A Research Agenda for Cannabis Informatics

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- Altered consciousness
  - Creative culture
  - Medicinal value
- Economic opportunities

- War on drugs
- Public safety
- Public health
- Sustainability
Data for science and policy

- Transformation of public opinion and policy around cannabis is one of the most dramatic shifts since same-sex marriage (Schnabel & Sevel, 2017)

- Policymakers, entrepreneurs, researchers, and citizens are struggling to understand the consequences of this “new technology”

- Generation, analysis, and communication of data plays a fundamental role in collective sensemaking and deliberation about the risks, benefits, and consequences of policy changes (Jasanoff, 2012)

- Legalization occurring with emerging “fourth paradigm” of networked and data-intensive scientific inquiry (Tansley & Tolle, 2009; Nielsen, 2011)
What are cannabis data?

Who makes it?

Where does it go?

When is it needed?

Why that shape?

How does it change?
The social cannabinoid system: Actors

- **Plants**: synthesize cannabinoids
- **People**: consume cannabinoids
- **Orgs**: distribute cannabinoids
- **Society**: regulates cannabinoids
Data from/for plants

- **Biology**: Genotypes, chemotypes, phenotypes
- **Agriculture**: Light, moisture, nutrients, yield
- **Breeding**: clones, crosses, landraces
Data from/for people

- **Pharmacology**: receptors, metabolism, interactions
- **Consumption**: dosage, delivery, delay
- **Behavioral**: euphoria, sensuality, creativity
- **Medical**: anxiety, appetite, nausea, pain
Data from/for organizations

- **Markets**: forecasting, strategy, compliance
- **Products**: inventory, R&D, sentiment
- **Customers**: community, loyalty, privacy
Data from/for society

- **Regulation**: taxation, zoning, forecasting
- **Public safety**: criminal diversion, DUIs, incarceration
- **Public health**: education, prevention, interactions
- **Sustainability**: water, energy, land, and labor use
The social cannabinoid system

- Plant-People interface
- Plant-Organizational interface
- Plant-Societal interface
- People-Organizational interface
- People-Societal interface
- Organizational-Societal interface

Who, what, where, when, why, and how of data moving through these interfaces between these actors
Plant-People interface

- Potency
- Effect design
- Consistency
Plant-Organizational interface

- Compliance, forecasting, inventory tracking
- Yield, extraction, processing, automation
- Research and development
Plant-Societal interface

- Basic and applied research and funding
- Incentives for research and development
- “Bench-to-bed” research translation
People-O rganizational interface

- Product development
- Marketing and loyalty
- Privacy
People-Societal interface

- Legislation and regulation
- Treatment and rehabilitation
- Behavioral, psychological, and medical research
- Law enforcement and public safety
Organizational-Societal interface

- Licensing, taxation, banking, regulation
- Forecasting and managing demand
- Social, demographic, and economic research
- Cannabis clemency
Building data infrastructures

- Balancing openness and privacy in centralized reporting systems
- Data fusion across levels of analysis and distributed databases
- Data standards, ontologies, and controlled vocabularies
- Open documentation and sharing of tools and software
Anticipatory research designs

- 9 states legalized recreational sale, 29 states permit medical use, 13 decriminalized possession
  - Up to 41 natural experiments poised to be run in coming decade(s)

- How to build anticipatory research designs to leverage discontinuities in policies and variance in adoption?
  - Collecting appropriate data now to be able to measure the effects of policy changes

- What data should be collected to make strongest causal claims about effects of policy change?
  - Public safety, public health, sustainability, economic, quality of life

https://en.wikipedia.org/wiki/Cannabis_in_the_United_States
Where to start?

- Methods for integrating empirical and folk knowledge
- Log analysis for forecasting, recommending, detection
- Platform governance and regulatory heterogeneity
- Bootstrapping quasi-clinical panels with social sensors
- Destigmatization dynamics and newcomer socialization
METRC as an unusual information technology

- "Closed loop" legal theory
  - Avoid diversion into grey markets
  - Prove that no product is crossing state lines
  - Ensure the authorities are all getting their cuts of tax revenue

- Supply chain problems demand supply chain solutions?
  - Adapting an RFID inventory tracking system designed for perishable foods and pharmaceuticals foreclosed on alternative models
  - Multi-stakeholder information technology (re)design

- Implications of gov't auditing of entire market's inventory
- Increasing adoption by risk-averse legislators in other states
- Lessons for designing and governing the Internet of Things?
Thank you!

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