

MICROTASK CROWDSOURCING FUNDAMENTALS

ELENA SIMPERL

UNIVERSITY OF SOUTHAMPTON

10/21/13

Tutorial@ISWC2013



MICROTASK CROWDSOURCING

Work is broken down into smaller (‘micro’) pieces that can be solved independently

The collage includes the following platforms:

- Servio**: A platform for getting work done. It features two boxes: "Need to get work done?" with a "Get Started" button, and "Want to earn money now?" with a "Learn More" button.
- CloudCrowd**: A platform for workers to earn money. It has a "Get Results from Mechanical Turk" section with a "Find HITs now" link, and a "Fund your account" section.
- CrowdSource**: A platform for hyper-specialized workers. It highlights "500,000+ Hyper-Specialized Workers On Demand".
- CrowdFlower**: A platform for mechanical turk workers. It shows sections for "Content Creation", "Product Matching", "Categorization", and "Search Relevance".
- Freebase**: A platform for crowdsourcing tasks related to databases. It features three jars containing brain models labeled "Freebase".
- The World's Largest Workforce**: A platform for hiring millions of people. It features a world map showing "515,587,994 total judgments/sec current velocity".
- samasource**: A platform for managing projects. It shows a flowchart: "you send samasource a project" → "samasource breaks it down into microwork" → "work is allocated to our service partners".
- MobileWorks**: A platform for crowdsourcing on demand. It features a "One Billion" statistic, a "Crowdsourcing On Demand Faster. More accurate. Painless." section, and a "Use crowds to..." section with various tasks like "Read handwriting", "Translate languages", and "Verify business listings".
- CloudCrowd**: A platform for crowdsourcing. It features the tagline "We're working on it. Lots of us."

MICROTASK CROWDSOURCING FUNDAMENTALS

DIMENSIONS OF MICROTASK CROWDSOURCING

10/21/13

Tutorial@ISWC2013



DIMENSIONS OF MICROTASK CROWDSOURCING

See also [Quinn & Bederson, 2012]

WHAT IS OUTSOURCED

- *Tasks based on human skills not easily replicable by machines*
 - Visual recognition
 - Language understanding
 - Knowledge acquisition
 - Basic human communication
 - ...

WHO IS THE CROWD

- Open call (crowd accessible through a platform)
- Call may target specific skills and expertise (qualification tests)
- Requester typically knows less about the ‘workers’ than in other ‘work’ environments

DIMENSIONS OF MICROTASK CROWDSOURCING (2)

See also [Quinn & Bederson, 2012]

HOW IS THE TASK OUTSOURCED

- Explicit vs. implicit participation
- Tasks broken down into smaller units undertaken in parallel by different people
- Coordination required to handle cases with more complex workflows
- Partial or independent answers consolidated and aggregated into complete solution

EXAMPLE: CITIZEN SCIENCE VIA MICROTAKS CROWDSOURCING

WHAT IS OUTSOURCED

- Object recognition, labeling, categorization in media content

WHO IS THE CROWD

- Anyone

HOW IS THE TASK OUTSOURCED

- Highly parallelizable tasks
- Every item is handled by multiple annotators
- Every annotator provides an answer
- Consolidated answers solve scientific problems



A screenshot of the Galaxy Zoo classification interface. At the top, it says "GALAXY ZOO" and has navigation links for Home, How To Take Part, My Galaxies, and Contact Us. On the right, there's a user profile section with a "Logout" button. The main area shows a large image of a spiral galaxy with several smaller stars or galaxies nearby. To the right of the image is a classification task: "Is there anything odd?". It includes two buttons: a checkmark for "Yes" and an X for "No". Below this, there's a note: "Please click an image below to return to an earlier point in the classification". At the bottom right is a "ADD TO MY FAVOURITES" button.

A LARGE, BUT NOT ALWAYS DIVERSE CROWD

Country of residence

- United States: 46.80%
- India: 34.00%
- Miscellaneous: 19.20%

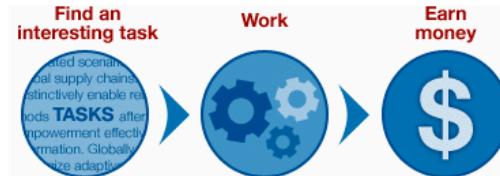


Make Money by working on HITs

HITs - Human Intelligence Tasks - are individual tasks that you work on. [Find HITs now.](#)

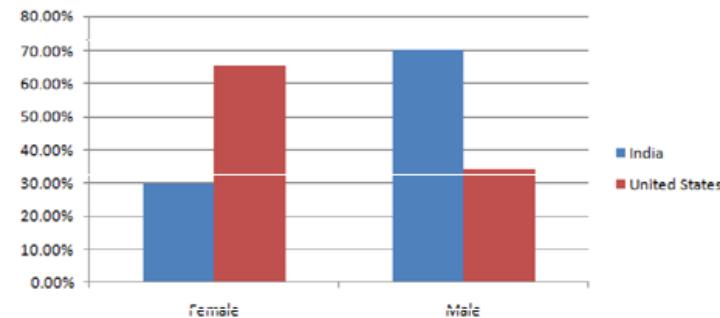
As a Mechanical Turk Worker you:

- Can work from home
- Choose your own work hours
- Get paid for doing good work

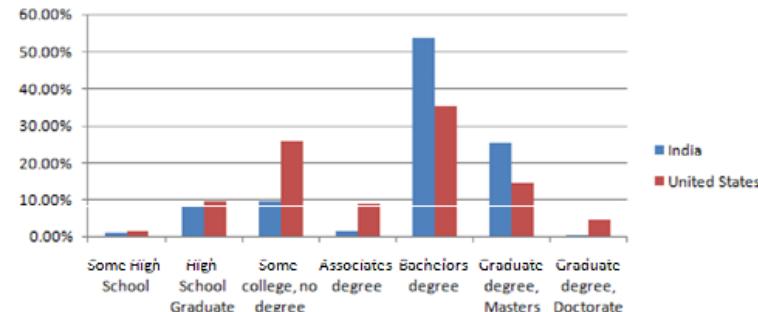


[Find HITs Now](#)

Gender Breakdown



Education Level



Get Results from Mechanical Turk Workers

Ask workers to complete HITs - Human Intelligence Tasks - and get results using Mechanical Turk. [Register Now](#)

As a Mechanical Turk Requester you:

- Have access to a global, on-demand, 24 x 7 workforce
- Get thousands of HITs completed in minutes
- Pay only when you're satisfied with the results



[Get Started](#)

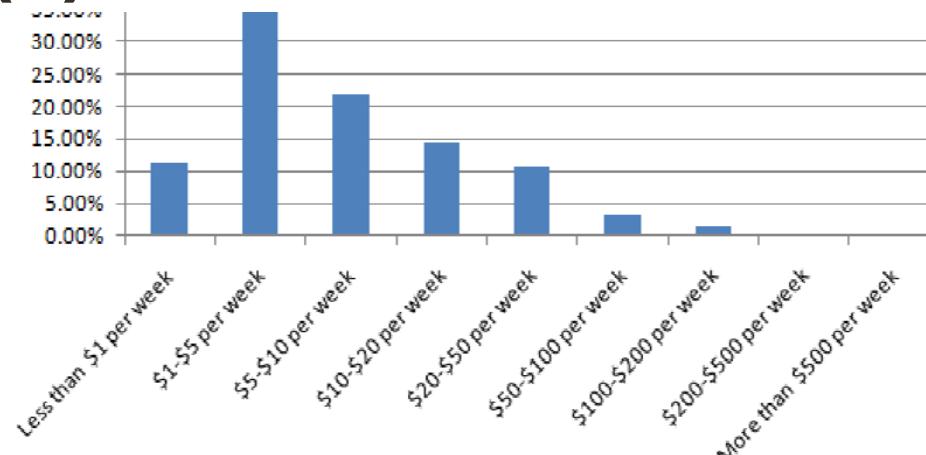
SIGNIFICANT AMOUNT OF RESOURCES AND TIMELY DELIVERY



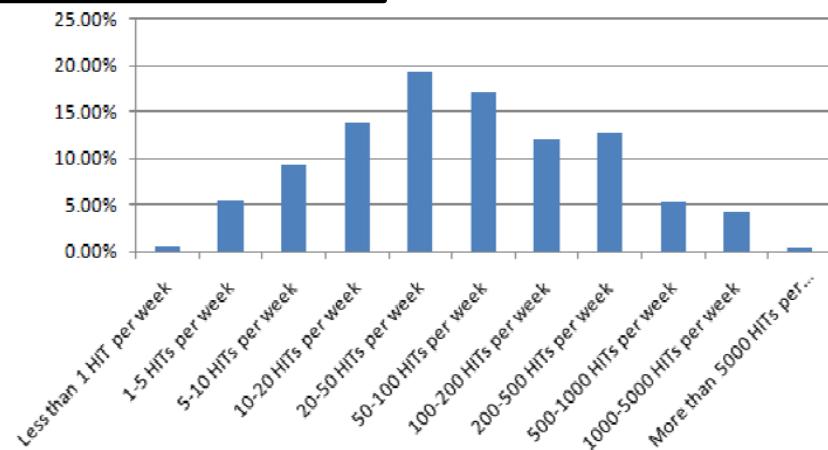
SIGNIFICANT AMOUNT OF RESOURCES AND TIMELY DELIVERY (2)

<http://www.mturk-tracker.com/>

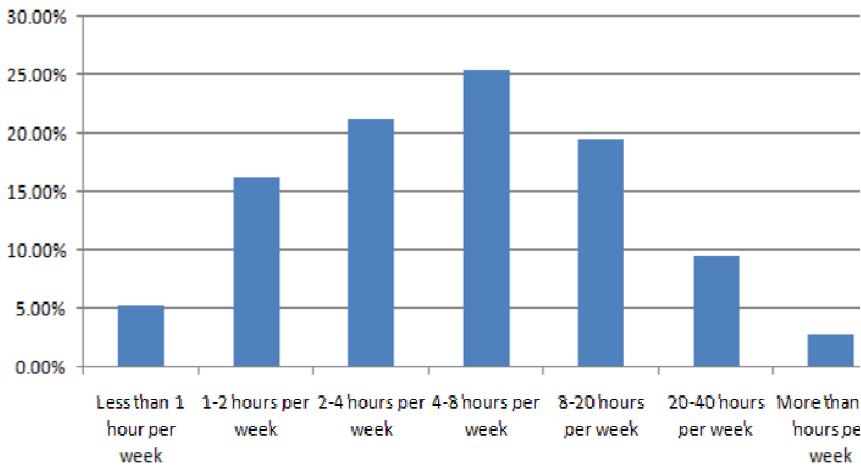
60% of workers spend more than 4 hours a week on MTurk



completed per week



Time spent on Mechanical Turk per week



BROAD RANGE OF TASKS



Business Data

Collect data on businesses at massive scale



Content Moderation and Curation

Quickly find both good and bad user generated content



Ranked

Boost conversions with better search results



Content Generation

Improve your search engine ranking with quality content



Custom solutions

We help businesses of all sizes automate really big custom projects



Customer and Lead Data Enhancement

Increase sales by knowing more about your customers



Sentiment and Opinion Analysis

Know exactly what people are saying about you



Categorize

Categorize products, businesses, videos, events, & more



Surveys

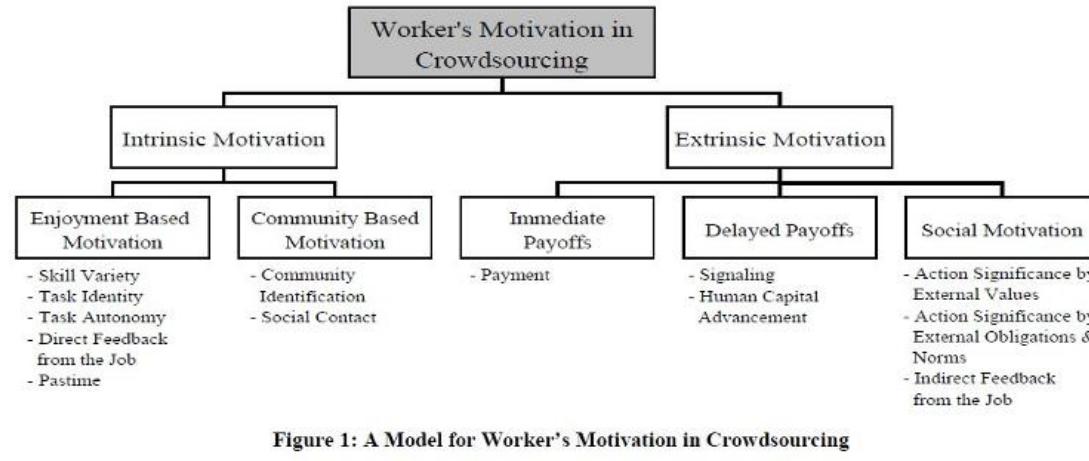
Find and interact with highly-qualified digital consumers



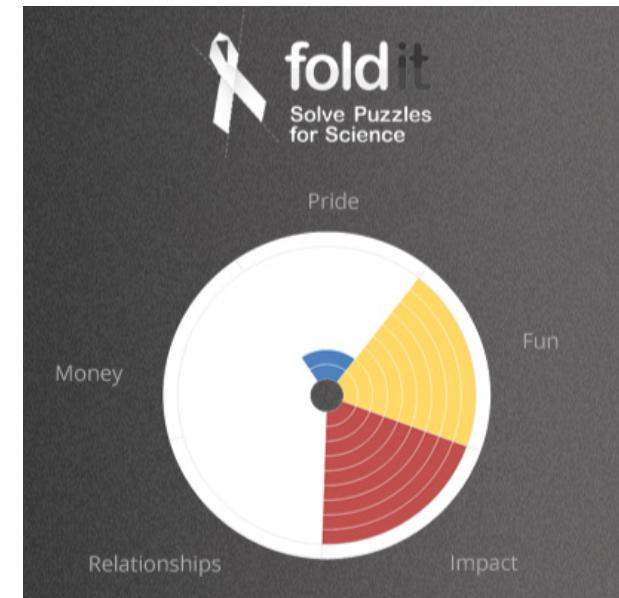
Builder

Advanced user? Developer? Build your own crowdsourcing projects

IT'S NOT ALWAYS JUST ABOUT MONEY



[Kaufmann, Schulze, Viet, 2011]



<http://www.crowdsourcing.org/editorial/how-to-motivate-the-crowd-infographic/>

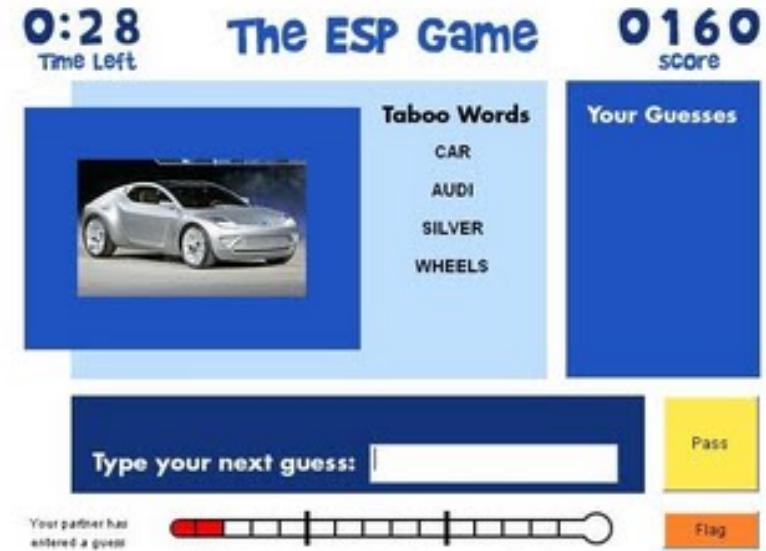
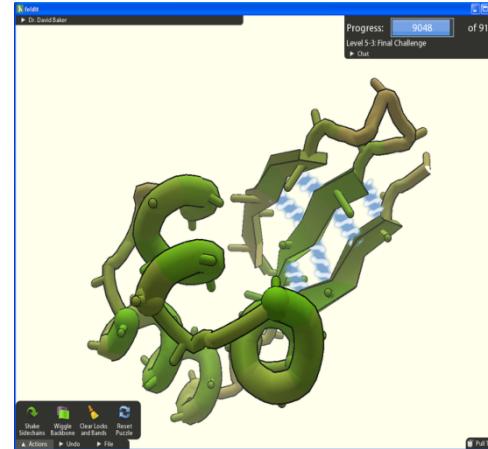
<http://www.oneskyapp.com/blog/tips-to-motivate-participants-of-crowdsourced-translation/>

EXPLICIT VS. IMPLICIT CONTRIBUTION - AFFECTS MOTIVATION AND ENGAGEMENT

Users aware of how their input contributes to the achievement of application's goal (and identify themselves with it)

vs.

Tasks are hidden behind the application narratives.
Engagement ensured through other incentives

A screenshot of "The ESP Game". At the top, it says "0:28 Time Left" and "0160 score". In the center, there is a blue box containing a silver car image. To the right, under "Taboo Words", are the words "CAR", "AUDI", "SILVER", and "WHEELS". To the left, under "Your Guesses", is a large blue box. At the bottom, there is a text input field with the placeholder "Type your next guess:" and a progress bar below it. Buttons for "Pass" and "Flag" are on the right.

COMPLEX WORKFLOWS CANNOT ALWAYS BE DIRECTLY IMPLEMENTED

See also [Bernstein et al., 2010]

WHAT IS OUTSOURCED

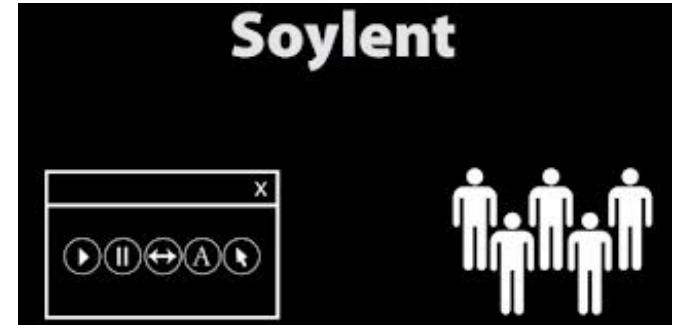
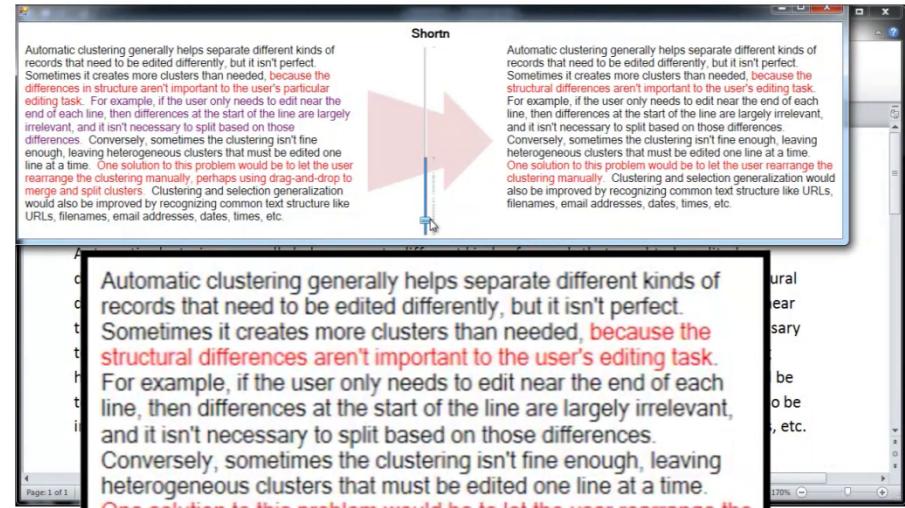
- Text shortening, proof-reading, open editing

WHO IS THE CROWD

- MTurk

HOW IS THE TASK OUTSOURCED

- Text divided into paragraphs
- Select-fix-verify pattern
- Multiple workers in each step



http://www.youtube.com/watch?v=n_miZqsPwsc

DIMENSIONS OF MICROTASK CROWDSOURCING (3)

See also [Quinn & Bederson, 2012]

HOW ARE THE RESULTS VALIDATED

- Solutions space closed vs. open
- Performance measurements/ground truth
- Statistical techniques employed to predict accurate solutions
- May take into account confidence values of algorithmically generated solutions

HOW CAN THE PROCESS BE OPTIMIZED

- Incentives and motivators
- Assigning tasks to people based on their skills and performance (as opposed to random assignments)
- *Symbiotic combinations of human- and machine-driven computation, including combinations of different forms of crowdsourcing*

OPEN SOLUTION SPACES

Selecting
the right
option vs.
assessing
the quality
of the work

The goal is to
undertake
much of the
assessment
either
automatically
or use the
crowd for it.

•draw a sheep facing to the left•

Upcoming Credentialed Work

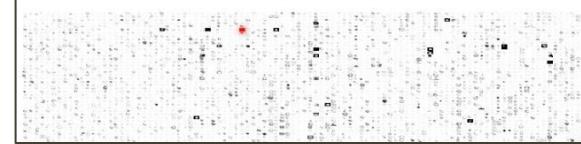
Last Updated: May 16, 2013 11:07AM PST

Start Date	Brief Description	Required Credential	Number of Tasks	Pay Rate
Current (on-going)	150 to 300-word Small Business Product Descriptions	Marketing Writer 2	100+ Remaining	5 Cents (Per Word)
Current (on-going)	475-word Reply! Articles	General Writer 1	400+ Remaining	3 Cents (Per Word)
Current (on-going)	65 to 75-word Medical Specialty Blurbz	General Writer 2	4000+	5 Cents (Per Word)
Current (on-going)	500- to 750-word movie reviews and analyses.	General Writer 1	36/week	3 Cents (Per Word)
Current (on-going)	450-word Small Business Blog Articles	Marketing Writer 2	40/month	5 Cents (Per Word)
Current (on-going)	300-word Marketing Content.	General Writer 1	100+	3 Cents (Per Word)
Current (test-run)	Costume/Accessory PDs.	Marketing Writer 1	300 remaining	3 Cents (Per Word)
Current (on-going)	Short Leadins.	General Writer 1	500/week	3 Cents (Per Word)
Current (on-going)	PPQAs	General Writer 1	20,000 (late May/early June)	3 Cents (Per Word)
Current (on-going)	Visa Print PDs	Marketing Writer 1	5000 Remaining	3 Cents (Per Word)



THE SHEEP MARKET

10,000 sheep created
by online workers.
More...



Example Categorization Questions

What type of business is this?

Bank of America

- Financial Institute
- Retailer
- Resturaunt
- Other

Does this blog comment meet
our guidelines?

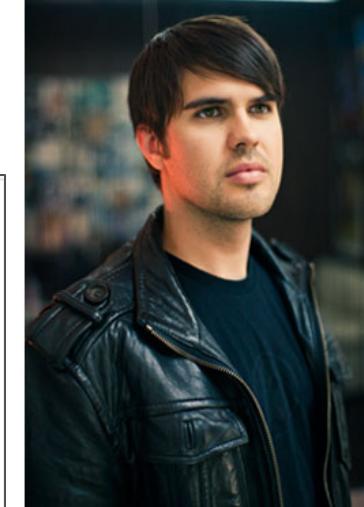
"No way! You're crazy to
think that!"

- Yes
- No

What emotion is shown in
this picture?



- Happiness
- Anger
- Sadness
- Surprise



MEASURING PERFORMANCE CAN BE CHALLENGING

WHO AND HOW

- Redundancy
- Excluding spam and obviously wrong answers
- Voting and ratings by the crowd
- Assessment by the requester
- Where does the ground truth come from and is it needed
 - Note: improving recall of algorithms

WHEN

- Real-time constraints in games
- Near-real-time microtasks, see Bernstein et al. Crowds in Two Seconds: Enabling Realtime Crowd-Powered Interfaces. In Proc. UIST 2011.

ALIGNING INCENTIVES IS ESSENTIAL

Motivation: driving force that makes humans achieve their goals

Incentives: ‘rewards’ assigned by an external ‘judge’ to a performer for undertaking a specific task

- Common belief (among economists): incentives can be translated into a sum of money for all practical purposes.

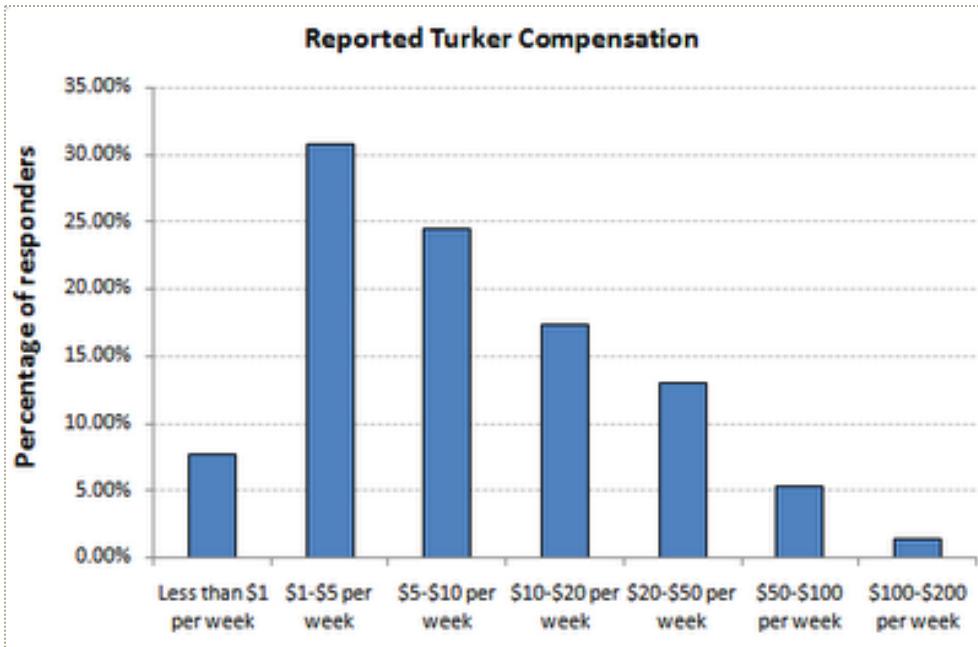
altruism
reputation
freedom reciprocity
self-expression
competition
community
autonomy
fun

Incentives can be related to both extrinsic and intrinsic motivations.

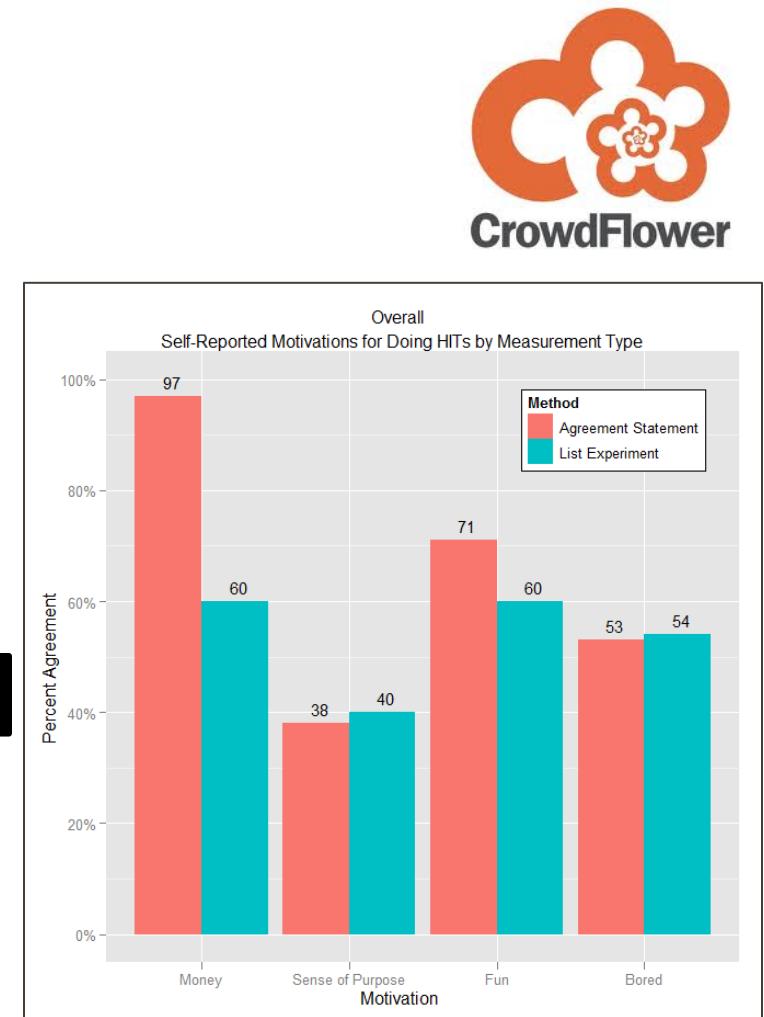
Extrinsic motivation if task is considered boring, dangerous, useless, socially undesirable, disliked by the performer.

Intrinsic motivation is driven by an interest or enjoyment in the task itself.

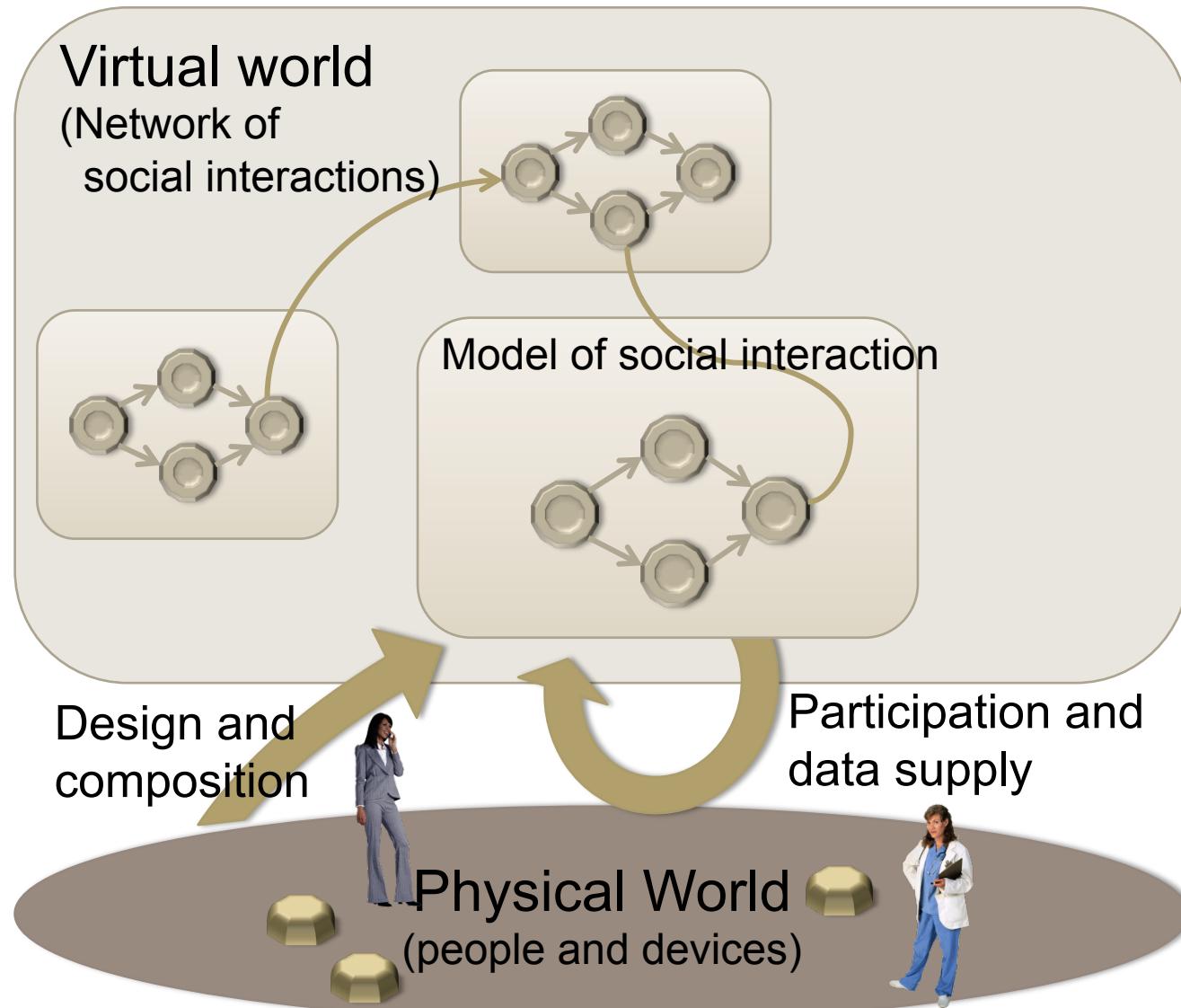
PRICING ON MTURK



[Ipeirotis, 2008]



HYBRID SYSTEMS



EXAMPLE: HYBRID DATA INTEGRATION

paper	conf
Data integration	VLDB-01
Data mining	SIGMOD-02

title	author	email	venue
OLAP	Mike	mike@a	ICDE-02
Social media	Jane	jane@b	PODS-05

Generate plausible matches

- paper = title, paper = author, paper = email, paper = venue
- conf = title, conf = author, conf = email, conf = venue

Ask users to verify

Does attribute **paper** match attribute **author**?

paper	conf
Data integration	VLDB-01
Data mining	SIGMOD-02

title	author	email
OLAP	Mike	mike@a
Social media	Jane	jane@b

Yes

No

Not sure

EXAMPLE: HYBRID QUERY PROCESSING

Use the crowd to answer DB-hard queries

Where to use the crowd:

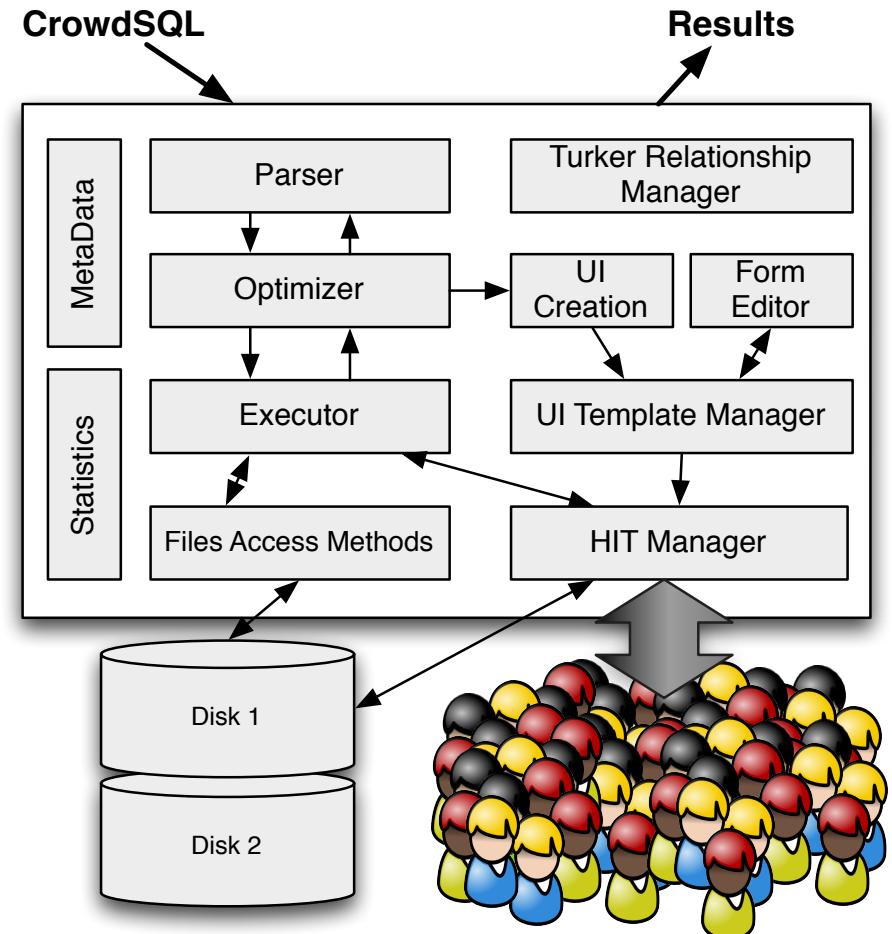
Find missing data

Make subjective comparisons

Recognize patterns

But not:

Anything the computer already does well



MICROTASK CROWDSOURCING FUNDAMENTALS

IN THIS TUTORIAL

PAID MICROTASK CROWDSOURCING

10/21/13

Tutorial@ISWC2013



COMPONENTS OF A MICROTASK PLATFORM

Task design
and workflow
support

Crowd and
crowd
selection

Task
assignment
and
publication

Rewards

Qualification
tests and
quality
assurance

Interface and
programming
support

AMAZON MECHANICAL TURK



Simple tasks,
grouped in
batches

US/India
Location
Acceptance rate
Masters

Newer tasks
on top of the
list

Reward set
by requester,
fixed + bonus

Qualification
tests

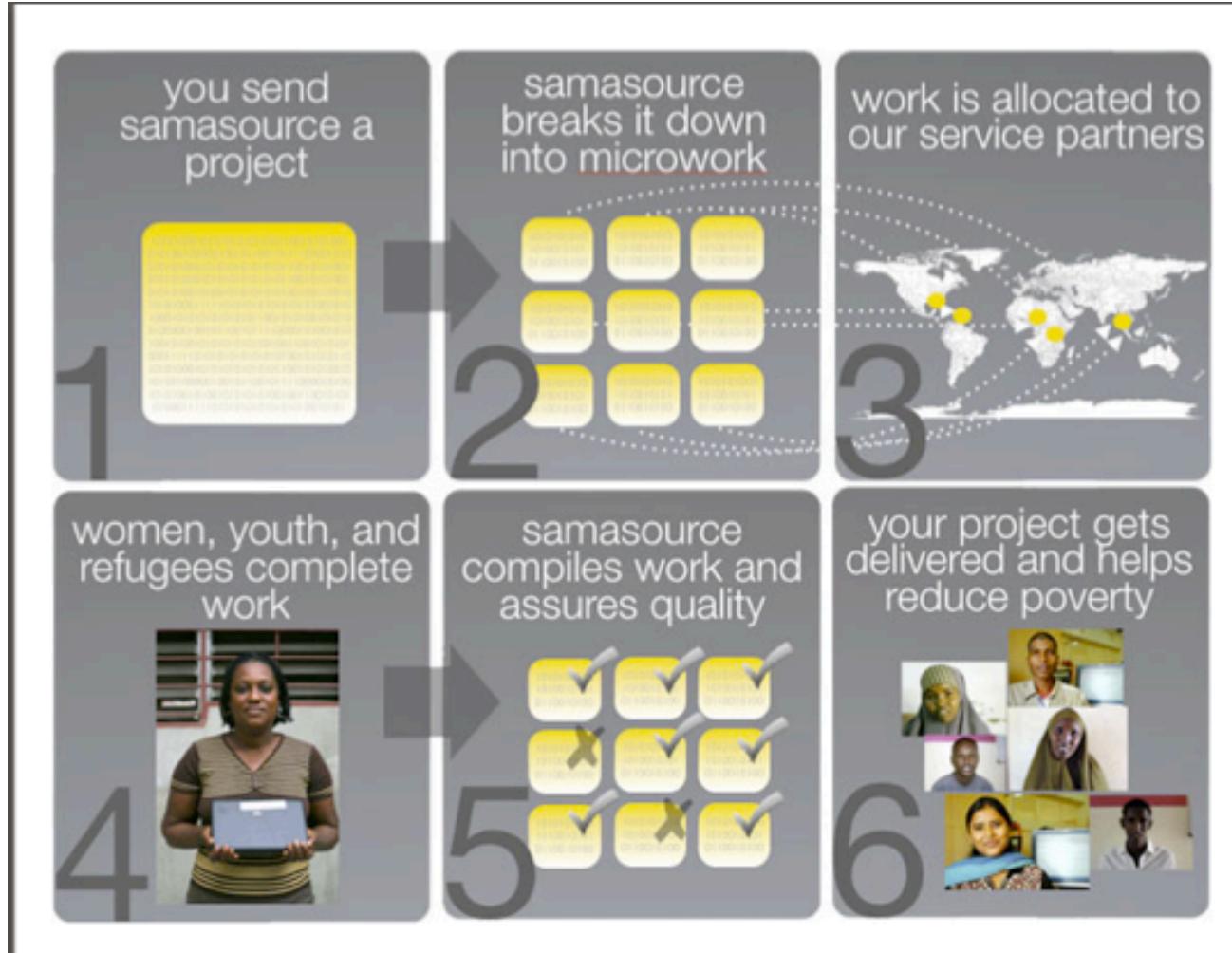
UI and SDK

CROWDFLOWER

- Stronger quality control by platform providers
- No restrictions to US-based requesters
- Aggregator, also uses MTurk crowd



SAMASOURCE.ORG



MOBILEWORKS

mobileworks

- Workers from South America
- Quality assurance by selected crowd members
- Reward decided by platform provider based on complexity of the tasks

The screenshot shows the MobileWorks beta homepage. At the top, there's a navigation bar with links for Home, Products, Pricing, Dev Center, and Social Mission. The main headline reads "Crowdsourcing On Demand" followed by the tagline "Faster. More accurate. Painless." Below this, there's a graphic of several small human figures standing in a row, with a callout bubble stating "thousands of tasks possible!". A section titled "Use crowds to..." lists various tasks: Read handwriting, Classify data, Tag images, Transcribe audio, Translate languages, Verify business listings, Proofread articles, and "... and more!". A "Learn more" button is located below this list. Further down, there's a section titled "Try out applications that use the MobileWorks crowd" featuring two examples: "Excavator" (Send teams of humans to collect email addresses, generate leads, or scrape data from the web) and "Digitizer" (Make paper forms a thing of the past. Use the power of the crowd to transform handwritten forms into Excel spreadsheets). Each example has a "Try it now!" button. Below these, there's an "OR" button and a "Build your Own" button. At the bottom, a footer note says "MobileWorks is crowd labor you should feel good about. We're changing the way the world works. [Learn more »](#)" and a standard footer with links for About Us, FAQ, Contact, Blog, and Privacy & Terms.

MANY OTHER PLATFORMS

The Clickworker website features a yellow header with navigation links for 'Order now', 'About Us', 'Press', 'How it works', and 'Customer-FAQ'. Below the header is a login form with fields for 'Username' and 'Password'. A large central banner asks 'Need to get work done?' and 'Want to earn money now?'. To the left, a sidebar for 'For Customers > Home' displays the text 'Your virtual On Demand' and 'Serv. JobBoy'. At the bottom, there's information about 'ShortTask' with icons for a bee and a person, and a section for 'Solvers'.

The microtask website has a teal header with links to 'HOME', 'COMPANY', 'SOLUTIONS', and 'BLOG'. A large banner on the right side claims 'One Billion tasks per day' and describes it as a 'distributed work platform for enterprises'. Below the banner, there's a video player and the text 'Distributed work... refined for your needs.' On the right sidebar, there are social media links and a 'Follow us' section.

The CrowdGuru website has a blue header with links to 'HOME', 'SIGN UP', 'SEARCH', 'ABOUT US', 'CONTACT US', 'FAQ', 'TOOLS', and 'LOG IN'. A main banner features the text 'Wir halten Ihnen den Rücken frei' and 'Crowd Guru erledigt Ihre Aufgaben, damit Sie sich auf das bewirtschaften konzentrieren - schneller, besser und günstiger.' Below the banner, there are three sections: 'Werksleistung', 'Recherche', and 'Gatesübertragung', each with a brief description and icons. At the bottom, there's a diagram illustrating a workflow from 'New Project Requests' to 'QA' and 'Project Delivery'.

MICROTASK CROWDSOURCING FUNDAMENTALS

SUMMARY

10/21/13

Tutorial@ISWC2013



SUMMARY

- Microtask crowdsourcing works best for tasks that computers find challenging
- Apply it for simple, repetitive tasks that can be clearly scoped and described
- Think about what you can pre-compute automatically
- Think about task design and phrasing of questions
- Complex workflows require additional effort
- Think about quality assurance, validation, aggregation of results, and task assignment
- Time is sometimes of essence
- It is not always about the financial reward
- There are more platforms out there beyond MTurk