Designing Work

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Abstract
Work environments now include machine-centric systems that have attributes which lead to new forms of organization. Not all of these organizational forms are conducive to meaningful human careers. This situation calls for new principles of work design.

Author Keywords
Work design; information systems; social ontology; crowd work; online design communities.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
Tasks performed in online communities are shaped by the architecture of the systems that underlie these communities. Architectures can be designed. As a society, it will be helpful to understand the emerging design space related to these communities.

This paper raises three sets of issues related to the nature of work in the future: the social ontology of platforms, online communities and related frames, the technological attributes of the underlying systems, and the social processes that define these new work systems. These ideas come in part from an NSF-funded project called Work in the Age of Intelligent Machines, whose purpose is to build a network of individuals interested in work design; the community can be explored at http://waim.network.

There are a range of different work environments that bear examining. The first are traditional workplaces that are being shaped by new technologies. For example, our analysis of job ads shows that new demand for skills are creating new job descriptions, and, arguably, new architectures and organizational structures [5].

Second are platforms that pay for labor. This includes Uber and Mechanical Turk. They use matching systems. These platforms provoke varying degrees of dissatisfaction from workers about pay, benefits and career ladders [4].

Third are platforms that host products or services, like the Apple App Store, Youtube, Turk, and Etsy. Payment can be for the product, or payment can be through advertising fees, as in Youtube. Even platforms that are producing significant overall wealth, such as the Apple and Google app platforms, have such a skewed distribution of returns that developers find their careers precarious [1]. But places like Turk can be used to produce creative work [10].

Fourth are commercial contest sites like Innocentive or Kagel. They pay money only for success. Contest sites are popular, but by design they compensate only the few that win. With colleagues we have explored ways of structuring contests that encourage many to build modular components to be reused by others, spreading the compensation to more participants and promoting recombination in the process [7].

Next are sites that don't pay at all, but share ideas. Non-paying sites don't solve the problem of the design of work: it is hard to argue for the sustainability of working without compensation. But such sites might suggest ways of structuring compensated work.

One environment the authors have been studying is Thingiverse [6]. This is a commercially owned site. Participants in the community contribute content for free. What characterizes this community, similar to many other design communities, is its use of remixing. Remixing takes place when users modify or recombine each other's work, and post the new designs for further development by other members of the community. A common feature of the site is open visibility: one can see what others have done before. But, it is true, what one sees may be a product of many factors, including the search engine one used, the prior popularity of a design, and the type of design one seeks to improve upon.

Such a community can be viewed in two ways: from the perspective of the artifacts created, and from the perspective of the people involved. The artifacts form a network; they link to other artifacts, and to their designers. The artifacts evolve, as designs are improved, reposted and improved again. The designers form a network. They link to artifacts, and they link to other designers.

The networks provide a trace of where ideas came from. Even though no payment takes place, community members take seriously acknowledgement, in a way similar to the way academics take seriously citations.

The commercial environment of Thingiverse is similar in shape to the non-commercial environment of Scratch. Indeed, Scratch also has user-generated contests, without pay [8].

Scratch is just one example of a nonprofit that doesn't pay compensation for contributions. Most prominent in this category is Wikipedia. In Wikipedia coordination can happen implicitly [9]. This implicit coordination may help create a satisfying and sustainable environment, at least editors who have other means of financial support.

The collective environments have a similarity. One can focus on the individual designs. Or one can look at the overall collective, as if there is group agency [2]. Most of these environments have complex hierarchical clusters: there may be common cause around the design of some objects and not others.

But the potential for such agency may be important, as it may be associated with the strong motivation that comes from belonging. Turk workers have found ways to create some kinds of group agency, outside the official auspices of the platform [3].

Who we work with can be random. It can be the result of our preference. It can be the result of the system's preference. Or it can be the work of these combined. Some experiments with crowd work have suggested it is possible for the algorithm to figure out who we might work well with [11].

This spectrum of environments is notable in the following sense. The middle part of spectrum is the one that is seen as problematic. We don't mind well-paying traditional systems architect jobs. We also don't mind people volunteering to create Wikipedia articles. But as a society we are suspicious that platforms are exploiting workers. Even though there are examples of traditional and volunteer organizations that also exploit workers. Can some of the attributes and processes of volunteer online communities improve the design of work that takes place through platforms?

So far most of these platforms have not let the participants intentionally affect or choose the algorithms. There are reasons not to, related to business models, security, regulation, and privacy. What might it be like if, say, ride-sharing drivers could cluster naturally and intentionally? And if riders could cluster naturally and intentionally? Algorithms might nudge or facilitate that clustering. Moreover, the algorithms might be shaped by individual and group agency.

Acknowledgements

This material is based upon work supported by the National Science Foundation under grants IIS-1422066, CCF-1442840, IIS-1717473, and IIS-1745463.

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