Computation and Organization

Michael Bernstein
Stanford Computer Science
Computation can power dramatically new forms of organization: experts in a click.

However, we need regulation to ensure that this is a positive future for workers.
ACHIEVING OUR COLLECTIVE GOALS
achieving our collective goals
The team scaling fallacy: Underestimating the declining efficiency of larger teams

Who’s in Charge Here? How Team Authority Structure Shapes Team Leadership

Team Familiarity, Role Experience, and Performance: Evidence from Indian Software Services


Out of Sight, Out of Sync: Understanding Conflict in Distributed Teams

The Mutual Knowledge Problem and Its Consequences for Dispersed Collaboration

The Influence of Shared Mental Models on Team Process and Performance

Some unintended consequences of job design
FAILURES TO ACHIEVE OUR COLLECTIVE GOALS ARE RARELY DUE TO INSUFFICIENT SKILLS AND INCREASINGLY DUE TO FRAUGHT COLLABORATIONS.
HOW MIGHT COMPUTING AUGMENT US IN ACHIEVING OUR COLLECTIVE GOALS?
EXPERTS IN A CLICK

Online platforms connect people who want work done with people interested in doing the work.
EXPERTS IN A CLICK

AI training data: “ghost work” [Gray and Suri 2019]
EXPERTS IN A CLICK

Driving, delivering: the gig economy

[Image via Brand Fabrik]
EXPERTS IN A CLICK

What becomes possible when nearly any expertise is available?

programmer, writer, designer, video editor, musician, &etc.
Visions of computation and organization
ON-DEMAND FLASH TEAMS

Web platform that supports authoring, reconfiguring, and running on-demand teams of experts

[Retelny et al. 2014]

What expertise?
When?
What are they doing?
How do the contributions come together?
ON-DEMAND FLASH TEAMS
CREATION BY REQUEST

What if you wanted something that no previous team had created?
CREATION BY REQUEST

Synthetic team created from compatible blocks from previous teams
CREATION BY REQUEST

Synthetic team created from compatible blocks from previous teams.
Flash organizations: rapidly assembled and reconfigurable organizations composed of online collaborators

[Valentine et al. 2017]
COMPUTATIONAL ORGANIZATIONAL STRUCTURES

Roles: parametrize required expertise

Teams: groups of workers with shared goal

Hierarchy: nested roles that determine decision rights
EMS TRAUMA REPORT

Medical resident, no experience managing or building software

Task timeline
EMS TRAUMA REPORT

Android Development
User Interface Design

Task timeline
EMS TRAUMA REPORT

Task timeline
EMS TRAUMA REPORT

Android Development
User Interface Design
Front End Development
Back End Development
User Testing

Task timeline
EMS TRAUMA REPORT

Task timeline
Ms. Valentine and Mr. Bernstein wanted to take the concept further. They created a platform, Foundry, in which the process of assembling and running a temporary organization could be automated, without so much as a phone call.
Automatic clustering generally helps separate different kinds of records that need to be edited differently, but it isn’t perfect. Sometimes it creates more clusters than needed, because the differences in structure aren’t important to the user’s particular editing task. For example, if the user only needs to edit near the end of each line, then differences at the start of the line are largely irrelevant, and it isn’t necessary to split based on those differences. Conversely, sometimes the clustering isn’t fine enough, leaving heterogeneous clusters that must be edited one line at a time. One solution to this problem would be to let the user rearrange the clustering manually, perhaps using drag-and-drop to merge and split clusters. Clustering and selection generalization would also be improved by recognizing common text structure like URLs, filenames, email addresses, dates, times, etc.
EXPERTS IN YOUR APPLICATIONS

Camera
Computation is powering dramatically new forms of organization: experts with a click
But.

Would you be happy if your own child joined this workforce? [Kittur et al. 2012]
Los Angeles Uber drivers join cities across the U.S. in strike ahead of much-anticipated IPO

Academic work including:

[Alkhatib et al. 2017]
[Dillahunt 2017]
[Irani and Silberman 2013]
[Gray et al. 2016]
[Hara et al. 2018]
[Martin et al. 2014]
[McInnis et al. 2016]

Stanford CASBS Future of Work and Workers Project
SPARKING THE CONVERSATION

The Future of Crowd Work

Aniket Kittur\textsuperscript{1}, Jeffrey V. Nickerson\textsuperscript{2}, Michael S. Bernstein\textsuperscript{3}, Elizabeth M. Gerber\textsuperscript{4}, Aaron Shaw\textsuperscript{4}, John Zimmerman\textsuperscript{1}, Matthew Lease\textsuperscript{5}, and John J. Horton\textsuperscript{6}

\textsuperscript{1}Carnegie Mellon University, \textsuperscript{2}Stevens Institute of Technology, \textsuperscript{3}Stanford University, \textsuperscript{4}Northwestern University, \textsuperscript{5}University of Texas at Austin, \textsuperscript{6}oDesk

\{nkittur, johnz\}@cs.cmu.edu, jnickerson@stevens.edu, msb@cs.stanford.edu, \{egerber, aaronshaw\}@northwestern.edu, ml@ischool.utexas.edu, john_horton@odesk.com

ABSTRACT

Paid crowd work offers remarkable opportunities for improving productivity, social mobility, and the global economy by engaging a geographically distributed workforce to complete complex tasks on demand and at scale. But it is also possible that crowd work will fail to achieve its potential, focusing on assembly-line piecework. Can we foresee a future crowd workplace in which we would want our children to participate? This paper frames the major challenges that stand in the way of this goal. Drawing on theory from organizational behavior and to a range of workers and focused support for various task. For example, anyone with access to the Internet can perform micro-tasks on the order of seconds using platforms such as Amazon’s Mechanical Turk, while more skilled workers can complete multi-hour tasks on professional online marketplaces such as oDesk or work for months to solve R&D challenges on open innovation platforms (e.g. Innocentive). Incentives and work structures also vary tremendously, ranging from crowdsourcing contests awarding prizes to winners (e.g. programming tasks on Topcoder) to micro-labor platforms that pay
We Are Dynamo: socio-technical infrastructure for collective action amongst crowd workers

[Salehi et al. 2015]

Amazon's Mechanical Turk workers protest: 'I am a human being, not an algorithm'

A Christmas email campaign is asking Amazon's CEO Jeff Bezos to improve terms for workers providing cheap digital labour
The campaign started in the fall of 2014. Several MTurk discussion forum leaders, working with graduate students and faculty at Stanford and the University of California at San Diego, were already building a virtual union hall of sorts for MTurk’s international worker base. The goal was to make it easier for workers to anonymously share stories about their experience and discuss possible actions that they could take. The site, nicknamed “Dynamo,” was part of a larger research project meant to explore how to “build systems that support collective action online.” One of its most successful actions was the drafting of their ways. That was followed by Dynamo, which its founders saw as a virtual union hall. “I want to help ordinary workers create a collective voice that has to be heard,” said Lilly Irani, one of Dynamo’s founders. Another Dynamo founder, Michael Bernstein, a Stanford University professor of computer science, added, “It’s easy to come together online, act upset, and blow smoke. We wanted to take it to the next level: What does it take to come together to transform that energy into decisions and the pursuit of common goals?”
FUTURES OF ONLINE WORK

Micro-internships
[Suzuki et al. 2016]

Guild-style collective accreditation
[Whiting et al. 2017]
Tools to ensure piecework is paid minimum wage

[Whiting, Hugh, Bernstein 2019]

Portable benefits

[NDWA, early collaboration with Alkhatib]
This is simply not enough.
However, I am increasingly uncomfortable creating this infrastructure unless we improve the future for workers.
This environment is both hurting people and stifling innovation.
Policy

Future of Work and Workers

Code
CALIFORNIA AND THE FUTURE

California has a reputation for being on the vanguard of the future of work

Care workers
Justice for Janitors
AB5

Noam Scheiber, labor and workplace reporter for the New York Times, 7/13/2017

Agree. Key is organizing workers on the platforms. Hollywood is all temp orgs. But unions are strong, workers do well
OUR NEEDS FOR THE FUTURE

Workers need to **feel comfortable taking risks** to join a computationally-mediated future of work.

We need to create opportunities that are **vastly preferred to equivalent traditional work**, instead of platforms that workers turn to when their traditional jobs fall through.

We must recognize that this is not exciting because it’s access to cheap labor: it’s exciting because it affords the ability for computation to **support collaboration between diverse participants** through networks.
OPPORTUNITIES

I see incredible opportunities if we can guarantee a positive future for work and workers.

Systems that help us convene the right collaborators

Systems that help us find the right way to collaborate

Systems that empower anyone — entrepreneurs, civil society, volunteer organizations — the ability to convene a group around themselves in minutes.
If we do nothing, incredible opportunities will be offset by a replay of the piecework of the past.

If we create innovative policies, we will be miles ahead of anywhere else on earth.

Collaborators: Melissa Valentine, Lilly Irani, Daniela Retelny, Rob Miller, David Karger, Mark Ackerman, Joel Brandt, CASBS Project on the Future of Work and Workers

Funders: NSF IIS-1351131, Sloan, Accenture ATL, Microsoft, Stanford Cyber Initiative, ONR, Hasso Plattner DTP