

# Human-centered computing and the future of work

## Lessons from Mechanical Turk and Turkopticon, 2008–2015

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This document is a summary of a dissertation.  
The dissertation is available online at:

<http://wtf.tw/diss.pdf>

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## Context

Online labor markets such as Amazon Mechanical Turk (AMT), Uber, and TaskRabbit are contributing to rapid changes in the nature of work for hundreds of thousands of workers. These markets stand to create significant new economic opportunities, but current market designs and management practices typically treat workers as second-class citizens. Take-home pay is typically low compared to similar work in traditional employment arrangements. Workers have limited means of influencing market design or management practice, and therefore little control over their own work arrangements. Low pay and limited control over work arrangements make it hard for workers to create reliable, sustainable livelihoods from the many uncoordinated work opportunities online labor markets present. But reliable, sustainable livelihoods matter for three reasons. First, workers value them—even as they value the unique flexibility online labor markets offer. Second, if workers cannot build reliable, sustainable livelihoods, the labor pool reached by online labor markets will be limited to casual or temporary workers—limiting the markets' own long-term sustainability. Third, reliable, sustainable livelihoods are crucial to socioeconomic mobility, a central concern of economic policy.

This dissertation uses Amazon Mechanical Turk (AMT), an online labor market for small information tasks—i.e., a "crowd work market"—as a case through which to examine the consequences of treating workers as second-class citizens, to argue for future platform designs and management practices that treat workers as central stakeholders, and to develop theory and method for doing so.

## Main messages of the dissertation

The central argument of this dissertation is that **workers' concerns should be more substantively and systematically addressed in the design and operation of online labor markets.**

Taking workers' concerns seriously will better allow them to create reliable, sustainable livelihoods from the work opportunities these new markets make available. It is therefore a crucial step in ensuring the markets' own sustainability, and will contribute to socioeconomic mobility in the economy at large.

Five messages elaborate this central argument. First, **in online labor markets, some workers are casual or transient, while others are professionals**, providing significant and reliable value to customers on an ongoing basis and relying on income earned in the market to meet their own basic needs. In AMT, the relatively small fraction of "Turkers" who rely on Turking income to meet basic needs do most of the work posted to the market. Most of these professional Turkers are educated and highly skilled and live in the United States. And many report that they work on AMT not by choice but because they are unable to secure other employment. Thus some of the narratives offered by researchers and employers to justify low pay—e.g., that most workers who rely on Turking income live in "developing" countries with low costs of living; that most "developed"-country workers work mainly to pass time; that crowd work is easy and workers relatively unskilled and uneducated; and that workers freely choose to participate in AMT and can easily choose other work if they find the pay too low—are inaccurate.

Second, **workers who rely on income earned through online labor markets to meet basic needs should be considered first-class stakeholders**, alongside customers and shareholders. These workers are strongly invested in the sustainability of the market. When the market is designed appropriately, these workers can be relied on to adhere to, and even enforce, market norms that benefit all participants. Their concerns and input regarding the design and operation of the market should be taken seriously. Formal processes for eliciting their input should be developed and integrated into market design and management practice.

Third, **workers in online labor markets are not usually the narrowly self-interested profit maximizers of classical economic theory.** Professionals—those workers who rely on income earned

through participation in the market—especially want market transactions to produce good outcomes for everyone, and want the market to be sustainable. They take professional pride in doing good work and helping other market participants. They adhere to norms they think will produce good outcomes for everyone, and spend unpaid time discussing what those norms should be. Thus researchers and platform operators should not see workers as narrowly self-interested profit maximizers. A more realistic approach is to see them as "situatedly rational" actors. "Situated rationality" augments the notion of "bounded rationality"—i.e., that actors have incomplete information and limited cognitive capacities—with the observation that actors' actions, and even their preferences, are shaped by a diversity of factors typically omitted in classical economic analysis, including rules, norms, and expectations. Certain market designs may induce situatedly rational actors to act as narrowly self-interested profit maximizers, but this result is not inevitable. On the contrary, it usually produces suboptimal outcomes and may indicate poor market design. Further, situatedly rational actors have mental models of how the market works. These models are often sophisticated, but rarely complete or perfectly accurate. And these models influence market outcomes.

Fourth, **online labor markets are not monolithic, perfectly competitive markets.** Nor is there a perfectly competitive "market of markets." Rather, **each market is part of a polycentric economic system composed of complexly interlinked action situations.** This system is characterized by imperfect competition and incomplete information. The notion of polycentricity indicates that there are multiple decision making locations within the system that, while formally independent, are interlinked by the consequences of decisions taken at each location. Each decision taken by an actor can be seen as occurring within an "action situation." Action situations can be described by the characteristics of the actors involved, their roles, the rules governing their actions, the information available to them, the possible outcomes of their actions, the relations between actions and outcomes, and actors' valuations of outcomes. In a given action situation, an actor may act according to a variety of logics—e.g., financial, institutional, or moral. These logics may not be commensurable with one another, and may not be formalizable.

Fifth and finally, **institutions funding human-centered computing (HCC) research should support an interdisciplinary practice-oriented research agenda to understand the consequences of**

**current online labor market designs and management practices, and to develop new designs and practices that incorporate workers who rely on market income as central stakeholders.** This agenda should integrate software practice, empirical research, theory development, and value-rational analysis. Software practice and empirical research are familiar in HCC. Current HCC theories must be expanded to larger scales of analysis and design. And the three aforementioned well-established research modes should be linked to value-rational analysis—the rigorous and broad-based consideration of questions such as *Where are we going in computationally mediated work? Who gains and who loses? Is this desirable? What should be done?* The influence of designers' and operators' understandings of such "nontechnical" issues in system design and use has long been acknowledged in HCC research. But online labor markets so tightly interweave the technical and the ostensibly nontechnical that questions once considered nontechnical can no longer be "outsourced" to social scientists or regulators. The computational mediation of work calls for computing researchers to take a more active role in the collective process of understanding the social consequences of technology design, articulating possible futures, distinguishing between what is desirable and what is merely possible, making plain the distribution of benefits and risks, and taking concrete steps to create the institutional conditions required to develop systems and practices that benefit a broad variety of stakeholders.

Industry collaboration will be crucial for the long-term sustainability of such an effort. But such collaboration will be complicated by the distinct institutional accountabilities and cultures of research and business. Indeed business broadly is grappling with parallel challenges, as can be seen in the relatively new discourses on corporate social responsibility and social entrepreneurship, the emergence of new structures for corporate governance such as the B Corporation, and the development of new computationally-mediated strategies for raising capital such as crowdfunding. The greatest potential for creating broad-based social value in online labor markets lies at the intersection of expanded HCC theory and method and new organizational models that aim to create sustainable value for a broader diversity of stakeholders than traditional models.

## **What the dissertation is**

The dissertation is an effort to link software practice, empirical research, theory development, and value-rational analysis in the context of online labor markets. It presents an empirical account of the polycentric economic system around AMT (Chapter 2). This account is written from my perspective as a builder and administrator of Turkopticon, a system used by many professional AMT workers to review employers. The dissertation then introduces theoretical material from empirical social science (Chapter 3) to structure this account. The perspective on the empirical material offered by the social scientific theory informs value-rational analysis, which in turn motivates a series of proposals for future computing research and software practice (Chapter 4).