipulation, trust, politics, and so forth, it is not only timely, but also extremely necessary, that we explore issues surrounding digital conviviality.

Building on this call for examinations into technology titans and what it means to be a digital convivial company, it is also beneficial to think of the future of tech. While Geisler (2011)

stated that digital spaces (such as the GCI) “provide more opportunities for readers and writers to become immersed in a virtual experience beyond what is familiar to them— not, however, to escape their embodied reality but to extend it” (p. 253), I ponder whether or not technologies will be extending our reality in ways more unimaginable than self-driving cars, biotech implants, and robots. Further, and as Hilary Brueck (2016) so poignantly questioned, I too, wonder: “If art is what makes us human, how come Google’s bots can do it too?” (Brueck, 2016, para. 1).

Therefore, if technology will potentially be capable of things that are arguably reserved for innately human capabilities (i.e., consciousness and creativity, as well as the qualities of love, empathy, sympathy, intuition, morality, sensory, feeling, arousal, and so forth), I can not help but wonder: *what will technology giants and their technologies be able to do next and how will it impact society?*

Therefore, I return once more to Vincent van Gogh and his masterpiece *The Starry Night* (1889d) to conclude this project. I look to Vincent’s thoughts that were shared with his brother, Theo, during the creation period of his starry masterpiece, where Vincent stated: “Looking at the stars always makes me dream” (quoted in Bee et al., 2013, p. 25). In thinking about these words, I cannot help but marvel how, today, we have technology moguls like Elon Musk launching SpaceX shuttles and Tesla cars into outer space. In this context, technology is taking concepts that were once far-fetched dreams (in the case of Musk, his dream to colonize Mars), and, literally, moving those dreams into the same orbit as the stars. Based on this, I cannot help but question what potential realities these creative (and arguably somewhat mad) geniuses will dream up next, and how those dreams will impact our lives?

REFERENCES

- 89plus About. (n.d.). About. *89plus.com*. Retrieved from <http://www.89plus.com/about/>
- 89plus Events. (n.d.). Residency series at Google Cultural Institute. *89plus.com*. Retrieved from <http://www.89plus.com/events/>
- Alphabet Code of Conduct. (2015, October 2). Alphabet investor relations: Code of conduct. *Abc.xyz*. Retrieved from <https://investor.google.com/corporate/code-of-conduct.html> which relinks to <https://abc.xyz/investor/other/code-of-conduct.html>
- Alt, R., & Zimmermann, H. (2001). Introduction to special section – Business models. *Electronic Markets*, 11(1), 3–9.
- Ambrose, C., & Paine, T. (2006). *Museum basics*. New York: Routledge.
- Apple’s Ad Game. (2008, February). *Macworld*, 25(2), 32-33.
- Arizona State University-Great Debate. (2017, February 25). Great debate: The future of artificial intelligence - Who's in control? *Arizona State University*. Retrieved from <https://origins.asu.edu/node/452>
- Art. (n.d.). In *Oxford Dictionaries online*. Retrieved from <https://en.oxforddictionaries.com/definition/art>
- Au, Y. A. (2001). Design science I: The role of design science in electronic commerce research. *Communications of the Association for Information Systems*, 7.
- Band, J. (2006). The Google Library Project: Both sides of the story. *Plagiarism: Cross-Disciplinary Studies in Plagiarism, Fabrication, and Falsification*, 6-21. Retrieved from <https://quod.lib.umich.edu/cgi/p/pod/dod-idx/google-library-project-both-sides-of-the-story.pdf?c=plag;idno=5240451.0001.002;format=pdf>
- Barad, K. 2007. *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Durham, NC: Duke University Press.
- Barbour, R. S. (1998). Mixing qualitative methods: Quality assurance or qualitative quagmire? *Qualitative Health Research*, 8(3), 352-361.
- Barzilai-Nahon, K. (2008). Toward a theory of network gatekeeping: A framework for exploring information control. *Journal of the American Society for Information Science and Technology*, 59(9), 1493–1512. doi: 10.1002/asi.20857
- Battelle, J. (2003, December 16). The ‘Creeping Googlization’ Meme. *BusinessWeek*. Retrieved from <https://web.archive.org/web/20091228104446/http://battellemedia.com/archives/000145.php>. Archived 2009, December 28, from the original J. Battelle’s Searchblog <http://battellemedia.com/archives/000145.php>.
- Baudrillard, J. (1983). *Simulations*. (P. Foss, P. Patton & P. Beitchman, Trans.). Los Angeles, CA: Semiotext(e).
- Baudrillard, J. (1994). *Simulacra and simulation*. (S. F. Glaser, Trans.). Ann Arbor, Michigan: The University of Michigan Press. (Original work published 1981).

- Baudrillard, J. (2001). *Jean Baudrillard: Selected Writings: First Edition*. (M. Poster, Trans. & Ed.). Stanford University Press, 166-184. (Original work published 1981).
- Bayer, A. (2014). *Evangelizing the 'Gallery of the Future': A critical analysis of the Google Art Project narrative and its political, cultural and technological stakes* (Doctoral dissertation). Electronic Thesis and Dissertation Repository. (Paper 2239).
- Beaulieu, A. (2005). Sociable hyperlinks: An ethnographic approach to connectivity. In C. Hine (Ed.), *Virtual methods: Issues in social research on the Internet* (pp. 183–197). Oxford: Berg.
- Bee, H. S., Heliczer, C., & McFadden, S. (Eds.). (2013). *MoMA highlights: 350 works from the Museum of Modern Art, New York*. New York: The Museum of Modern Art. (Original work published 1999).
- Beer, D. (2013). *Popular culture and new media: The politics of circulation*. New York: Palgrave Macmillan.
- Beil, K. (2013). Seeing syntax: Google Art Project and the twenty-first century period eye. *Afterimage*, 40(4), 22–27.
- Bellow, G. (1919). *Emma in the Purple Dress* [oil painting]. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/asset/emma-in-the-purple-dress/jAEBejNRDbSxQ>
- Benjamin, W. (1969). The work of art in the age of mechanical reproduction. In H. Arendt (Ed.), *Illuminations* (pp. 217–251). New York: Schocken. (Original work published 1936).
- Bennett, J. (2010). *Vibrant matter: A political ecology of things*. Durham, NC: Duke University Press.
- Bennett, J. (2012, May 4). Systems and things: A materialist and an object-oriented philosopher walk into a bar. A plenary lecture for the Conference on the Nonhuman Turn, Milwaukee, WI. Retrieved from <https://www.youtube.com/watch?v=pYxy-MlypUU>
- Benson, F. W. (1890). *Summer* [oil painting]. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/asset/summer/cQF4zvQY-heg-Q>
- Berger, J. (1972). *Ways of seeing: Based on the BBC television series*. London: British Broadcasting Corporation and Penguin Books.
- Berger, P. & Luckmann, T. (1966). *The social construction of reality: A treatise its the sociology of knowledge*. Garden City, New York: Anchor Books.
- Beyond GCI. (2013). Google Cultural Institute. *Beyond*. Retrieved from <https://bynd.com/work/google-cultural-institute/>
- Bloor, D. (1991). *Knowledge and social imagery*. Chicago: University of Chicago Press. (Original work published 1976).
- Bogost, I. (2009, December 8). What is object-oriented ontology? A definition for ordinary folk. *Bogost.com*. Retrieved from http://bogost.com/writing/blog/what_is_objectoriented_ontolog/
- Bogost, I. (2012). *Alien phenomenology, or what it's like to be a thing*. Minneapolis: University of Minnesota Press.

- Botticelli, S. (1483-1485). *The Birth of Venus* [painting]. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/asset/MQEeq50LABEBVg>
- Bourdieu, P. (1994). *Language and symbolic power*. Oxford: Polity Press.
- Brassier, R. (2007, April 27). Speculative realism. Discussed speculative realism with I. H. Grant, G. Harman, Q. Meillassoux, & A. Toscano (Host) at Speculative Realism Conference, Goldsmiths College, University of London, London.
- Brueck, H. (2016, March 1). Google's computers are making thousands as artists. *Fortune.com*. Retrieved from <http://fortune.com/2016/03/01/google-deepdream-art/>
- Bruni, A. (2005). Shadowing software and clinical records: On the ethnography of non-humans and heterogeneous contexts. *Organization*, 12(3), 357–378. <http://doi.org/10.1177/1350508405051272>
- Bryant, L. R. (2008). *Difference and givenness: Deleuze's transcendental empiricism and the ontology of immanence*. Evanston: Northwestern University Press.
- Bryant, L. R. (2009). Deleuze's transcendental empiricism: Notes towards a transcendental materialism. In E. Willatt & M. Lee (eds.), *Thinking between Deleuze and Kant: A strange encounter*. Continuum.
- Bryant, L. R., Srnicek, N., & Harman, G. (Eds.). (2011). *The speculative turn: Continental materialism and realism*. Melbourne, Australia: Re.press. Retrieved from http://www.repress.org/book-files/OA_Version_Speculative_Turn_9780980668346.pdf
- Business Model Innovation Matters. (2012, March 29). Google Business Model [image]. *Business Model Innovation Matters*. Retrieved from <https://businessmodelinnovationmatters.files.wordpress.com/2012/03/google-business-model1.png>
- Caines, M. (2013, December 3). Arts head: Amit Sood, Director, Google Cultural Institute. *The Guardian*. Retrieved from <https://www.theguardian.com/culture-professionals-network/culture-professionals-blog/2013/dec/03/amit-sood-google-cultural-institute-art-project>
- Callon, M. (1986). Some elements of a sociology of translation: Domestication of the scallops and the fishermen of St Brieuc Bay. In J. Law (Ed.), *Power, action and belief: A new sociology of knowledge?* (pp. 196– 223). London: Routledge.
- Callon, M. (1991). Techno-economic networks and irreversibility. In J. Law (Ed.), *A sociology of monsters? Essays on power, technology and domination* (pp. 132–161). London: Routledge.
- Callon, M. (1999). Actor-network theory: The market test. In J. Hassard & J. Law (Eds.), *Actor-network theory and after*. Oxford: Blackwell Publishers.
- Callon, M. & Latour, B. (1981). Unscrewing the big leviathan: How actors macro-structure reality and how sociologists help them do so. In K. KnorrCetina & A.V. Cicourel (Eds.), *Advances in social theory and methodology: Toward an integration of micro- and macro-sociologies* (pp. 277-303). Boston: Routledge & Kegan Paul.
- Callon, M. & Law, J. (1997). After the individual in society: Lessons on collectivity from science, technology and society. *Canadian Journal of Sociology*, 22(2), 165-182.

- Carlson, S. A. (2006). Towards an information systems design research framework: A critical realist perspective. *Proceedings of the 1st International Conference on Design Science Research in Information Systems and Technology*, Claremont, CA.
- Champ, J. (2016). Chapter five: Literature Section. In *The Montana challenge: A post-humanist approach to fish, wildlife, newspapers, and meaning*. Unpublished manuscript, Department of Journalism and Media Communication, Colorado State University, Fort Collins, Colorado, USA.
- Charisma. (n.d.). In *Oxford Dictionaries online*. Retrieved from <https://en.oxforddictionaries.com/definition/charisma>
- Chesbrough, H. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Boston, Mass.: Harvard Business School Press.
- Chesbrough, H. (2006). *Open Business Models: How to Thrive in the New Innovation Landscape*. Boston, MA: Harvard Business Review Press.
- Cirksena, K. & Cuklanz, L. (1992). Male is to female as ___ is to __: A guided tour of five feminist frameworks for communication studies. In L. F. Rakow (Ed.), *Women making meaning: New feminist directions in communication* (pp. 18-44). New York: Routledge.
- Colbert, S. (2010, September 30). The Colbert report: Aaron Sorkin [video file]. *Comedy Central: The Colbert report*. Retrieved from <http://www.cc.com/video-clips/h7gmgz/the-colbert-report-aaron-sorkin>
- Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field settings*. Boston: Houghton Mifflin.
- Cressman, D. (2009). A brief overview of actor-network theory: Punctualization, heterogeneous engineering & translation. *ACT Lab/Centre for Policy Research on Science & Technology*. Burnaby, BC: Simon Fraser University. Retrieved from <http://summit.sfu.ca/item/13593>
- Culture. (n.d.). In *Oxford Dictionaries online*. Retrieved from <https://en.oxforddictionaries.com/definition/culture>
- Czarniawska, B. (2009). Emerging institutions: Pyramids or anthills? *Organization Studies*, 30(4), 423–441.
- Czarniawska, B., & Sevón, G. (2005). Global ideas: How ideas, objects and practices travel in the global economy. *Administrative Science Quarterly*, 51(3), 512-514. <https://doi.org/10.2189/asqu.51.3.512>
- Czarniawska, B. (Ed.) & Sevón, G. (Ed.) (2011). *Translating organizational change*. Berlin, Boston: De Gruyter. Retrieved from <https://www.degruyter.com/view/product/144144>
- Darling Instagram. (2018, February 27). #BlackHistoryMonth. *Instagram*. Retrieved from <https://instagram.com/p/BftyODPIOZz/>
- Da Vinci, L. (1503). *Mona Lisa* [Oil on poplar panel]. *Louvre*. Retrieved from <https://www.louvre.fr/en/oeuvre-notices/mona-lisa-portrait-lisa-gherardini-wife-francesco-del-giocondo>

- Davis, J. (2013, June 25). From Sutton Hoo to the soccer pitch: Culture with a click. *Google Official Blog*. Retrieved from <https://googleblog.blogspot.com/2013/06/from-sutton-hoo-to-soccer-pitch-culture.html>
- DeepMind. (n.d.). *Deep Mind*. Retrieved from <https://deepmind.com/>
- DeepMind About. (n.d.). About. *Deep Mind*. Retrieved from <https://deepmind.com/about/>
- De Landa, M. (2006). *A new philosophy of society: Assemblage theory and social complexity*. New York: Continuum.
- Deleuze, G., & Guattari, F. (1988). *A thousand plateaus: Capitalism and schizophrenia*. London: Athlone.
- Deleuze, G. (1992). Ethology: Spinoza and us. In J. Crary & S. Kwinter (Eds.), *Zone 6: Incorporations* (pp. 625–633). New York: Zone Books.
- Denzin, N. K. (1998). The art and politics of interpretation. In N. K. Denzin & Y. S. Lincoln (Eds.), *Collecting and Interpreting Qualitative Materials* (pp. 313–344). Thousand Oaks, CA: SAGE Publications, Inc.
- Denzin, N. K., & Lincoln, Y. S. (2011). *The Sage handbook of qualitative research*. Thousand Oaks: Sage.
- Doronichev, A. (2016a, April 5). Tilt Brush: painting from a new perspective. *The Keyword*. Retrieved from <https://blog.google/products/google-vr/tilt-brush/>
- Doronichev, A. (2016b, November 10). Experience Daydream today. *The Keyword*. Retrieved from <https://blog.google/products/google-vr/experience-daydream-today/>
- Downard, T. (2015, May 19). 'Wicked' a show for the green girl in all of us. *DCPA NewsCenter*. Retrieved from <https://www.denvercenter.org/blog-posts/newscenter/2015/05/20/wicked-a-show-for-the-green-girl-in-all-of-us>
- Dumoulin, V., Shlens, J., & Kudlur, M. (2016, October 26). Supercharging style transfer. *Google Research Blog*. Retrieved from <https://research.googleblog.com/2016/10/supercharging-style-transfer.html>
- Dumoulin, V., Shlens, J., & Kudlur, M. (2017). A learned representation for artistic style. In *Proceedings of the 2017 International Conference on Learning Representations*, Toulin, France. Retrieved from <https://arxiv.org/pdf/1610.07629.pdf>
- Duncan, C. (1995). *Civilizing rituals: Inside public art museums*. London: Routledge.
- Ellingson, L. L. (2009). *Engaging crystalization in qualitative research*. Thousand Oaks, CA: Sage.
- Elmer, G. (2004). *Profiling machines*. Cambridge, MA: MIT Press.
- Engeström, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research*. Orienta-Konsultit Oy, Helsinki.
- Expert System ML Apps. (2017, April 18). Machine learning applications: How they work (and when they fail in text analytics). *ExpertSystem.com*. Retrieved from <http://www.expertsystem.com/machine-learning-applications/>

- Fleck, L. (1979). *Genesis and development of a scientific fact*. Chicago: University of Chicago Press.
- Fontana, A., & Frey, J. H. (1998). Interviewing: The art of science. In N. K. Denzin & Y. S. Lincoln (Eds.), *Collecting and Interpreting Qualitative Materials* (pp. 47–78). Thousand Oaks, CA: SAGE Publications, Inc.
- Foucault, M. (1979). *Discipline and punish*. New York: Vintage Books.
- Foucault, M. (1986). Of other spaces. *Diacritics*, 16(Spring 1986), 22-27.
- Furht, B., & Villanustre, F. (2016). *Big data technologies and applications*. Switzerland: Springer International Publishing.
- GAC. (n.d.). Google Arts & Culture. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/>
- GAC Art Selfie. (2018, January 19). Search art with your Selfie: A Google Arts & Culture Experiment. *YouTube*. Retrieved from <https://youtu.be/jERGXnQT9W0>
- GAC Barney Gallery. (n.d.). Landscape in the night sky. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/usergallery/RgJyCT13P406KA>
- GAC Black History. (2018, February 15). Black history and culture. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/project/black-history-and-culture>
- GAC Experiments. (n.d.) Arts & Culture experiments. *With Google*. Retrieved from <https://experiments.withgoogle.com/arts-culture>
- GAC Google+ Art Talks. (n.d.). GAC Art Talks. *Google+*. Retrieved from <https://plus.google.com/collection/4CChI>
- GAC Harry Potter. (2018, February 27). Harry Potter: A history of magic. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/project/harry-potter-a-history-of-magic>
- GAC Instagram. (2018, February 15). #BlackHistoryMonth. *Instagram*. Retrieved from <https://instagram.com/p/BfOZzEwlgXb/>
- GAC Mobile App. (n.d./2018). Google Arts & Culture mobile application. *Google Play*. Retrieved from <https://play.google.com/store/apps/details?id=com.google.android.apps.cultural&hl=en> (last updated April 18, 2018).
- GAC MOMA. (n.d.). MOMA, The Museum of Modern Art. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/partner/moma-the-museum-of-modern-art>
- GAC MOMA Fifth Floor. (2018). MOMA fifth floor. *Google Arts and Culture*. Retrieved from <https://goo.gl/jEjd2Y>
- GAC Selfie. (n.d.). Selfie. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/camera/selfie>
- GAC Stone Gallery. (n.d.). Leah Stone Dissertation Gallery. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/favorite/group/MwICxCN3jAIGLg> (originally created February 23, 2018).

- GAC The Bedroom. (n.d.). The Bedroom 1888 [digitized painting]. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/asset/the-bedroom/KwF-AdF1REQI6w>
- GAC The Bedroom Gigapixel. (n.d.). The Bedroom 1888 gigapixel [digitized zoomed-in view]. *Google Arts and Culture*. Retrieved from <https://goo.gl/wXLqLe>
- GAC The Bedroom Street View. (n.d.). Van Gogh Museum street view [360-degree map]. *Google Arts and Culture*. Retrieved from <https://goo.gl/Zjhncf>
- GAC Themes. (2018, February 27). Google Arts & Culture | Themes. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/project>
- GAC The Starry Night. (n.d.). The Starry Night [digitized painting]. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/asset/the-starry-night/bgEuwDxel93-Pg>
- GAC The Starry Night Gigapixel. (n.d.). The Starry Night gigapixel [digitized zoomed-in view]. *Google Arts and Culture*. Retrieved from <https://goo.gl/QWYqBx>
- GAC The Starry Night Street View. (2017). MOMA street view [360-degree map]. *Google Arts and Culture*. Retrieved from <https://goo.gl/3tCqSm>
- GAC The Starry Night Street View. (2018). MOMA street view [360-degree map]. *Google Arts and Culture*. Retrieved from <https://goo.gl/3tCqSm>
- GAC User Gallery. (n.d.). GAC User Gallery. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/search/usergallery?q=user%20gallery>
- GAC User Gallery Search. (n.d.). GAC User Gallery Search. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/search?q=user%20gallery>
- GAC VR App. (2017, September 26). Google Arts & Culture VR. *Google Play*. Retrieved from <https://play.google.com/store/apps/details?id=com.google.vr.museums>
- GAC We Wear Culture. (2017). We wear culture. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/project/fashion>
- Gatys, L. A., Ecker, A. S., & Bethge, M. (2015). A neural algorithm of artistic style. arXiv:1508.06576 [cs.CV]. *Cornell University Library*. Retrieved from <https://arxiv.org/pdf/1508.06576.pdf>
- Gatys, L. A., Ecker, A. S., & Bethge, M. (2016). Image style transfer using convolutional neural networks. In *2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*; pp. 2414-2423, Las Vegas, NV. doi: 10.1109/CVPR.2016.265. Retrieved from <https://ieeexplore.ieee.org/document/7780634/citations>
- GCI About. (2015). Cultural Institute about. *Google Cultural Institute*. Retrieved from <https://www.google.com/culturalinstitute/about/>
- GCI Art Talks. (2015). Art talks: Insights from the experts. *Google Cultural Institute*. Retrieved from <https://www.google.com/culturalinstitute/about/partners/art-talks/#>
- GCI Dead Sea Scrolls. (n.d.) Dead Sea Scrolls. *Google Cultural Institute*. Retrieved from <https://www.google.com/culturalinstitute/about/deadseascroll/>

- GCI FAQ. (n.d.). Cultural Institute platform help: Frequently asked questions. *Google Support*. Retrieved from <https://support.google.com/culturalinstitute/partners/answer/6002688?hl=en>
- GCI Lab. (n.d.). The Lab. *Google Cultural Institute*. Retrieved from <https://www.google.com/culturalinstitute/thelab/#welcome>
- GCI Open Gallery. (n.d.). Open gallery. *Google Cultural Institute*. Retrieved from <https://www.google.com/opengallery/u/0/> [link reroutes to <https://www.google.com/culturalinstitute/beta/opengalleryinfo>]
- GCI Partners. (2015) Partners. *Google Cultural Institute*. Retrieved from <https://www.google.com/culturalinstitute/about/partners/>
- GCI Sign up. (n.d.). Google Cultural Institute: Partnership agreement. *Google Services*. Retrieved from <https://services.google.com/fb/forms/cisignup/>
- GCI Sophie Taeuber-Arp. (n.d.). Sophie Taeuber-Arp exhibit. *Google Cultural Institute*. Retrieved from <https://www.google.com/culturalinstitute/beta/exhibit/swKioHNhYqZoLw?hl=en>
- GCI Users. (2015). Users. *Google Cultural Institute*. Retrieved from <https://www.google.com/culturalinstitute/about/users/>
- GCI Yad Vashem. (n.d.) Yad Vashem. *Google Cultural Institute*. Retrieved from <https://www.google.com/culturalinstitute/about/yadvashem/>
- Geisler, C. (2011). IText revisited: The continuing interaction of information technology and text. *Journal of Business and Technical Communication*, 25(3), 251-255.
- Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report*, 8(4), 597-606. Retrieved from <http://nsuworks.nova.edu/tqr/vol8/iss4/6>
- Gompertz, W. (2011, October 17). Van Gogh did not kill himself, authors claim. *BBC.com*. Retrieved from <http://www.bbc.com/news/entertainment-arts-15328583>
- Google+ Events. (n.d.). Art Talk with the Museum of Modern Art, New York. *Google+*. Retrieved from <https://plus.google.com/u/0/events/cihbq5nveafs6afav95d9qv33i4>
- Google AR Experiments. (2017, November 1). AR Experiments: Expanding creative possibilities with ARCore. *YouTube*. Retrieved from <https://youtu.be/7SwZUNDSWaM>
- Google Chrome GAC. (2017, August 29). Google Arts & Culture Chrome app. *Chrome*. Retrieved from <https://chrome.google.com/webstore/detail/google-arts-culture/akimgimeeoignljfchpbkpfbmeapk>
- Google CI Chromecast. (2014, December 17). Google Cultural Institute - Chromecast backdrop demo. *YouTube*. Retrieved from <https://youtu.be/X1WFCKX1XyM>
- Google Code of Conduct. (2017, October 12). Alphabet investor relations-Google code of conduct. *Abc.xyz*. Retrieved from <https://abc.xyz/investor/other/google-code-of-conduct.html>
- Google Company. (n.d.). Google company. *Google*. Retrieved from <https://www.google.com/about/our-company/>

Google DeepDream Generator. (n.d.). *Deep Dream Generator*. Retrieved from <https://deepdreamgenerator.com/>

Google Design. (n.d.). Google careers design. *Google Careers*. Retrieved from <https://careers.google.com/fields-of-work/design/>

Google Experiments. (n.d.). Experiments. *With Google.* Retrieved from <https://experiments.withgoogle.com/>

Google Facts. (n.d.). Google facts. *Google*. Retrieved from <https://www.google.com/about/company/facts/>

Google GAC Experiments. (2016, November 17). Google Arts & Culture experiments. *YouTube*. Retrieved from <https://youtu.be/xgnxnmqnR7Y>

Google GAC YouTube. (2017, May 31). Searching for art just got better. Where will you start? *YouTube*. Retrieved from <https://youtu.be/65NJfQyWuUs>

Google Locations. (n.d.). Google locations. *Google*. Retrieved from <https://www.google.com/about/company/facts/locations/>

Google Maps MOMA. (2018). Google Maps MOMA. *Google Maps*. Retrieved from <https://goo.gl/maps/SBvQghaTZK52>

Google Maps MOMA Starry Night. (2018). Google Maps MOMA. *Google Maps*. Retrieved from <https://goo.gl/maps/XZzCoK1tY482>. (Original museum scan January 2012).

Google Our Company. (n.d.). Our Company. *Google International*. Retrieved from <https://www.google.com/intl/en/about/our-company/>

Google Play. (n.d.). Cardboard Apps. *Google Play*. Retrieved from <https://play.google.com/store/apps/details?id=com.google.samples.apps.cardboarddemo>

Google Play Touch Van Gogh. (2015, August 20). Touch Van Gogh. *Google Play*. Retrieved from <https://play.google.com/store/apps/details?id=air.nl.ijsfontein.vangogh.production>

Google Play Virtual Bedrooms. (2015, November 7). Virtual Bedrooms. *Google Play*. Retrieved from <https://play.google.com/store/apps/details?id=com.Veejays.VirtualBedroomsPitch>

Google Products. (n.d.). Our Products. *Google International*. Retrieved from <https://www.google.co.in/about/products/>

Google Research Brain Art. (n.d.) Music and Art Generation. *Research at Google*. Retrieved from <https://research.google.com/teams/brain/music-and-art/>

Google Research Brain Team. (n.d.) Google Brain Team. *Research at Google*. Retrieved from <https://research.google.com/teams/brain/>

Google Research Music and Art. (n.d.) Music and Art Generation. *Research at Google*. Retrieved from <https://research.google.com/teams/brain/music-and-art/>

Google Search France. (2018, January 18). Google search: ‘what is the capital of France’ [screen capture]. *Google*. Retrieved from <https://goo.gl/L3yBvh>

Google Store. (n.d.). Google Cardboard. *Google Store*. Retrieved from https://store.google.com/product/google_cardboard?utm_source=google-cardboard&utm_medium=MS&utm_campaign=Google_Cardboard

- Google Tilt Brush. (n.d.). Tilt Brush Artist in Residence. *Google Tilt Brush*. Retrieved from <https://www.tiltbrush.com/air/>
- Google VR Cardboard. (n.d.). Google Cardboard. *Google VR*. Retrieved from <https://vr.google.com/cardboard/>
- Google VR Daydream. (n.d.). Daydream. *Google VR*. Retrieved from <https://vr.google.com/daydream/>
- Google VR Daydream Experiences. (n.d.). Apps & Experiences. *Google VR*. Retrieved from <https://vr.google.com/daydream/experiences/>
- Google VR Get Cardboard. (n.d.). Google Get Cardboard. *Google VR*. Retrieved from <https://vr.google.com/cardboard/get-cardboard/>
- Gordijn, J. (2002). *Value-based requirements engineering: Exploring innovative e-commerce ideas*. (Doctoral Dissertation). Vrije Universiteit, Amsterdam, Netherlands. Retrieved from https://www.cs.vu.nl/en/Images/J_Gordijn_25-06-2002_tcm210-258560.pdf
- Graves, J. B. (2005). *Cultural democracy: The arts, community, and the public purpose*. Chicago: University of Illinois Press.
- Gray Area About. (n.d.). About mission. *Gray Area*. Retrieved from <https://grayarea.org/about/mission/>
- Gray Area Event. (2016, February 26). DeepDream: The art of neural networks. *Gray Area*. Retrieved from <https://grayarea.org/event/deepdream-the-art-of-neural-networks/>
- Gregg, D. G., Kulkarni, U. R. & Vinze, A. S. (2001). Understanding the philosophical underpinning of software engineering research in information systems. *Information Systems Frontiers*, 3(2), 169-183.
- Greimas, A. J., & Courtés, J. (1982). *Semiotics and language: An analytical dictionary* (trans: Crist, L. & Patte, D.). Bloomington: Indiana University Press.
- Gries, L. (2015). *Still life with rhetoric: A new materialist approach for visual rhetorics*. Utah State University Press. Kindle version.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 105-117). Thousand Oaks, CA: Sage.
- Gunkel, D. J. (2009). Beyond mediation: Thinking the computer otherwise. *Interactions: Studies in Communication and Culture*, 1(1), 53–70.
- Haraway, D. (1991a). A cyborg manifesto: Science, technology, and socialism-feminism in the late twentieth century. In *Simians, Cyborgs, and Women: The Reinvention of Nature* (pp. 149–182). New York: Routledge.
- Haraway, D. (1991b). Situated knowledges: The science question in feminism and the privilege of partial perspective. In *Simians, Cyborgs, and Women: The Reinvention of Nature* (pp. 183–202). New York: Routledge.
- Haraway, D. (1999). The biopolitics of postmodern bodies: Determinations of self in immune system discourse. *differences: A Journal of Feminist Cultural Studies*, 1(1), 3–43.

- Harman, G. (1999). *Tool-being: Elements in a theory of objects*. (Doctoral Dissertation). DePaul University, Chicago, Illinois. Retrieved from <https://www.learntechlib.org/p/123532/>
- Harman, G. (2010, July 23). Brief SR/OOO tutorial. *Object-Oriented Philosophy*. Retrieved from <https://doctorzamalek2.wordpress.com/2010/07/23/brief-srooo-tutorial/>
- Hassard, J., Law, J., & Lee, N. (1999). Preface. *Organization: Special Issue on Actor-Network Theory*, 6(3), 387-390.
- Healy, M., & Perry, C. (2000). Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm. *Qualitative Market Research*, 3(3), 118-126.
- Hemment, B., & Thompson, J. L. (2013). Digital public space – A challenge. In D. Hemment, B. Thompson, J.L. de Vincente, & R. Cooper (Eds.), *Digital Public Spaces*. Manchester: FutureEverything. Retrieved from <http://futureeverything.org/wpcontent/uploads/2014/03/DPS.pdf>
- Hennion, A. (2001). Music lovers: Taste as performance. *Theory, Culture, & Society*, 18, 1-22.
- Herndl, C. G. (2012, May). Rhetoric and the new materialism. Paper presented at the 15th Biennial Rhetoric Society of America Conference, Philadelphia, PA.
- Hevner, A., March, S., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS Quarterly*, 28(1), 75-105.
- Heydon, R., & O'Neill, S. (2014). Songs in our hearts: Affordances and constraints of an intergenerational multimodal arts curriculum. *International Journal of Education & The Arts*, 15(16). Retrieved from <http://www.ijea.org/v15n16/>
- Holzman, W. (Playwright), Schwartz, S. (Composer), & Mantello, J. (Director). (2003, October). *Wicked: The untold story of the witches of Oz*. [Musical performance]. Universal Stage Productions: Gershwin Theatre, New York, NY.
- Huberman, A. M., & Miles, M. B. (1998). Data management and analysis methods. In N. K. Denzin & Y. S. Lincoln (Eds.), *Collecting and interpreting qualitative materials* (pp. 179–188). Thousand Oaks, CA: SAGE Publications, Inc.
- Hume, D. (2007). *An enquiry concerning human understanding*. (P. J. R. Millican, Ed.). Oxford, UK: Oxford University Press. (Original work published 1748).
- Illich, I. (1973). *Tools for conviviality*. New York: Harper & Row.
- iRobot. (n.d.). Roomba. *iRobot*. Retrieved from <http://www.irobot.com/For-the-Home/Vacuuming/Roomba.aspx>
- Kant, I. (1998). *Critique of pure reason*. (P. Guyer, & A. W. Wood, Trans.). Cambridge: Cambridge University Press. (Originally work published in 1781).
- Kellner, D. (2015). Jean Baudrillard. *The Stanford Encyclopedia of Philosophy* (Summer 2015 Edition), Edward N. Zalta (Ed.). *Stanford.edu*.

- Jenkins, H. (2009). *Confronting the challenges of participatory culture: Media education for the 21st century*. With R. Purushotma, M. Weigel, K. Clinton, & A. J. Robison. Cambridge, MA: MIT Press. Retrieved from <https://www.dropbox.com/s/co9mdasoh8r1ew7/8435.pdf?dl=0>
- Jenkins, H. (2012). Building the new field of digital media and learning: An occasional paper on digital media and learning. *Confronting the challenges of participatory culture: Media education for the 21st century* [white paper]. With K. Clinton, R. Purushotma, A. J. Robison, & M. Weigel. Chicago, IL: MacArthur Foundation. Retrieved from https://www.macfound.org/media/article_pdfs/JENKINS_WHITE_PAPER.PDF
- Jewitt, C., & Kress, G. (Eds.). (2003). *Multimodal literacy*. New York, NY: Peter Lang.
- Johnson, E. (2016, July 13). What are the differences among virtual, augmented and mixed reality? *Recode*. Retrieved from <https://www.recode.net/2015/7/27/11615046/whats-the-difference-between-virtual-augmented-and-mixed-reality>
- Kaleidoscope. (n.d.). In *Oxford Dictionaries online*. Retrieved from http://www.oxforddictionaries.com/us/definition/american_english/kaleidoscope
- Kock, N. (2007). *Systems analysis and design fundamentals: A business process redesign approach*. Thousand Oaks, CA: Sage.
- Kuhn, T. S. (1962). *The structure of scientific revolutions*. Chicago, IL: University of Chicago Press.
- Latour, B. (1987). *Science in action*. Cambridge, MA: Harvard University Press. Retrieved from <http://www.shi.uo-mo.com/images/misc/200704211104130.pdf>
- Latour, B. (1988). *The pasteurization of France*. Cambridge, MA: Harvard University Press.
- Latour, B. (1993). *We have never been modern*. Hemel Hempstead: Harvester Wheatsleaf.
- Latour, B. (1995). Social theory and the study of computerized work sites. In W. Orlikowski, G. Walsham, M. Jones, & J. DeGross (Eds.), *Information technology and changes in organizational work* (pp. 285–307). London: Chapman & Hall.
- Latour, B. (1996). *Aramis, or the love of technology*. Cambridge, MA: Harvard University Press.
- Latour, B. (1999). On recalling ANT. In J. Law, & J. Hassard (Eds.), *Actor-network theory and after* (pp. 15-25). Oxford: Blackwell.
- Latour, B. (2005). *Reassembling the social: An introduction to actor-network theory*. Oxford University Press Inc., New York.
- Lauterbach, K. (2017, June 8). We wear culture: Discover why we wear what we wear with Google Arts & Culture. *The Keyword*. Retrieved from <https://www.blog.google/topics/arts-culture/we-wear-culture-discover-why-we-wear-what-we-wear/>
- Law, J. (1986). On the methods of long distance control: Vessels, navigation and the Portuguese route to India. In J. Law (Ed.), *Power, action and belief: A new sociology of knowledge?* (pp. 234-263). Boston: Routledge.
- Law, J. (1987). Technology and heterogenous engineering: The case of Portuguese expansion. In W. E. Wijker, T. P. Hughes, & T. J. Pinch (Eds.), *The social construction of technological systems*. Cambridge, MA: MIT Press.

- Law, J. (1992). Notes on the theory of the actor-network: Ordering, strategy, and heterogeneity. *Systems Practices*, 5, 379–393.
- Law, J. (2009). Actor-network theory and material semiotics. In B. S. Turner (Ed.), *The new Blackwell companion to social theory*. Blackwell Publishers.
- Law, J., & Mol, A. (2003, December 8). Situating technoscience: An inquiry into spatialities. Lancaster LA1 4YN, UK: Centre for Science Studies, Lancaster University. Retrieved from <http://www.lancaster.ac.uk/fass/resources/sociology-online-papers/papers/law-mol-situating-technoscience.pdf>
- Lee, N., & Brown, S. (1994). Otherness and the actor network: The undiscovered continent. *American Behavioral Scientist*, 36(6), 772-790.
- Lessig, L. (2004). *Free culture: How big media uses technology and the law to lock down culture and control creativity*. New York: Penguin.
- Lessig, L. (2008). *Remix: Making art and commerce thrive in the hybrid economy*. New York: Penguin. Retrieved from <http://dx.doi.org/10.5040/9781849662505>
- Letter to Google C.E.O. (2018). *The New York Times*. Retrieved from <https://static01.nyt.com/files/2018/technology/googleletter.pdf>
- Levy, S. (2011). *In the plex: How Google thinks, works, and shapes our lives*. New York: Simon and Schuster.
- Lewis, M., Yarats, D., Dauphin, Y. N., Parikh, D., & Batra, D. (2017, June). Deal or no deal? End-to-end learning for negotiation dialogues. *Eprint arXiv:1706.05125* [cs.AI]. Retrieved from <https://arxiv.org/pdf/1706.05125.pdf>
- Li et al. (2014). Channeling science information seekers' attention? A content analysis of top-ranked vs. lower-ranked sites in Google. *Journal of Computer-Mediated Communication*, 19, 562–575. Doi: doi:10.1111/jcc4.12043
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.
- LinkedIn Crossan. (n.d.). Steve Crossan user profile. *LinkedIn*. Retrieved from <https://www.linkedin.com/in/stevecrossan/>
- LinkedIn Nemroff. (n.d.). Lauren Nemroff user profile. *LinkedIn*. Retrieved from <https://www.linkedin.com/in/lauren-nemroff-aa15b36/>
- LinkedIn Sood. (n.d.). Amit Sood user profile. *LinkedIn*. Retrieved from <https://www.linkedin.com/in/amitsood85/>
- Livingstone, R. (2011). Better at life stuff: Consumption, identity, and class in Apple. *Journal of Communication Inquiry*, 35(3), 210-234.
- Luo, M. (2018, January 17). Exploring art (through selfies) with Google Arts & Culture. *The Keyword*. Retrieved from <https://blog.google/topics/arts-culture/exploring-art-through-selfies-google-arts-culture/>
- Lyon, D. (2007). *Surveillance studies*. London: Polity.
- Maguire, G. (1995). *Wicked: The life and times of the wicked witch of the west*. New York: Harper.

- Manjoo, F. (2017, May 10). Tech's frightful five: They've got us. *The New York Times*. Retrieved from <https://www.nytimes.com/2017/05/10/technology/techs-frightful-five-theyve-got-us.html>
- Markham, A. N., & Baym, N. K. (2009). *Internet inquiry: Conversations about method*. Los Angeles: Sage Publications.
- Marx, K. (1976). *Capital: A critique of political economy* (1st vol.). (B. Fowkes, Trans.). London: Penguin. (Original work published 1867).
- Material. (n.d.). In *Oxford Dictionaries online*. Retrieved from <https://en.oxforddictionaries.com/definition/material>
- Materiality. (n.d.). In *Oxford Dictionaries online*. Retrieved from <https://en.oxforddictionaries.com/definition/materiality>
- Maxwell, J. A. (2012). *A realist approach for qualitative research*. Los Angeles, London, New Delhi, Singapore, Washington D.C.: Sage Publications, Inc.
- McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (1955). A proposal for the Dartmouth Summer Research Project on artificial intelligence. Retrieved from <http://raysolomonoff.com/dartmouth/boxa/dart564props.pdf>
- McClellan, A. (1994). *Inventing the Louvre: Art, politics, and the origins of the modern museum in eighteenth-century Paris*. Cambridge University Press.
- McClelland, C. (2017, December 4). The difference between artificial intelligence, machine learning, and deep learning. *Medium*. Retrieved from <https://goo.gl/nTRjHL>
- McKay, J., & Marshall, P. (2005) A review of design science in information systems. In *Proceedings of the 16th Australasian Conference on Information Systems*, Sydney, Australia.
- McLean, C., & Hassard, J. (2004). Symmetrical absence/symmetrical absurdity: Critical notes on the production of actor-network accounts. *Journal of Management Studies*, 41, 493-519. 10.1111/j.1467-6486.2004.00442.x.
- Meillassoux, Q. (2008). *After finitude*. (R. Brassier, Trans.). London: Continuum. (Original work published 2006). Retrieved from <https://altexploit.files.wordpress.com/2017/06/quentin-meillassoux-ray-brassier-alain-badiou-after-finitude--an-essay-on-the-necessity-of-contingency-bloomsbury-academic-continuum-2009.pdf>
- Melchione, B. (n.d.). George Peaslee invites us into the 3D canvas of virtual reality. *Crixeo*. Retrieved from <https://www.crixeo.com/virtual-reality-george-peaslee/>
- Metro-Goldwyn-Mayer. (1939). *The Wizard of Oz*. [Musical Motion Picture]. With Fleming, V. (Director), LeRoy, M. (Producer), Langley, N., Ryerson, F., Woolf, E. A. (Screenplay), Harburg, E. Y. (Lyricist), Arlen, H., & Stothart, H. (Composers). United States, Metro-Goldwyn-Mayer.
- Metz, C. (2016, February 29). Google's artificial brain is pumping out trippy-and pricey-art. *Wired*. Retrieved from <https://www.wired.com/2016/02/googles-artificial-intelligence-gets-first-art-show/>

- Mol, A. (2002). *The body multiple: Ontology in medical practice*. Durham, NC: Duke University Press.
- Mol, A. (2010). Actor-network theory: Sensitive terms and enduring tensions. *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, 50(1), 253-269.
- MOMA Exhibitions Van Gogh. (2008). *Van Gogh and the Colors of the Night*. Museum of Modern Art, New York, NY. Retrieved from <https://www.moma.org/interactives/exhibitions/2008/vangoghnight/flashsite/>
- MOMA Identifying Art. (n.d.). Identifying art through machine learning: A project with Google Arts & Culture Lab. *MOMA*. Retrieved from <https://www.moma.org/calendar/exhibitions/history/identifying-art>
- MOMA Master Check List. (1941, September 30). Museum of Modern Art acquires important van Gogh. *MOMA*. Retrieved from https://www.moma.org/documents/moma_master-checklist_325261.pdf
- MOMA Press Release. (1941, September 30). Museum of Modern Art acquires important van Gogh. *MOMA*. Retrieved from https://www.moma.org/documents/moma_press-release_325262.pdf
- MOMA Provenance Research Project. (n.d.). Provenance Research Project. *MOMA*. Retrieved from <https://www.moma.org/collection/works/79802?locale=en>
- MOMA Design Store. (n.d.). The Starry Night. *MOMA Design Store*. Retrieved from <https://store.moma.org/search-results?q=the+starry+night&lang=default>
- Monet, C. (1925). *Wisteria* [oil painting]. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/asset/wisteria/EwEH4h2MbYBjOw>
- Mordvintsev, A., Olah, C., & Tyka, M. (2015, June 17). Inceptionism: Going deeper into neural networks. *Google Research Blog*. Retrieved from <https://research.googleblog.com/2015/06/inceptionism-going-deeper-into-neural.html>
- Morton, T. (2015, November). Charisma and causality. *ArtReview*. Retrieved from https://artreview.com/features/november_2015_feature_timothy_morton_charisma_causality/
- Morville, P. (2005). *Ambient findability: What we find changes who we become*. Sebastopol, CA: O'Reilly Media.
- Munch, E. (1893). *Starry Night* [oil painting]. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/asset/starry-night/3QFU0VI38eLOcA?hl=en>
- Munch, E. (1922/1924). *Starry Night* [oil painting]. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/asset/starry-night/yAGe5le4bzd55A?hl=en>
- Murdoch, J. (2001). Ecologising sociology: Actor-network theory, co-construction and the problem of human exemptionalism. *Sociology*, 35(1), 111–133. <http://doi.org/10.1177/0038038501035001008>
- Nahon, K., & Hemsley, J. (2013). *Going viral*. Cambridge, United Kingdom: Polity Press.

- Narkar, S. (2017, August 2). Mark Zuckerberg and Elon Musk – The great debate on artificial intelligence. *LinkedIn*. Retrieved from <https://www.linkedin.com/pulse/mark-zuckerberg-elon-musk-great-debate-artificial-sameer-narkar>
- National Association for Media Literacy Education. (2010, April 6). Media Literacy. *National Association for Media Literacy Education*. Retrieved from <http://namle.net/publications/media-literacy-definitions/>
- Niccolai, M. (2017, May 31). Searching for art just got better. Where will you start? *The Keyword*. Retrieved from <https://blog.google/products/search/searching-art-just-got-better-where-will-you-start/>
- Noordegraaf, J. (2004). *Strategies of display: Museum presentation in nineteenth-and twentieth-century visual culture*. Rotterdam: Museum Boijmans Van Beuningen.
- Nunamaker, J. F., Chen, M., & Purdin, T. D. M. (1991). Systems development in information systems research. *Journal of Management Information Systems*, 7(3), 89-106.
- Olson, S. R. (2004). The extensions of synergy. *Journal of Promotion Management*, 10(1-2), 65-87.
- Osterwalder, A. (2004). *The business model ontology a proposition in a design science approach* (Doctoral Theses). University of Lausanne, Switzerland. Retrieved from http://www.hec.unil.ch/aosterwa/PhD/Osterwalder_PhD_BM_Ontology.pdf
- Osterwalder, A., & Pigneur, Y. (2013). *Business model generation: A handbook for visionaries, game changers, and challengers*. Hoboken, NJ [etc.]: Wiley. (Original work published 2010).
- Pariser, E. (2011). *The Filter Bubble*. New York: Penguin.
- Patarin, S. (2014, April 7). *Working at Google: The example of the Cultural Institute* [PDF document]. Retrieved from <http://igm.univ-mlv.fr/~cdavid/fr/cours/L3/2014-03-GoogleCulturalInstitute.pdf>
- Pateli, A., & G. Giaglis (2003). A framework for understanding and analysing e-business models. *BLED 2003 Proceedings*. 4. Retrieved from <http://aisel.aisnet.org/bled2003/4>
- Peaslee, G. (2016, October 4). Starry Night diorama Tilt Brush. *Sketchfab*. Retrieved from <https://sketchfab.com/models/3e0b5185d1f8435b993e1bad2f82928e>
- Performing Arts. (n.d.). In *Oxford Dictionaries online*. Retrieved from https://en.oxforddictionaries.com/definition/performing_arts
- Petersen, L. K. (2013). The materiality of everyday practices in urban greenspace. *Journal of Environmental Policy & Planning*, 15(3), 353–370. <http://doi.org/10.1080/1523908X.2013.766576>
- Pfanner, E. (2011, November 20). Quietly, Google puts history online. *The New York Times*. Retrieved from <http://www.nytimes.com/2011/11/21/technology/quietly-google-puts-history-online.html>
- Phelps, L. W. (2003, March). How we take responsibility for inquiry: An account of accountability. Paper presented at the Conference on College Composition and Communication, New York City, NY.

- Pickering, A. (1995). *The mangle of practice: Time, agency, and science*. Chicago: University of Chicago Press. <http://dx.doi.org/10.7208/chicago/9780226668253.001.0001>
- Pizonka, S., Lechtreck, H.-J., Lüttichau, M. V., & Daners, P. (2016). Vincent van Gogh up close. Museum Folkwang. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/exhibit/UQKy1roGr95tKw>
- Plato. (1892). *The Dialogues of Plato: Tr. Into English, with Analyses and Introductions, Volume 4*. (B. Jowett, Trans.). New York, NY: Oxford University Press. (Original work published 360 B.C.E). Retrieved from <https://goo.gl/7SmMi2>
- Potts, L. (2009). Using actor-network theory to trace and improve multimodal communication design. *Technical Communication Quarterly*, 18(3), 281-301.
- Potts, L. (2014). *Social media in disaster response: How experience architects can build for participation (ATTW Series in Technical and Professional Communication)*. Taylor and Francis. Kindle Edition.
- Reid, A. (2012). What is object-oriented rhetoric? *Intineration*. Retrieved from <http://tundra.csd.sc.edu/itineration/node/11>
- Richardson, L. (2000). Writing: A method of inquiry. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 923-948). Thousand Oaks, CA: Sage.
- Rogers, R. (2013). *Digital methods*. Cambridge, Massachusetts: The MIT Press.
- Roosth, S., & Silbey, S. (2009). Science and technology studies: From controversies to posthumanist social theory. In B. S. Turner (Ed.), *The new Blackwell companion to social theory* (3rd ed., pp. 452-473). Oxford: Blackwell.
- Roth, D. (1997/1998). Solo Scenes [media installation]. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/asset/solo-scenes/QwGAKr7vjJiGNw>
- Salmons, J. (2015). *Qualitative online interviews*. London & Thousand Oaks, CA: Sage Publications.
- Salkever, A. (2003, December 16). Google here, there, and everywhere. *BusinessWeek Online*. Retrieved from http://www.businessweek.com/technology/content/dec2003/tc20031216_9018_tc047.htm
- Schmidt, E., & Rosenberg, J. (2014). *How Google works*. Grand Central Publishing.
- Schwartz, L. (2013, March 4). Introducing Art Talks on Google+. *Google Blog*. Retrieved from <https://googleblog.blogspot.nl/2013/03/introducing-art-talks-on-google.html>
- Seales, B. W., Crossan, S., Yoshitake, M., & Girgin, S. (2013). From assets to stories via the Google Cultural Institute platform. *2013 IEEE International Conference on Big Data*.
- Semko, E. (2018, January 19). Google Arts app matches St. Louis woman with portrait of her own grandmother. *Riverfront Times*. Retrieved from <https://www.riverfronttimes.com/artsblog/2018/01/19/google-arts-app-matches-st-louis-woman-with-portrait-of-her-own-grandmother>
- Serres, M. (1974). *Hermès III, la traduction*. Paris: Minuit.

- Shane, S., & Wakabayashi, D. (2018, April 4). 'The business of war': Google employees protest work for the Pentagon. *The New York Times*. Retrieved from <https://www.nytimes.com/2018/04/04/technology/google-letter-ceo-pentagon-project.html>
- Sheehan, J. J. (2000). *Museums in the German art world from the end of the old regime to the rise of modernism*. New York: Oxford University Press.
- Shinn-Morris, L. (n.d.). 10 things you might not know about Vincent van Gogh. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/theme/agLStrYjblBRKA>
- Sood, A. (2013, April 15). Taking a minute to enjoy some art on World Art Day. *The Keyword*. Retrieved from <https://blog.google/topics/arts-culture/taking-minute-to-enjoy-some-art-on/>
- Sood, A. (2015, December 1). Step on stage with the Google Cultural Institute. *Google Blog*. Retrieved from <https://googleblog.blogspot.co.uk/2015/12/step-on-stage-with-google-cultural.html>
- Sood, A. (2016a, January 21). From self-portraits to street art: 1,000 museums at your fingertips. *The Keyword*. Retrieved from <https://blog.google/topics/arts-culture/from-self-portraits-to-street-art-1000/>
- Sood, A. (2016b, June 29). Every piece of art you've ever wanted to see -- up close and searchable, Amit Sood. *YouTube*. Retrieved from <https://youtu.be/CjB6DQGalU0>
- SoulPancake. (2017, August 2). Step inside van Gogh's 'Starry Night' with virtual reality!, Art attack master works. *YouTube*. Retrieved from <https://youtu.be/Woc0GZkDa7k>
- Spinuzzi, C. (2008). *Network: Theorizing knowledge work in telecommunications*. Cambridge: Cambridge University Press.
- Spinuzzi, C. (2011). Losing by expanding: Corraling the runaway object. *Journal of Business and Technical Communication*, 25(4): 449–86. Retrieved from <https://repositories.lib.utexas.edu/bitstream/handle/2152/28330/SpinuzziLosingbyExpanding.pdf?sequence=4&isAllowed=y>
- Stähler, P. (2001). Geschäftsmodelle in der digitalen Ökonomie. *Merkmale, Strategien und Auswirkungen*. MCM. St.Gallen, University of St.Gallen HSG.
- Stähler, P. (2002, October 4-5). Business models as an unit of analysis for strategizing. In *Proceedings of the International Workshop on Business Models*, Lausanne, Switzerland.
- Stanford Encyclopedia of Philosophy. (2012). Leibniz's influence on Kant. *Stanford University*. (Original work published 2004). Retrieved from <https://plato.stanford.edu/entries/kant-leibniz/>
- Star, S. L., & Griesemer, J. R. (1989). Institutional ecology, 'translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science*, 19(3), 387–420. <http://doi.org/10.1177/030631289019003001>
- Stepanek, M. (2009, March 6). Remix Culture. *Stanford Social Innovation* [blog]. Retrieved from https://ssir.org/articles/entry/remix_culture

- Stogner, M. (2013). Searching for Aristotle in the digital age: Creating cultural narrative with 21st century media technologies. *The International Journal of New Media, Technology, and the Arts*, 8.
- Strategyzer AG. (n.d.). The business model canvas. *Strategyzer*. Retrieved from <https://assets.strategyzer.com/assets/resources/the-business-model-canvas.pdf>
- Strinati, D. (2004). *An introduction to theories of popular culture*. London: Routledge.
- Sullivan, D. (2007, February 2). Google ramps up personal search. *Search Engine Land*. Retrieved from <http://searchengineland.com/google-ramps-up-personalized-search-10430>
- Tamen, M. (2010). *What art Is like: In constant reference to the Alice books*. Cambridge, MA: Harvard University Press.
- Tanev, S., Storni, C., & Stuedahl, D. (2015). Special issue on actor-network theory, value cocreation and design in open innovation environments. *International Journal of Actor-Network Theory and Technological Innovation*, 7(3), iv-ix.
- Thompson, R., & Rodley, E. (2016). The GAP between expectation and reality: A comparative analysis of Google Arts & Culture partner experiences. *Peabody Essex Museum Report*. Retrieved from <http://connected.pem.org/wp-content/uploads/2016/09/Google-Arts-Culture-Report.pdf>
- Tufekci, Z. (2015). Algorithmic harms beyond Facebook and Google: Emergent challenges of computational agency. *Journal on Telecommunications and High Technology Law*, 13, 203-217. Retrieved from <http://ctlj.colorado.edu/wp-content/uploads/2015/08/Tufekci-final.pdf>
- Tufekci, Z. (2018, March 10). YouTube, the great radicalizer. *The New York Times*. Retrieved from <https://www.nytimes.com/2018/03/10/opinion/sunday/youtube-politics-radical.html>
- Van Gogh, V. (1888a). *Starry Night Over the Rhone* [oil painting]. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/asset/starry-night/uQE3XORhSK37Dw?hl=en>
- Van Gogh, V. (1888b). *The Bedroom* [oil painting]. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/asset/the-bedroom/KwF-AdF1REQ16w>
- Van Gogh, V. (1888c). *The Cafe Terrace on the Place du Forum* [oil painting]. *Kroller Muller*. Retrieved from <https://krollermuller.nl/en/vincent-van-gogh-terrace-of-a-cafe-at-night-place-du-forum-1>
- Van Gogh, V. (1889a). *Portrait of Joseph Roulin* [oil painting]. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/asset/portrait-of-joseph-roulin/dgHM8pgTjWF6Cg>
- Van Gogh, V. (1889b). *The Bedroom* [oil painting]. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/asset/the-bedroom/rgHdFPzCeCfnxQ>
- Van Gogh, V. (1889c). *The Olive Trees* [oil painting]. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/asset/the-olive-trees/dQGSvz9nCSYxgw>
- Van Gogh, V. (1889d). *The Starry Night* [oil painting]. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/asset/the-starry-night/bgEuwDxe193-Pg>

- Van Gogh, V. (1889e). Van Gogh's Bedroom in Arles [oil painting]. *Google Arts and Culture*. Retrieved from <https://www.google.com/culturalinstitute/beta/asset/van-gogh-s-bedroom-in-arles/kQEugEsNjGDZfw>
- Van Gogh, V. (1889f). Wheat Field with Cypresses [oil painting]. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/asset/wheat-field-with-cypresses/agF0eS5NNsa0fg>
- Van Gogh, V. (1890). Undergrowth with Two Figures [oil painting]. *Google Arts and Culture*. Retrieved from <https://artsandculture.google.com/asset/undergrowth-with-two-figures/PgGaehoXTiERQQ>
- Vaidhyanathan, S. (2007, September 29). The Googlization of everything wiki. Retrieved from http://wiki.p2pfoundation.net/Googlization_of_Everything
- Vaidhyanathan, S. (2011). *The Googlization of everything: (And why we should worry)*. University of California Press.
- Vidich, A. J., & Lyman, S. M. (2003). Qualitative methods: Their history in sociology and anthropology. In N. K. Denzin & Y. S. Lincoln (Eds.), *The landscape of qualitative research: Theories and issues* (2nd ed., pp. 55–99). Thousand Oaks, CA: SAGE Publications, Inc.
- Visnjic, F. (2016, June 4). Bits and pieces-an inverted landscape of always moving Hoberman Spheres [image]. *Creative Applications*. Retrieved from <http://www.creativeapplications.net/environment/bits-and-pieces-an-inverted-landscape-of-always-moving-hoberman-spheres/>
- Visualize. (n.d.). In *Oxford Dictionaries online*. Retrieved from <https://en.oxforddictionaries.com/definition/visualize>
- Walls, J.G., Widmeyer, G.R. & El Sawy, O.A. (1992). Building an Information System Design Theory for Vigilant EIS. *Information Systems Research*, 3(1), 36-59.
- Walsh, M. (2011). *Multimodal literacy: Researching classroom practice*. Newtown, New South Wales: Primary English Teaching Association (e:lit).
- Weber, S. (2010). Design science research: Paradigm or approach? In *AMCIS 2010 Proceedings*, 214. Retrieved from <http://aisel.aisnet.org/amcis2010/214>
- Weinberger, D. (2012). *Too big to know: Rethinking knowledge now that the facts aren't the facts, experts are everywhere, and the smartest person in the room is the room*. New York: Basic Books.
- Wood, E. (2016, September 29). The Keyword: Is this thing on?. *The Keyword*. Retrieved from <https://blog.google/topics/inside-google/introducing-the-keyword-our-new-official-blog/>
- Wrye, J. (2012). *Nutritionism and the making of modern pet food*. (Doctoral Dissertation). Carleton University, Ontario, Canada. Retrieved from https://curve.carleton.ca/system/files/etd/a8a2ed23-de03-4fbf-8d95-a3633e1bbc66/etd_pdf/7daa2c2e49f9ba261548fd220eab3f52/wrye-nutritionismandthemakingofmodernpetfood.pdf
- Yearly, S. (1988). Argumentation, epistemology and the sociology of language. *Argumentation*, 2(3), 351-367. <https://doi.org/10.1007/BF0017697>

- Zolnowski, A., Schmitt, A. K., & Böhmman, T. (2011a). Understanding the impact of remote service technology on service business models in manufacturing: From improving after-sales services to building service ecosystems. In *ECIS 2011 Proceedings*.
- Zolnowski, A., Semmann, M., & Böhmman, T. (2011b). Metamodels for representing service business models. In *Proceedings of SIGSVC Workshop*.
- Zolnowski, A., Semmann, M., & Böhmman, T. (2012). Vergleich Von Metamodellen Zur Repräsentation Von Geschäftsmodellen Im Service. In Thomas, O. & Nüttgens, M., (Eds.), *Dienstleistungsmodellierung 2012 - Vom Servicemodell Zum Anwendungssystem* (pp. 26-48). Physica, Heidelberg.
- Zott, C., Amit, R., & Massa, L. (2011). The business model: Theoretical roots, recent development, and future research. *Journal of Management*, 37(4), 1019-1042.



Research Integrity & Compliance Review Office
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011 eprotocol
TEL: (970) 491-1553
FAX: (970) 491-2293

may be made to this document without first obtaining the approval of the IRB. NOTE: Please submit an amendment via eProtocol to include the letter of email of support from Google upon receipt.

Approval Period:	May 08, 2017 through April 24, 2018
Review Type:	EXPEDITED
IRB Number:	00000202

NOTICE OF APPROVAL FOR HUMAN RESEARCH

DATE: May 11, 2018
TO: Champ, Joseph, Journalism & Technical Commun
Luft, Gregory, Journalism & Technical Commun, Stone, Leah, Journalism & Technical Commun
FROM: Swiss, Evelyn, CSU IRB 2
PROTOCOL TITLE: Googlization, Innovation, and Participation in Cultural Digital Space: Experience Architecture Maps of the Google Cultural Institute
FUNDING SOURCE: NONE
PROTOCOL NUMBER: 17-7199H
APPROVAL PERIOD: Approval Date: April 24, 2018 Expiration Date: April 23, 2019

The CSU Institutional Review Board (IRB) for the protection of human subjects has reviewed the protocol entitled: Googlization, Innovation, and Participation in Cultural Digital Space: Experience Architecture Maps of the Google Cultural Institute. The project has been approved for the procedures and subjects described in the protocol. This protocol must be reviewed for renewal on a yearly basis for as long as the research remains active. Should the protocol not be renewed before expiration, all activities must cease until the protocol has been re-reviewed.

Important Reminder: If you will consent your participants with a signed consent document, it is your responsibility to use the consent form that has been finalized and uploaded into the consent section of eProtocol by the IRB coordinators. Failure to use the finalized consent form available to you in eProtocol is a reportable protocol violation.

If approval did not accompany a proposal when it was submitted to a sponsor, it is the PI's responsibility to provide the sponsor with the approval notice.

This approval is issued under Colorado State University's Federal Wide Assurance 00000647 with the Office for Human Research Protections (OHRP). If you have any questions regarding your obligations under CSU's Assurance, please do not hesitate to contact us.

Please direct any questions about the IRB's actions on this project to:

IRB Office - (970) 491-1553; RICRO_IRB@mail.Colostate.edu

Evelyn Swiss, Senior IRB Coordinator - (970) 491-1381; Evelyn.Swiss@Colostate.edu

Tammy Felton-Noyle, IRB Biomedical Coordinator - (970) 491-1655; Tammy.Felton-Noyle@Colostate.edu



Swiss, Evelyn

Approval is to continue to analyze data collected per the approved protocol and to continue to recruit the remaining 33 participants with the approved recruitment and consent.



Knowledge to Go Places

Research Integrity & Compliance Review Office
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011 eprotocol
TEL: (970) 491-1553
FAX: (970) 491-2293

Approval Period:	April 24, 2018 through April 23, 2019
Review Type:	EXPEDITED
IRB Number:	00000202

APPENDIX B: RECRUITMENT MATERIALS

RECRUITMENT EMAIL DRAFT

Hello,

My name is Leah Stone and I am a doctoral student and researcher from Colorado of State University in the Department of Journalism and Media Communication. For my dissertation research, I am conducting a study about how people use and participate with the Google Cultural Institute.

What I'm looking for:

Participants who

- Work or have worked at Google and/or its Cultural Institute, or
- Work at a cultural institution that has partnered with the Cultural Institute, and/or
- Those who use the Cultural Institute digital platform for fun, educational purposes, and/or for artistic/cultural experiences.

What will be requested of you?

- You will be asked to talk about how you participate (use, work, create, curate, collaborate) with the Cultural Institute during an informal interview (approximately 60 minutes).
- Additionally, you will be asked to provide a link to your Cultural Institute profile so that I can explore your curated collection.

Participation Details, Benefits, and Risks:

- Your participation would be completely voluntary. If you decide to participate, you may withdraw your consent and stop participation at any time without penalty.
- If you are not able to devote at least 60 minutes of your time, you should not participate. Additionally, if you have not used the Cultural Institute within the last year to curate your own and/or view other digital collections, you should not participate (only applicable to regular users; not applicable to creators, employees, engineers, and partners of CI).
- There are no direct benefits to participating in the study. However, participating may help you generate a better understanding of your personal Cultural Institute use.
- There are no known risks for participating in this study. If you consider any question to be too sensitive, you are free not to answer it. However, all of your answers are important to us.

If you are willing to participate in an interview, please email me at leah.stone@colostate.edu. When I receive your email, I will provide an electronic informed consent form, which provides additional details about this study and your participation. Depending on the type of interview we set up (in person or online), I will either bring a hard copy or send you a digital copy of the informed consent form and ask you to sign at that time.

If you have any questions about the research, please contact me via email at the address listed above. I appreciate your time and look forward to hearing from you.

Sincerely,
Leah Stone

SAMPLE TEXT FOR RECRUITMENT ON SOCIAL MEDIA

I'm a Ph.D. student at Colorado State and I'm just beginning my doctoral dissertation research on how people use and participate with the Google Cultural Institute. I'm looking for participants who work at Google, work at the Cultural Institute, work at a cultural institution that has partnered with the Cultural Institute, and those who use the Cultural Institute digital platform for fun, educational purposes, and/or artistic/cultural experiences.

Through the whole study, as always, any information you submit will be confidential. As social scientists, we are held to high standards of ethics, lawfulness, and good science. The project has been approved by Colorado State University's review board and adheres to federal standards for protecting your rights and your privacy as a research participant.

If you have any questions at all, please let me know. Thanks. Leah Stone.
leah.stone@colostate.edu

APPENDIX C: INFORMED CONSENT FORM

Consent to Participate in a Research Study Colorado State University

Thank you for your interest in participating in this study. The following information is provided so that you may make an informed decision about participating in this research. This protocol and the following information have been approved by Colorado State University's Institutional Review Board.

TITLE OF STUDY: Googlization, Innovation, and Participation in Cultural Digital Space: Experience Architecture Maps of the Google Cultural Institute

PRINCIPAL INVESTIGATOR:

Dr. Joseph Champ, Associate Professor
Department of Journalism and Media Communication
Colorado State University
E-mail – joseph.champ@colostate.edu
Phone – 970.391.4938

CO-PRINCIPAL INVESTIGATOR:

Leah Stone, Doctoral Candidate
Department of Journalism and Media Communication
Colorado State University
E-mail – leah.stone@colostate.edu
Phone – 801.809.1258

WHY AM I BEING INVITED TO TAKE PART IN THIS RESEARCH?

You are invited to participate in this study based on your indication of contributing to and using the Cultural Institute digital platform. The purpose of this research is to explore how people feel about and use the Google Cultural Institute digital platform. Your insight will greatly contribute to this study.

WHO IS CONDUCTING THE STUDY?

This study is being conducted by Leah Stone to fulfill requirements for her doctoral program. She is working under the guidance of her doctoral committee chair, Dr. Joseph Champ.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this study is to examine how people feel about and use the Google Cultural Institute digital platform, as well as the purpose and reason(s) for this use.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

You will be asked to participate in an interview lasting approximately 60 minutes. The interview

can take place at a location of your choosing (e.g., online, your home, a coffee shop, or your office). The interview will be audio/video recorded to help the researcher retain all information that is shared.

Additionally, we are seeking participants who work at the Cultural Institute or work for cultural institutions who have partnered with the CI and who would be willing to let the researcher come in and observe your institution's public space.

WHAT WILL I BE ASKED TO DO?

You will be asked to engage in a conversation about how and why you use(d) the Cultural Institute digital platform. Additionally, you will be asked to share the URL to your Cultural Institute profile so that the researcher can study your digital collections before the interview takes place. During the interview, you may be asked questions about the content found on your collection.

ARE THERE REASONS WHY I SHOULD NOT TAKE PART IN THIS STUDY?

You should not participate in this study if:

- You are unable to devote at least 60 minutes of your time for an interview.
- You are unable to share your Cultural Institute profile URL and consent to your digital collection being studied (only applicable to regular users; not applicable to creators, employees, engineers, and partners of CI).
- You do not use (or have not used) the Cultural Institute digital platform to curate, create and/or view collections within the last year (only applicable to regular users; not applicable to creators, employees, engineers, and partners of CI).

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There are no known risks for participating in this study. If you consider any question to be too sensitive, you are free not to answer it. However, all of your answers are important. It is not possible to identify all potential risks in research procedures, but the researchers have taken reasonable safeguards to minimize any known and potential, but unknown, risks.

ARE THERE ANY BENEFITS FROM TAKING PART IN THIS STUDY?

While there are no direct benefits to you for participating in this study, we hope to gain a better understanding of how people use the Cultural Institute, how art and culture artifacts are digitally preserved and how to build participatory technology platforms in general.

DO I HAVE TO TAKE PART IN THE STUDY?

Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled.

WHO WILL SEE THE INFORMATION THAT I GIVE?

We will keep private all research records that identify you, to the extent allowed by law. All interviews will be kept confidential, your personal information (your name, title, place of employment, email address) will be stored separately from your interview answers, recording and transcript. Only the PI and co-PI will have access to the interview submissions and

documents. For this study, we will assign a code to your data (001) so that the only place your name will appear in our records is in the consent form and in our data spreadsheet which links you to your code. Only the research team will have access to the link between you, your code, and your data.

The only exceptions to this are if we are asked to share the research files for audit purposes with the CSU Institutional Review Board ethics committee, if necessary. When we write about the study to share with other researchers, we will write about the combined information we have gathered. You will not be identified in these written materials. We may publish the results of this study; however, we will keep your name and other identifying information private.

All data will be secured and destroyed three years after the submission of this project.

WILL I RECEIVE ANY COMPENSATION FOR TAKING PART IN THIS STUDY?

You will receive no compensation for participating in this study.

WHAT IF I HAVE QUESTIONS?

If you have questions about the study, you can contact the Co-Primary Investigator: Leah Stone at leah.stone@colostate.edu.

If you have any questions about your rights as a volunteer in this research, contact CSU's Institutional Review Board at RICRO_IRB@mail.colostate.edu; 970-491-1553.

We will give you a copy of this consent form.

Following the interview and/or observation, we may possibly follow-up with emails if clarification on anything we talked about is needed.

Sincerely,

Joseph Champ
Assistant Professor
Principal Investigator

Leah Stone
PhD Student
Co-Principal Investigator

Participant confirms participation in multiple activities: observation, interview, photographs.

Please initial by each research activity listed below that you are volunteering to participate in.

- Researchers can observe me in the course of my daily work activities ____ (initials)
- I will participate in an interview ____ (initials)
- Researchers may take photos of me ____ (initials)
- Researchers can observe the institution space ____ (initials)
- Researchers may take photos of the institution space and artifacts ____ (initials)

Permission to re-contact:

Do you give permission for the researchers to contact you again in the future to follow-up on this study or to participate in new research projects? Please initial next to your choice below.

- Yes _____ (initials)
- No _____ (initials)

Permission to audiotape/videotape interviews or interventions:

The researchers would like to audiotape/videotape your interview to be sure that your comments are accurately recorded. Only our research team will have access to the audiotapes, and they will be destroyed when they have been transcribed

Do you give the researchers permission to audiotape/videotape your interview? Please initial next to your choice below.

- Yes, I agree to be digitally recorded _____ (initials)
- No, do not audiotape my interview _____ (initials)

Permission to use direct quotes:

Please let us know if you would like your comments to remain confidential or attributed to you. Please initial next to your choice below.

- I give permission for comments I have made to be shared using my exact words and to include my (name/position/title). _____ (initials)
- You can use my data for research and publishing, but do NOT associate my (name/position/title) with direct quotes. _____ (initials)

Your signature acknowledges that you have read the information stated and willingly sign this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing 5 pages.

Signature of person agreeing to take part in the study Date

Printed name of person agreeing to take part in the study

Name of person providing information to participant Date

Signature of Research Staff

APPENDIX D: SUMMARY OF INTERVIEW SCRIPT AND QUESTION GUIDES

INTERVIEW QUESTION GUIDES

Interview Question Guide (Voice Only)

The following are merely a guide to begin the conversation. As explained in methodology section of dissertation proposal, a key tenet of ANT is to “follow the actors.” That is, start with some guiding questions, then branch off into questions based on what the respondent says. For example, if the participant notes that he/ she really loves the Cultural Institute platform, I might ask a question about why the platform is so special. If he/she were to say that the platform has allowed him/her to experience art in a new way or see artworks he/she has never seen before, I might ask the participant to tell me about this new way to experience art, about certain artworks, about the Cultural Institute platform in general, and how he/she uses the platform.

Hi! <introduce myself and engage in a bit of banter to establish an initial familiarity>

I’m going to tell you a little bit about the project and what I’ll be asking you to do. This project is part of my Ph.D. research on how people feel about and participate with the Google Cultural Institute. There will be **two parts to the project** – this first interview, and then possibly some follow-up emails if I need some clarification on anything we talked about. About a week after the follow-up emails, when I have reviewed all of our conversations and made sure I don’t have any further questions, I will send you a thank you letter for participating.

This interview will be **video and audio recorded** – before we go any further I’d like to make sure this is all right with you. All of the recordings will be edited to make sure your **identity is protected** and that nobody other than me will be able to connect what you say with your name.

<confirm agreement>

Then we’ll go ahead with this interview. The purpose of our conversation today is to help me understand your experiences with the Cultural Institute and how you feel about and use its digital platform. We’ll spend roughly an hour going through some questions, but really my job today is to listen. **You’re the boss** - I encourage you to tell me stories you think are relevant even if I don’t ask a specific question about them – you have total freedom to talk about whatever you want to talk about whether it’s related to the question or not.

Please treat this as a **conversation** instead of as a formal interview, as I’ll probably tell some stories myself, interrupt you if I don’t understand something, and go with the flow of the conversation.

Interview Questions

If Google Employee participant

- What is your role at the Cultural Institute, in other words, what is it you do for the Cultural Institute?
- Describe a typical day in your job with regard to the CI platform?
- Can you walk me through the CI platform from the viewpoint of how you want it to be used by others (eg. Cultural institutions, educators, artists, general public)?
- How have copyright laws created challenges for the CI platform?

If Partner Institution participant

- Why did you decide to partner with the Cultural Institute?
- What steps did you and/or the institution take to deciding to partner with the CI?
- Who made the formal decision?
- Explain the initial CI partnership steps? Did Google send someone out to see your cultural institution?
- Whose job is it to digitally capture the artifacts within the institution for the CI platform?
- Were you trained to use Google's technology (eg. Camera, mapping scan, gigapixel camera, uploading to CI platform, meta-tagging the content, creating stories surrounding the content on the CI platform)?
- Do you find the CI platform easy to use? Why or why not?
- What aspects of the CI platform would make your job easier?
- What aspects of the CI platform make your job challenging?
- How often do you collaborate or participate with or contribute to the CI platform?
- How have copyright laws created challenges with working with the CI platform?

If User participant

- How did you first hear about or find out about the CI?
- What was your first initial reaction to the CI?
- Describe a time you used the CI for educational purposes?
- Describe a time you used the CI platform and something didn't work the way you wanted it to?
- Describe a time you used the CI platform and you were excited/amazed with what you could do?
- What features and/or opportunities would you like available on the CI platform?
- In other words, do you feel it is easy to collaborate on the CI platform?
- How often do you use the CI platform?
- Do you use it to visit places you have already experienced in person or do you use it to visit places you have not experienced in person? Explain.

Wrap up with a thank you and invitation to e-mail with further thoughts.

APPENDIX E: ACTOR-NETWORK THEORY MAPS OF THE DIGITAL CONVIVIAL
 BUSINESS MODEL CANVAS AND MATERIALITY CANVAS

Value Propositions

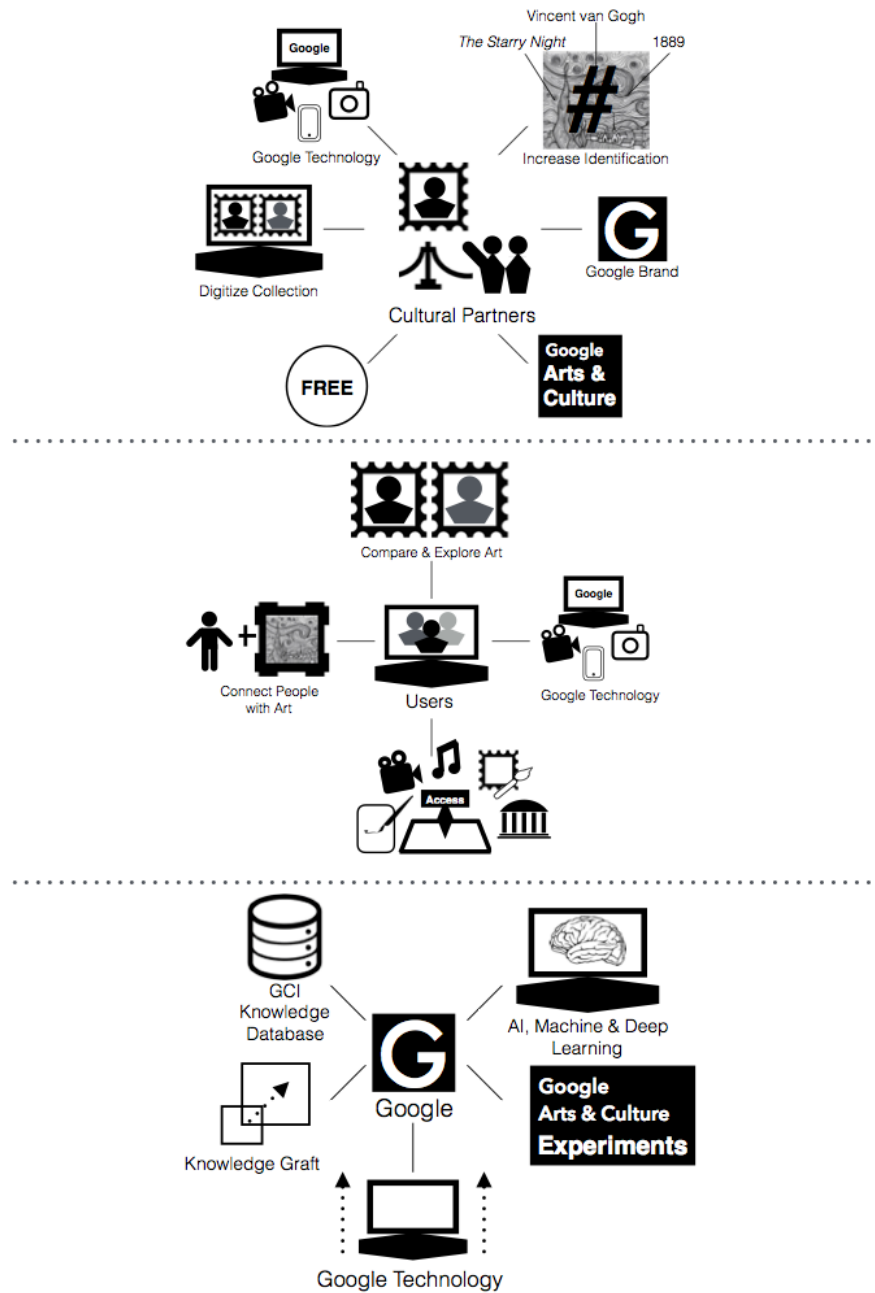


Figure 55. Actor-network theory maps of the Value Proposition block of the Google Cultural Institute Digital Convivial Business Model Canvas.

Customer Segments

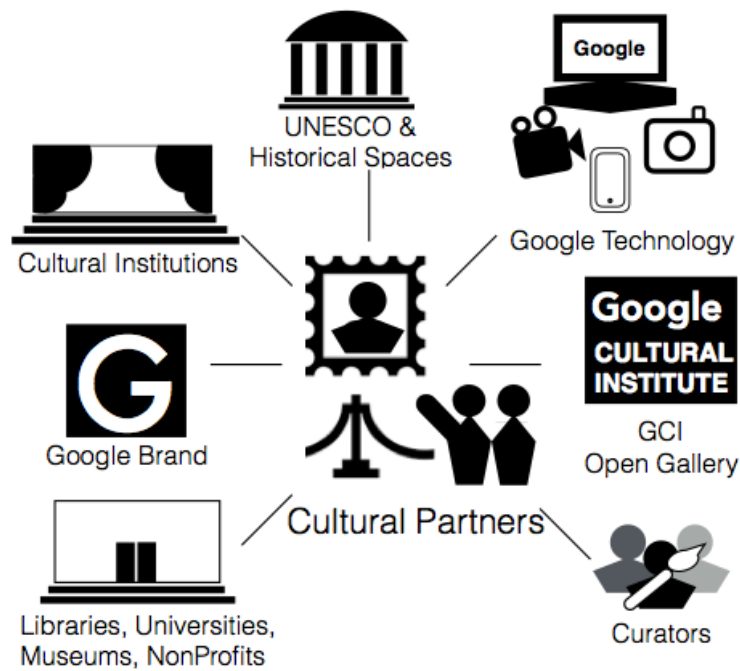
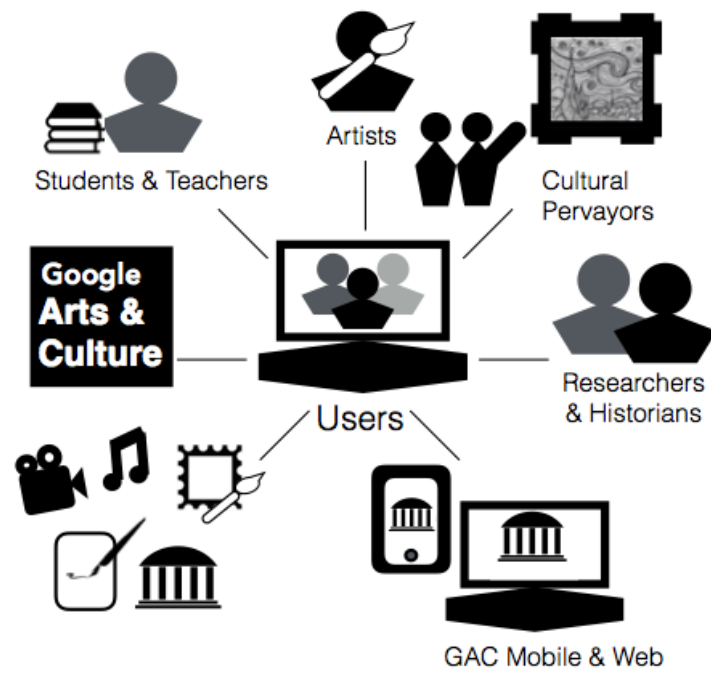


Figure 56. Actor-network theory maps of the Customer Segments block of the Google Cultural Institute Digital Convivial Business Model Canvas.

Customer Relationships

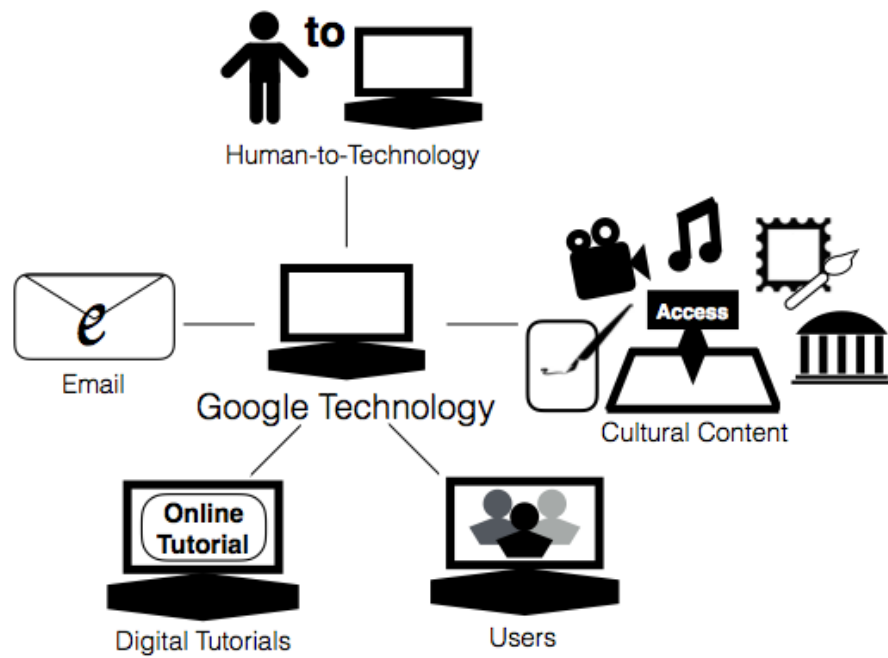
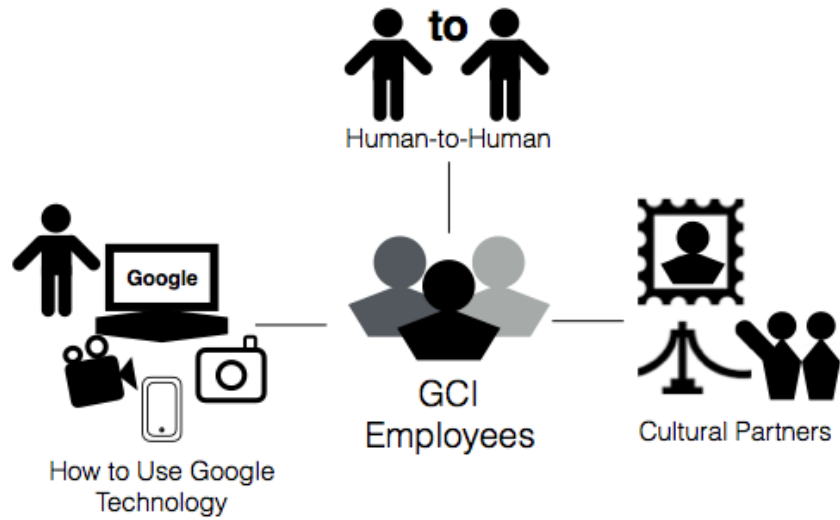


Figure 57. Actor-network theory maps of the Customer Relationships block of the Google Cultural Institute Digital Convivial Business Model Canvas.

Customer Channels

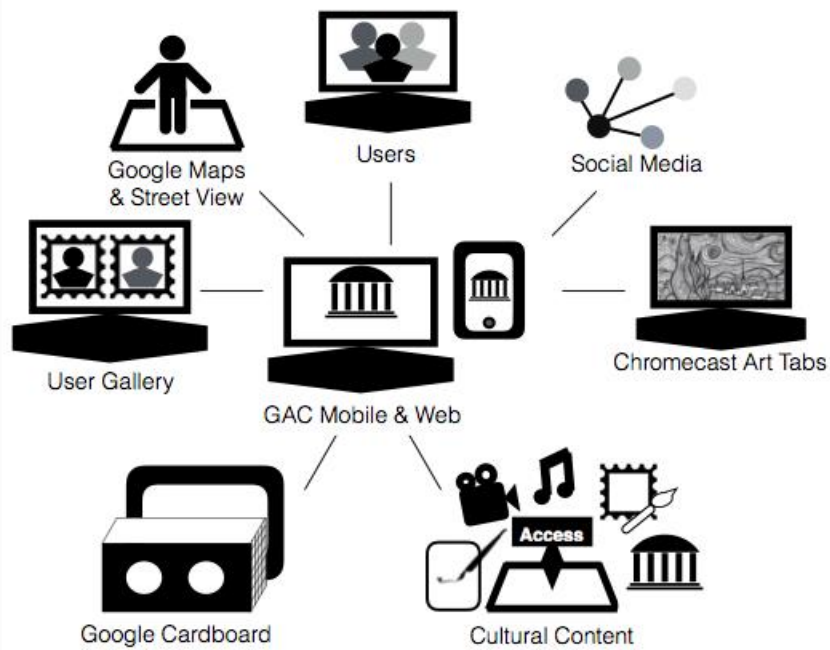
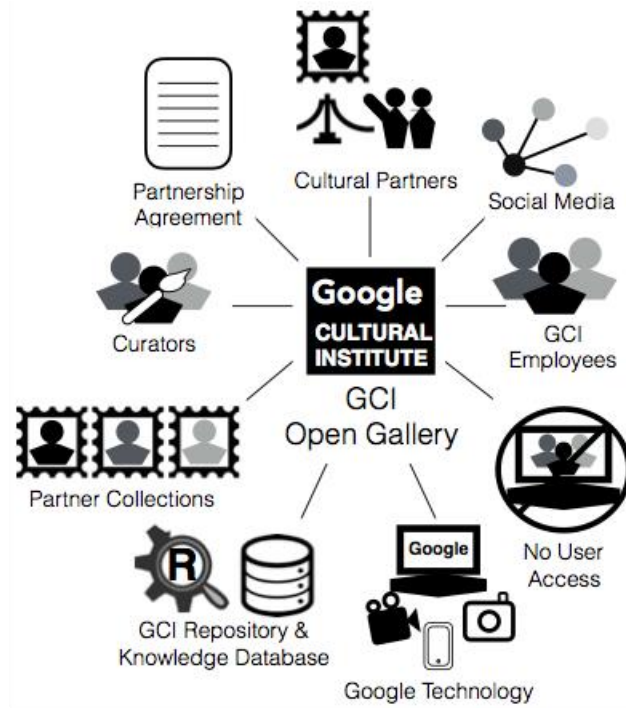


Figure 58. Actor-network theory maps of the Customer Channels block of the Google Cultural Institute Digital Convivial Business Model Canvas.

Participatory Culture

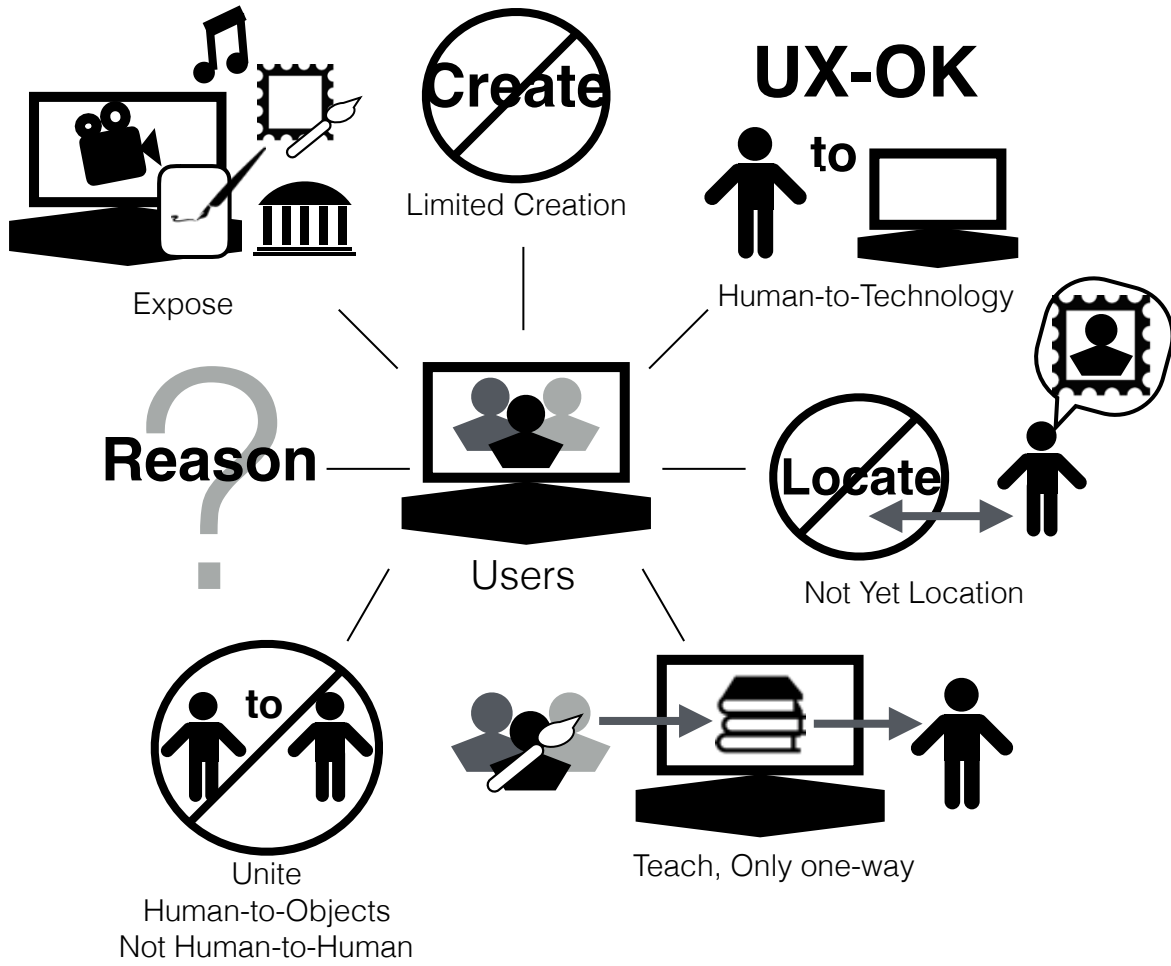


Figure 59. Actor-network theory maps of the Participatory Culture block of the Google Cultural Institute Digital Convivial Business Model Canvas.

Key Partners

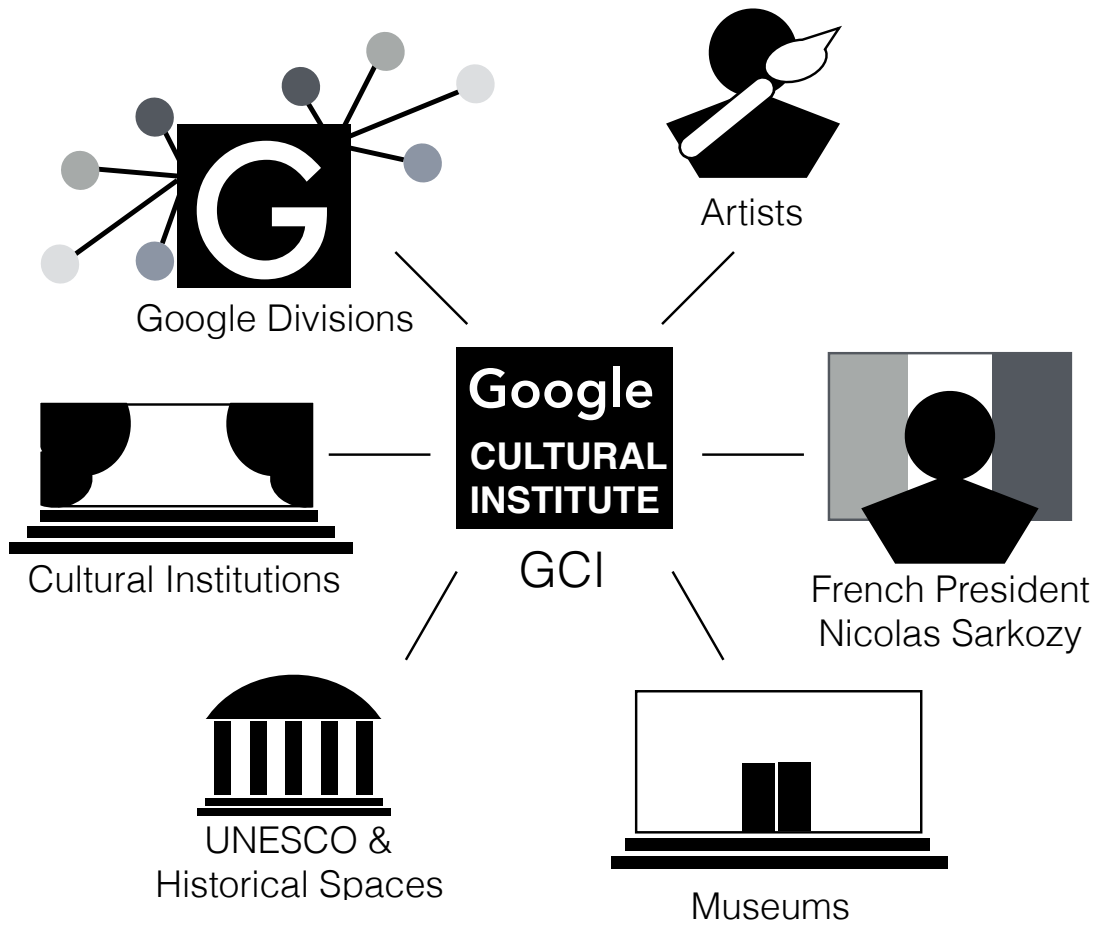


Figure 60. Actor-network theory maps of the Key Partners block of the Google Cultural Institute Digital Convivial Business Model Canvas.

Key Resources

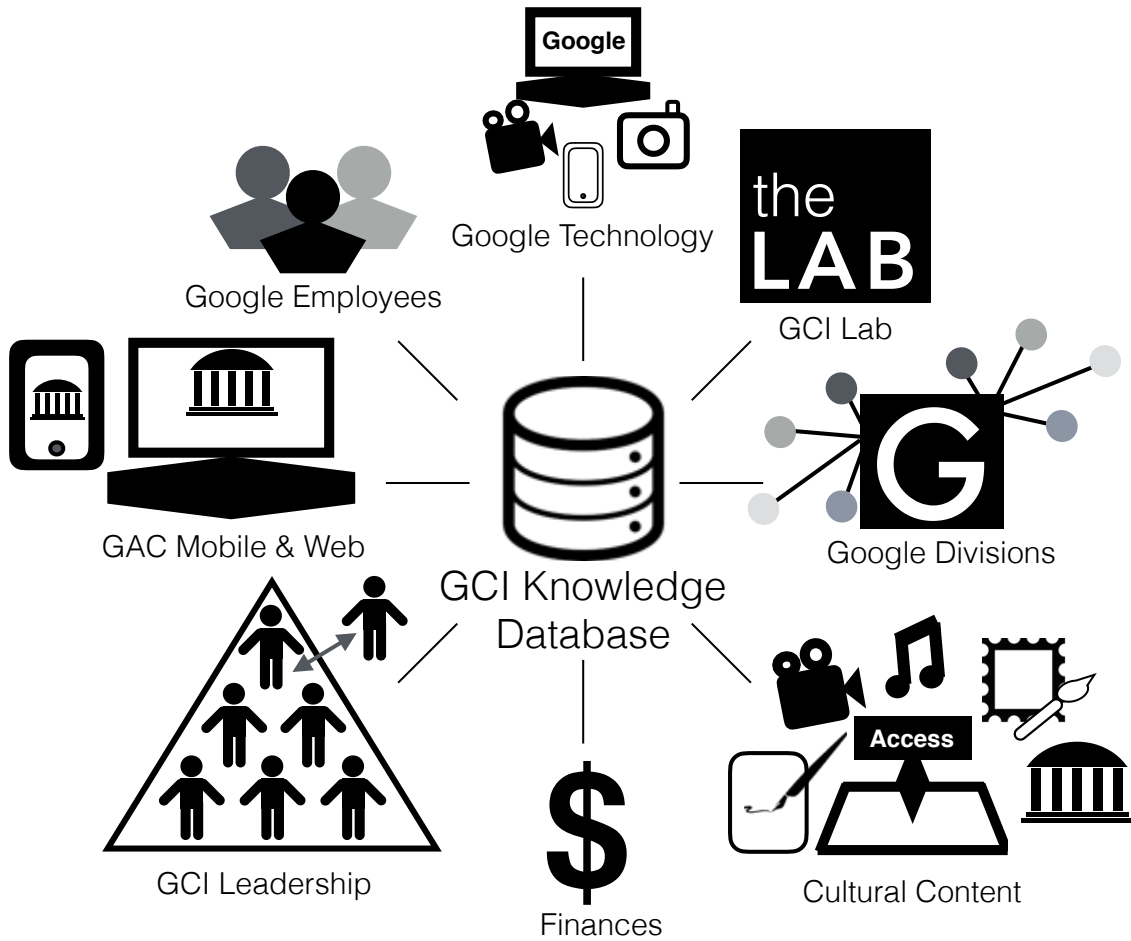


Figure 61. Actor-network theory maps of the Key Resources block of the Google Cultural Institute Digital Convivial Business Model Canvas.

Key Activities

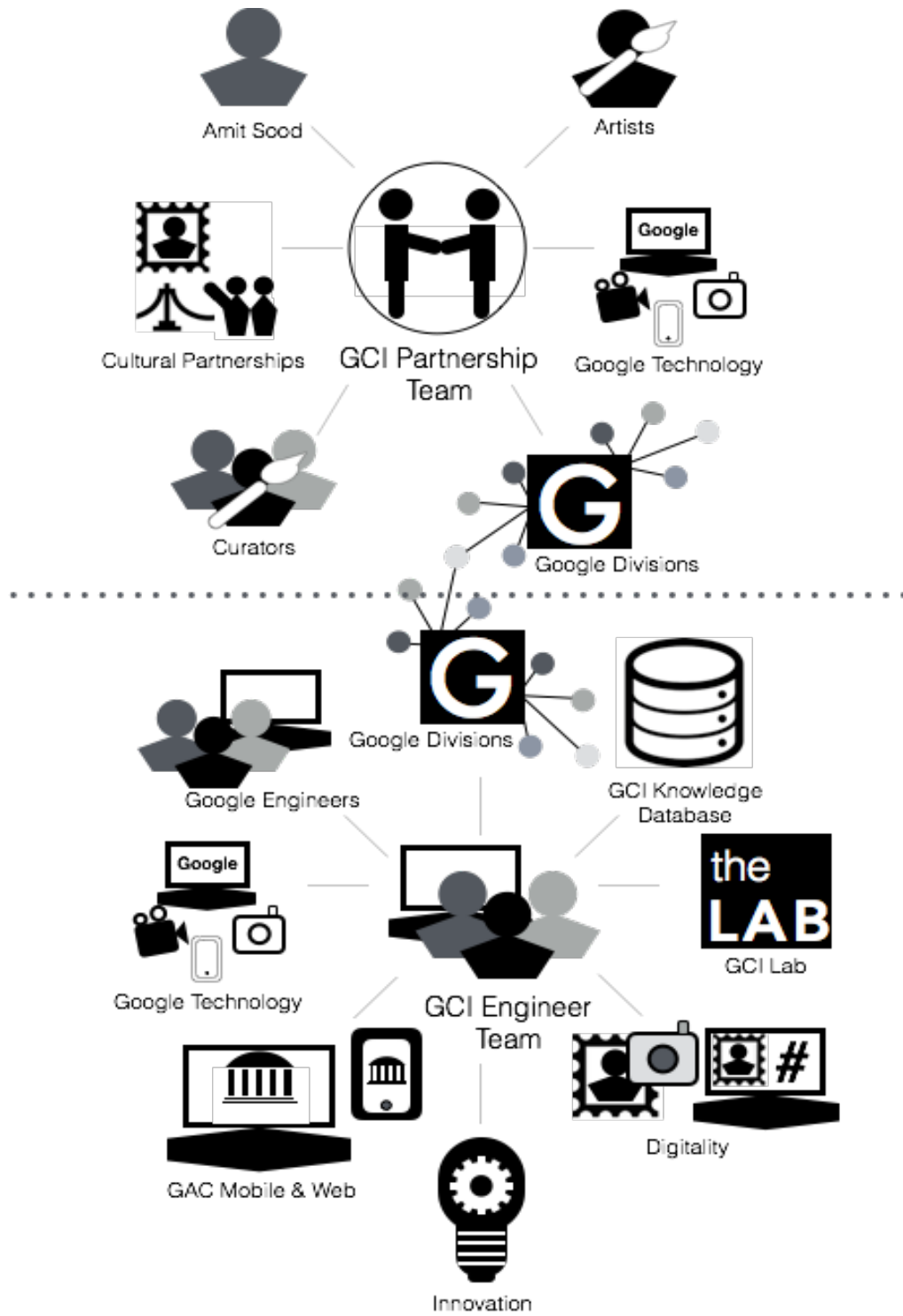


Figure 62. Actor-network theory maps of the Key Activities block of the Google Cultural Institute Digital Convivial Business Model Canvas

Digitality Process

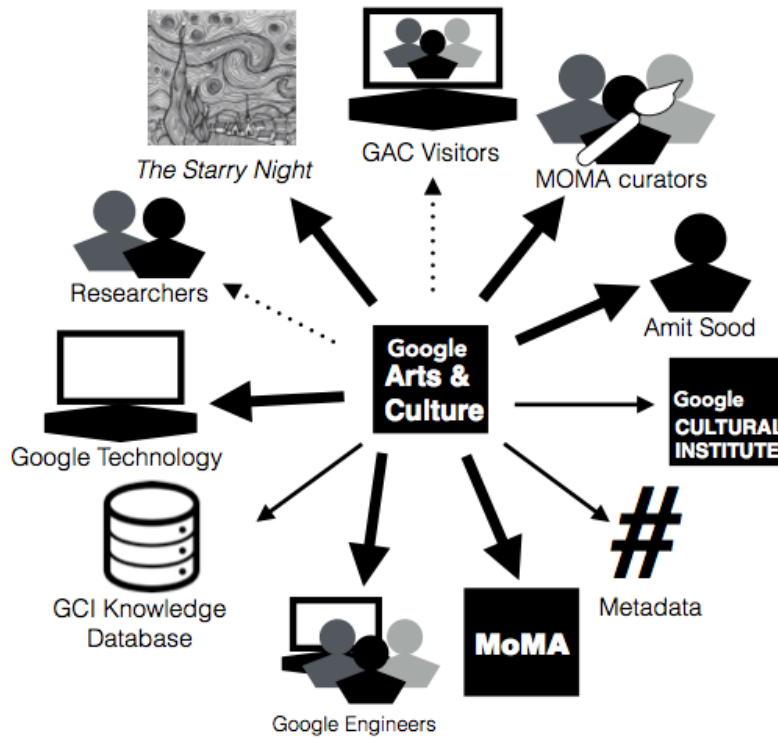
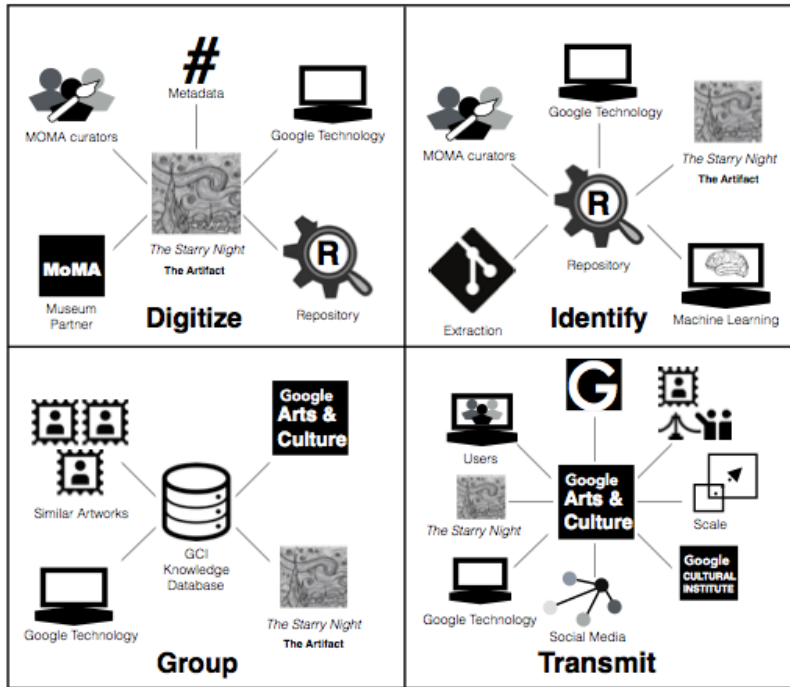


Figure 63. Actor-network theory maps of the Digitality Process block of the Google Cultural Institute Digital Convivial Business Model Canvas.

Revenue Streams

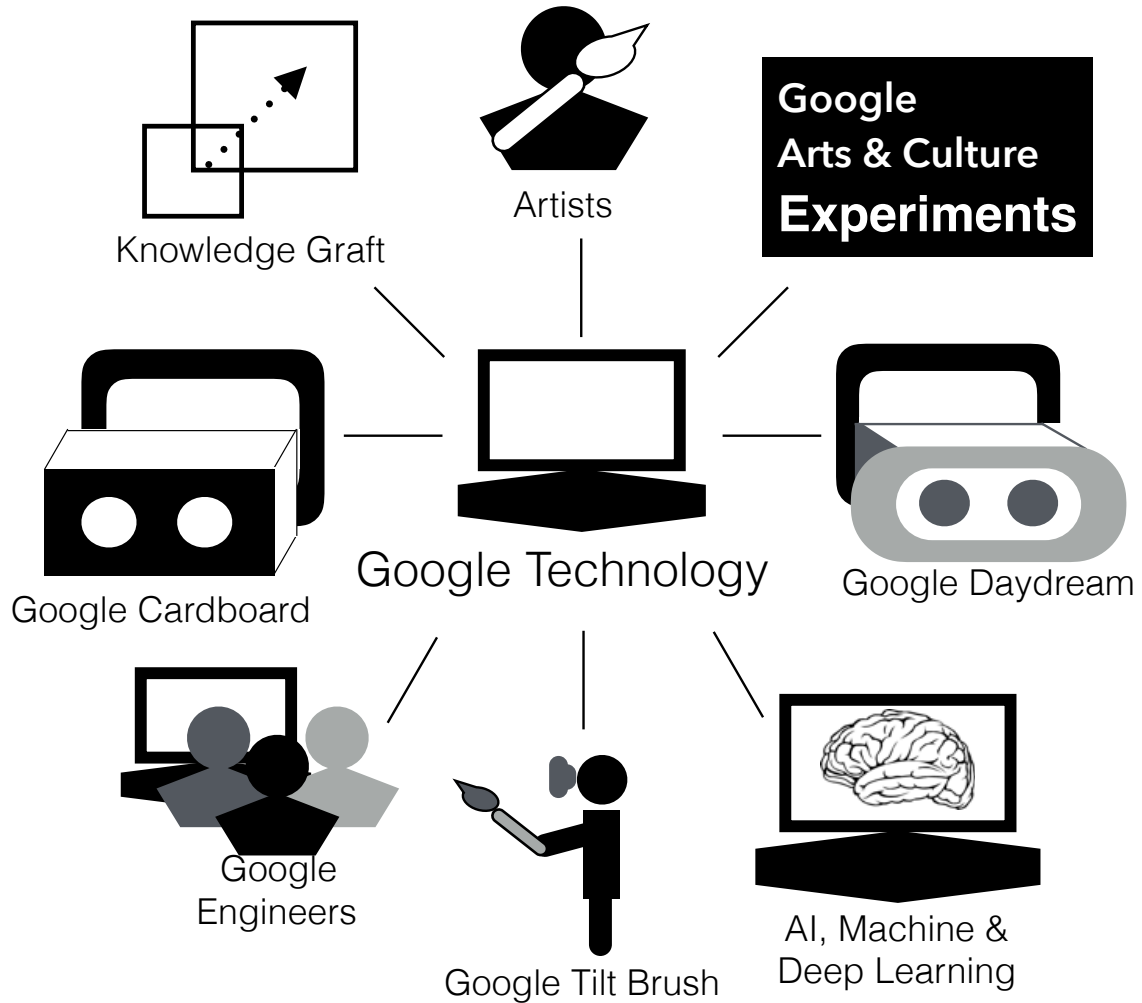


Figure 64. Actor-network theory maps of the Revenue Streams block of the Google Cultural Institute Digital Convivial Business Model Canvas.

Cost Structures

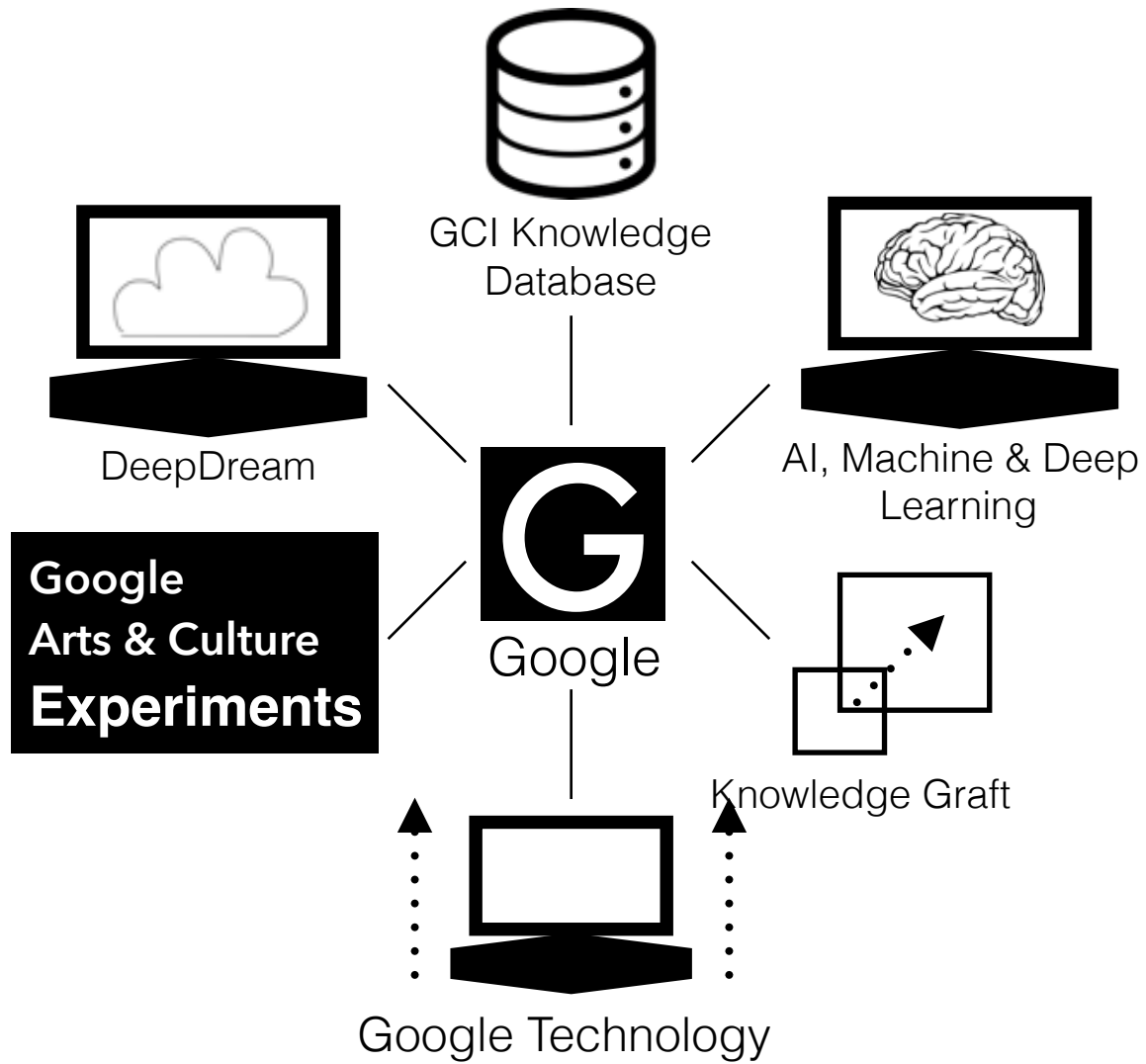


Figure 65. Actor-network theory maps of the Cost Structures block of the Google Cultural Institute Digital Convivial Business Model Canvas.

The Digital Convivial Business Model Canvas of the Starry Night-Google Cultural Institute Ecosystem

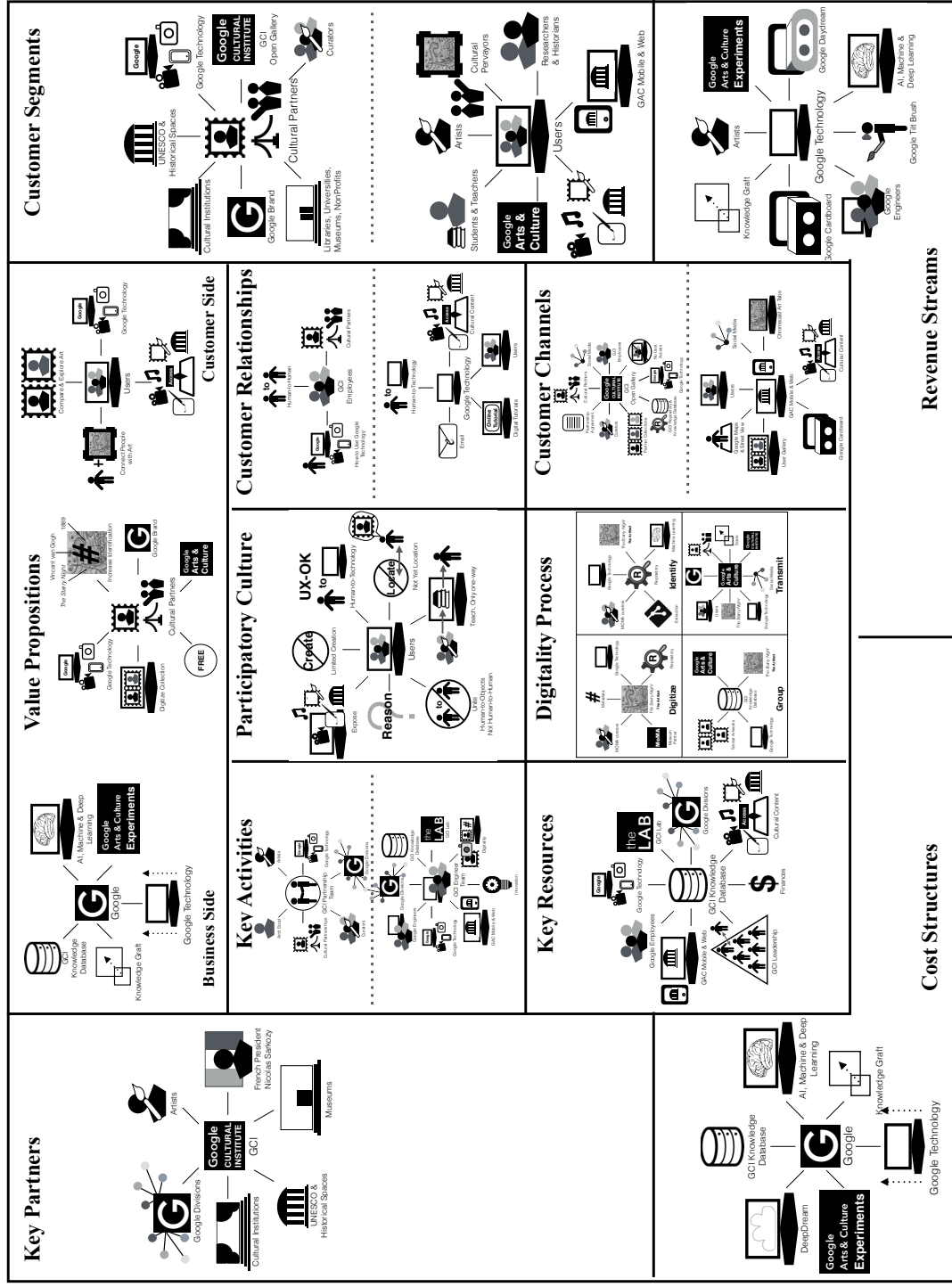


Figure 66. The Digital Convivial Business Model Canvas of the Starry Night-Google Cultural Institute ecosystem.

The Materiality Canvas of *The Starry Night* Across the Starry Night-Google Cultural Institute Ecosystem

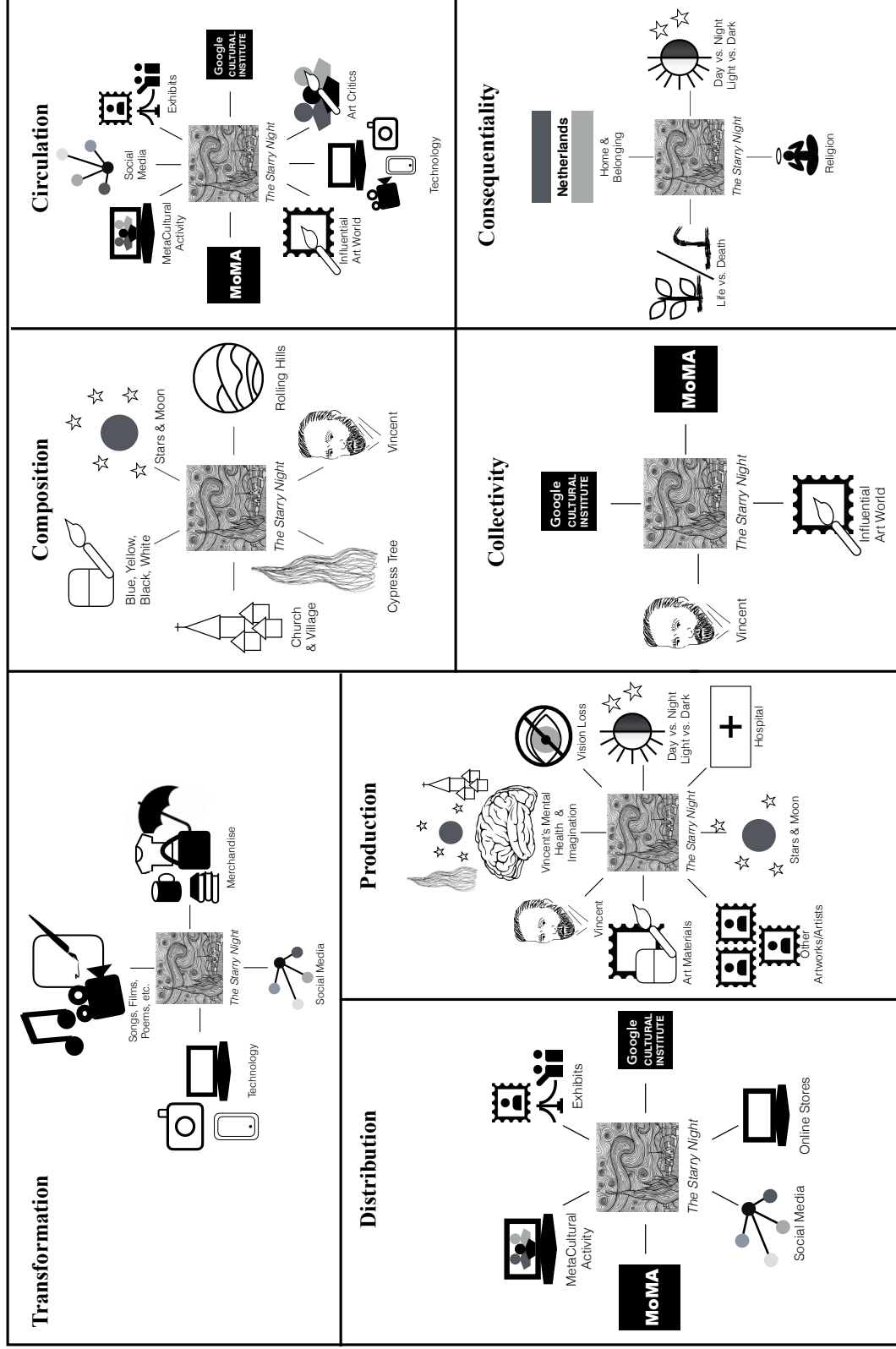


Figure 67. The Materiality Canvas of *The Starry Night* across the Starry Night-Google Cultural Institute ecosystem.

LIST OF ABBREVIATIONS

AI: artificial intelligence

ANN: artificial neural network

ANT: actor-network theory

AR: augmented reality

BMC: business model canvas

CEO: chief operating officer

CSU: Colorado State University

CULTURE: create, use, locate, teach, unite, reason, expose

CV: computer vision

DCBMC: digital convivial business model canvas

DCPA: Denver Center for the Performing Arts

DIGT: digitize, identify, group, and transmit

DL: deep learning

DMI: Digital Methods Institute

DR: digital reality

DS: design science

DSR: design science research

EGOS: European Group for Organizational Studies

EMEA: Europe, Middle East, and Africa

GAC: Google Arts & Culture

GAP: Google Art Project

GBSP: Google Book Search Project

GBT: Google Brain Team

GCI: Google Cultural Institute

HS: Hoberman Sphere

IRB: Information Review Board

IS: information systems

IT: information technology

MGM: Metro-Goldwyn-Mayer

ML: machine learning

MOMA: Museum of Modern Art

MR: mixed reality

NN: neural network

OED: Oxford English Dictionary

OOO: object-oriented ontology

PRT: Personal Rapid Transit

RQ: research question

SEEMEA: Southern and Eastern Europe Middle East and Africa region

STS: science and technology studies

The Met: The Metropolitan Museum of Art

TL: transfer learning

UNESCO: United Nations Educational, Scientific and Cultural Organization

UX: user experience

VR: virtual reality