Empirical Ethics: Studying Values in Data Science Practice

Katie Shilton
University of Maryland, College Park
College Park, MD, USA
kshilton@umd.edu

Abstract
Values and ethics are a primary focus of human-centered data science, as we struggle to understand not only what we can do with granular data about people, but what we should do. Much of the work in data science ethics is anticipatory and prescriptive, which is valuable but incomplete. An understanding of what we should do must incorporate empirical understandings of how people and systems work together to produce, confront, and solve ethical challenges. This paper describes three case studies which investigate values and ethics in practice to illustrate what we can learn about both ethics policy and design from empirical ethics research.

Author Keywords
Ethics; values; empirical methods; data science.

ACM Classification Keywords
H.1.2. Human factors

Introduction
Human-centered data science is emerging as a response to claims that "big data" could produce knowledge without theory, methods, or humans in the loop [3, 6]. Values and ethics are an important focus within human-centered data science, as scholars debate whether and how data about people should be collected, analyzed, reused, and shared [4, 14].
An important component of building ethical consensus for human-centered data science should be learning from empirical data about practice [5]. While thinking critically about risks, consequences and possibilities of data science is an important component of ethical analysis, equally important is studying how diverse stakeholders in data science (system developers, analysts, and data subjects) understand their moral obligations and choices, and how their decisions impact data system design and use. Recommendations, rules and policy are important and needed, but they should be guided by empirical analyses of how people and systems broach ethics in practice. However, a review of empirical studies of ethics in information systems and social computing literatures shows that is far from clear how to go about conducting such studies [12].

This position paper draws on three case studies to suggest the kinds of knowledge to be gained through empirical ethics research. It outlines a vision for how a field struggling to understand risk, consequences, and possibilities can learn from empirical observation of the people, data systems and infrastructures that increasingly shape our world. The first case investigates values in the development of infrastructure, a question increasingly important to the far-reaching data science infrastructures currently under construction. The second engages the ethical practices of data science researchers. The third investigates the values of the subjects of data collection: users of mobile applications.

Values in Infrastructure
As data science develops supporting infrastructures, these systems concretize social and political values [2]. Understanding how developers make ethical and political choices during the design of infrastructures can help us understand resulting affordances, features, and design biases. The Values in NDN project describes how work practices within technology development challenge developers’ assumptions of technological neutrality, and encourage developers to consider ethics and politics as relevant to design [10]. Participant-observation of a team engaged in developing Internet infrastructure (Named Data Networking or NDN), revealed how the work practices required by infrastructural technologies challenged traditional methods for values-oriented design. Many development decisions must be made before use cases are well understood, and self-testing infrastructure presents logistical and technical challenges. But analysis of field notes and interviews also illustrated that design practices such as imagining users and use cases, engaging in interdisciplinary dialogue, and self-testing prototypes encouraged values awareness and ethical praxis on development teams. The project’s findings illustrate how developers’ decisions will impact policy issues such as free speech and censorship, content privacy and security, and network neutrality.

Values in Online Data Research
Defining research ethics for studying digital and social media communities is an ongoing challenge. This project argues that researchers working with open and online datasets are converging around norms for responsible research practice that can help guide IRBs or others interested in regulating research ethics. Studying these convergences provides guidance as to what researchers feel to be reasonable practice; a first step for understanding responsible conduct of research. The project draws on qualitative interviews [11] and a survey of 263 social science, information science, and computer science researchers who use online data
[14]. The interviews investigated the challenges researchers experienced when collecting, managing, and analyzing online data. Analysis of the interviews revealed a diverse set of ethical challenges that push the boundaries of existing research ethics guidance. The interview data also describes existing practices for navigating ethical quandaries, and documents resources that help researchers meet ethical challenges. Survey results demonstrate a set of emerging ethical norms in this community that go beyond IRB requirements, including transparency with research communities, removing potentially identifiable outliers before sharing results, and engaging in deliberative processes with colleagues in addition to IRBs. Our results also reveal that neither discipline nor academic/industry affiliation correlate with differences in research ethics beliefs or practices. Social computing researchers in the computer, information, and social sciences think deeply about research ethics, and ethical disagreements are not disciplinary in nature [14].

**Values of Data Subjects**
Significant empirical ethics research focuses on the values of technology users [e.g. 1, 7]. Such studies can be adapted to understanding the expectations and values of data subjects to better understand the human impacts of data science. For example, a survey of the privacy expectations of mobile application users sought to understand the values of data subjects. Mobile applications frequently collect large amounts of personal data about their users [13]. This project used factorial vignette surveys of over 1900 U.S. mobile application users to measure context-dependent user privacy expectations: what actors, data types, and situations for data collection and use users expect or find objectionable. Findings demonstrated that very common activities of mobile applications (harvesting and tracking location data, contacts, keywords, and images) do not meet users’ expectations [8]. But these differences are modulated by both data type and social context. For example, users expect weather applications to use location data, but do not expect music or banking applications to use location. The findings support the theory of privacy as contextual integrity [9], which posits that privacy judgments are not individual preferences, but instead shared reactions to particular data uses in social contexts. Empirical findings suggest that contextual integrity can provide a sound ethical basis for human-centered data decisions.

**Conclusion**
Empirical projects can help us understand how values are baked into technological infrastructures; how data scientists make difficult decisions about their research practices; the values and expectations of data subjects; and developing norms among all of these communities. Understanding values consensus and conflict among the people building systems, the values built into those systems, the people collecting data, and the subjects of those data can help us make better normative decisions about data use. Empirical ethics research will help us practice responsible data science.

**Acknowledgements**
Special thanks to collaborator Jaime Snyder for ongoing conversations which have shaped this work. This work is supported by NSF Grants IIS-0832873, CNS-1040868, and CNS-1421876.

**References**
choices and values through social class. 


