

# MobileWorks: Designing for Quality in a Managed Crowdsourcing Architecture (Extended Abstract)

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## Abstract

Online labor marketplaces offer the potential to automate a variety of tasks too difficult for computers, but present requesters with significant difficulties in obtaining accurate results. We share experiences from building MobileWorks, a crowd platform that departs from the marketplace model to provide robust, high-quality results. Three architectural contributions yield measurably improved accuracy on input tasks. A *dynamic work routing system* identifies expertise in the crowd and ensures that all work posted into the system is completed with bounded completion times and at fair worker prices. A *peer management* system ensures that incorrect answers are prevented by experienced members of the crowd. Last, *social interaction techniques* give the best workers the ability and incentives to manage, teach & supervise other members of the crowd, as well as to clarify tasks. This process filters worker error and allows the crowd to collectively learn how to solve unfamiliar tasks.

## Introduction

Human computation platforms are online services that allow software systems to subcontract portions of their functionality to a large crowd of human workers over the web. Because they require software systems to interact with humans on a paid basis, human computation platforms provide an interesting set of challenges at the interface of economics, HCI, and theory.

Amazon's Mechanical Turk operates as a web-based marketplace where employers can post groups of tasks to be solved and workers can browse these tasks or choose to answer them. The problems of designing effective tasks, filtering unqualified workers, and eliminating incorrect answers are largely left to employers, with ratings available for filtering workers based on past accuracy. Employers must build extensive quality control infrastructure on top

of narrowly-constrained application domains, such as audio transcription, web research, or text recognition, and employ domain-specific techniques to deal with possible errors.

MobileWorks is an alternative crowdsourcing platform designed to prevent the accuracy and speed deficiencies faced by employers in online labor marketplaces. A central difference is that MobileWorks is *not* a marketplace: it operates as an algorithmically managed service, routing work to qualified workers and recruiting additional participants as needed. Tasks presented to the system are automatically matched and presented to qualified workers identified through a combination of human and programmatic testing. Discrepancies are resolved by the best workers (managers) who play an active role in maintaining the quality of the system and managing other workers. Worker-to-worker interaction, led by managers, permits additional worker training and discussion of individual tasks. These mechanisms allow us to address the same class of tasks solved on conventional labor marketplaces while providing substantially higher accuracy.

MobileWorks operates with a social mission to provide employment to marginalized populations in the developing world; as such, the majority of its workers are drawn from low-income populations in South and Southeast Asia and paid a fair baseline wage.

We have reported only a subset of results from MobileWorks to give a sense of the impact of our techniques. However, we have a sizable body of data from over a half-million tasks executed in the system, as well as demographic studies carried out on the worker pool. We look forward to making these available to the research community. MobileWorks is available for use online at <http://mobileworks.com>.

## References

- Ahn, L. von, Dabbish, L. Labeling images with a computer game. CHI 2004.
- Little, G. , et al. Exploring iterative and parallel human computation. HCOMP, 2010.
- Ahn, L. von. Games with a Purpose. IEEE Computer 39, (2006), 92–94.
- Cooper, S., et al. Predicting protein structures with an online game. Nature, 2010.
- Ahn, L. von, et al. reCAPTCHA: Human-based Character Recognition via Web Security Measures.
- Oleson, Sorokin, et al. Programmatic Gold: Targeted and Scalable Quality Assurance in Crowdsourcing. HCOMP 2011.
- Ipeirotis, P. Mechanical Turk, Low Wages, and the Market for Lemons. 27 July 2010. [www.behind-the-enemy-lines.com/2010/07/mechanical-turk-low-wages-and-market.html](http://www.behind-the-enemy-lines.com/2010/07/mechanical-turk-low-wages-and-market.html)
- Bernstein, M. S., Little, G., Miller, R. C., Hartmann, B., Ackerman, M. S., Karger, D. R., et al. (2010). Soylent : A Word Processor with a Crowd Inside. Artificial Intelligence, 313-322.
- Kulkarni, A., Can, M., Hartmann, B. (2012) Collaboratively crowdsourcing workflows with Turkomatic. CSCW 2012.
- Dow, S., Kulkarni, A. Hartmann, B., Klemmer, S. (2012) Shepherding the Crowd Yields Better Work. CSCW 2012.
- Bigham, J.P., Jayantc, C., Ji, H., et al. VizWiz: nearly real-time answers to visual questions. Proceedings of UIST 2010, ACM (2010), 333-342.
- Bernstein, M., Brandt, J., Miller, R., Karger, D. Crowds in two seconds: enabling realtime crowd-powered interfaces. Proceedings of UIST 2011.
- Eagle, N. (2009). txteagle : Mobile Crowdsourcing, Internationalization, Design and Global Development.
- Samasource. <http://samasource.org>
- Khanna, S., Ratan A, Davis, J., Thies, W. (2010). Evaluating and Improving the Usability of Mechanical Turk for Low-Income workers in India, ACM SigDev
- Benjamin B. Bederson and Alexander J. Quinn. 2011. Web workers unite! addressing challenges of online laborers. In Proceedings of the 2011 annual conference extended abstracts on Human factors in computing systems (CHI EA '11). ACM, New York, NY, USA, 97-106.
- Silberman, M.S., Irani, L. and Ross, R. 2010. Ethics and tactics of professional crowdwork. XRDS 17, 2 (December 2010), 39-43.
- Lehdonvirta, V., Enrkvist M. (2011). Knowledge map of the virtual economy.
- Ipeirotis, P. G. (2010). Analyzing the Mechanical Turk Marketplace. XRDS, 17(2), 16-21.
- Ross, J., Irani, L., Silberman, M. S., Zaldivar, A., and Tomlinson, B. 2010. Who are the crowdworkers?: shifting demographics in Mechanical Turk. In Proceedings of CHI 2010, Atlanta GA, ACM, 2010

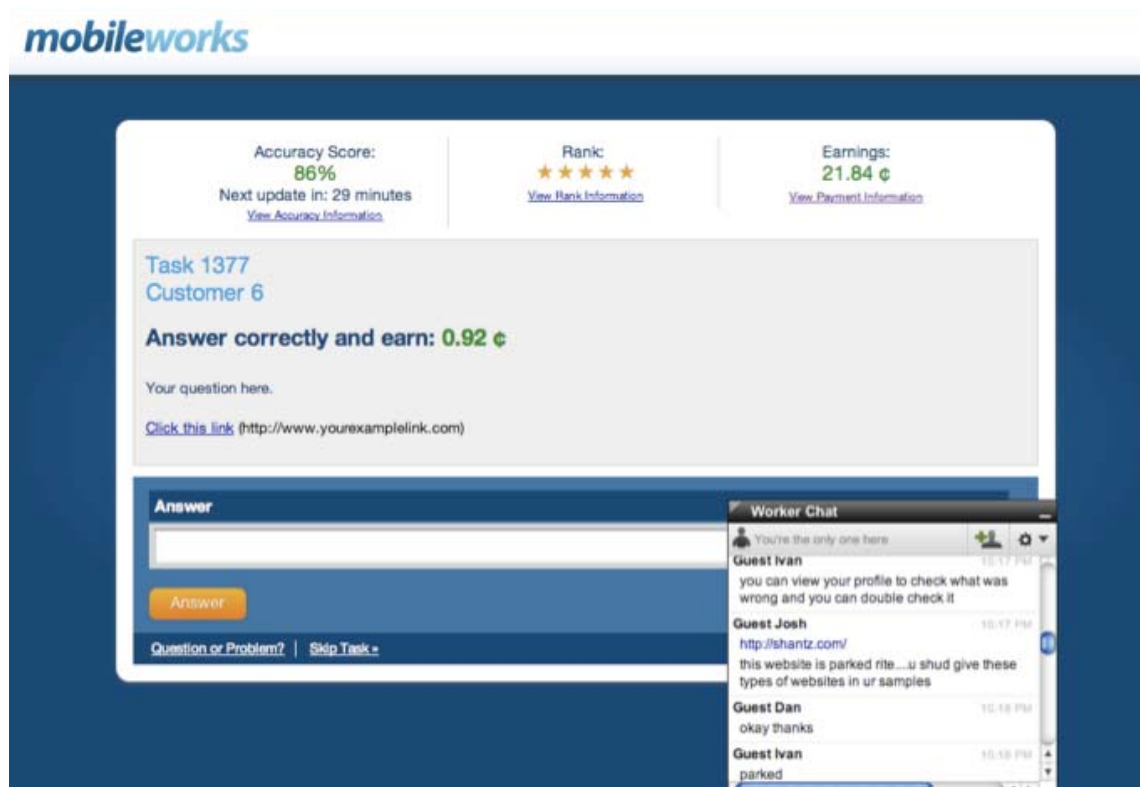


Figure 1. The MobileWorks interface serves a stream of appropriate tasks continuously to workers, interleaving qualification tests, expert tasks, unskilled tasks and training material. Workers are presented with immediate feedback on performance and earnings. Worker-to-worker chat is used to debug tasks on the fly, and workers can escalate tasks for managerial review.