

# Crowd Computing: From Human Computation to Collective Intelligence

IJCAI 2015

**Mark Klein**

Massachusetts Institute of Technology (MIT)

[m\\_klein@mit.edu](mailto:m_klein@mit.edu)

<http://cci.mit.edu/klein>

**Ana Cristina Bicharra Garcia**

Universidade Federal Fluminense (UFF)

[bicharra@ic.uff.br](mailto:bicharra@ic.uff.br)

[www.addlabs.uff.br](http://www.addlabs.uff.br)

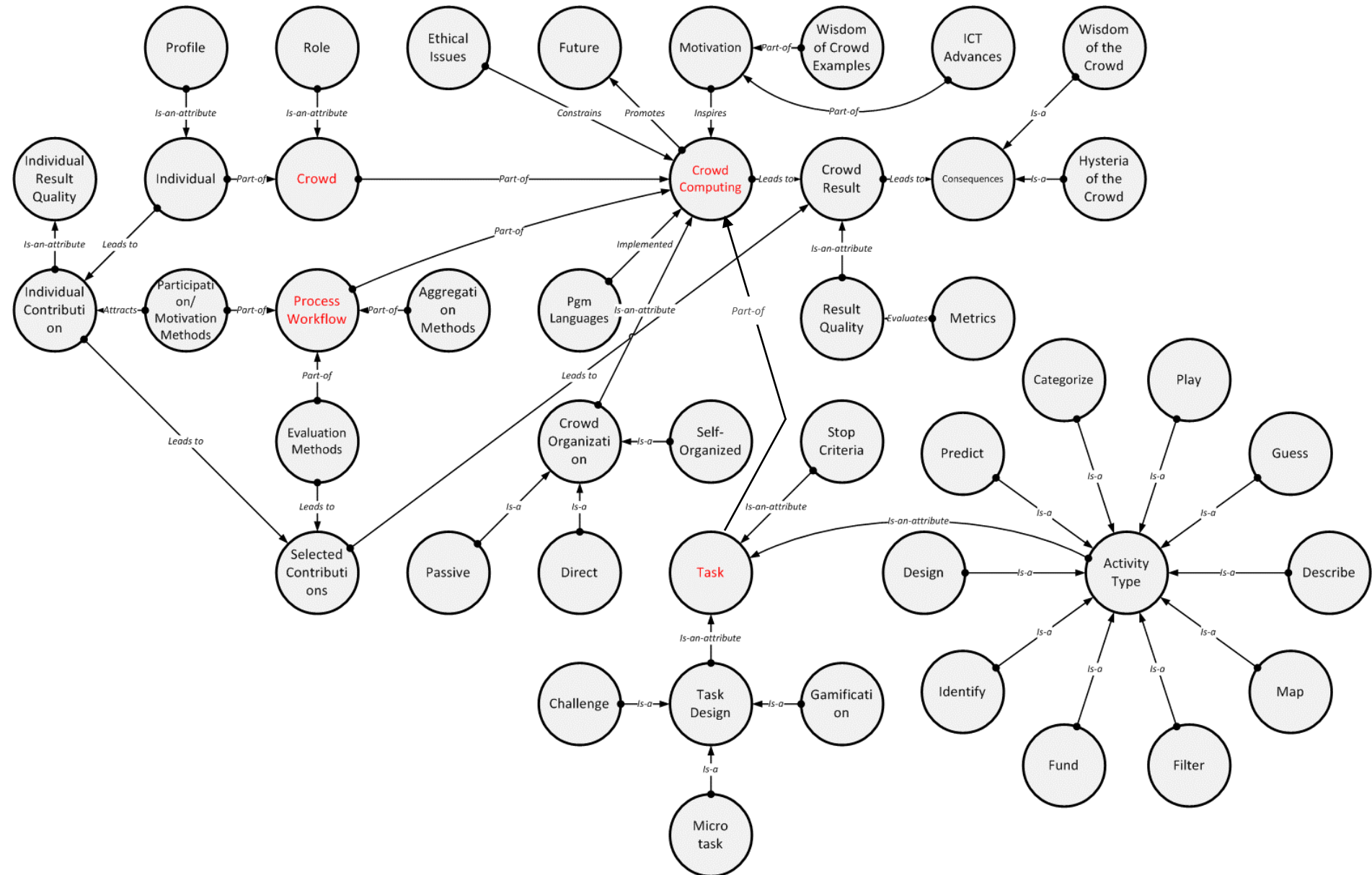
# Course Outline

---

- Introduction and Basic Concepts
- The Crowd
- The Task
- Evaluation techniques
- Selection techniques
- Aggregation techniques
- Programming Languages for Collective Intelligence
- Legal Issues
- Collective Intelligence as a new wave of changes

# INTRODUCTION

# Crowd Computing Taxonomy



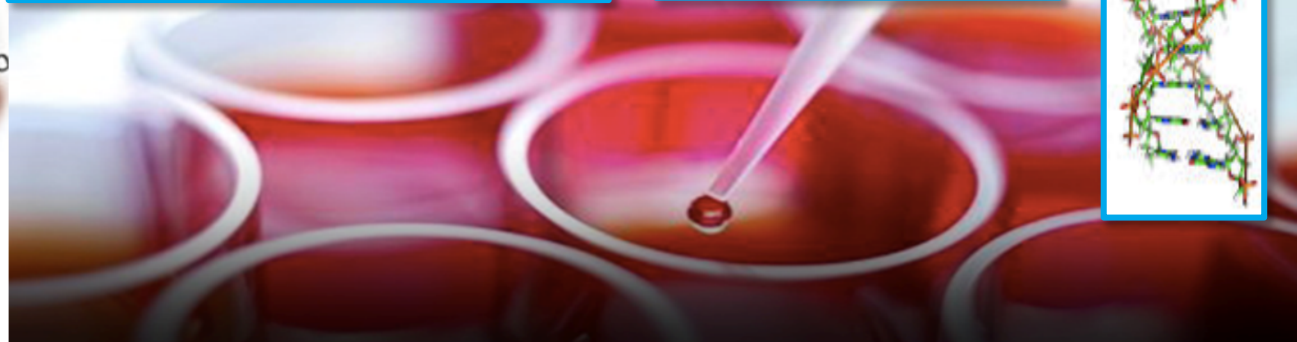
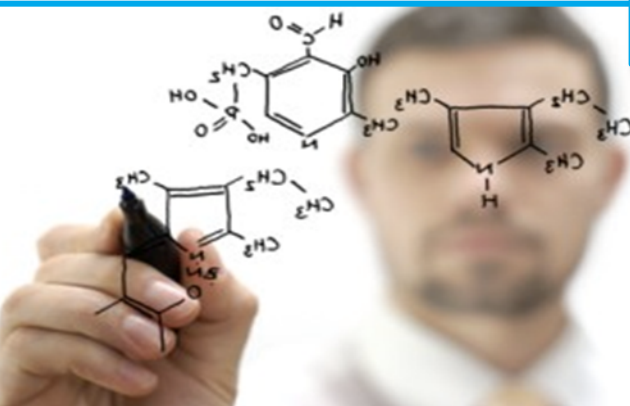
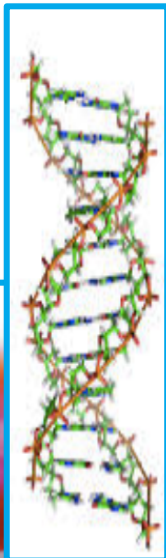
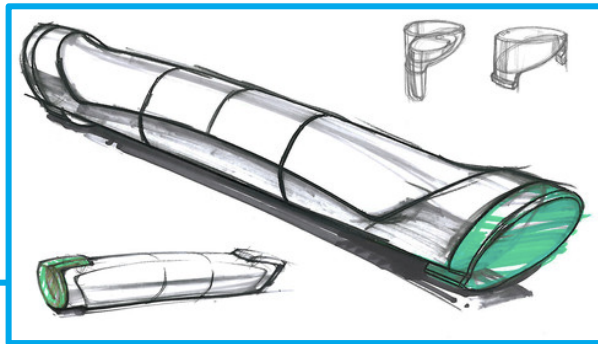


# INTRODUCTION

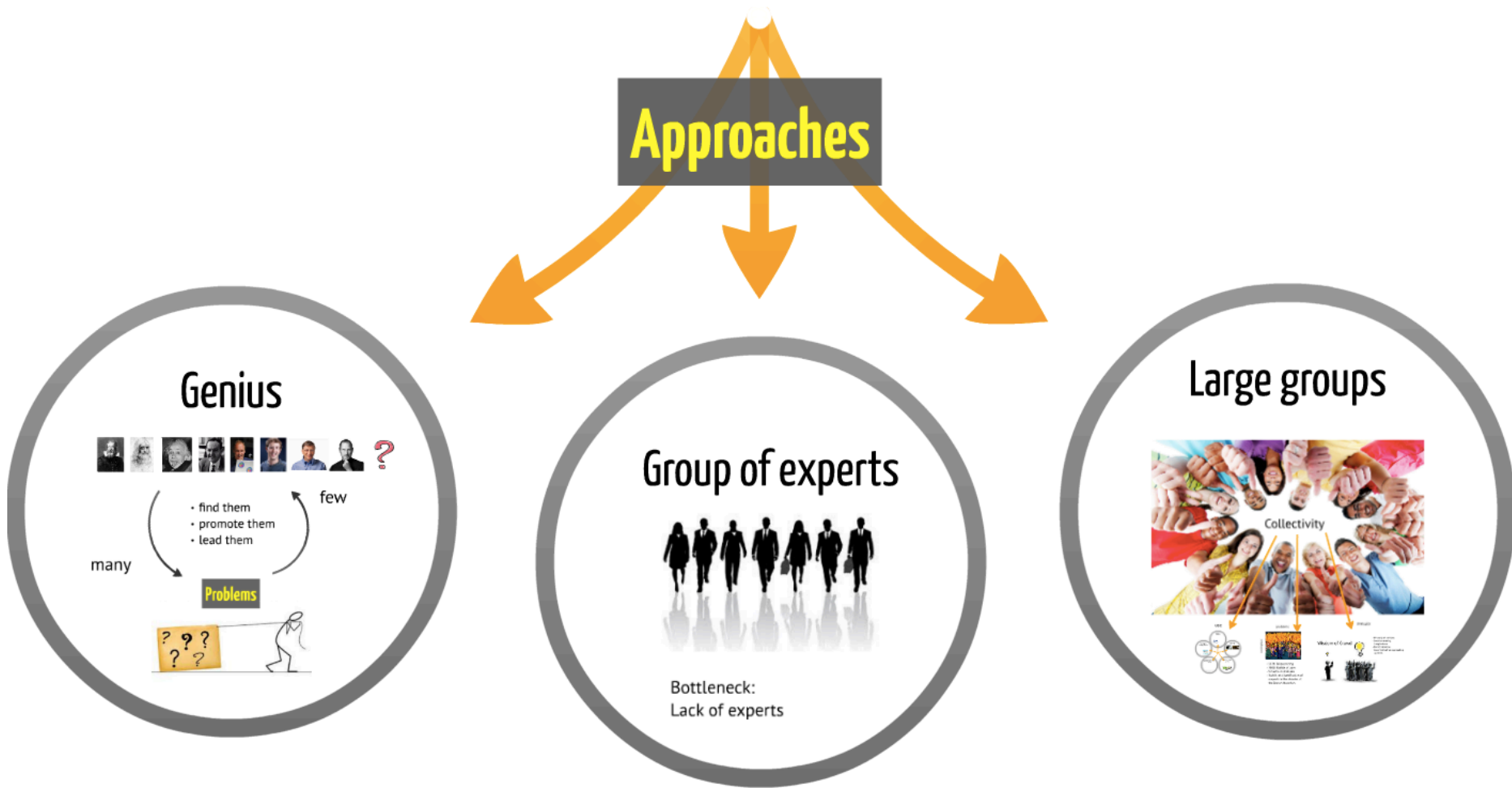
WHY SHOULD WE CARE?

# Complex problems

- Examples:
  - Find the cure for sicknesses
  - Design new products in a very competitive world
  - Fund projects
  - Fully analyze huge number of alternative
  - Find things/get a precise answer in a overloaded information world
  - Discover new protein structures



# Human problem-solving approaches



# INTRODUCTION

COLLECTIVE INTELLIGENCE IS A NOT NEW IDEA

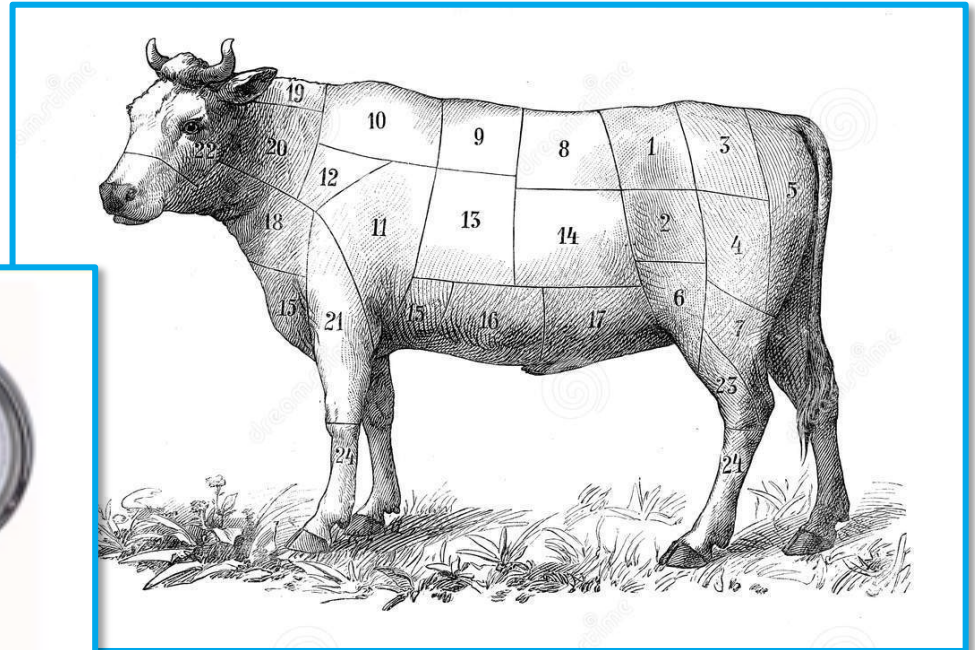
# CI traces

(Surowiecki 2004)

## The weight of an Ox

- 1907 Galton's experiment:
  - 787 people
  - Ox weight: 1,198 pounds
  - Average Guess: 1,197 pounds

*Crowd creates better estimates*



# CI traces

(Surowiecki 2004)

## Jelly beans in a jar

- 1987, Prof. Jack Treynor, University of Southern California:
  - 850 jelly beans
  - 56 students
  - Average estimate only 2,5% off
- 2007, Michael Maubóussin, Columbia Business School:
  - 1,116 jelly beans
  - 73 students
  - Guesses: 250--4,100
  - Average Guess: 1,151 (only 3% off)

*Crowd creates better estimates*



# CI traces

(Surowiecki 2004)

## Who wants to be a millionaire?

- Phone a friend: 65%
- Ask the audience: 91%





# CI traces

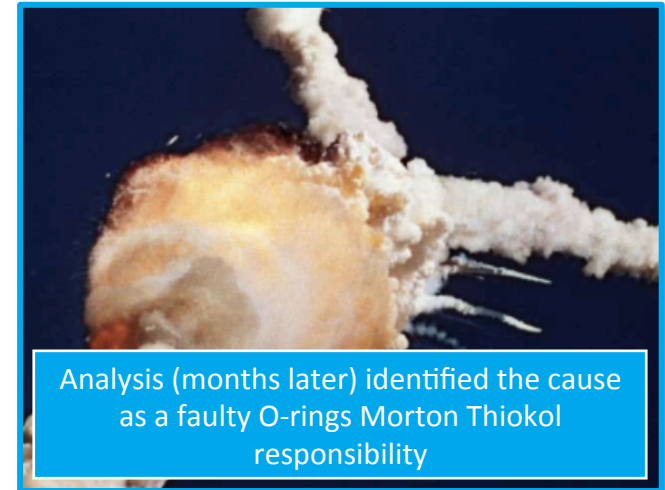
(Surowiecki 2004)

**01/28/86, Space Shuttle Challenger spacecraft disintegrated over the Atlantic Ocean.**

- Impact for the 4 major builders:
  - Rockwell: built the shuttle & main engines
  - Lockheed: managed ground support
  - Martin Marietta: the ship's external fuel tank
  - Morton Thiokol: the solid-fuel booster rocket

## STOCK MARKET'S REACTION

Company	21 minutes after explosion	1 day after explosion
Rockwell	-6%	-3%
Lockheed	-5%	-3%
Marietta	-3%	-3%
Thiokol	-6%	-12%



**The crowd fast identified the responsible**



# EXERCISE 1

GUESS HOW MANY PEOPLE ARE AT IJCAI TODAY

**It will be posted in our website tomorrow:**

- Corrected answer
- Average answer
- Closest answer

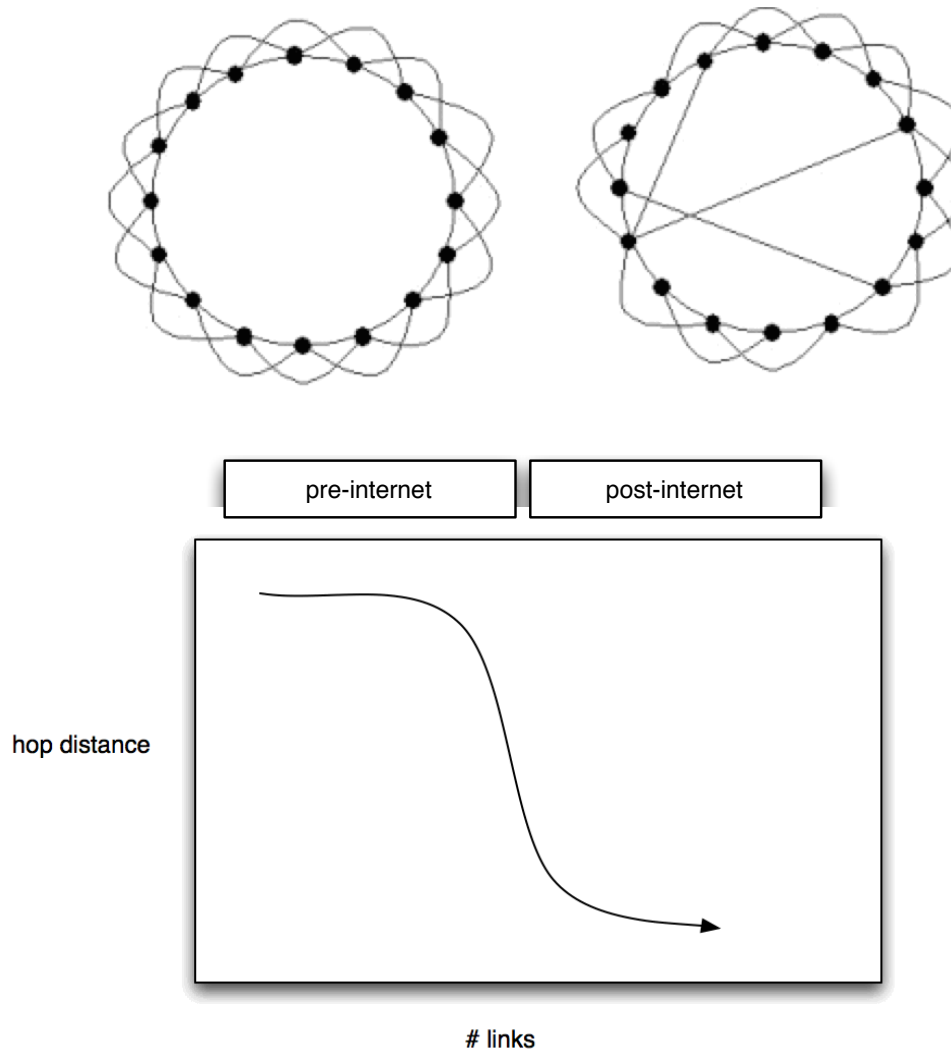
# INTRODUCTION

WHY IS COLLECTIVE INTELLIGENCE SO IN FASHION NOWADAYS?

- Fast and cheap Internet
  - High engagement in social networks
  - Facebook
    - 1,44 billion of active users (2015)
  - YouTube
    - 1 billion users (2015)
    - 300 h of video uploaded per minute
  - Twitter
    - 302 M of users
    - 80% active users on mobile
    - 500 M tweets per day
- Fully connection: People are always connected - Mobile advances
- Social media inclusiveness
- Easy to participate

# Internet Phase Transition

- Weak links (enabled by social media) can greatly reduce hop distances



# INTRODUCTION

THE DIFFERENT ROLES A CROWD MAY PLAY

# Paid workforce

## Mechanical Turk

- Amazon offers “a crowd for hiring”
- Workers: Paid work
- Employee: define the task and might define the desired crowd profile
- Good for:
  - Very simple tasks such as:
    - Evaluating products
    - Choosing between two alternatives
    - Answering surveys
  - Hits
- Bad for
  - Tasks that requires “thinking”

# Other sites

- Sites offering similar services
  - ClickWorker (German site → pay more the workers)
  - MicroTurks (low participation)
  - RapidWorkers (easy tasks- use to pay \$0.1 per vote in YouTube-minimum \$4 to pay)
  - CloudCrowd - good payment, ask Facebook and PayPal to participate
  - MicroWorkers - simple task as commenting a video
  - ShortTask - small site
  - JobBoy - surveys
  - Do my stuff - bid task. Not too many in the crowd
  - Web e-serve: specializes in tasks related to social media
  - Crowd Flower\*\* More complex tasks such as translation, transcripts and surveys
  - Mini Freelance - small social tasks such as do a review and social bookmarking
  - CloudCrowd - tasks related to writing
  - Crowdtap - only US participants

# Crowd as Forecast

*(Betting paper 2003)*

- Forecasting Hollywood results
  - HSX.com
  - Hollywood Stock Exchange
    - Crowd correctly predicted 32 out of 39 Oscar nominees
    - 7 out of 8 top category winners
- Forecasting presidential elections
  - IOWA Electronic Market (IEM) – University of North Carolina
    - Correctly predicted all but 1 candidate between 1868 and 1940



# Crowd as Investor

---

- Crowdfunding projects
  - KIVA
  - [www.kiva.org](http://www.kiva.org)
  - Post a project
  - Ask for contribution to do project
  - Donors receive at the end their money back into Kiva's account
  - Reputation is key (“the crowdfunding bank”)
- In general, it costs 5-6%

# Other crowdfunding projects

- Kickstarter: artistic projects-rigorous submission process (only projects from U.S., U.K. and Canada)
  - [www.kickstarter.com](http://www.kickstarter.com)
- Indiegogo: initially for film production. “platform is available to anyone, anywhere, to raise money for anything”
  - [www.indiegogo.com](http://www.indiegogo.com)
- RocketHub: SciFund annual challenge
  - [www.rockethub.com](http://www.rockethub.com)
- Peerbackers: funding entrepreneurs and innovators -- all over the world.
  - [peerbackers.com](http://peerbackers.com)
- SoMoLend (Social Local lending): targets brick-and-mortar companies that already have customers and cash flow and can service debt. Money comes from friends and relatives
  - <https://somolend.com>

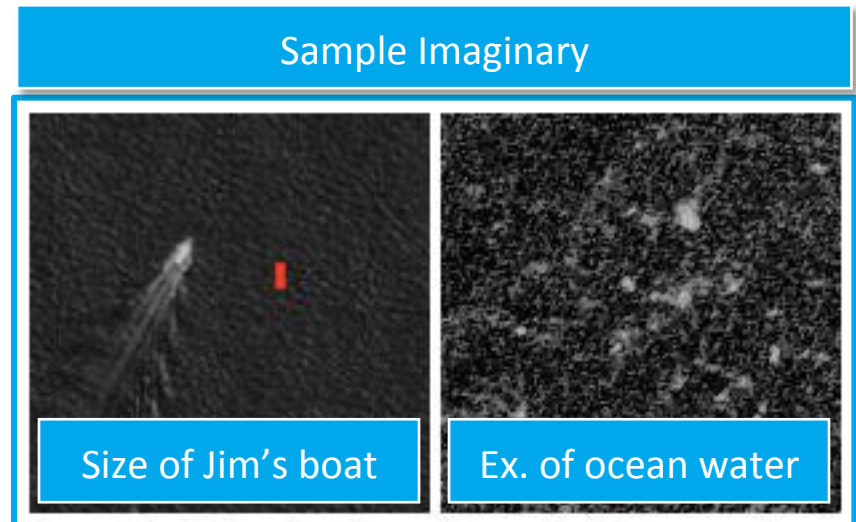
# Crowd as investigator

- Zooniverse
  - more than 100,000 volunteers classified over 1m galaxies in a few months



# Crowd as investigator

- Where is Jim Gray?
  - Famous researcher
  - Turing award (1998)
  - Microsoft e-Science group
  - Lost at sea in January 2007
  - Coast Guard's air and surface search cover 40,000 square miles
  - 12,000 people scanned NASA satellite imagery covering 30,000 square miles
  - Public call for help
- Nasa website to find craters in Mars
  - <http://beamartian.jpl.nasa.gov/>
- The mystery of Flight MH370



# Crowd as Oracle

---

- Answering questions
- VizWiz
  - [Vizwiz.com](http://Vizwiz.com)
  - Mobile application
  - Take a picture
  - Speak a question
  - Get an answer

# Others

---

- Users post questions
- Users post answers
- Users evaluate answers
- Ranked answers
- Quora
  - <https://www.quora.com>
- StackOverflow
  - <http://stackoverflow.com>

# Crowd as Advisor/Evaluator

- Recommendation Systems
  - Users evaluation on products
  - Rating and ranking
  - Most common and accepted use of the crowd
  - Standard example: [Amazon.com](https://www.amazon.com)

### Customer Reviews

★★★★☆ 477  
4.6 out of 5 stars

5 star	<div><div></div></div>	72%
4 star	<div><div></div></div>	21%
3 star	<div><div></div></div>	5%
2 star	<div><div></div></div>	1%
1 star	<div><div></div></div>	1%

Share your thoughts with other customers

[Write a customer review](#)

[See all 477 customer reviews](#)

### Most Helpful Customer Reviews

38 of 38 people found the following review helpful

★★★★★ **Worth the read**  
By [Wolfe](#) on September 7, 2013

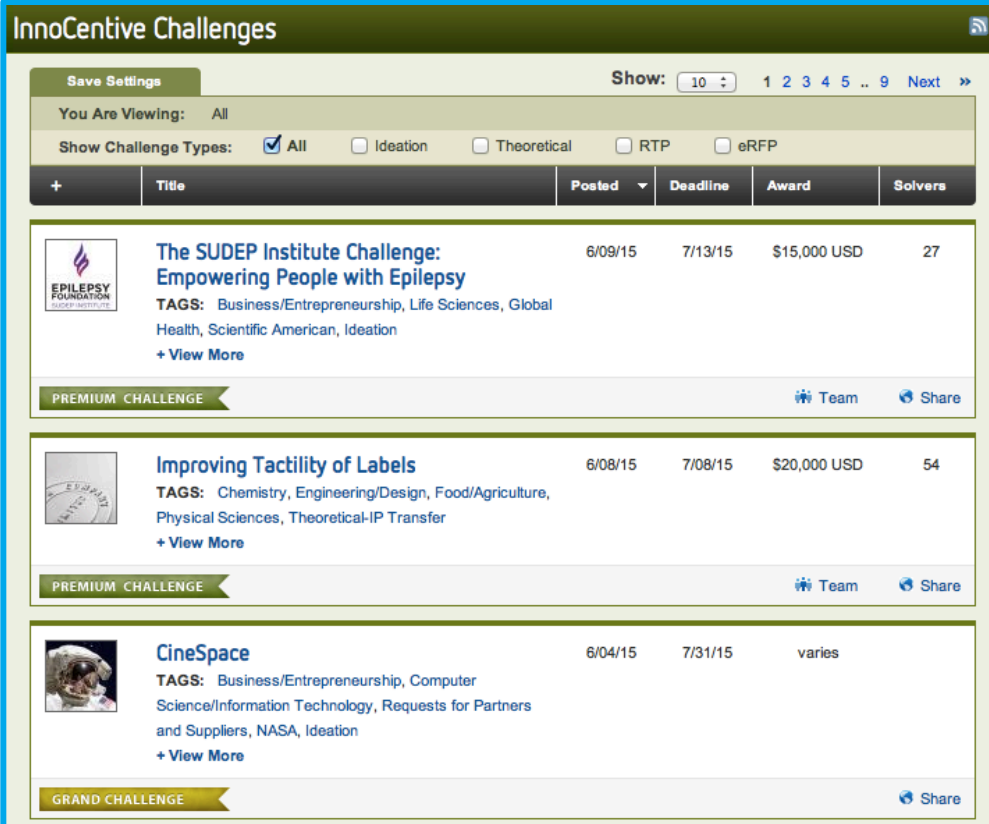
Format: Paperback

For anyone planning to walk to Camino -or even if you dream of doing so-, this is an engaging read. I was hooked from the first words. Loved reading about Kurt's insights and lessons learned along the way- the people, the scenery- just enough detail without becoming boring. Doesn't contain lists of what to take, etc but there are plenty of books with that. This was about how the walk changes you. Loved it!




[Comment](#) | Was this review helpful to you? [Yes](#) [No](#)

# Crowd as Inventor

- Innocentive
  - <http://www.innocentive.com>
  - Run contests to solve open problems
  - Objective is to find in the crowd the genius



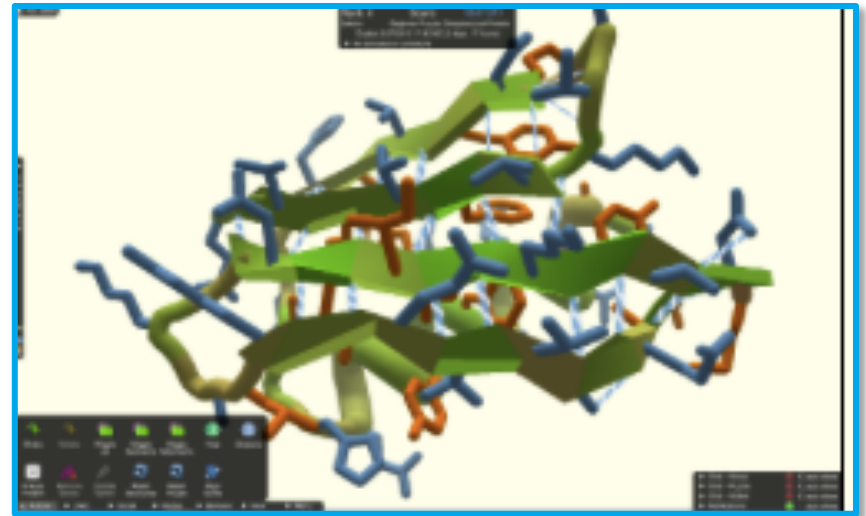
The screenshot displays the 'InnoCentive Challenges' website interface. At the top, there's a header with the site name and a 'Save Settings' button. Below this, a navigation bar shows 'You Are Viewing: All' and 'Show Challenge Types' with checkboxes for 'All' (selected), 'Ideation', 'Theoretical', 'RTP', and 'eRFP'. A table lists challenges with columns for '+', 'Title', 'Posted', 'Deadline', 'Award', and 'Solvers'. Three challenges are visible: 1. 'The SUDEP Institute Challenge: Empowering People with Epilepsy' (Posted: 6/09/15, Deadline: 7/13/15, Award: \$15,000 USD, Solvers: 27). 2. 'Improving Tactility of Labels' (Posted: 6/08/15, Deadline: 7/08/15, Award: \$20,000 USD, Solvers: 54). 3. 'CineSpace' (Posted: 6/04/15, Deadline: 7/31/15, Award: varies, Solvers: not specified). Each challenge entry includes a logo, a 'View More' link, and a 'Premium Challenge' or 'Grand Challenge' badge. The bottom of the page shows a 'Share' button for the 'CineSpace' challenge.

	Title	Posted	Deadline	Award	Solvers
	<b>The SUDEP Institute Challenge: Empowering People with Epilepsy</b> TAGS: Business/Entrepreneurship, Life Sciences, Global Health, Scientific American, Ideation <a href="#">+ View More</a>	6/09/15	7/13/15	\$15,000 USD	27
PREMIUM CHALLENGE <a href="#">Team</a> <a href="#">Share</a>					
	<b>Improving Tactility of Labels</b> TAGS: Chemistry, Engineering/Design, Food/Agriculture, Physical Sciences, Theoretical-IP Transfer <a href="#">+ View More</a>	6/08/15	7/08/15	\$20,000 USD	54
PREMIUM CHALLENGE <a href="#">Team</a> <a href="#">Share</a>					
	<b>CineSpace</b> TAGS: Business/Entrepreneurship, Computer Science/Information Technology, Requests for Partners and Suppliers, NASA, Ideation <a href="#">+ View More</a>	6/04/15	7/31/15	varies	
GRAND CHALLENGE <a href="#">Share</a>					



# Others

- Climate Colab: solutions to Global warming
  - <http://climatecolab.org>
- Netflix: better recommendation algorithm
  - Launched in 2006
  - \$1 M grand prize
  - Few months later → a better algorithm appeared
  - In 2009, got the prize
  - <http://www.netflixprize.com>
- FoldIt: new protein structure
  - 3D game
  - Goal is to find new protein structure



## **EXERCISE 2**

GUESS HOW MANY JELLIES ARE IN A JAR

# INTRODUCTION

## CROWD HYSTERIA

# Not always a crowd leads to CI

- 1636: Tulips' price
  - rage among Dutch to possess tulip
  - price of a bulb of tulip went up to the price of a house
  - sudden glut caused prices to fall
- 2000: Bubble of the .com companies
- 2013: Reddit-wrong identification of suspects in the terrorist attack of the Boston marathon
  - The site, **incorrectly** identified an Indian American college student as “Suspect Number Two”
  - 272,000 users on the site

# INTRODUCTION

REQUIREMENTS FOR THE WISDOM OF THE CROWD

# Premises for the Wisdom of the crowd

*(Surowiecki 2004)*

- Diversity of opinions
  - Groups with a range of perspectives outperform groups of like-minded experts. (Page 2008)
    - Without diversity group tend to GROUPTHINK
- Independence of decision-making
  - For evaluation task, communication leads to biased opinions
- Decentralization
  - Contribution comes from all over
- Good method for aggregating opinions

# THE CROWD

TYPE OF CROWDS

# Type of crowds

---

- According to the anonymity of the individuals
  - Anonymous participation
  - Identified participation
- According to crowd's profile
  - Required profile
  - Any profile
- According to communication within the crowd
  - Communication allowed (reputation plays a role)
  - Without communication



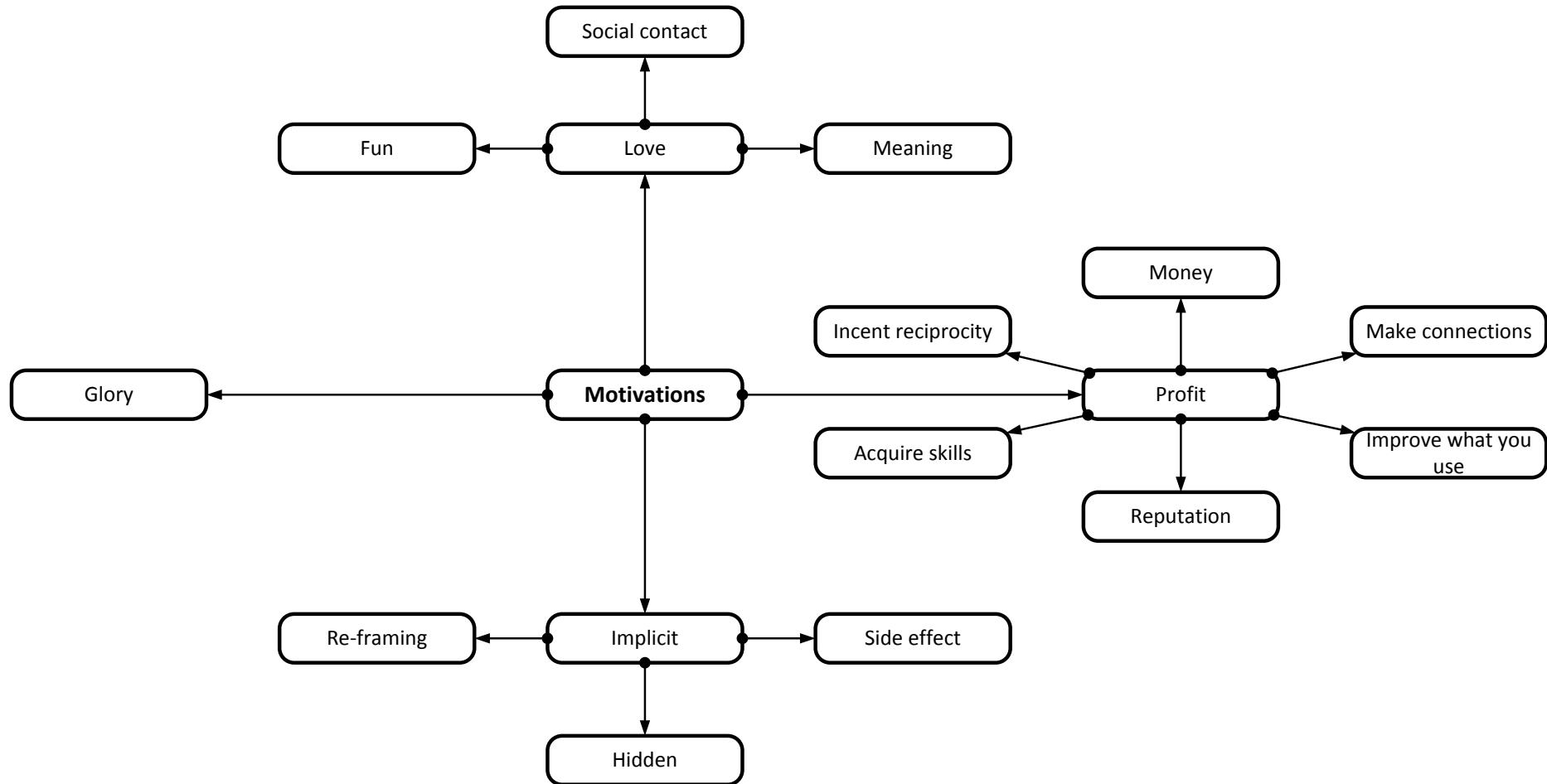
# THE CROWD

INCENTIVES: MAKING THE CROWD PARTICIPATING

# Crowd participation incentive

- According to the incentive
  - Monetary reward (Ex. mechanical turk)
  - Recognition reward (Ex. Trip advisor → Reputation of the recommenders)
  - Obligation (No option - Ex. Captcha)
  - Fun (ex. FoldIt)
  - Voluntary work for a cause (Ex. Finding the sailor; Virginia hitting case)

# Crowd motivation taxonomy



# THE CROWD

CROWD ORGANIZATION

# Types of crowd organization

---

- Direct Crowdsourcing
  - There is a coordinator/employer that recruit people and guide the crowd to do a specific task
- Self-organized Crowdsourcing
  - Based on common interests or events, a group spontaneously emerges to do a task
- Passive Crowdsourcing
  - Work is fruit of the crowd's usual activity.

# Direct organization

---

- Coordination is done by a central person (in general, the person that hired the crowd)
- The task is designed by the coordinator
- Ex.: Mechanical Turk

# Self-organized Crowdsourcing

- Volunteer work
  - Wikipedia1 (biggest encyclopedia)
  - Missing people identification in satellite photos (Hellerstein and Tennenhouse 2011)
  - Solution of mathematical open problems (Cranshaw and Kittur 2011b)
  - Collective witness during crisis and violent government actions (Okolloh 2009)
  - Creation of a DB of common sense knowledge (Singh et al. 2002)
- Issues
  - Leadership
  - Coordination
  - Conflict
  - Creativity
  - Collective Action

# Self-organized Crowdsourcing: Leadership

- Self-organized groups → decision making process is pivot
  - Group spend most time discussing what to do?
    - Example: Wikipedia (Kittur et al. 2007)
      - Data: log of all activities in wiki
      - All content editing versus editing on action coordination
        - With time, content contributions decay from 95% to ~50% → it suggests that with time coordination issues appear
        - With the raise of the number of contributions, quality only improves if editor take direct action instead of remaining discussing in the “Talk”
  - Difficult entrance to natural leader



# Self-organized Crowdsourcing: Coordination

- In crisis situation coordination does not seem to be a problem
  - Twitter has been a good media to maintain people aware of problems
    - Lack of official information → individuals share information → others filter and make it available
  - Users can remain in local news
  - Ex. Shooting in University of Virginia (Vieweg et al. 2010)

# Self-organized Crowdsourcing: Conflict

---

- Conflicts are welcomed in crowdsourcing (diversity of opinions)
  - Systems planned to live with conflicts
    - Deliberatorium (Klein 2011)
    - Reflect (Kriplean et al. 2011)
    - ConsiderIt (Kriplean et al. 2011)

# Self-organized Crowdsourcing: Creativity

---

- Is it possible to obtain creative solution from the crowd?
  - Maybe
- Scratch:
  - Online community remixing animations (Resnick et al. 2009; Hill and Monroy-Hernandez 2013)

# Self-organized Crowdsourcing: Collective Action

- Example:
  - Collective action to find a Berkeley professor (Jin Gray) that disappear in the ocean (flight fell in the ocean):
    - “hacker” community looking at satellite images built software to search◇ they didn’t find the flight
  - Precursor work of collective intelligence
  - Break the inertia is the biggest challenge
  - Catalyst allow individuals to condition their participation
    - Ex. I will only teach class with at least an audience of 10 students (Cheng and Bernstein 2014)

# Passive Crowdsourcing

- Objective
  - No interference in users normal flow of actions
  - Requires
  - Tool instrumentation, regulation and inference
- Individual contribution is a sub product of normal actions
  - Search site log (Culliss 2000)
    - Use the interaction log to optimize search-reorganize/reprioritize the results
    - Do not ask users to do anything
  - Cell usage: AirSage - (Burbank et al. 2011 )
    - Change the repetition tower
    - Hint of where we are
    - Hint to traffic analysis
  - Google page indexing
    - Clicking on a page helps ranking a page for future retrievals

# Examples of passive crowdsourcing

- Waze
  - Cell information to indicate better/faster routes
- Edit-wear and Read-wear systems (Hill et al. 1992)
  - In which part of the document users will spend more time reading / editing
- Data mining of the Twitter messages to identify
  - Sickness propagation (Sadilek et al. 2012)
  - Political results (Livne et al. 2011)
- Livelihoods project (Cranshaw et al. 2012)
  - Check-in in the foursquare to build neighborhood models
- HelpMeOut (Hartmann et al. 2010)
  - Use IDEs to capture developers reaction to errors. It builds a library of errors & fixes to suggest fixes when similar errors occurs.

# THE CROWD

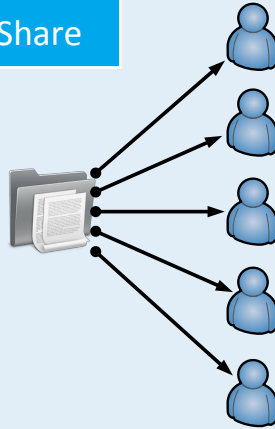
CROWD COORDINATION

# Types of Coordination

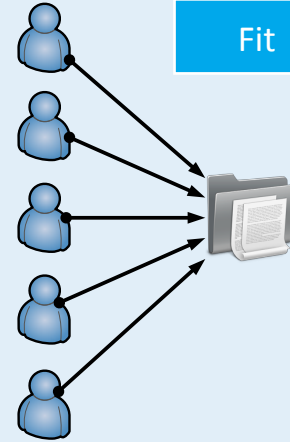
Flow



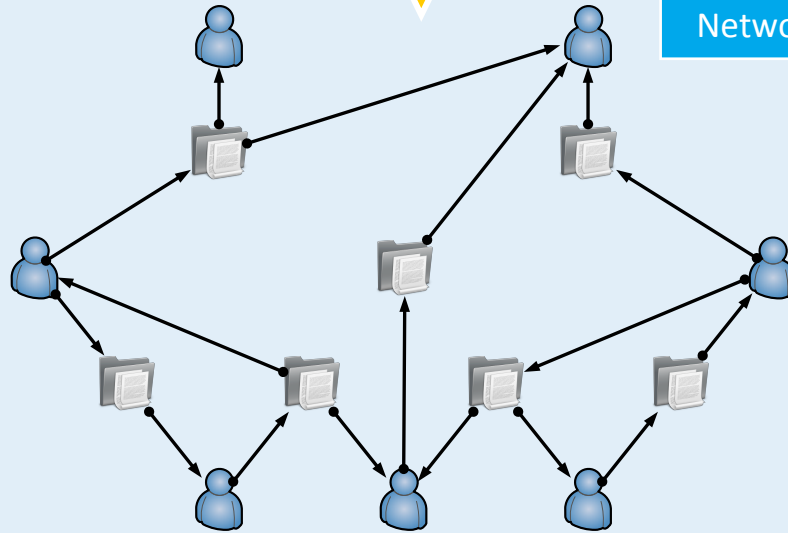
Share



Fit



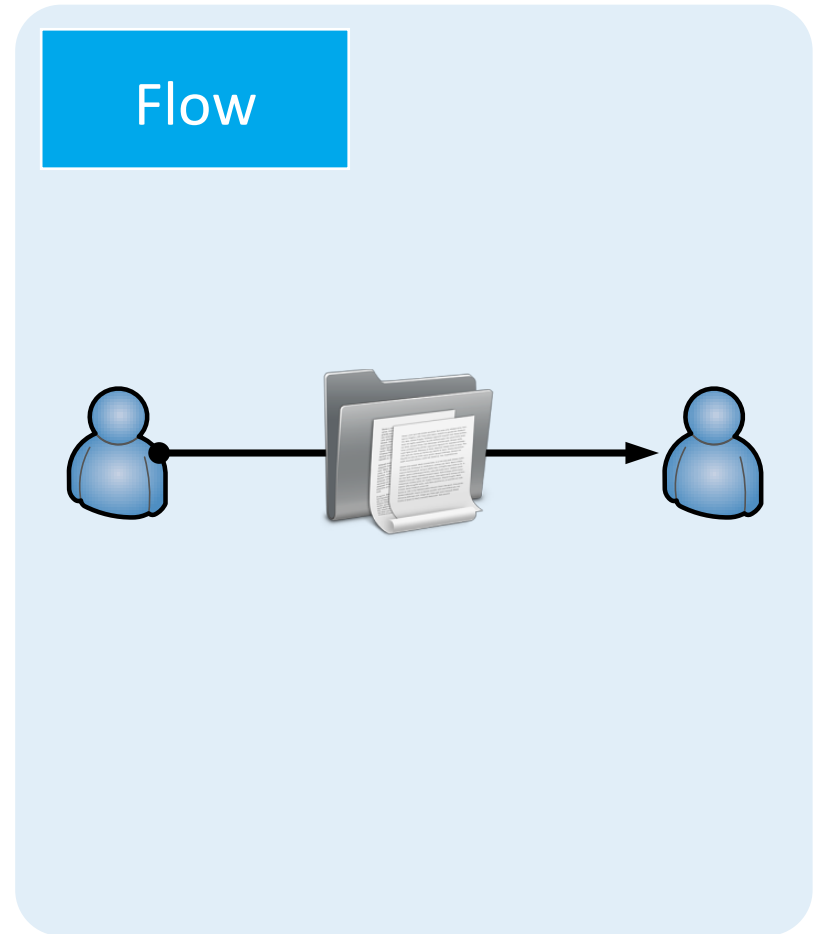
Network



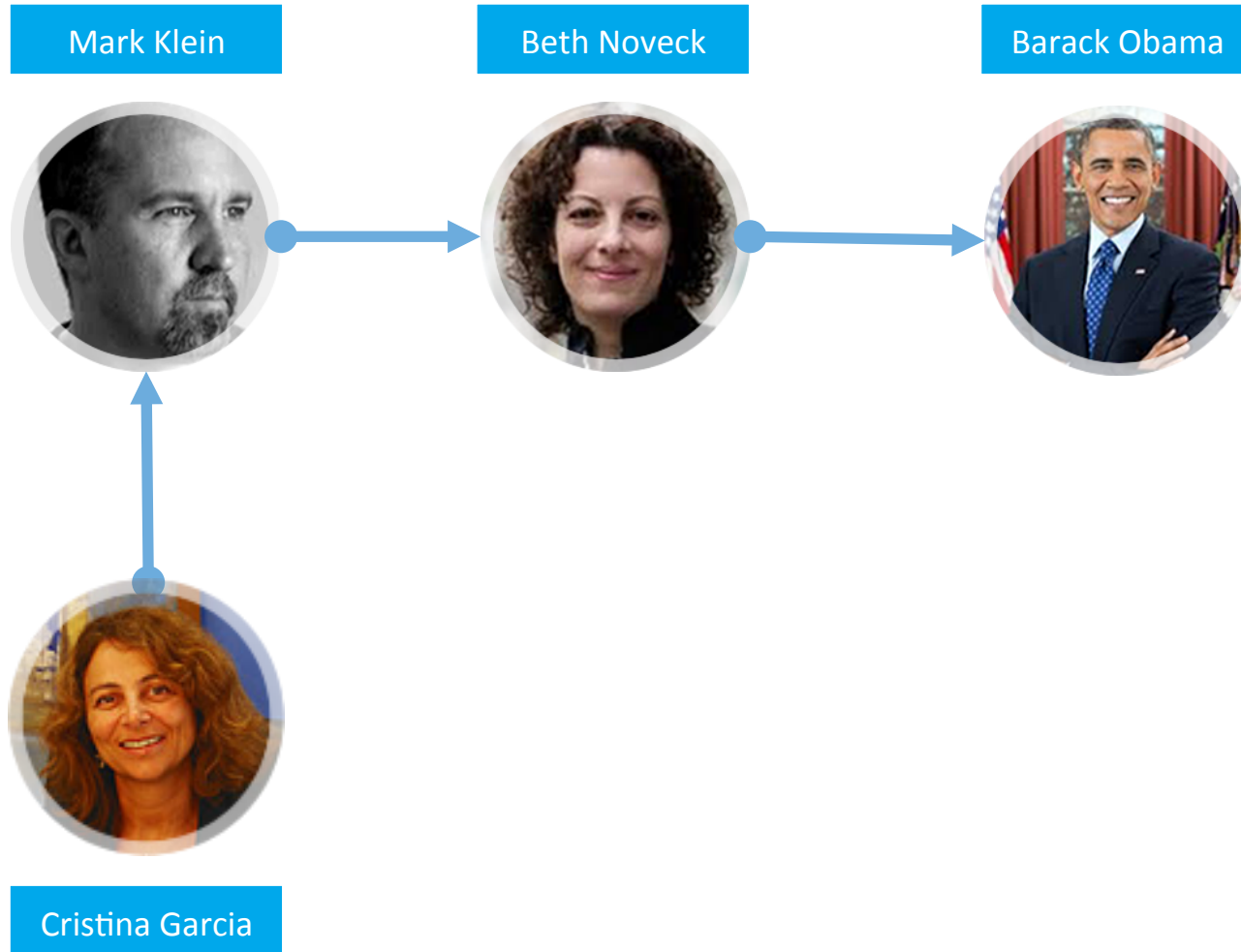


# Type of coordination: Flow

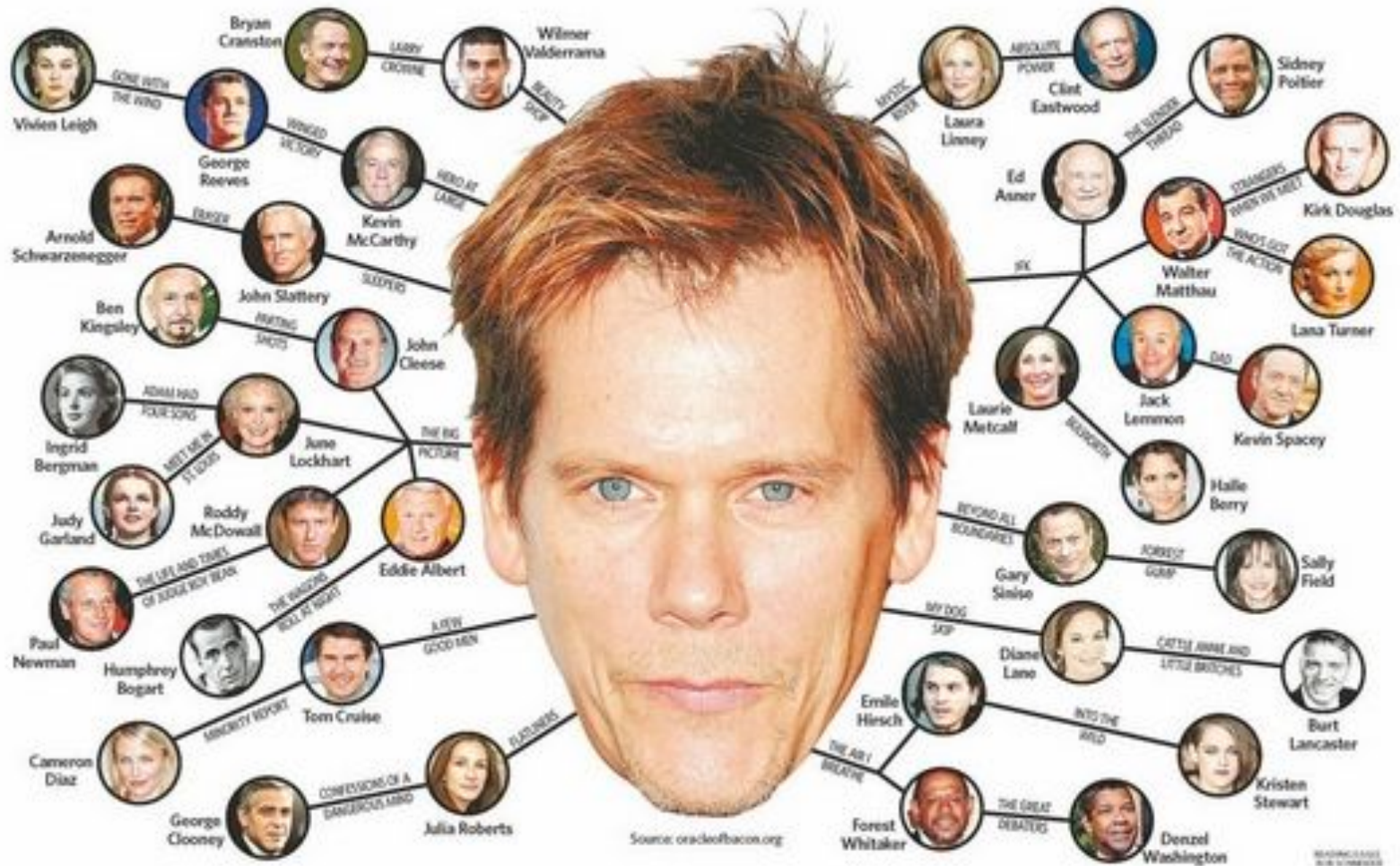
- *Push* communication
- Examples:
  - Text
  - Email
  - Micro-blogs (e.g. twitter)
  - ...



# The Power of Weak Links



# Six Degrees of Separation



# Social Filtering via Web of Trust

The image is a screenshot of a Twitter profile page for Mark Klein (@markklein1960). The profile header shows a blue background with Mark Klein's profile picture, name, and handle. Below this, it displays 'TWEETS 6', 'FOLLOWING 7', and 'FOLLOWERS 37'. A 'Who to follow' section lists three accounts: Bill Gates (@BillGates), Singularity Sunrise (@Singul...), and science (@science), each with a 'Follow' button. The main timeline shows three tweets. The first tweet is from WIRED (@WIRED) about Google's fight over the future of Android. The second tweet is from Elsevier (@ElsevierConnect) about new research on Parkinson's disease. The third tweet is from Scientific American (@sciam) about the Nepal earthquake, featuring a USGS ShakeMap image.

Twitter interface showing a profile for Mark Klein (@markklein1960) and a timeline of tweets.

**Profile:**

- Name: Mark Klein
- Handle: @markklein1960
- Tweets: 6
- Following: 7
- Followers: 37

**Who to follow:**

- Bill Gates (@BillGates) - Followed by KurzweilAINew...
- Singularity Sunrise (@Singul...) - Follow
- science (@science) - Follow

**Timeline:**

- WIRED @WIRED · 37m**  
Google faces enormous forces in the fight over the future of Android  
[wrd.cm/1OxcgUm](http://wrd.cm/1OxcgUm)
- Elsevier @ElsevierConnect · Apr 22**  
Freely available new research on #Parkinsons for #ParkinsonsAwarenes Month  
[elsevier.com/connect/clinic...](http://elsevier.com/connect/clinic...)  
Promoted by Elsevier
- Scientific American @sciam · 39m**  
Why did the deadly #NepalEarthquake happen? [ow.ly/McuCg](http://ow.ly/McuCg) #science

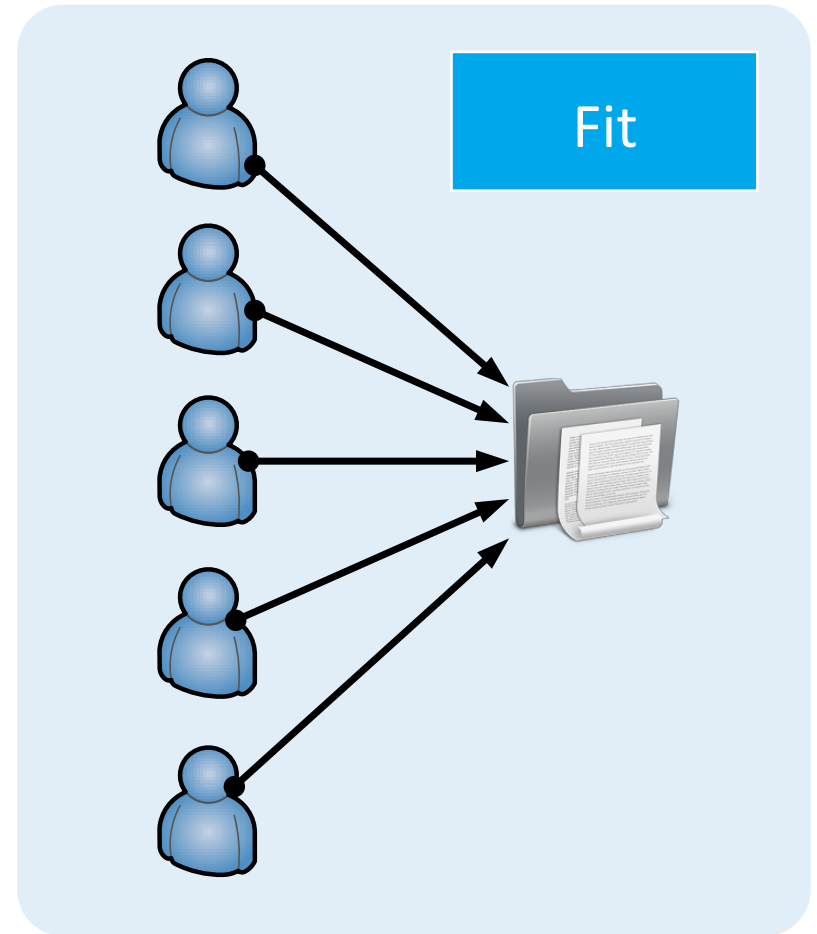
The Scientific American tweet includes a USGS ShakeMap image showing the magnitude 7.8 earthquake in Nepal.

# Type of coordination: Share

- A *pull* medium – publishing for free
- Examples
  - Medical
    - <http://www.webmd.com/>
  - Entertainment
    - <https://www.youtube.com/user/TayZonday>
  - Educational
    - “Take the world’s best courses, online, for free”
      - <https://www.edx.org/> (MIT, Harvard, Berkeley ...)
      - <https://www.khanacademy.org/>
  - Open data
    - <http://catalog.data.gov/dataset>
    - <http://data.worldbank.org/>

# Type of coordination: Fit

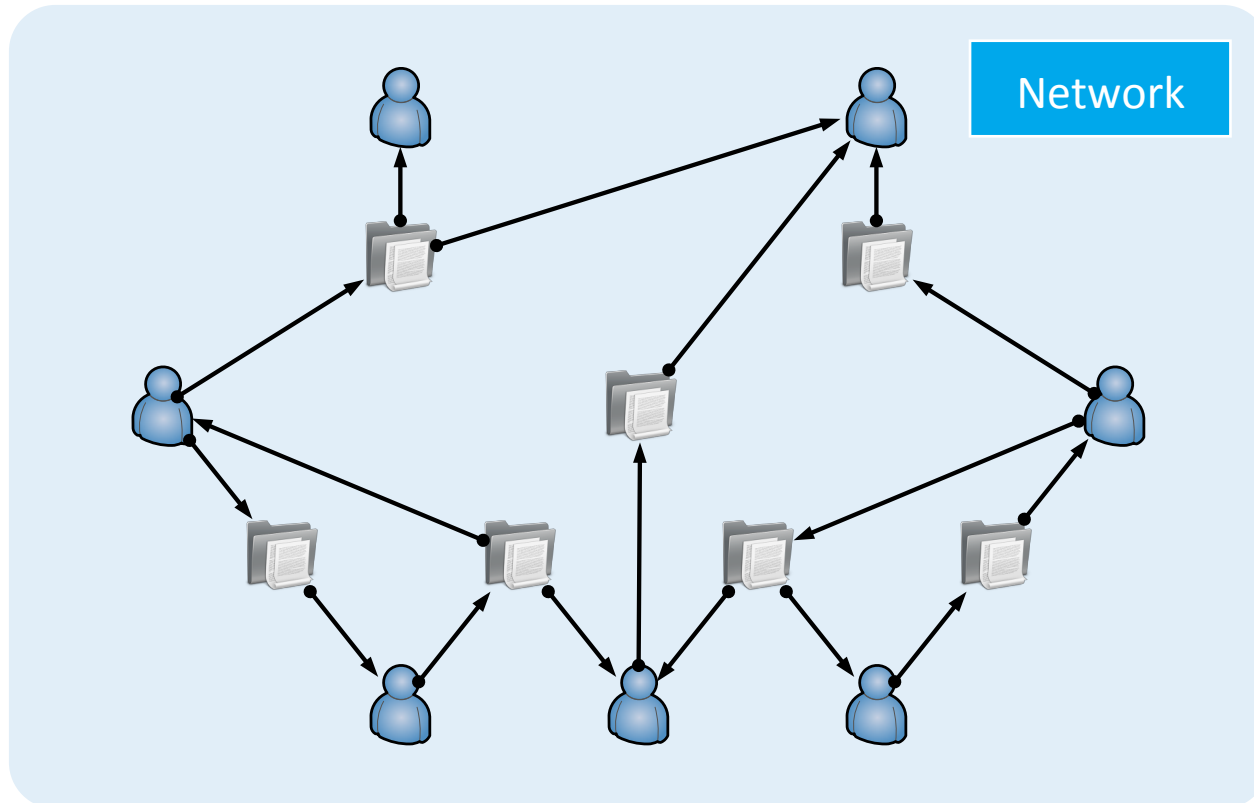
- Push communication
- Example
  - Wikipedia



# Type of coordination: Network

- The Web

- Individual create
- Individuals get
- Reputation filtering
- Knowledge filtering



# THE CROWD

## QUALITY CONTROL OF THE CROWD'S WORK

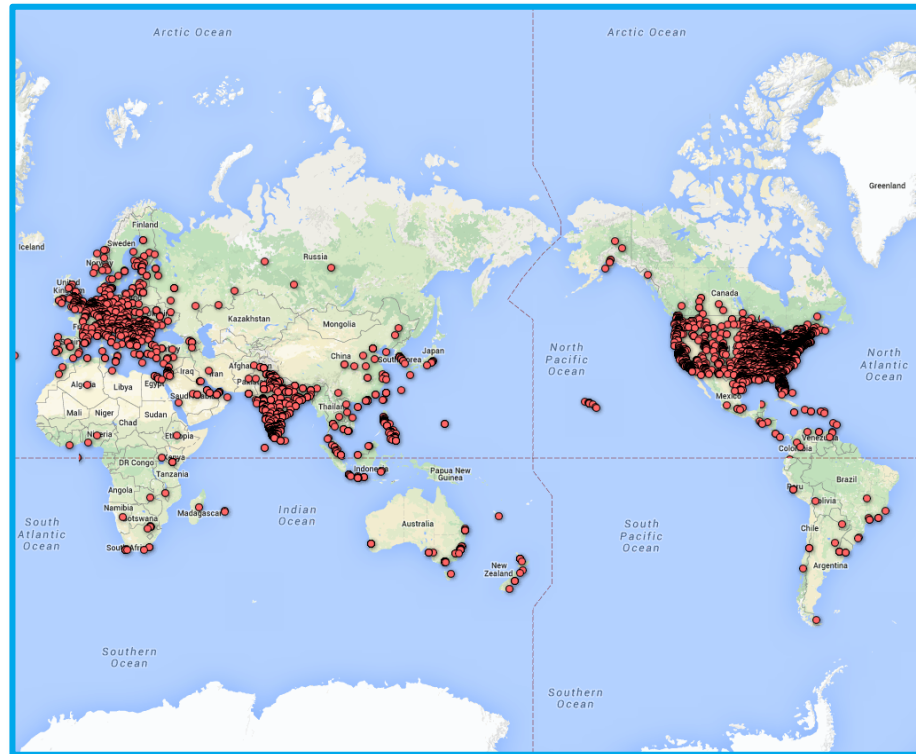
How do we ensure that workers do a good job?

<http://www.cs.rochester.edu/u/jbigham/vizwiz/video/>



# Demographics

- In January 2011, Mturk had over 500,000 workers in over 190 countries
- Crowdfunder claims 5 million contributors
- Obs.: **Mostly English speaking population**



# Flip-a-Coin Experiment

Please flip an actual coin, and type H if it shows heads, or T if it shows tails.

Requester: Rob Miller

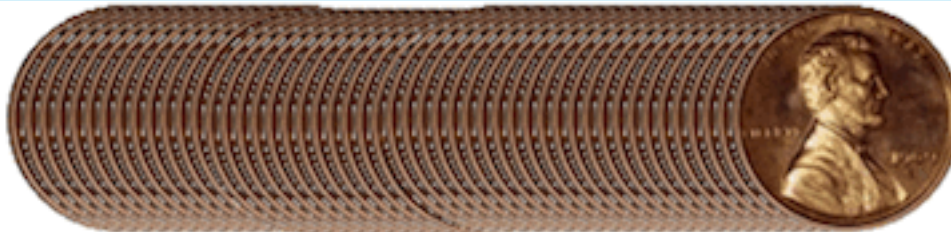
Reward: \$0.01 per HIT

HITs Available: 1

Duration: 60 minutes

Qualifications Required: None

Please flip an actual coin, and type H if it shows heads, or T if it shows tails.



70 heads



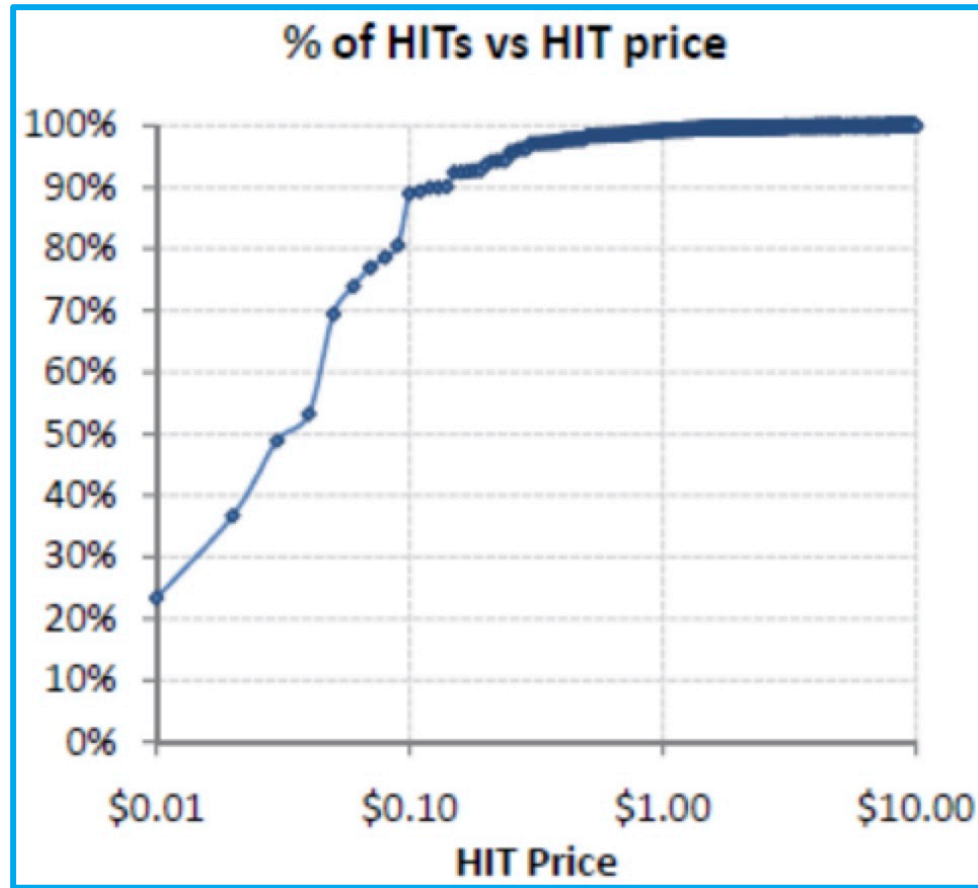
29 tails



1 "1"

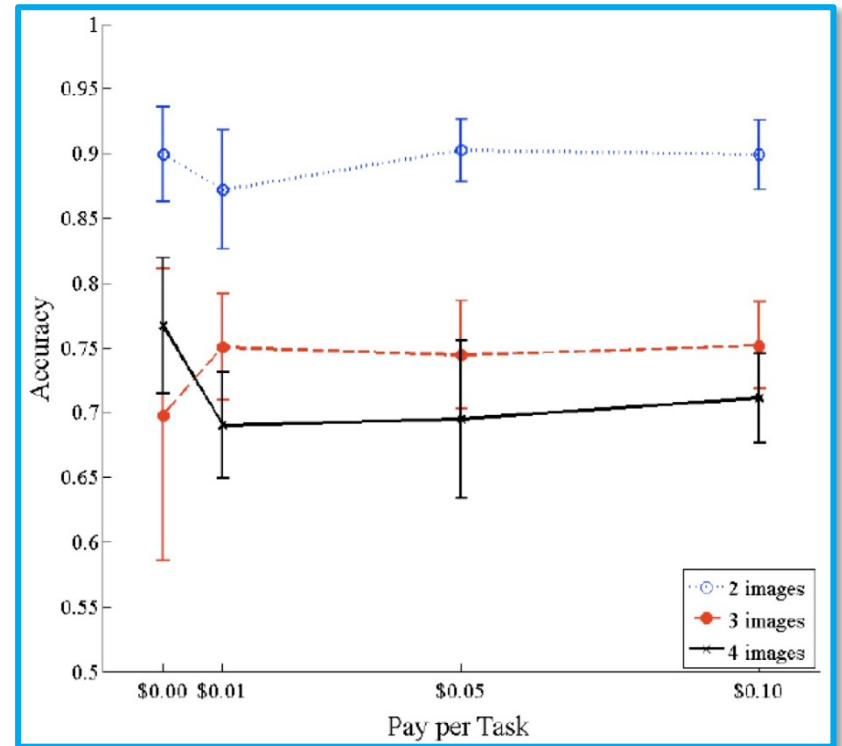
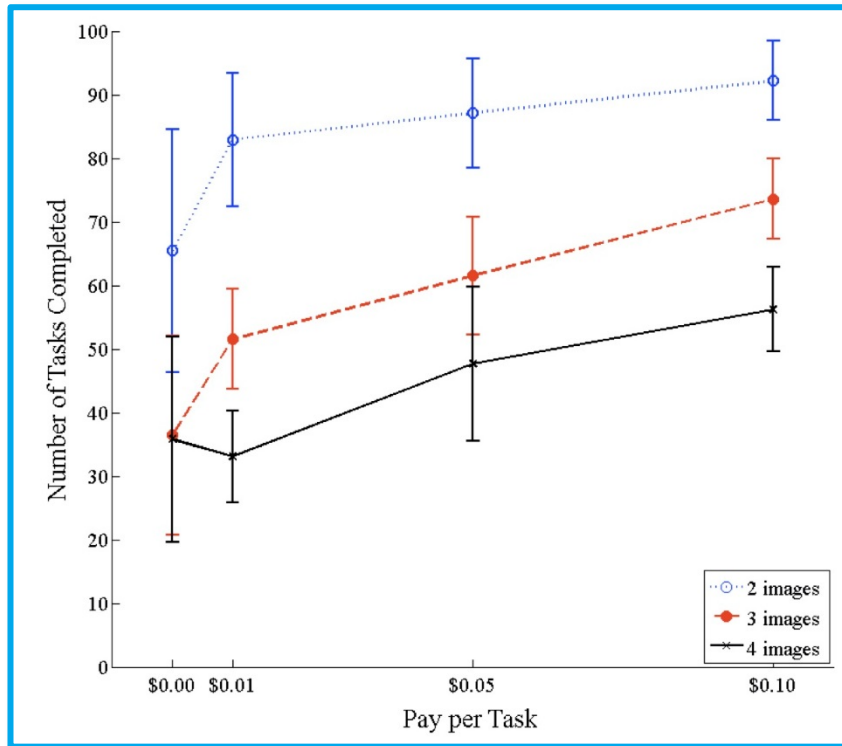
Rob Miller of CSAIL  
estimates that 30% of  
MTURK results are junk

# Prices: Remuneration is typically low



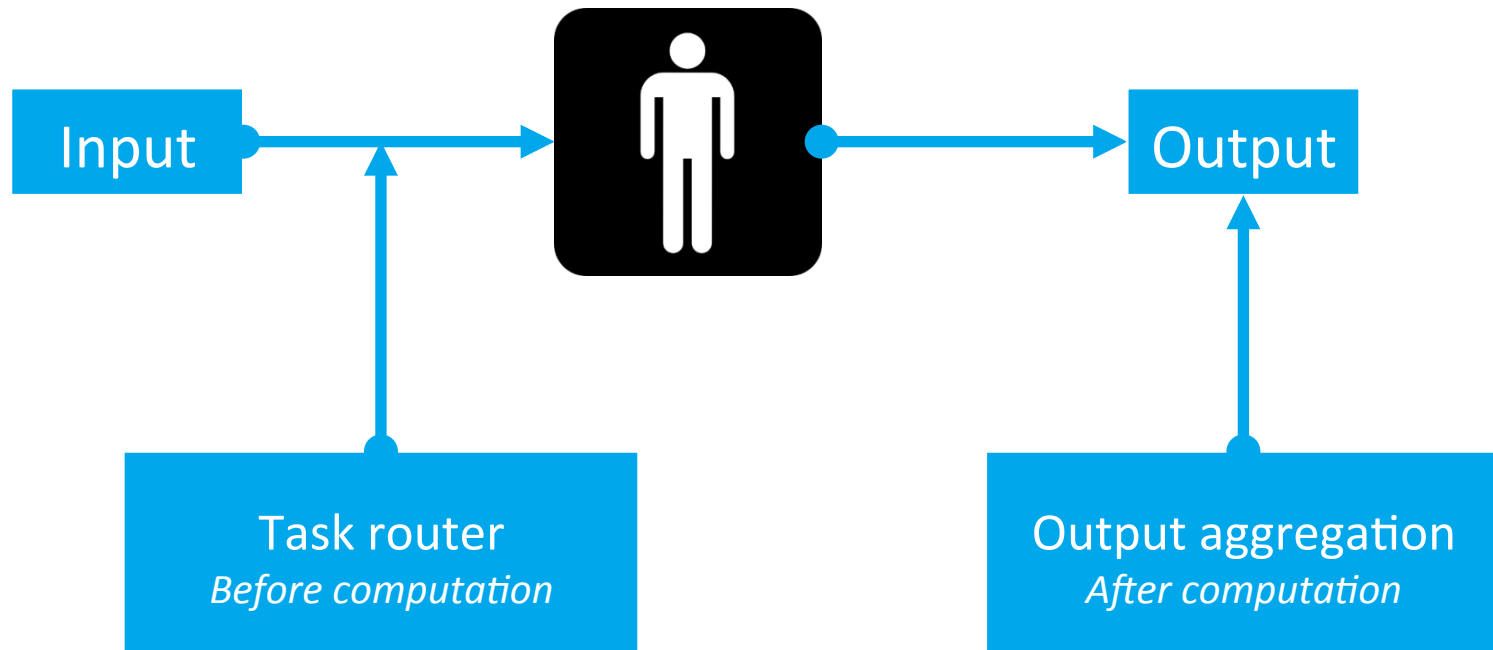
# Pay for Participation

- Call for: Pay for Performance



# Quality Leverage Points

- Filter the crowd
- Filter the result



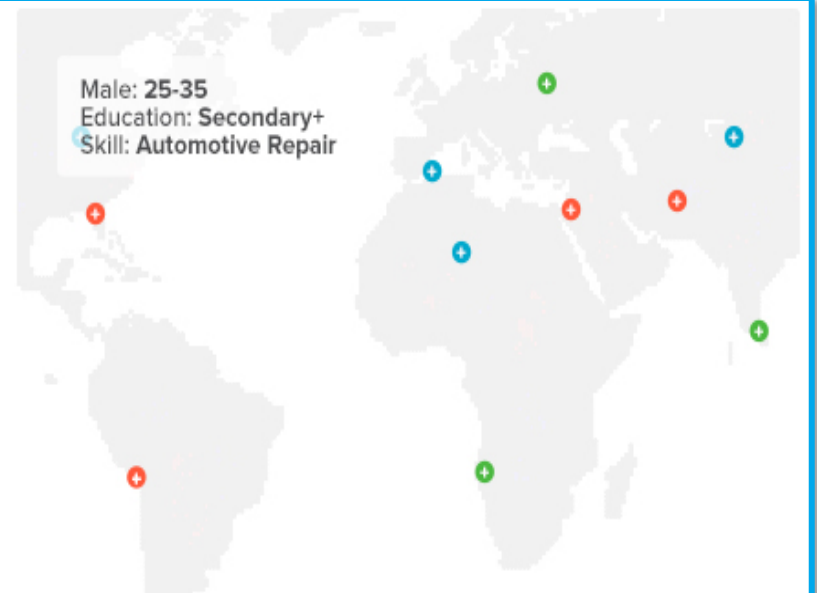
# Filter The Crowd

- Filter by **contributor features** (demographics, performance history, screening questions)
- Supported by **machine learning**

## Contributor Targeting

Find the best brains for your microtasks to deliver the best results

Finding the right people for the right job is often difficult and requires a lot of resources. We use our history of 1 billion human judgments across 5 million contributors to determine trust levels within our system. You can also target jobs by skill (e.g., content writing or fashion expertise), geography, or demographic.



# Challenge: Identity Switching

## Nilton Rossoni Sentenced To 68 Months In Federal Prison For Colossal eBay Fraud; Elaborate Scheme Featured 59 Mail Drops, 260 Bogus Auction Accounts

By PatrickPretty.com 6:46 pm Feb 5, 2010

 [Print](#)  [Email](#)  [Post](#)  [Republish](#)



It was a case that was all about the numbers. In the end, the number with the most meaning to Nilton Rossoni was 68 — the number of months he'll be spending in federal prison.

Rossoni conducted more than 5,500 fraudulent auctions on eBay. He pulled off his scheme by using at least 260 bogus accounts, at least 59 mail drops, six names, four bogus passports and three banks.

Rossoni, 50, formerly of Sunny Isles and Hallandale Beach, Fla., collected \$717,000 in the scheme between October 2003 and June 2008. The bizarre fraud was smashed by the U.S. Postal Inspection Service.

Winning bidders were notified via e-mail to send a check or money order payable either to Celso Ferreira, Jorge Carlos, Joao Santos, Lourival Philipps, Prime Hill Inc. or Primo Hill Inc. Buyers were instructed to send payments via U.S. Mail to specific addresses, all of which proved to be mail drops.

"Elaborate" barely described the scheme.

"Rossoni rented at least 59 separate private mail boxes at various Commercial Mail Receiving Agencies (CMRA), including The UPS Store, Mail Boxes Etc., and Pak-Mail, using fraudulent Brazilian passports in the names of Celso Ferreira, Jorge Carlos,

# Challenge: Reputation Manipulation

## Belkin paying 65 cents for good reviews on NewEgg and Amazon?

by John Biggs on January 17, 2009

Tags: Belkin, shills, wtf

**amazonmechanical turk**  
beta Artificial Intelligence

Your Account | HITs

All HITs | HITs Available To You

Search for:  containing

Timer: 00:00:00 of 60 minutes

Want to work on this HIT?

Write Product Reviews: 25-50 Words  
Requester: Mike Bayard  
Qualifications Required: HIT approval rate (%) is not less than 95

---

### Write a Positive 5/5 Review for Product on Website

Positive review writing.

- Use your best possible grammar and write in US English only
- Always give a 100% rating (as high as possible)
- Keep your entry between 25 and 50 words
- Write as if you own the product and are using it
- Tell a story of why you bought it and how you are using it
- Thank the website for making you such a great deal
- Mark any other negative reviews as "not helpful" once you post yours

Instructions:

The link below leads to a product on a website. Read-through the product's features and write a positive review for it using the guidelines above to the best of your ability. I have also provided the part number for this product and you can click on the links below to see it on several alternative websites. In order to post some reviews you will need to create an account on the site. You can use your own email address or open a new free webmail account (gmail, yahoo...) and use it to post with.

[CLICK HERE TO VIEW PRODUCT ASSIGNED TO THIS HIT](#)

MFG PART: FSU301

I just contacted Belkin to confirm but this doesn't look good. A site called **The Daily Background** found evidence that Belkin Bizdev guy, Michael Bayard, is paying folks 65 cents to write good things about Belkin routers. Why? I'm not sure. I sure didn't mind Belkin routers in the first place and 65 cents isn't a lot of money for a paragraph. Maybe a flat



# Option: Peer Recruitment

- This incents people to use their social knowledge to find someone who can do a good job



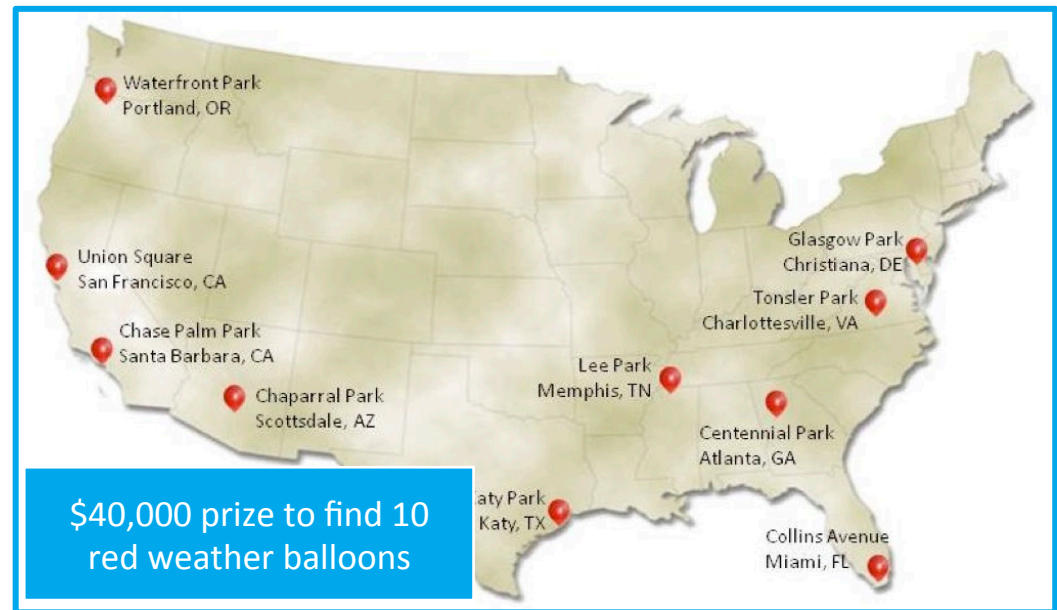
\$500



\$1000



\$2000

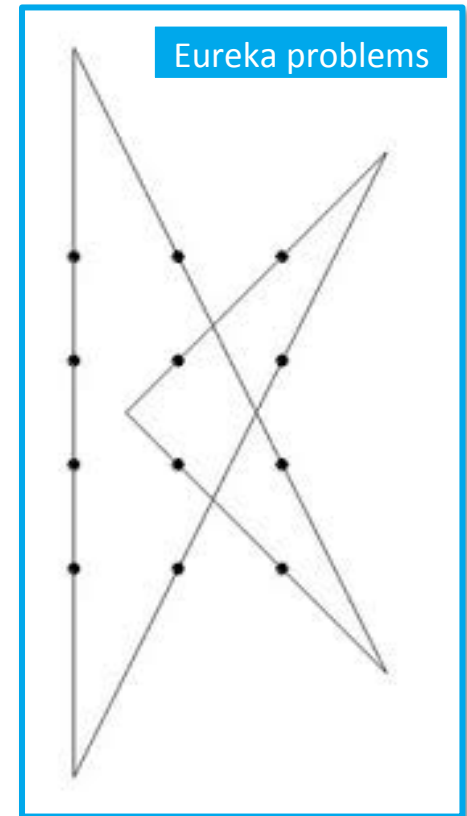


# Filter the output: How Much Redundancy?

- “gold” questions
- Answer features (e.g. answer time)
- Eureka problems
- Consistency amongst redundant tasks

The	King	himself	directed	the	operations
Tbe	Kiag	himself	directed	tlie	operations
The	King	birnsell	directed	tlie	operations
Tbe	King	bimself	directed	tlie	operations
The	King	lala		the	
		himself		the	

Consistency amongst redundant tasks



# THE CROWD

OPEN ISSUES

# The crowd

---

- Number of people
  - How many people does it take to make a crowd?
- Diversity
  - How diverse should the crowd be? Age, gender, education, expertise in the task, religion, age, Country, culture.....
- Communication
  - What degree of communication should be allowed to not interfere with independence of decision-making?

# THE TASK FOR THE CROWD

# Types of tasks

## According to the activity

- Play (FoldIt)
- Map
- Guess
- Predict
- Describe
- Categorize
- Identify
- Design
- Filter
- Fund (crowdfunding sites)

## According to crowd awareness

- Implicit (Captcha)
- Explicit (Innocentive)

## According to the task design

- Micro tasks (CastingWords);
- Cognitive Challenge (NetFlix)
- Gamification (FoldIt)

## According to stop criteria

- Duration of the task
  - Limited (Mechanical Turk jobs)
  - Unlimited (ideation contests)
- According to expiration date
  - Open (NetFlix)
  - With a deadline (Mechanical Turk)

# Typical Crowdsourcing Tasks

- Small tasks which are easy for people, but difficult for computers: "artificial intelligence"

<u>Judging image properties</u>		<a href="#">View a HIT in this group</a>	
<b>Requester:</b> <a href="#">Phillip Isola</a>	<b>HIT Expiration Date:</b> May 15, 2015 (6 days 22 hours)	<b>Reward:</b> \$0.01	
	<b>Time Allotted:</b> 60 minutes	<b>HITs Available:</b> 15851	
<u>How many dividends are being announced for given Ticker symbol? - (New Instructions!)</u>		<a href="#">View a HIT in this group</a>	
<b>Requester:</b> <a href="#">OCMP39</a>	<b>HIT Expiration Date:</b> May 13, 2015 (4 days 22 hours)	<b>Reward:</b> \$0.03	
	<b>Time Allotted:</b> 15 minutes	<b>HITs Available:</b> 12718	
<u>Is The Formatting of This Job Description Perfect?</u>		<a href="#">View a HIT in this group</a>	
<b>Requester:</b> <a href="#">OCMP26B</a>	<b>HIT Expiration Date:</b> May 22, 2015 (1 week 6 days)	<b>Reward:</b> \$0.04	
	<b>Time Allotted:</b> 20 minutes	<b>HITs Available:</b> 11379	
<u>Get company name, stock symbol and stock exchange for advertisers</u>		<a href="#">View a HIT in this group</a>	
<b>Requester:</b> <a href="#">Pat Moore</a>	<b>HIT Expiration Date:</b> May 15, 2015 (6 days 18 hours)	<b>Reward:</b> \$0.02	
	<b>Time Allotted:</b> 30 minutes	<b>HITs Available:</b> 9953	
<u>Transcribe up to 25 Seconds of Media to Text - Earn up to \$0.12 per HIT!</u>		<a href="#">View a HIT in this group</a>	
<b>Requester:</b> <a href="#">Crowdsurf Support</a>	<b>HIT Expiration Date:</b> May 7, 2016 (51 weeks 6 days)	<b>Reward:</b> \$0.08	
	<b>Time Allotted:</b> 15 minutes	<b>HITs Available:</b> 9188	

<https://www.mturk.com/mturk/findhits?match=false>

# Task accomplishment's strategies

---

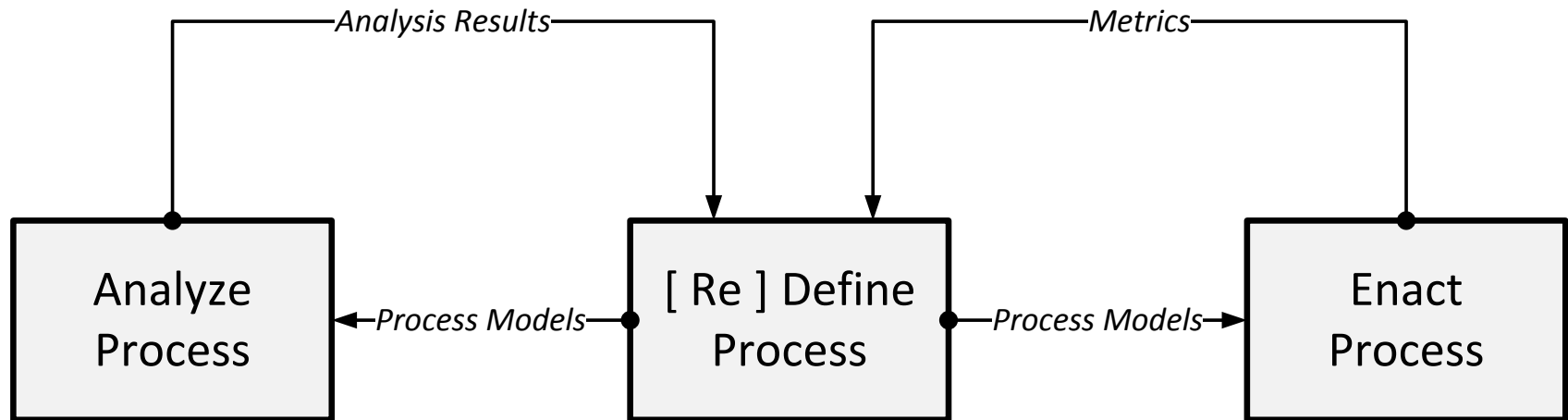
- Challenge
  - Contests
  - Ex. Innocentive contests; Climate Colab
- Divide task into micro tasks
  - Simple tasks
  - Ex. Most Mechanical Turk jobs; CatingWords
- Gamification
  - Transform the problem into a game
  - Ex. FoldIt



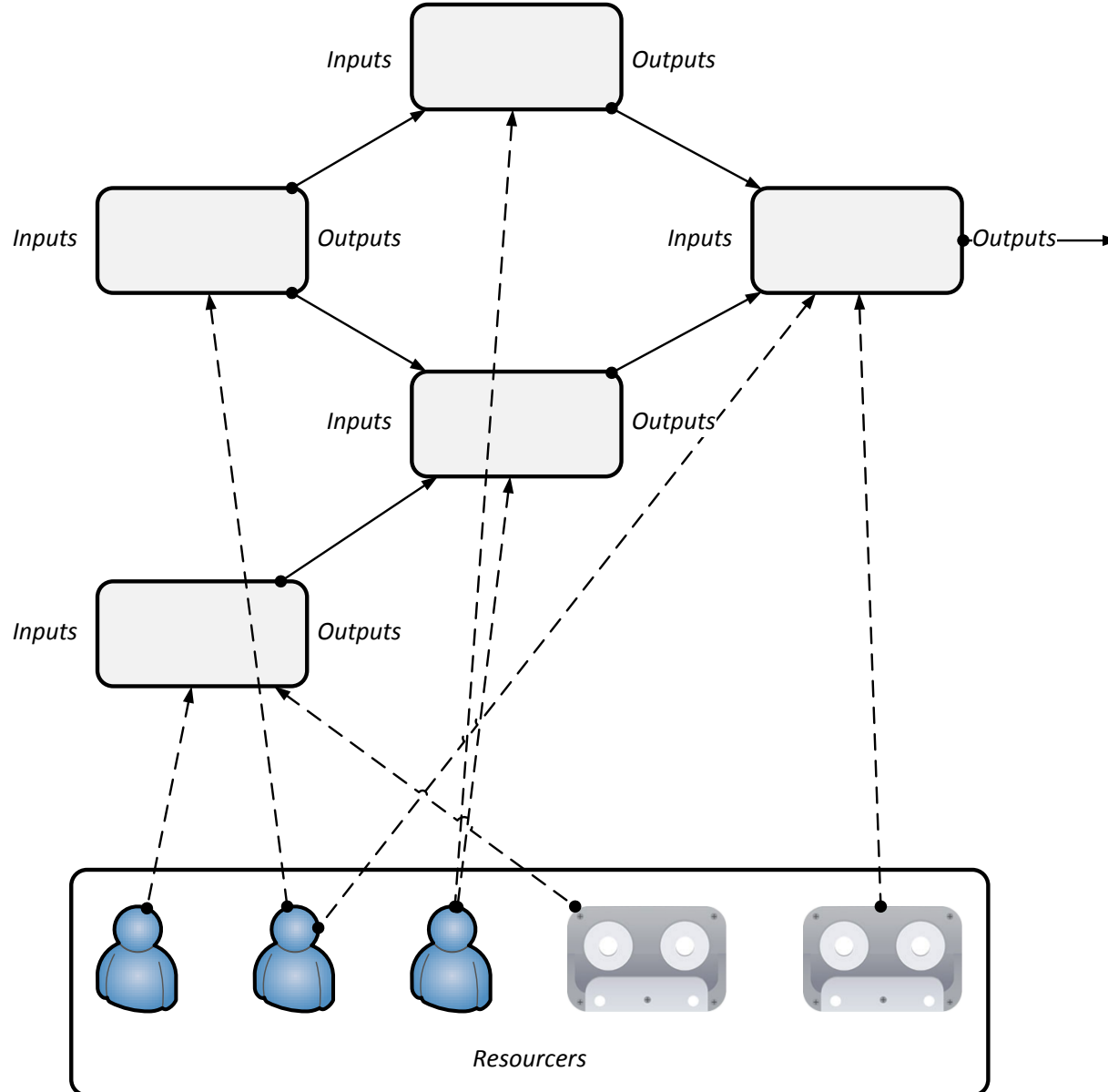
# THE TASK FOR THE CROWD

TASK WORKFLOW

# Components of Workflow Technology



# Process Definition



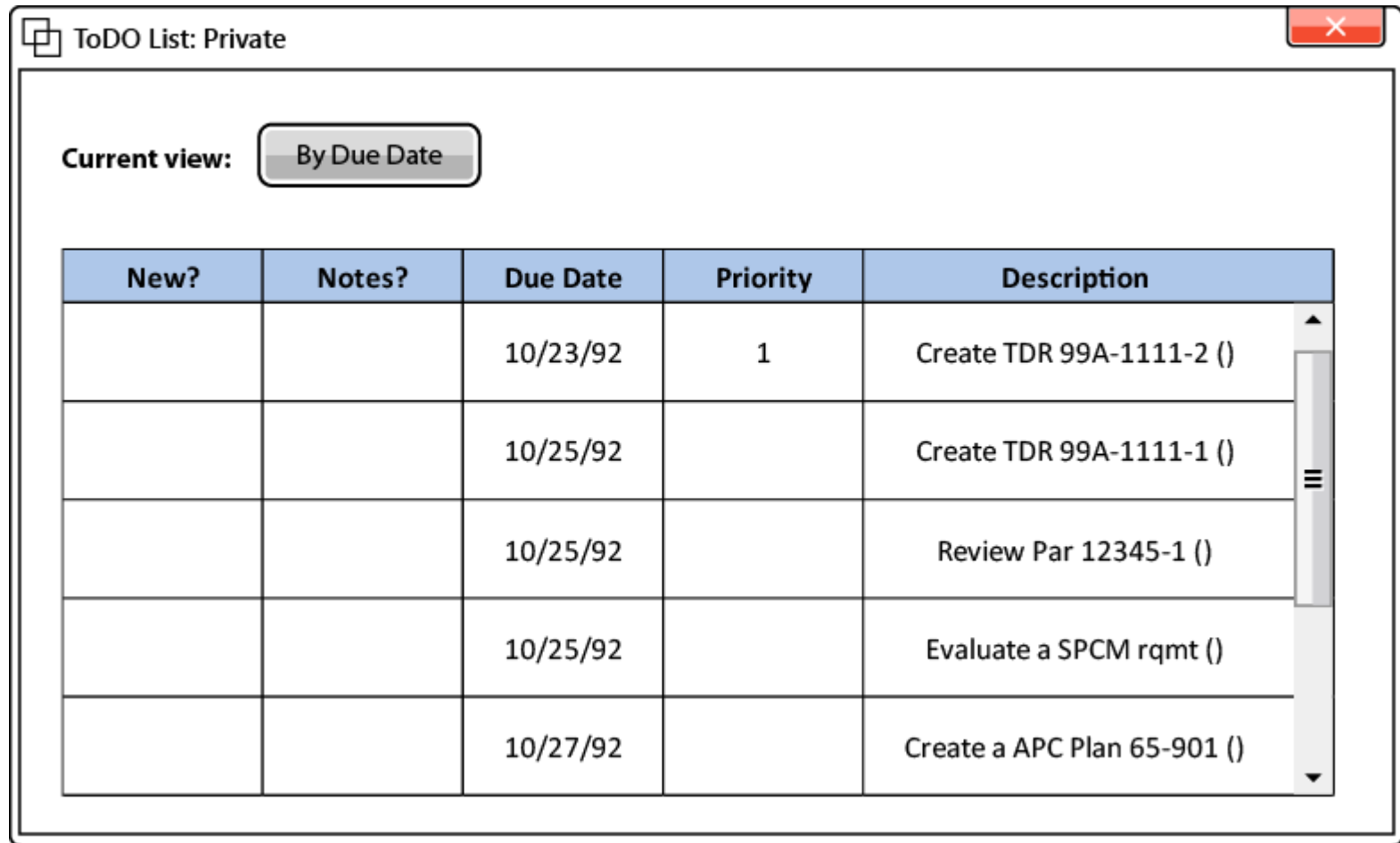
# Process Analysis

---

- Simulation
- Critical path analysis
- Deadlock analysis
- Dependency matrix analysis

# Process Enactment

- Ex. Mechanical Turk sets up the user ToDo list

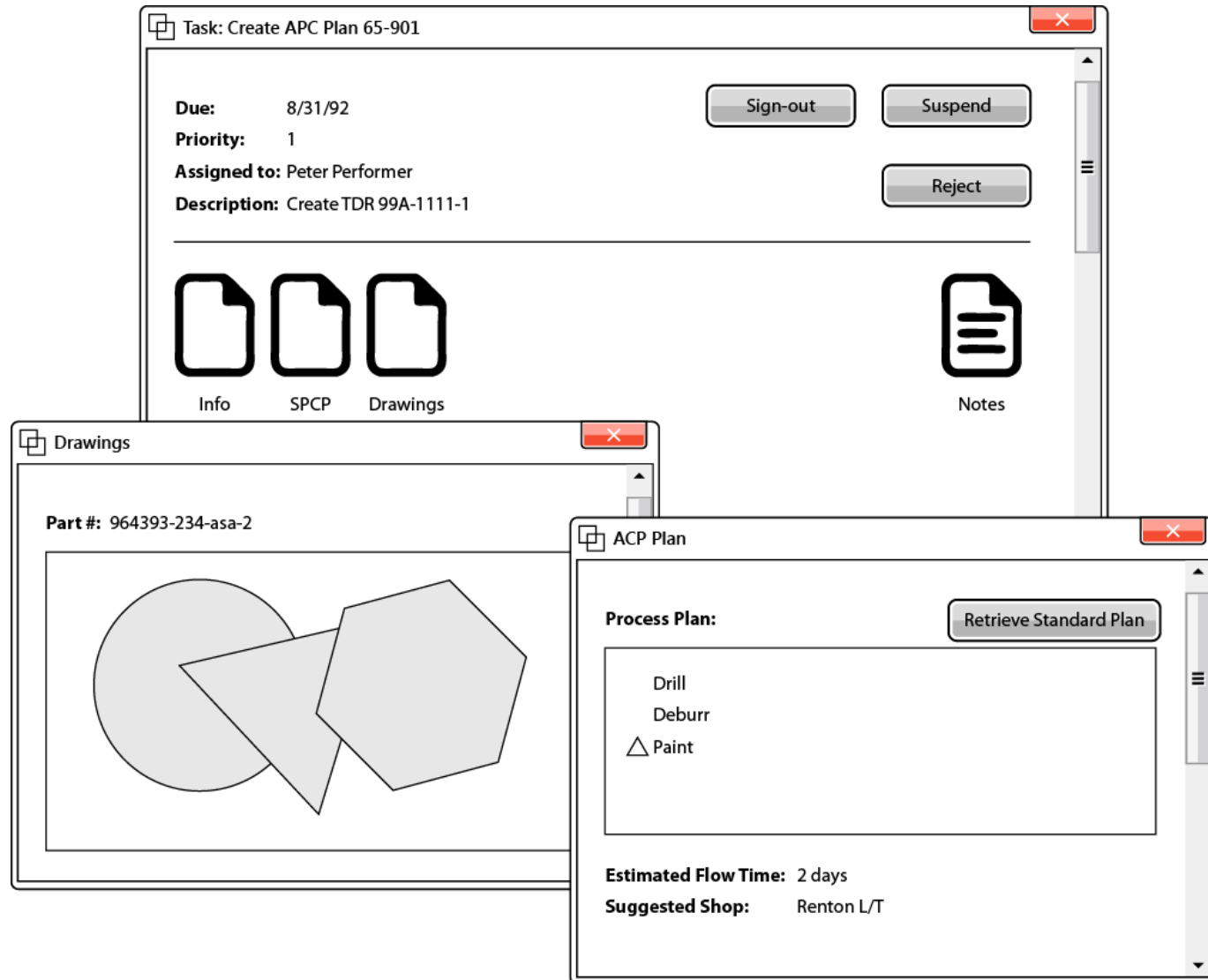


The screenshot shows a window titled "ToDo List: Private" with a red close button in the top right corner. Below the title bar, there is a "Current view:" label and a button labeled "By Due Date". The main content area contains a table with five columns: "New?", "Notes?", "Due Date", "Priority", and "Description". The table lists five tasks, sorted by their due dates. A vertical scrollbar is visible on the right side of the table.

New?	Notes?	Due Date	Priority	Description
		10/23/92	1	Create TDR 99A-1111-2 ()
		10/25/92		Create TDR 99A-1111-1 ()
		10/25/92		Review Par 12345-1 ()
		10/25/92		Evaluate a SPCM rqmt ()
		10/27/92		Create a APC Plan 65-901 ()

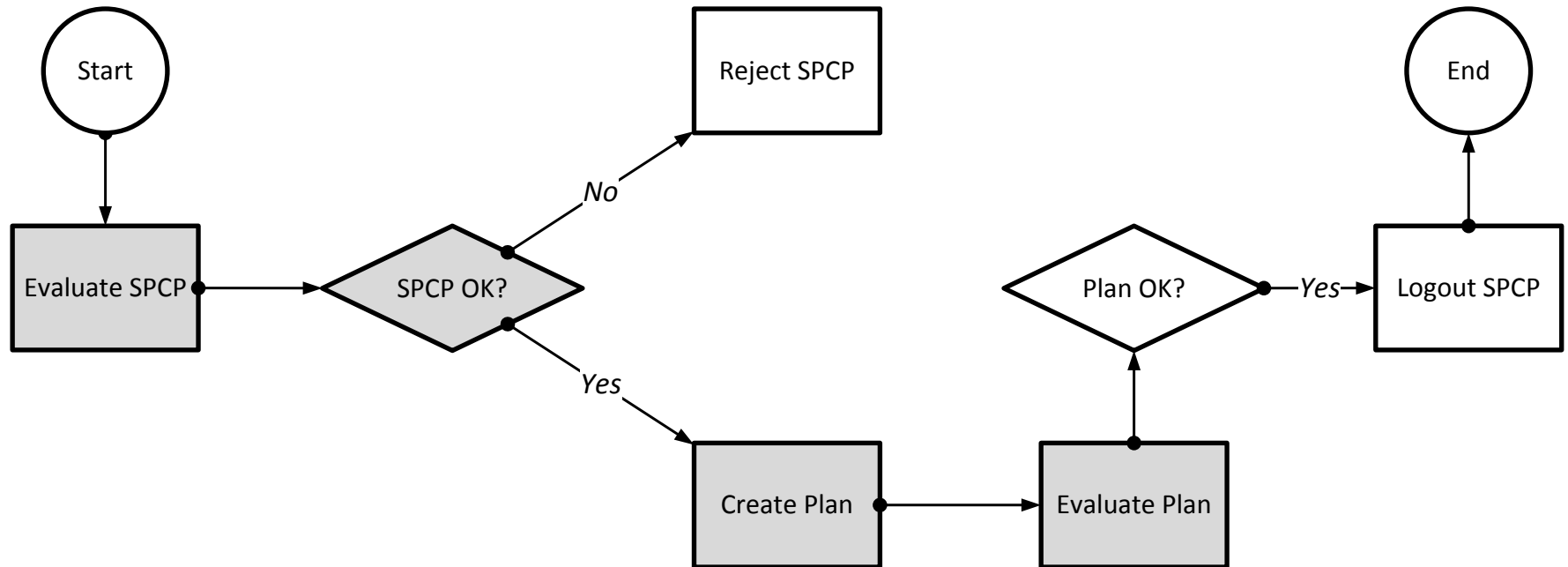
# Task Performance Environment

- User would have all resources required to accomplish the task

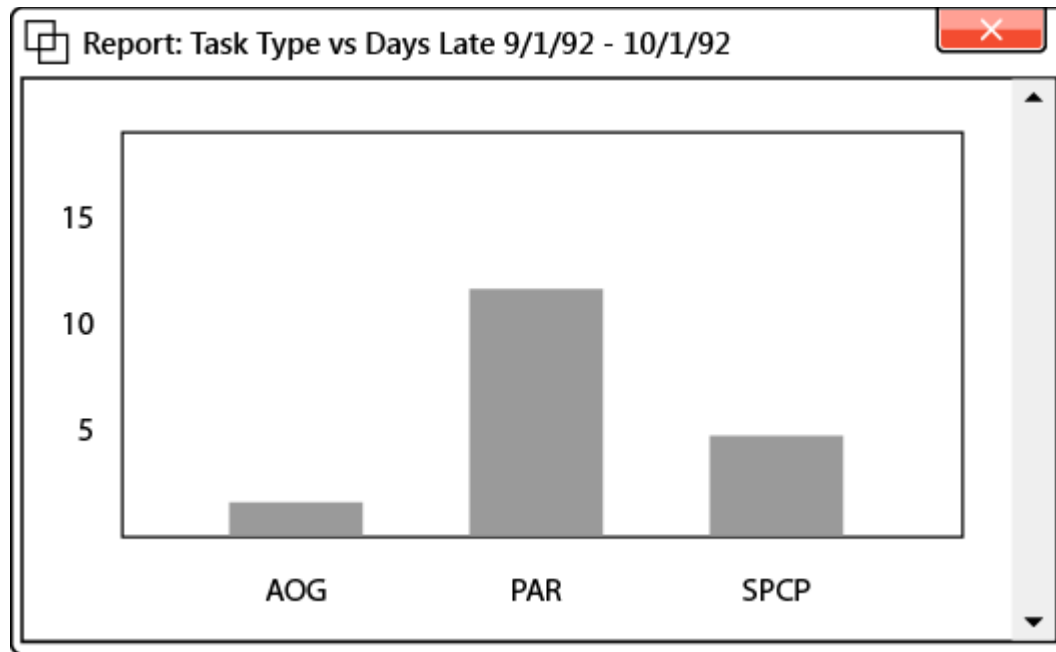


# Status Tracking

- Task completion can be followed by employer



# Metrics Collection





# Users Hate It in SE, but didn't notice in CI

---

- The rigidity of workflow systems means that people often (typically) find it to be a hindrance e.g. Boeing manufacturing example

# TASK EVALUATION

# Types of task evaluation methods: Filtering the contribution

## ● Evaluating the Individual

- Calculated Reputation
- Indication (Red Ballon)
- Profile
- Run a pre-task

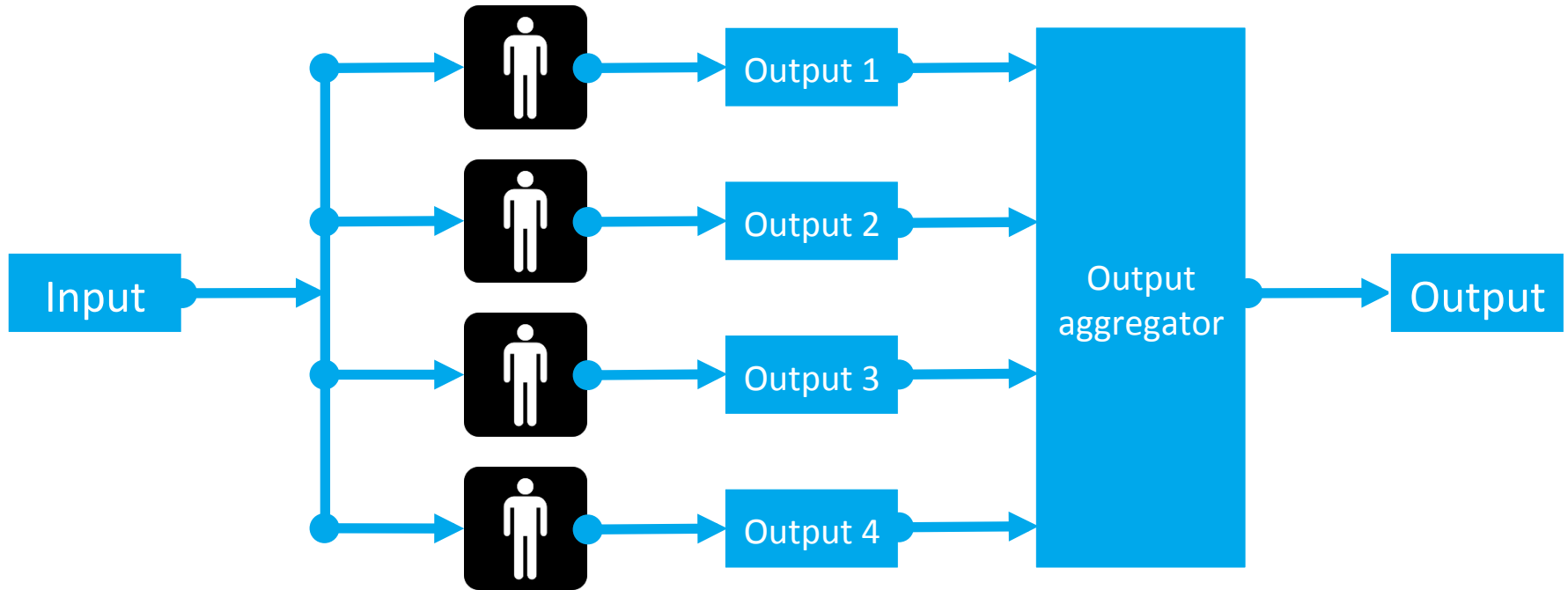
## ● Evaluating the Result

- Rating/Ranking
  - Explicit as in any recommendation systems
  - Implicit as in Google environment (navigation affects pagerank)
- Comparing to Gold examples
  - Captcha with 2 words: a known and a unknown
- Automatic evaluation
  - Run & check the correctness
  - Run & calculate the “goodness”–FoldIt
  - Corpus analysis – ex. Colab winner guessing
  - Run & compare to threshold
  - Netflix → expected 10% improvement

# TASK AGGREGATION

# Aggregate Answers

- Diverse aggregation functions

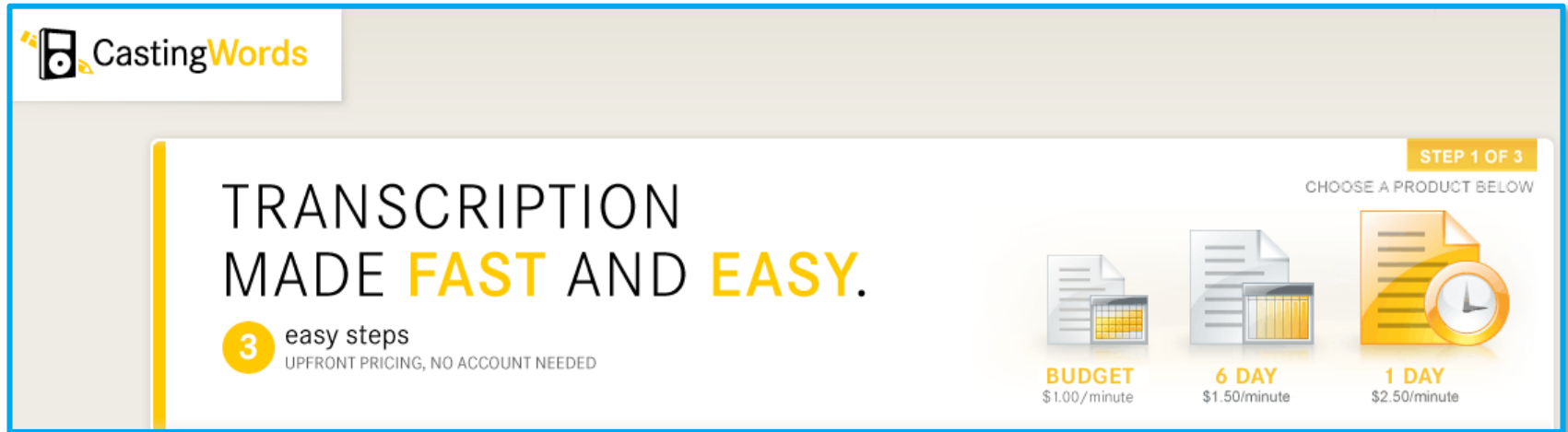


# Types of Task Aggregation: providing the result

- No aggregation needed: the solution is from one individual
  - The winner of a contest
- Statistic functions
  - Average of numbers (ex. Ox weight)
- Merge of selected answers
  - Photosynt
- Fit into a framework
  - Letter recognition in Captcha applications to feed old books transcriptions
- Fit the puzzle
  - DNA sequencing
  - Transcript (CastingWords)

# Fit the puzzle: Casting Words

- Transcribes long audio recordings by:
  - splitting them into overlapping segments
  - distributing the work among workers
  - performing quality control
  - recombining the transcription fragments



The advertisement banner for CastingWords features a light beige background with a blue border. In the top left corner is the CastingWords logo, which includes a stylized icon of a document with a play button and the text "CastingWords". The main text in the center reads "TRANSCRIPTION MADE FAST AND EASY." with "FAST" and "EASY" in yellow. Below this, a yellow circle with the number "3" is followed by the text "easy steps" and "UPFRONT PRICING, NO ACCOUNT NEEDED". On the right side, there is a section titled "STEP 1 OF 3" and "CHOOSE A PRODUCT BELOW". This section displays three product options: "BUDGET" at \$1.00/minute, "6 DAY" at \$1.50/minute, and "1 DAY" at \$2.50/minute. Each option is accompanied by an icon representing a document and a clock.

**CastingWords**

TRANSCRIPTION MADE **FAST** AND **EASY**.

**3** easy steps  
UPFRONT PRICING, NO ACCOUNT NEEDED

**STEP 1 OF 3**  
CHOOSE A PRODUCT BELOW

Product	Price
BUDGET	\$1.00/minute
6 DAY	\$1.50/minute
1 DAY	\$2.50/minute

# Merge: Photosynth

- People submit picture of same object
- Algorithmically merge the images to create a 3D model of the object





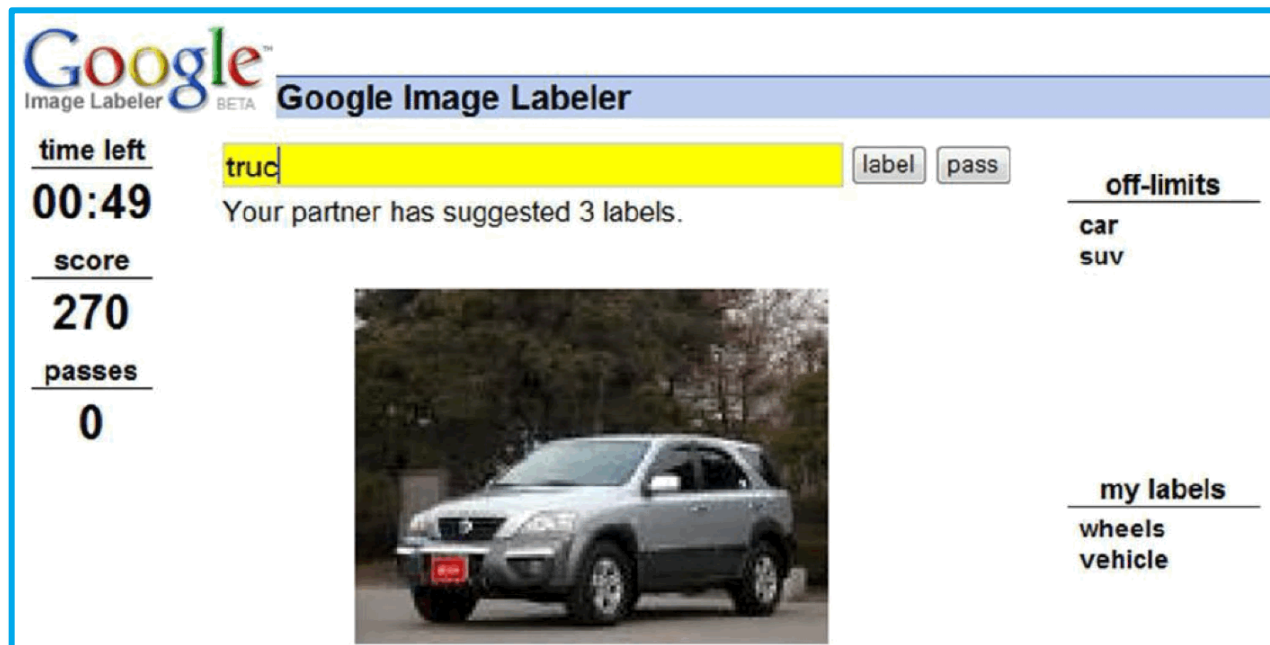
# Statistic Function: ESP Game

(von Ahn & Dabbish 2004)

## Objective: acquire good image labels

### • Type of Task: Game

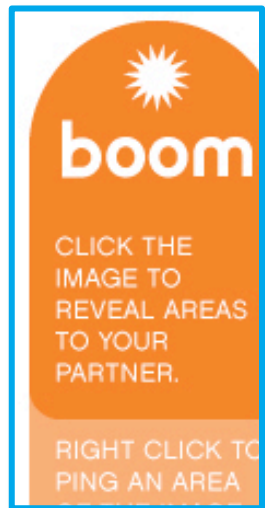
- Competing teams
- Team of 2 people
- Point is given when both individuals write the same label for the image
- Match means good label



# Statistic Function: Peek A Boom

(von Ahn, Liu & Blum 2006)

TIME LEFT  
**1:29**



SCORE  
**500**

**GUESSES** ?

**BUSH**

-----

-----

-----

-----

-----

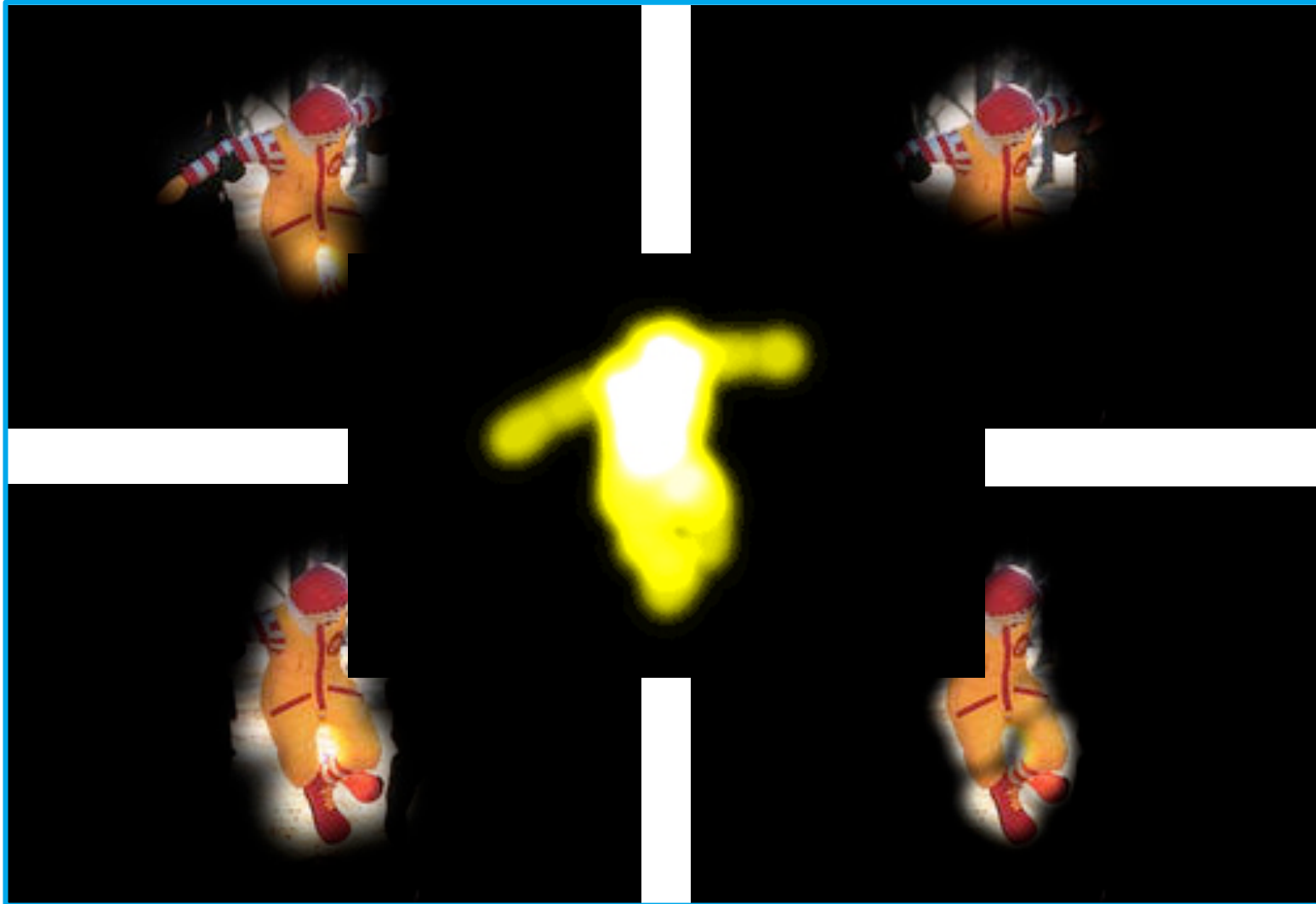
# Statistic Function: Peek A Boom

*(von Ahn, Liu & Blum 2006)*



## Statistic Function: Peek A Boom

(von Ahn, Liu & Blum 2006)



# Statistic Function: Peek A Boom

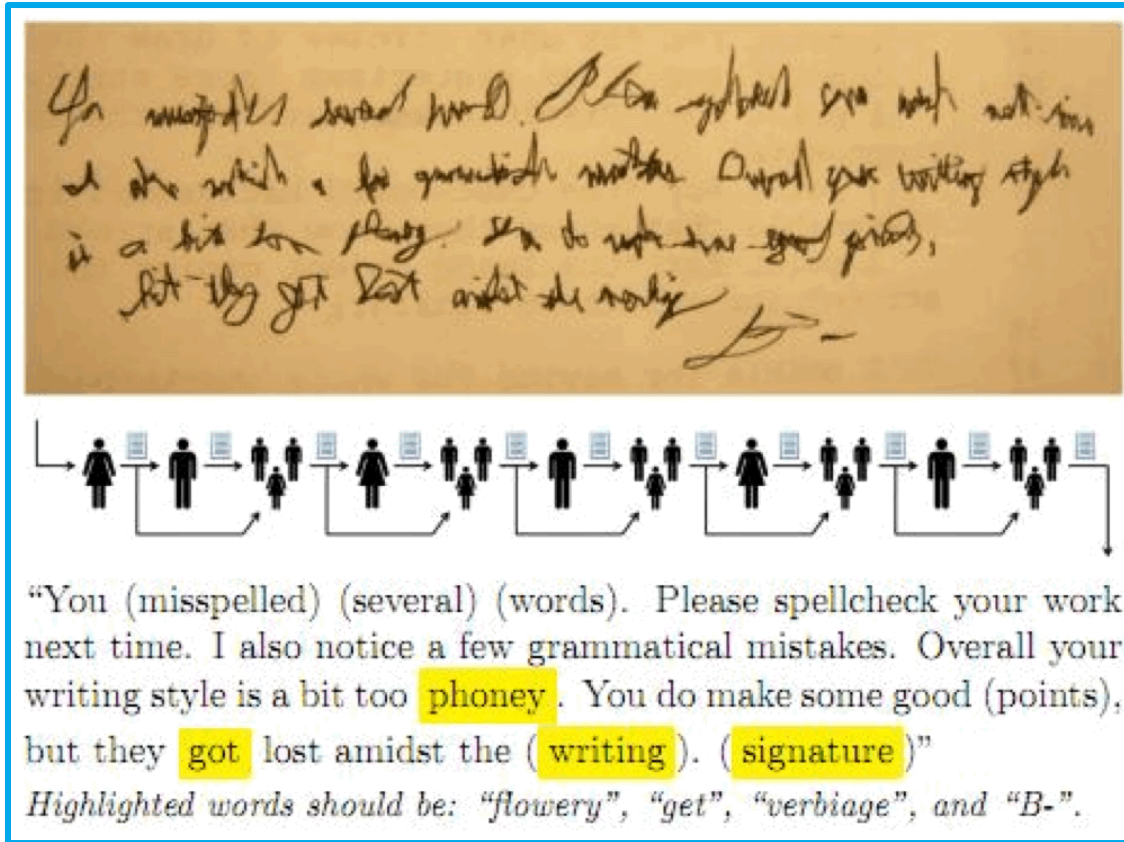
- Aggregation method: statistic function. Pixel intensity





# Fit into a framework: Iterative Improvement

((Bersnstein et al 2010))



<http://projects.csail.mit.edu/soylent/>

## Soylent

### Find-Fix-Verify

- Find
  - Highlight phrases that need editing
- Fix
  - Revise phrase within context
- Verify
  - Quality control step
  - People vote on better fix

# CROWD PROGRAMMING LANGUAGES

# Crowd vs Computer Programming

---

- Writing a program for the crowd is different than writing for the cloud



# Crowd vs Computer Programming

- Incentives
  - Must design carefully to encourage good performance while **avoiding gaming**
- Cognitive diversity
  - People vary widely in **skills** – it's much harder to match tasks and resources
  - The **composition** of the crowd changes on a second-by-second basis
- Error-prone
  - People have a **high error-rate** as well as **huge error diversity**, compared to software

# Programming languages for aggregating microtasks

---

- Turkit
- CrowdForge
- Crowd Databases

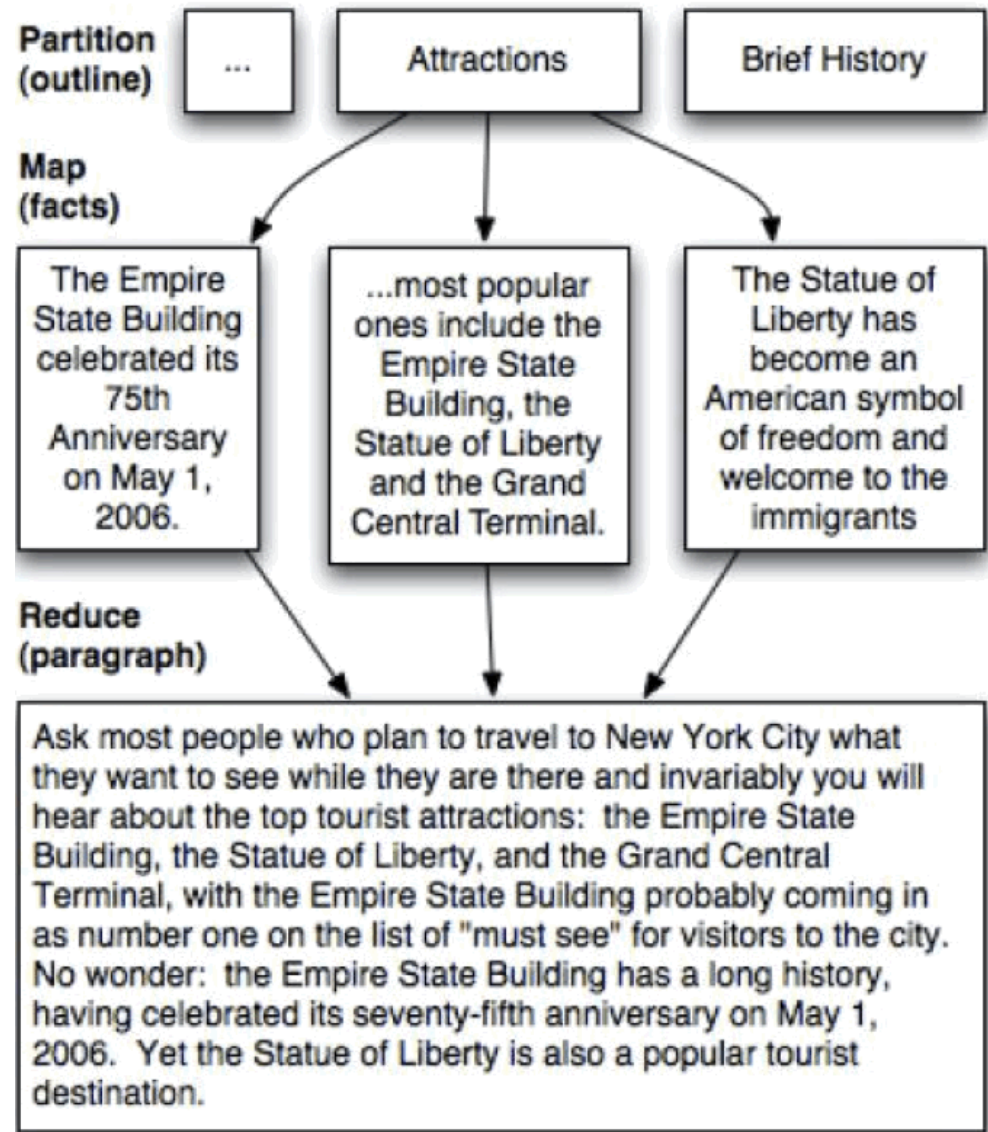
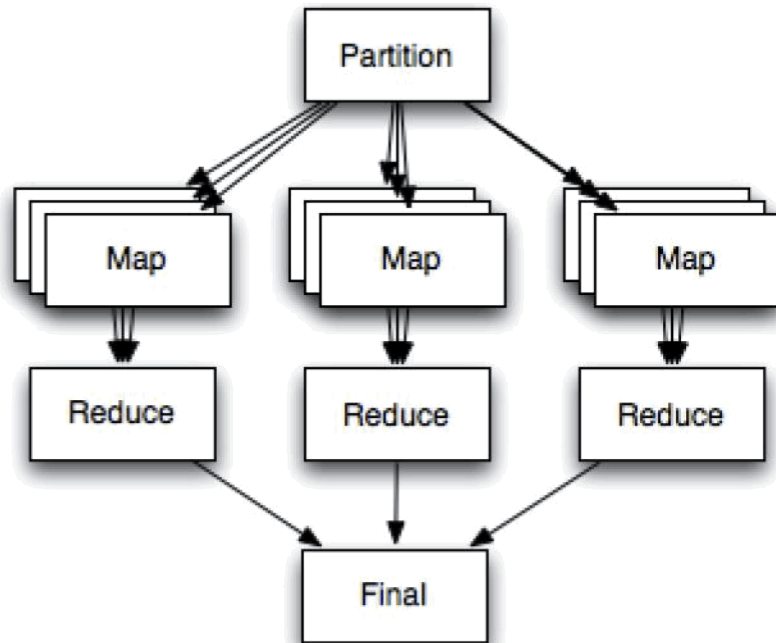
# Turkit

- Javascript with call to Mechanical Turk

```
quicksort(A)
  if A.length > 0
    pivot ← A.remove(A.randomIndex())
    left ← new array
    right ← new array
    for x in A
      if compare(x, pivot)
        left.add(x)
      else
        right.add(x)
    quicksort(left)
    quicksort(right)
    A.set(left + pivot + right)
```

```
compare(a, b)
  hitId ← createHIT(...a...b...)
  result ← getHITResult(hitId)
  return (result says a < b)
```

# Crowdforge



# Crowd-based Databases

```
CREATE TABLE picture (  
    p IMAGE,  
    subject STRING  
);  
SELECT p FROM picture  
WHERE subject = "Golden Gate Bridge"  
ORDER BY CROWDORDER(p,  
    "Which picture visualizes better %subject");
```

<http://db.csail.mit.edu/qurk/>

<https://amplab.cs.berkeley.edu/publication/crowddb-answering-queries-with-crowdsourcing/>

# ETHICAL CONCERNS

(Zittain 2009)

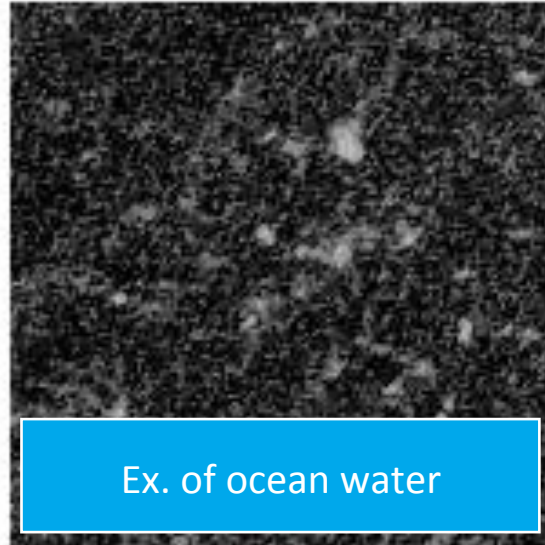
# What is the purpose of the task?

- Trying to find a lost person
  - Famous researcher (DB)
  - Lost at sea in January 2007

## Sample Imaginary



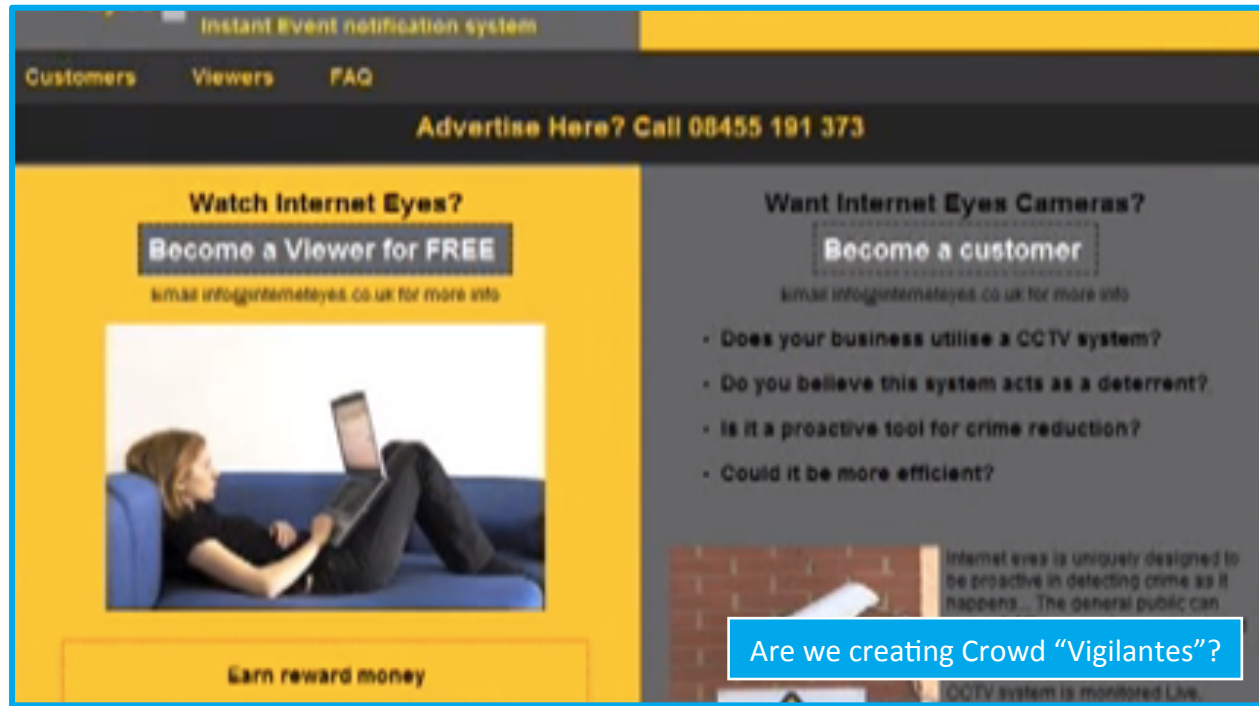
Size of Jim's boat



Ex. of ocean water

# What is the purpose of the task?

- People look at scenes and press a button if they notice something inappropriate
  - Crowd receive a
  - Micro task





# What is the purpose of the task?

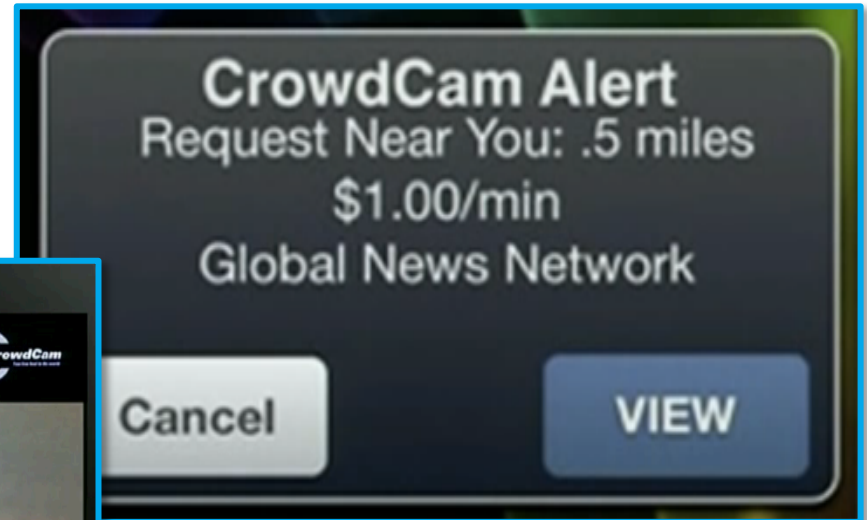
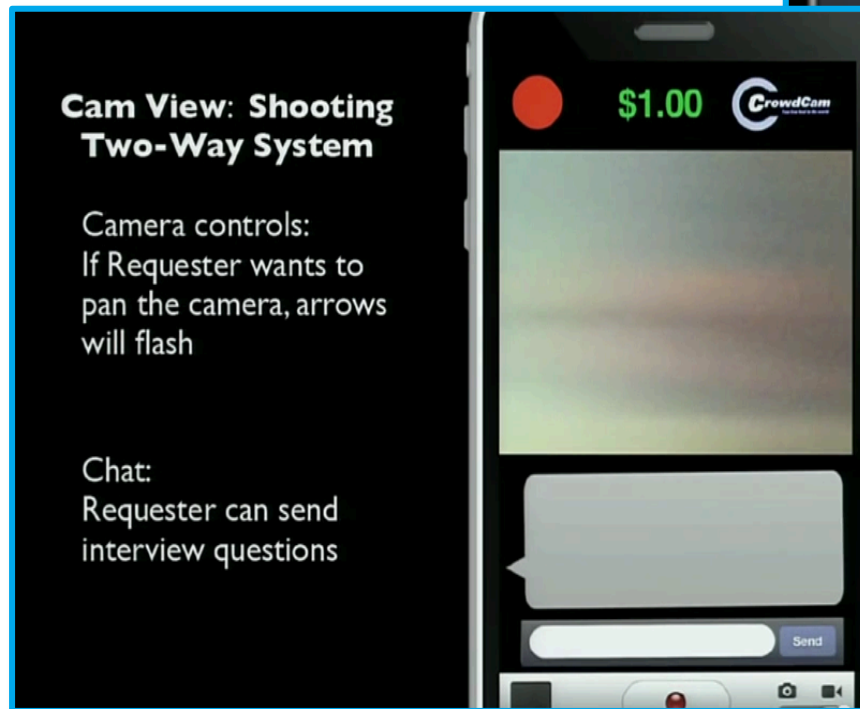
- What are we doing?
  - Ignorance on what we are really helping to do
  - We can work on a cause we wouldn't if we knew



Frontiers vigilance

# What is the purpose of the task?

Mass news: micro task- redirect camera positioning to register something



Are we creating Crowd  
"Vigilantes"?

# What is the purpose of the task?

---

- **India** - given an image, identify persons that are smoking marijuana (probably they will be arrested)
- **Iran** - given an image, identify persons that are participating in a riot (probably they will be killed)

# What is the purpose of the task?

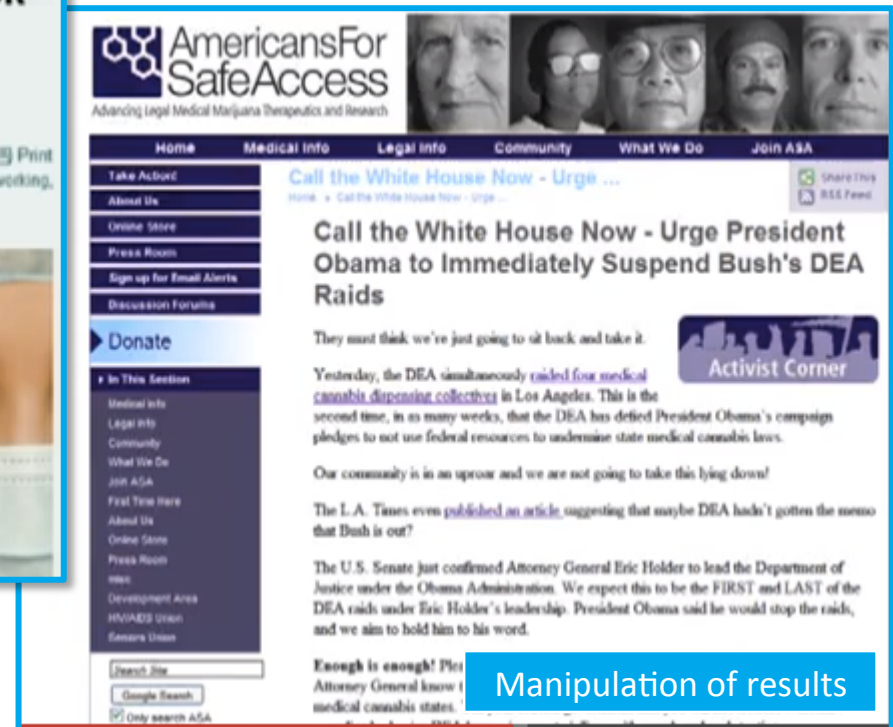
---

- Trip Advisor
- Amazon book review
- [Booking.com](https://www.booking.com)

# What is the purpose of the task?



Write to your representative and support this action



Manipulation of results

# Who is going to use the result?

- What are we actually helping to solve?

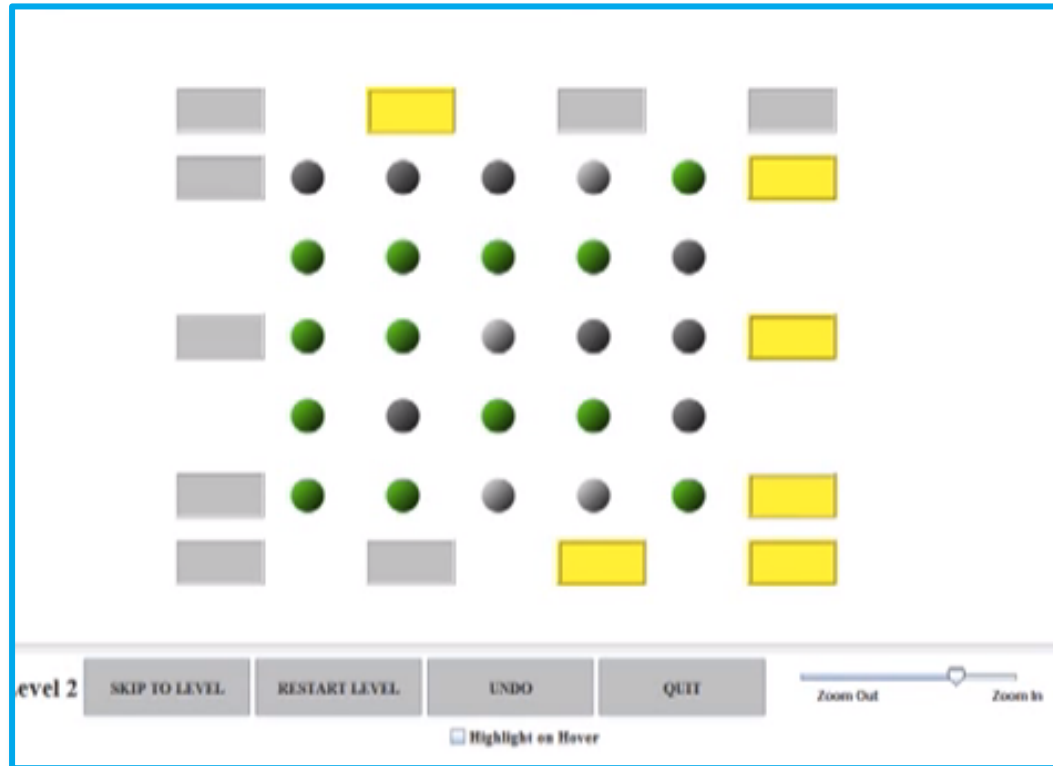
The screenshot shows the Innocentive website interface. At the top, the logo reads 'INNOCENTIVE WHERE THE WORLD INNOVATES'. Navigation links include 'sopenthe | Log Out', 'Help', and 'Contact Us'. The main heading is 'Challenge Overview - "Seeking Pyrazolopyridinyl-diazenes"'. Below this, a yellow box contains instructions to view detailed requirements and links for 'View Challenge Details' and 'See Other Challenges'. A sidebar on the left titled 'VIEW CHALLENGE DETAILS' lists requirements for solvers, including providing contact information and signing a challenge-specific agreement. A yellow oval highlights the challenge title 'Seeking Pyrazolopyridinyl-diazenes' in the main content area. Below the title, it states 'DEADLINE: Oct 28, 2009' and '5 Project Rooms'. The 'Challenge Overview' section describes the goal: 'Material supply of non-commercial Pyrazolopyridinyl-diazenes is desired. By the date molecules which meet the Requirements listed in the Detailed Description of the Challenge. For the molecules that are selected by the Seeker, the Solver shall then send in material samples along with documentation of their purity. This Challenge is targeting Solvers who: have matching compounds already made (on the shelf), or; are ready to synthesize matching compounds within the provided timelines. This Challenge provides Solvers with a three month time period for preparing the selected compounds after the deadline of the Challenge.' At the bottom, there is a 'What is Innocentive?' section and a 'SAFEHARBOR' logo from the U.S. Department of Commerce.

Who are asking us to perform the task?

For which purpose?

# Who is in the crowd?

- Rewritten as a game



Human Computing for EDA  
Andrew DeOrio and Valeria Bertacco  
Department of Computer Science and Engineering, University of Michigan  
(awdeorio, valeria)@umich.edu

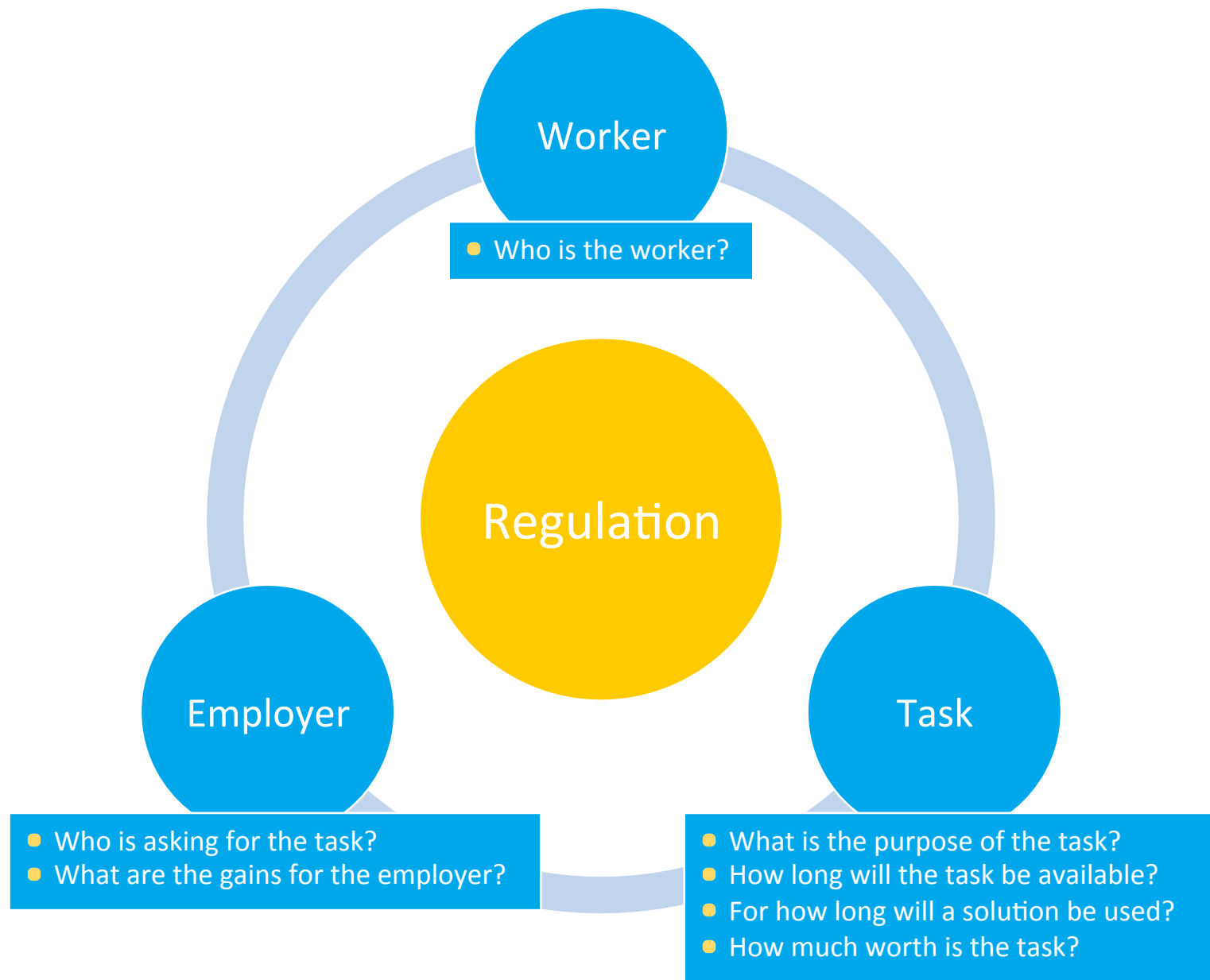


# Who is in the crowd?

- Legal Issues
  - Child work



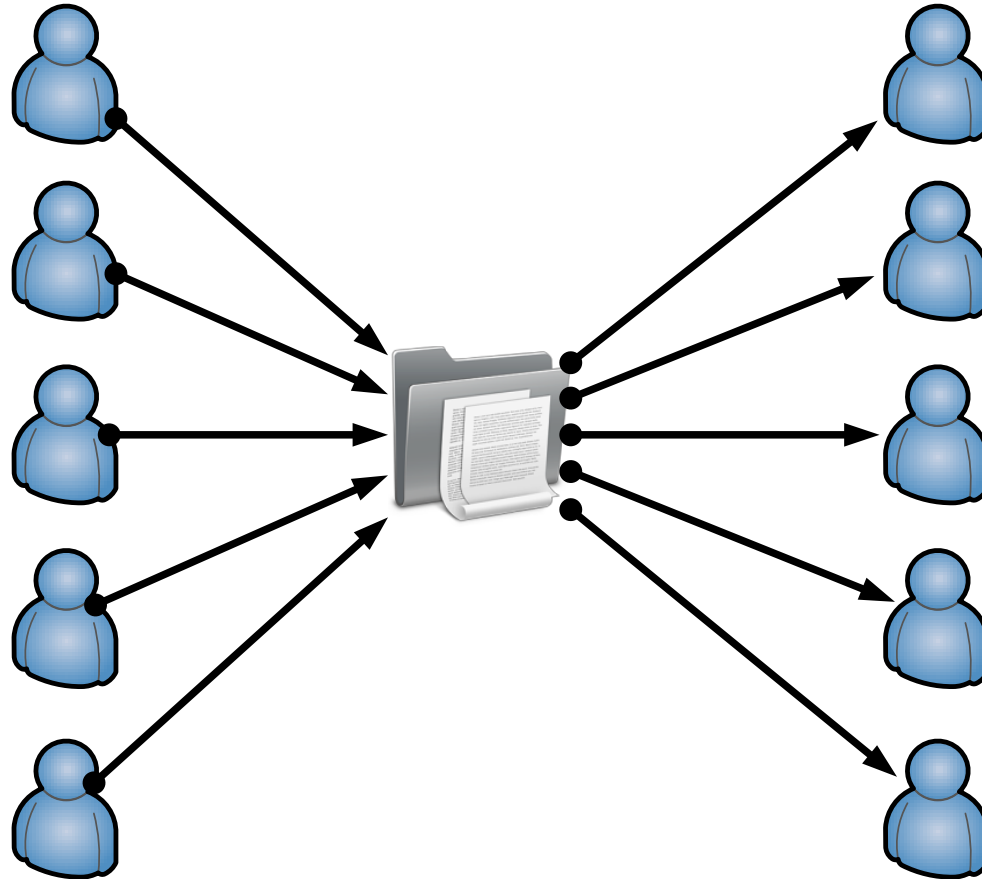




**A BIG CHANGE IS COMING**

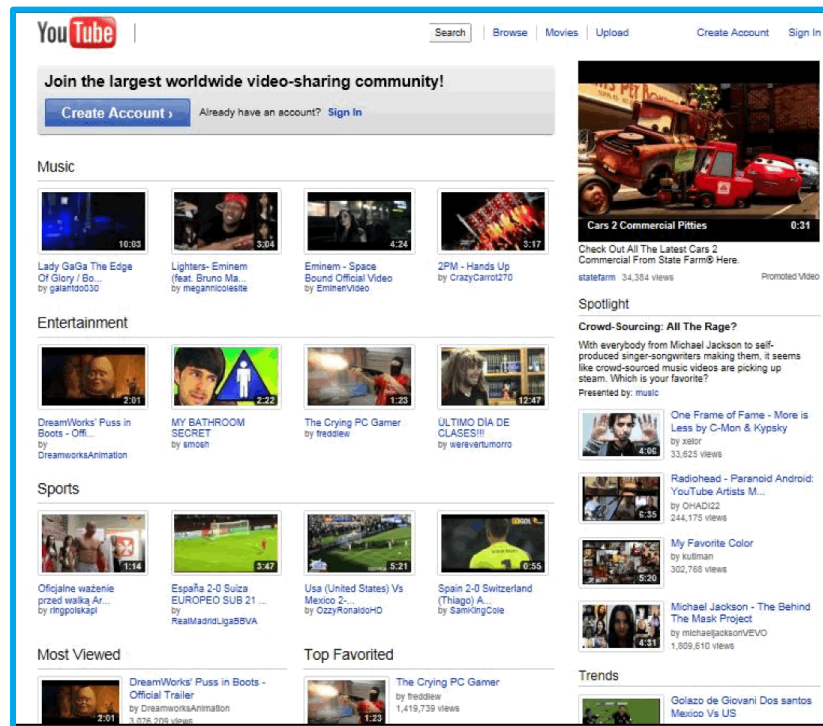
# Aggregate and Share

- Replacing traditional knowledge-based institutions with crowd-generated content



# Entertainment

- As of November 2011, more than 300 hours of video are uploaded to YouTube per minute - the equivalent of more than 1.5 million full-length movies every week.
- In May 2010, YouTube was serving more than two billion videos a day "nearly double the prime-time audience of all three major US television networks combined."



<https://www.youtube.com/yt/press/statistics.html>

# News

- Example: October 2010 [WikiLeaks](#) released the largest classified military leak in history: 391,832 reports documenting the war and occupation in Iraq as told by soldiers in the US Army.

WikiLeaks



Advanced search



The screenshot shows the Ushahidi website homepage. At the top is the Ushahidi logo, a globe with a network of lines, followed by the name "Ushahidi" in a bold, sans-serif font. To the right of the logo is a navigation bar with four links: "About Us", "Products", "Get Involved", and "Downloads". The "Downloads" link is highlighted with a red background. Below the navigation bar is a large text block that reads: "We are a non-profit tech company that develops free and open source software for information collection, visualization and interactive mapping." Below this text is a large banner image. The banner is split into two parts. The left part shows a close-up of a hand holding a small, white, cylindrical object. The right part shows two men in suits standing on a stage, one of whom is receiving an award. Below the banner is a row of four small, circular icons. Below the icons are three columns of content. The first column is titled "What is the Ushahidi Platform" and features a world map with a "Watch The Video" button. The second column is titled "Manage the River of Information" and features a "GETTING STARTED WITH SWIFT RIVER" banner with a "Watch The Video" button. The third column is titled "Crowdsourcing In 'the cloud'" and features a "CROWDMAP" banner with a globe icon. Below each of these three columns is a short paragraph of text.

**Ushahidi**

About Us Products Get Involved Downloads

We are a non-profit tech company that develops free and open source software for information collection, visualization and interactive mapping.

**Ushahidi Receives (RED) Webby Award**

David Kobia @ 2011 Webby Awards

**What is the Ushahidi Platform**

Watch The Video

We built the Ushahidi platform as a tool to easily crowdsource information using multiple channels, including SMS, email, Twitter and the web.

**Manage the River of Information**

GETTING STARTED WITH SWIFT RIVER

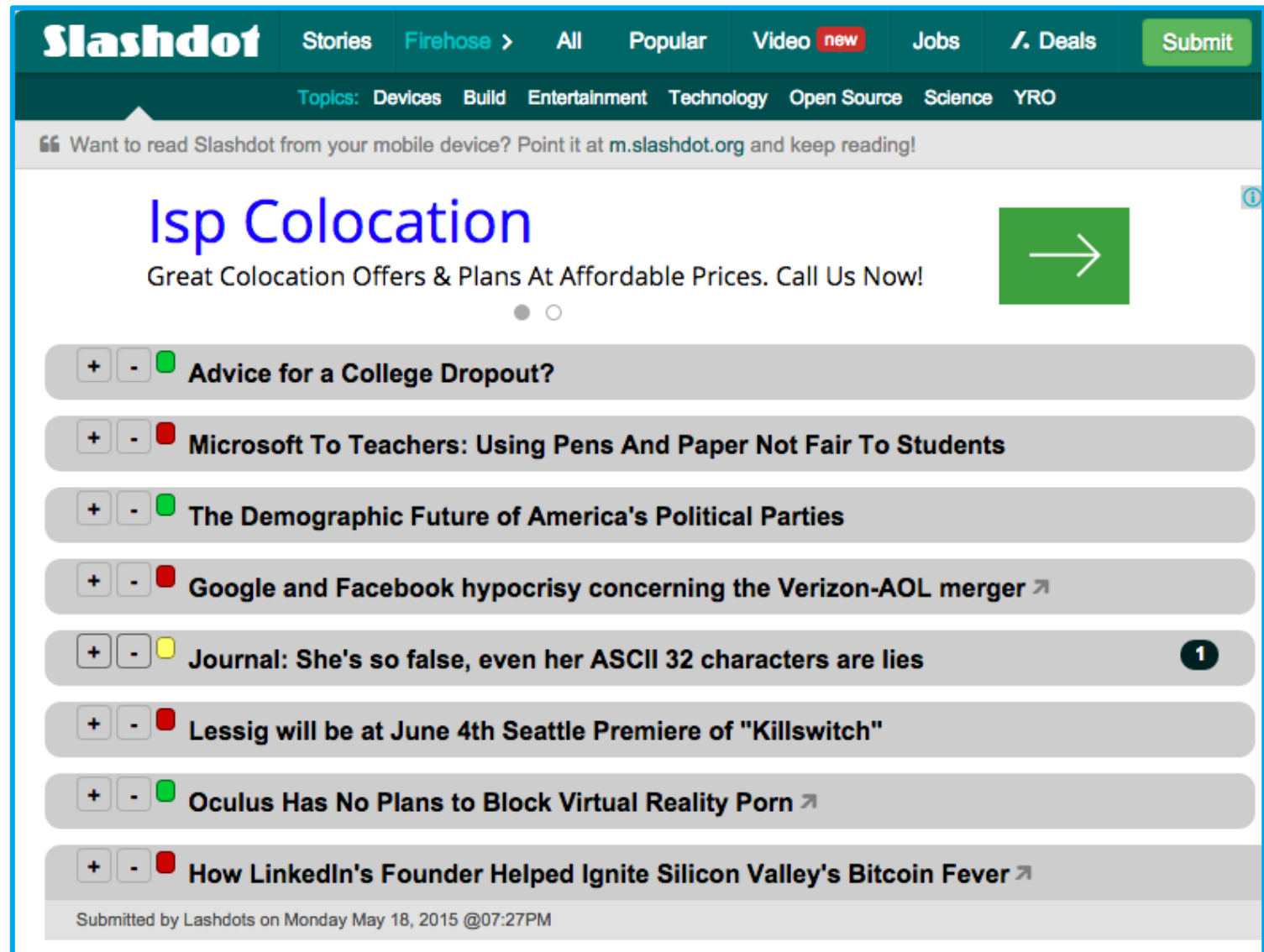
Watch The Video

SwiftRiver is an open source platform that aims to democratize access to tools for filtering & making sense of real-time information.

**Crowdsourcing In "the cloud"**

CROWDMAP

When you need to get the Ushahidi platform up in 2 minutes to crowdsource information, Crowdmap will do it for you. It's our hosted version of the



**Slashdot** Stories **Firehose >** All Popular Video **new** Jobs /. Deals Submit









Topics: Devices Build Entertainment Technology Open Source Science YRO

Want to read Slashdot from your mobile device? Point it at [m.slashdot.org](http://m.slashdot.org) and keep reading!

## Isp Colocation

Great Colocation Offers & Plans At Affordable Prices. Call Us Now!

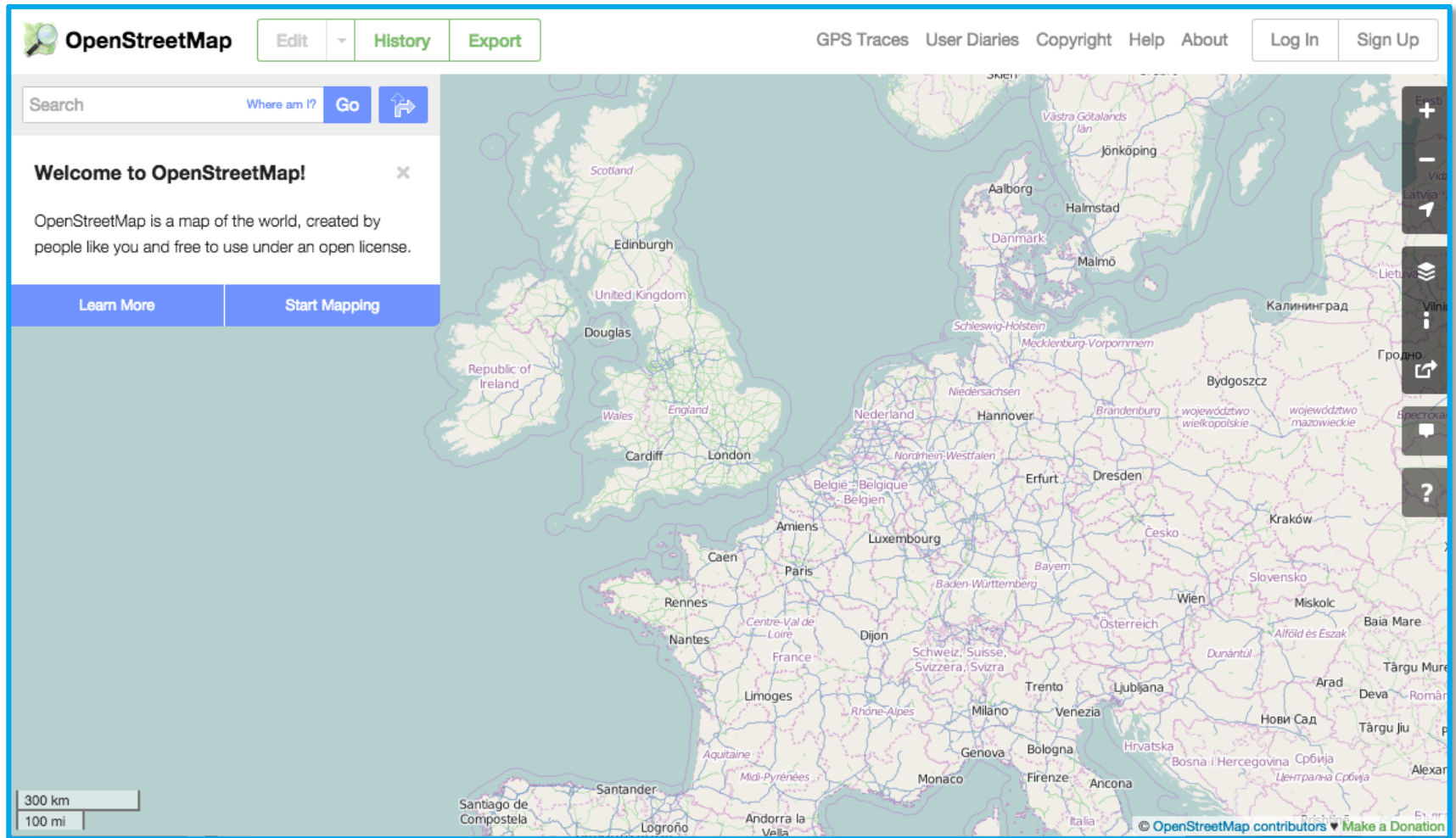
➔

- + -  Advice for a College Dropout?
- + -  Microsoft To Teachers: Using Pens And Paper Not Fair To Students
- + -  The Demographic Future of America's Political Parties
- + -  Google and Facebook hypocrisy concerning the Verizon-AOL merger ↗
- + -  Journal: She's so false, even her ASCII 32 characters are lies **1**
- + -  Lessig will be at June 4th Seattle Premiere of "Killswitch"
- + -  Oculus Has No Plans to Block Virtual Reality Porn ↗
- + -  How LinkedIn's Founder Helped Ignite Silicon Valley's Bitcoin Fever ↗

Submitted by Lashdots on Monday May 18, 2015 @07:27PM

# Map Making

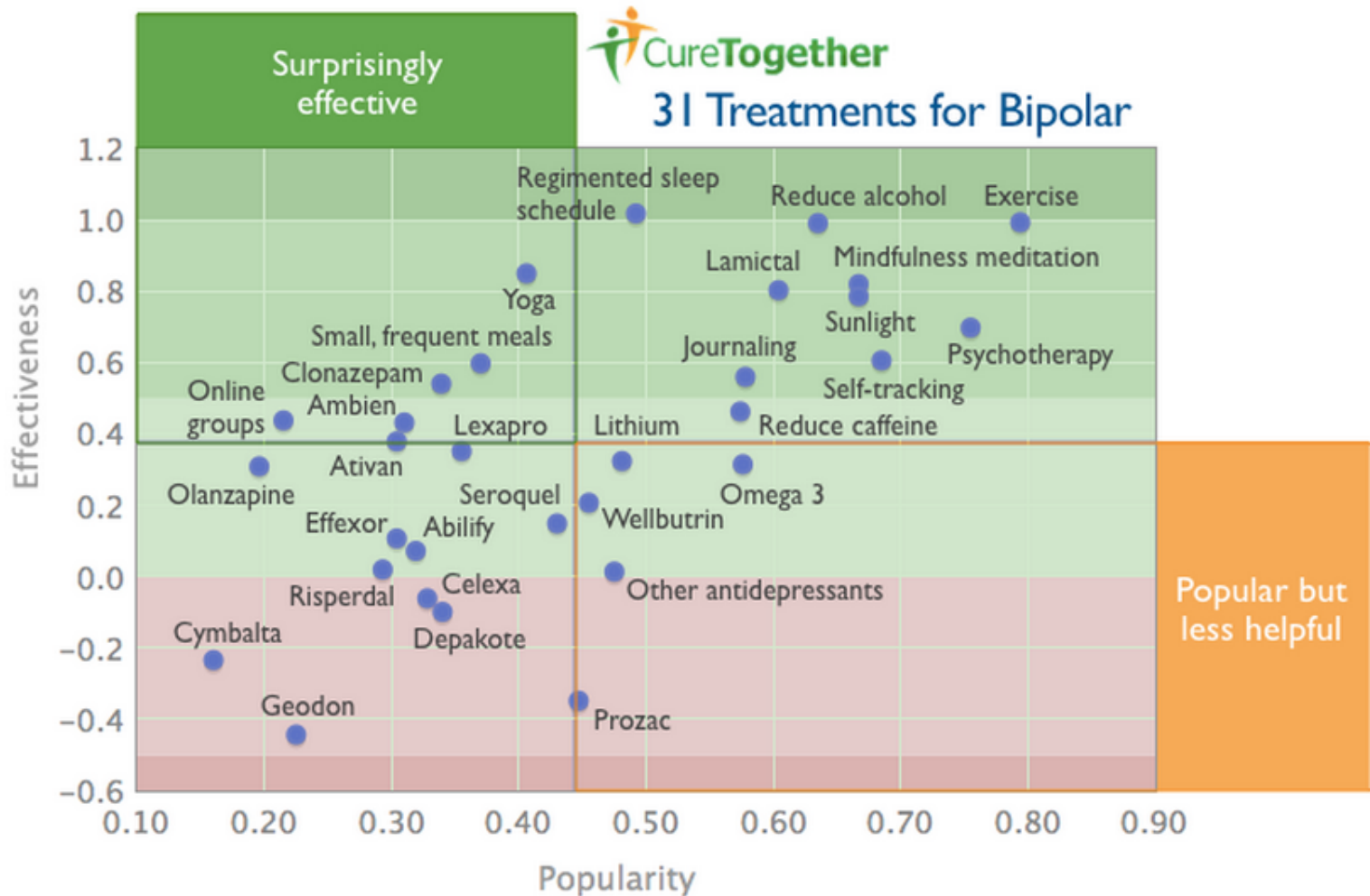
- “free” maps aren’t free
- Started in 2004, over 500,00 contributors





## Bipolar Managed Best Without Drugs: 227 Patients Report

February 15th, 2012 Alexandra Carmichael Posted in [Infographics](#), [Research Findings](#) 2 Comments »



## Welcome to eBird

*Birding in the 21st Century.*

The **Cornell** Lab  
of Ornithology

Audubon

The **Cornell** Lab  
**GLOBAL BIG DAY**  
MAY 9 2015

Every bird counts. Support conservation.

Learn More

Help Support eBird



Donate Now

## News and Features

### Global Big Day—Worldwide Success

18 May 2015

6013 species. 42920 checklists. 13664 people. One Global Big Day. Inspirational. Amazing. Unbelievable. These few words only begin to describe our feelings at watching eBird checklists flood in from the first ever [Global Big Day](#) on Saturday, 9 May. Groups worldwide mobilized their friends and contacts via Facebook, Twitter, email, and other outreach efforts.



An illustration of a bird in flight, with its wings spread wide, positioned above a stylized blue and white globe. The bird is black and white, with a yellow beak.  
**BirdCast**  
Real-Time Bird Migration Forecasts

# Data Science



Visualize

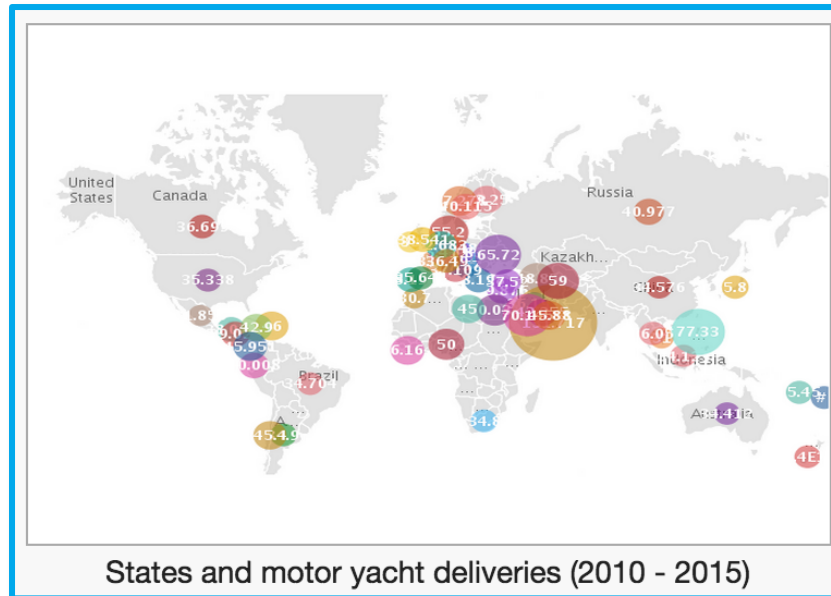


Explore



Share

Join Many Eyes



<http://www-01.ibm.com/software/analytics/many-eyes/>

# Government

**SeeClickFix**

Get the AppTools for GovernmentLoginSign Up

**Nagoya, Japan** [change]


Report an Issue

↑ ISSUES


Search Issues...

▼ Search


**ISSUES**



**「止まれ」の文字が** > Open  
若宮大通 名古屋市, 愛知県  
「止まれ」の文字が見づらくなっています  
09-10-2014 · Reported by atsushi · Share · Flag  
1 vote  
FIX IT! Write a comment...



**これは....** > Open  
環状線 名古屋市, 愛知県  
大丈夫なのでしょうか?  
09-10-2014 · Reported by Ken · Share · Flag  
1 vote  
FIX IT! Write a comment...



Map data ©2015 Google, ZENRIN. Terms of Use

<http://seeclickfix.com/>

# Government

**NEW YORK**  
**LAW SCHOOL**



[HOME](#) | [ARCHIVED APPLICATIONS](#) | [CONTACT US](#)

## Home

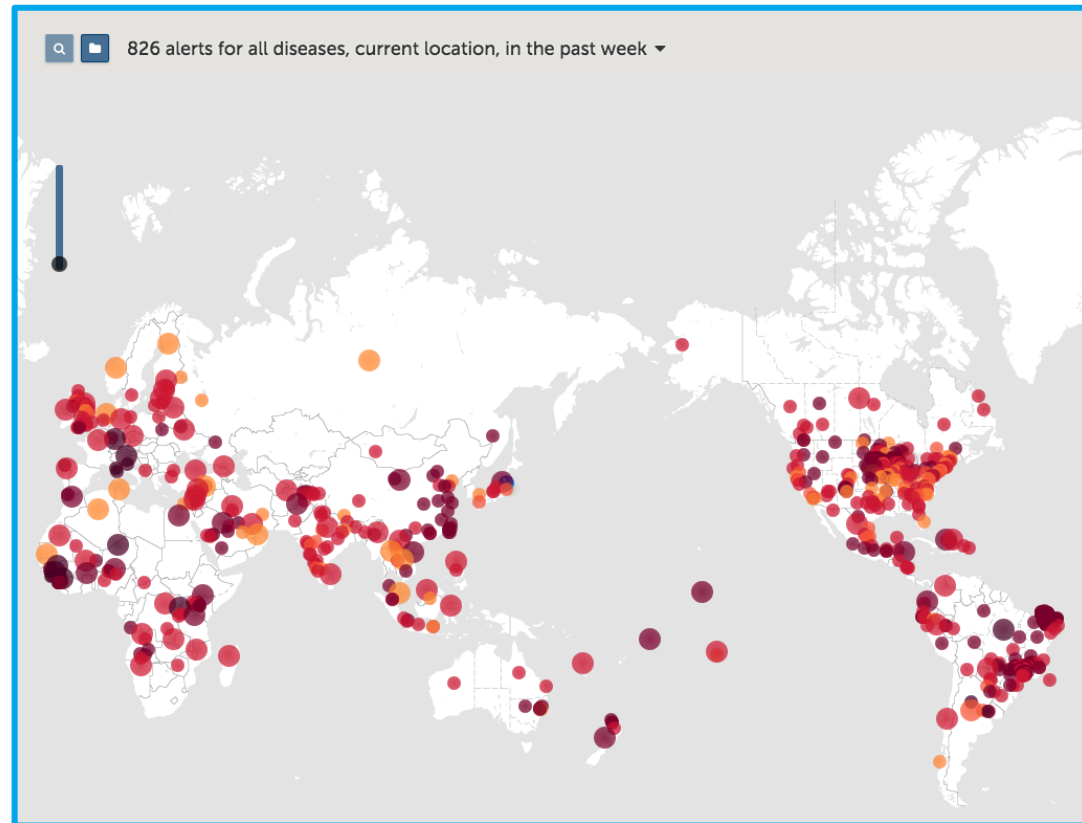
### About Peer To Patent ®

Peer To Patent is a historic initiative by the United States Patent and Trademark Office (USPTO) that opens the patent examination process to public participation for the first time. Peer to Patent is an online system that aims to improve the quality of issued patents by enabling the public to supply the USPTO with information relevant to assessing the claims of pending patent applications. This pilot project connects an open network for community input to the legal decision-making process. The community supplies information and research based on its expertise. The patent examiner makes the final determination on the basis of legal standards. This process combines the democracy of open participation with the legitimacy and effectiveness of administrative decision making.

<http://www.peertopatent.org/>

# HealthMap

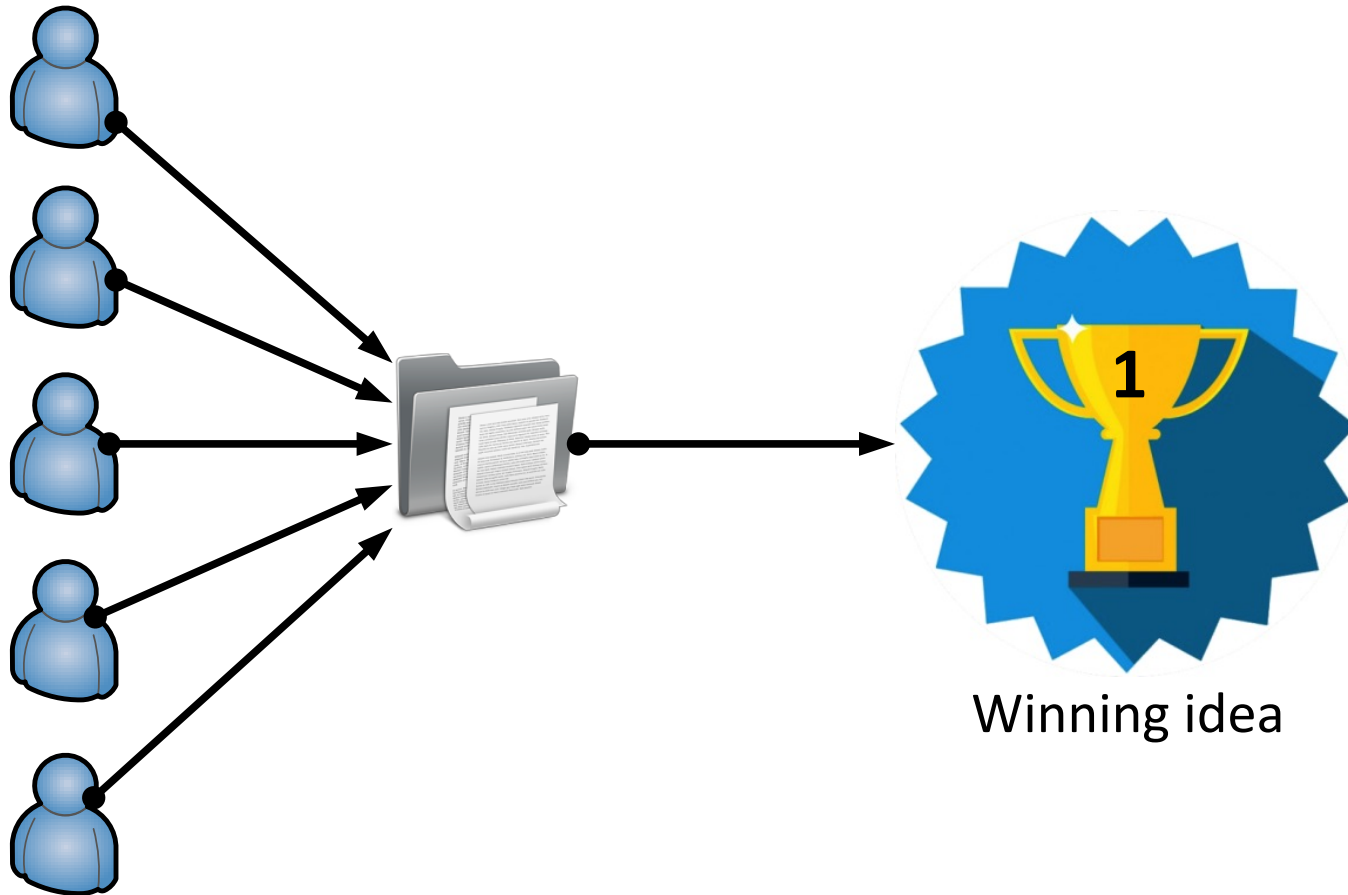
- HealthMap brings together disparate data sources, including online news aggregators, eyewitness reports, expert-curated discussions and validated official reports, to achieve a unified and comprehensive view of the current global state of infectious diseases and their effect on human and animal health.



<http://www.healthmap.org/en/>

# Social Ideation

- Focusing crowd on finding superior solutions





# Social Ideation

The screenshot shows the 'My Starbucks Idea' website. At the top, the Starbucks logo and 'My Starbucks Idea' text are visible. Navigation links include 'GOT AN IDEA?', 'VIEW IDEAS', and 'IDEAS IN ACTION'. A sign-in prompt says 'Hi there, Sign In to make a comment.' Social sharing options for Facebook, Twitter, and a general share button are present. A search bar is labeled 'Search Ideas'. The page is divided into three main sections: 'PRODUCT IDEAS', 'EXPERIENCE IDEAS', and 'INVOLVEMENT IDEAS', each with a list of ideas and their counts. A large central image shows a Starbucks interior with the text 'SHARE. VOTE. DISCUSS. SEE.' and 'Share your ideas, tell us what you think of other people's ideas and join the discussion.' Below this is a 'Most Recent Ideas' section listing recent suggestions with timestamps.

My Starbucks Idea

GOT AN IDEA? VIEW IDEAS IDEAS IN ACTION

Hi there, [Sign In](#) to make a comment.

Share [f](#) [t](#) [+](#)  
Follow us on [twitter](#)

Ideas so far \_\_\_\_\_

Search Ideas [Q](#)

PRODUCT IDEAS

- 33,701 Coffee & Espresso Drinks
- 3,587 Frappuccino® Beverages
- 9,865 Tea & Other Drinks
- 15,533 Food
- 8,167 Merchandise & Music
- 16,575 Starbucks Card
- 3,055 New Technology
- 10,871 Other Product Ideas

EXPERIENCE IDEAS

- 8,082 Ordering, Payment, & Pick-Up
- 14,656 Atmosphere & Locations
- 11,133 Other Experience Ideas

INVOLVEMENT IDEAS

- 4,990 Building Community
- 9,132 Social Responsibility
- 5,581 Other Involvement Ideas
- 1,541 Outside USA

SHARE. VOTE. DISCUSS. SEE.

Share your ideas, tell us what you think of other people's ideas and join the discussion.

my STARBUCKS IDEA

Most Recent Ideas \_\_\_\_\_

- 7 Min(s) Ago Have two pickup landings
- 27 Min(s) Ago Option for Shared Rewards for All Registered Cards
- 1 Hour(s) Ago Donate leftover funds to the local community projects
- 1 Hour(s) Ago Decaf Pump Pot Needed
- 1 Hour(s) Ago Soups and pasta
- 1 Hour(s) Ago Stake out a signature shade grown bird friendly coffee
- 2 Hour(s) Ago Order replacement Mugs
- 2 Hour(s) Ago Setup DECAFFIENATED as a category
- 2 Hour(s) Ago Give a New L.E.D. shaped Light Bulb Icon for Really, Really, Really Gr...
- 2 Hour(s) Ago Less plastic and more donations

<http://mystarbucksidea.force.com/>

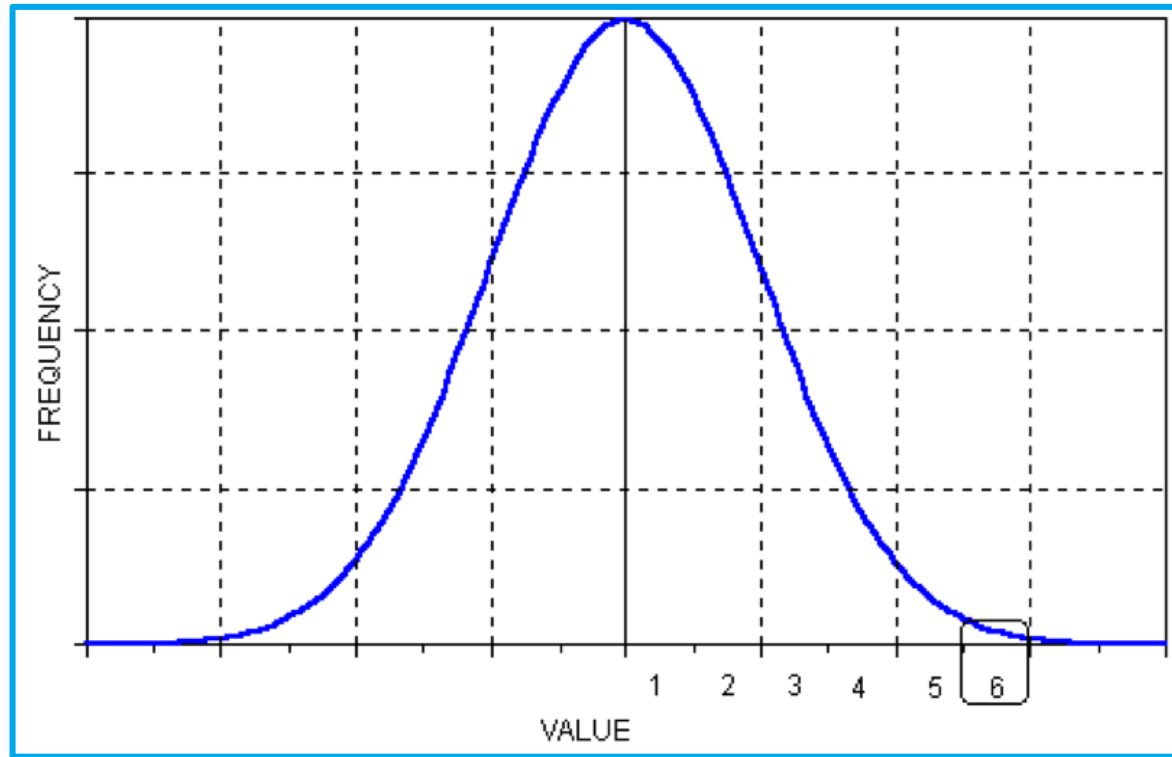


# Large-Scale Participation

Organization	Contributions	Contributors
Open for questions	70K	100K
Google 10 <sup>^</sup> 100	150K	100K
IBM Idea Jam	46K	150K
Dell Ideastorm	21K	

# Long Tail: Finding Your Genius

- No matter who you are, most of the smartest people work for someone else (Bill Joy, Sun CTO)



# Access to Marginals

---

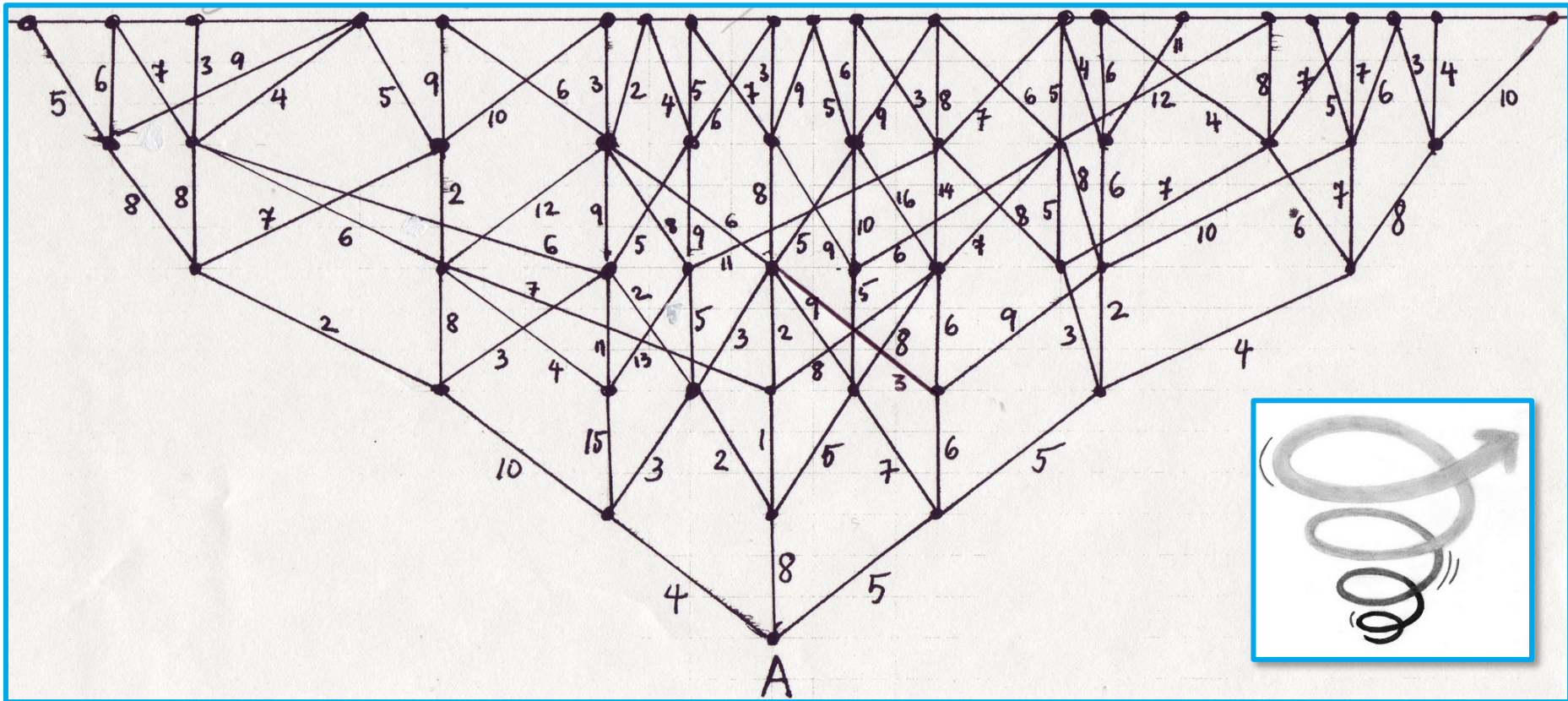
- Typically, solutions come from non-experts
- Famous example: a surface chemistry problem that stymied Proctor & Gamble was solved by a dentist (innocentive)
- Usually, the "marginal" developed solution long before a suitable problem appeared

# Idea Synergy



# Evolutionary Quality Spiral

- People can share, recombine, and refine each other's creative outputs



# Diversity Trumps Ability

(Page 2008)

- Caltech professor Scott E. Page built a computer model in which two groups of software agents tried to solve a difficult problem.
  - Geniuses: the best agents
  - Crowd: a diverse group of agents
- The crowd won! Why?
  - Geniuses are more homogenous - use a few "best" heuristics
  - Many problems don't succumb to a single approach: each step may require a different toolbox
  - The crowd's toolbox is much bigger: if there are 100 mental tools, and each person has 50 tools, there are  $100!/50! = 10^{96}$  possible unique combinations

# TIME-CENTRIC SOCIAL IDEATION

e.g. web forums, email

## Low Signal-to-Noise

Planeta Forum - View topic - Carbon Emission Offsetting

8/11/08 2:12 PM

PLANETA.COM

**Planeta Forum**  
 time to teach a new way

[FAQ](#) [Search](#) [Memberlist](#) [Usergroups](#) [Register](#)  
[Profile](#) [Log in to check your private messages](#) [Log in](#)

## Carbon Emission Offsetting

[Go to page](#) [Previous](#) [1](#), [2](#)

[new topic](#)

[post reply](#)

[Planeta Forum Forum Index](#) -> [Climate](#)

[View previous topic](#) [View next topic](#)

Author

Message

**planeta**

Site Admin

Posted: Wed Aug 15, 2007 1:20 am Post subject: Elsewhere on the Web

[quote](#)

Joined: 14 May 2003

Posts: 6000

Location: Oaxaca, Mexico

Irresponsible Tourism: Carbon Offset

[http://www.irresponsibletourism.info/forum/forum\\_topics.asp?TID=2](http://www.irresponsibletourism.info/forum/forum_topics.asp?TID=2)

Discuss carbon offsetting and carbon sequestration, is it a sham?

[profile](#)

[pm](#)

[www](#)

[Back to top](#)

**planeta**

Site Admin

Posted: Thu Aug 16, 2007 12:14 am Post subject: Businessgreen.com

[quote](#)

Joined: 14 May 2003

Posts: 6000

Location: Oaxaca, Mexico

Firms warned offsetting does "more harm than good"

<http://www.businessgreen.com/2007/08/firms-warned-of.html>

### Quote:

A leading scientist with the Tyndall Centre for Climate Change Research has warned that "doing nothing is better than offsetting" on the grounds that there is a serious risk that the practice is leading to increased emissions.

Dr Kevin Anderson, an academic at the University of Manchester and energy programme leader for the Tyndall Centre, said that the failure by many offset firms to look at the wider implications of investing in carbon reduction projects in developing economies meant that they were guilty of inadvertently increasing carbon emissions.

[profile](#)

[pm](#)

[www](#)

[Back to top](#)

**planeta**

Site Admin

Posted: Tue Oct 22, 2007 2:22 pm Post subject: Paying off unsustainable Life Styles

[quote](#)

Joined: 14 May 2003

Posts: 6000

Location: Oaxaca, Mexico

New feature on Planeta.com

Carbon Offsets: Paying off Unsustainable Life Styles or Investing in Sustainability - Michael Kaye

<http://www.planeta.com/planeta/07/0709offsets.html>


<http://forum.planeta.com/viewtopic.php?h=413&ppcorder=0&postorder=asc&start=23&end=5738&id=3396&view=2144&fullsize=true>


Page 1 of 6







# Low Signal-to-Noise



- Ignorance (did someone already say that?)
- Getting the last word/dominating the conversation
- Off-topic, low-quality content

☐  Is Carbon Emission Offsetting a good idea?

☐  yes

-  carbon offsets do reduce greenhouse gas emissions (if not fraudulent)
-  it is getting easier and easier to find good carbon offsets
-  Many major meetings are using them

☐  no

-  it fosters complacency, distracting from more important measures
-  it's too easy to cheat; may not always decrease carbon emissions

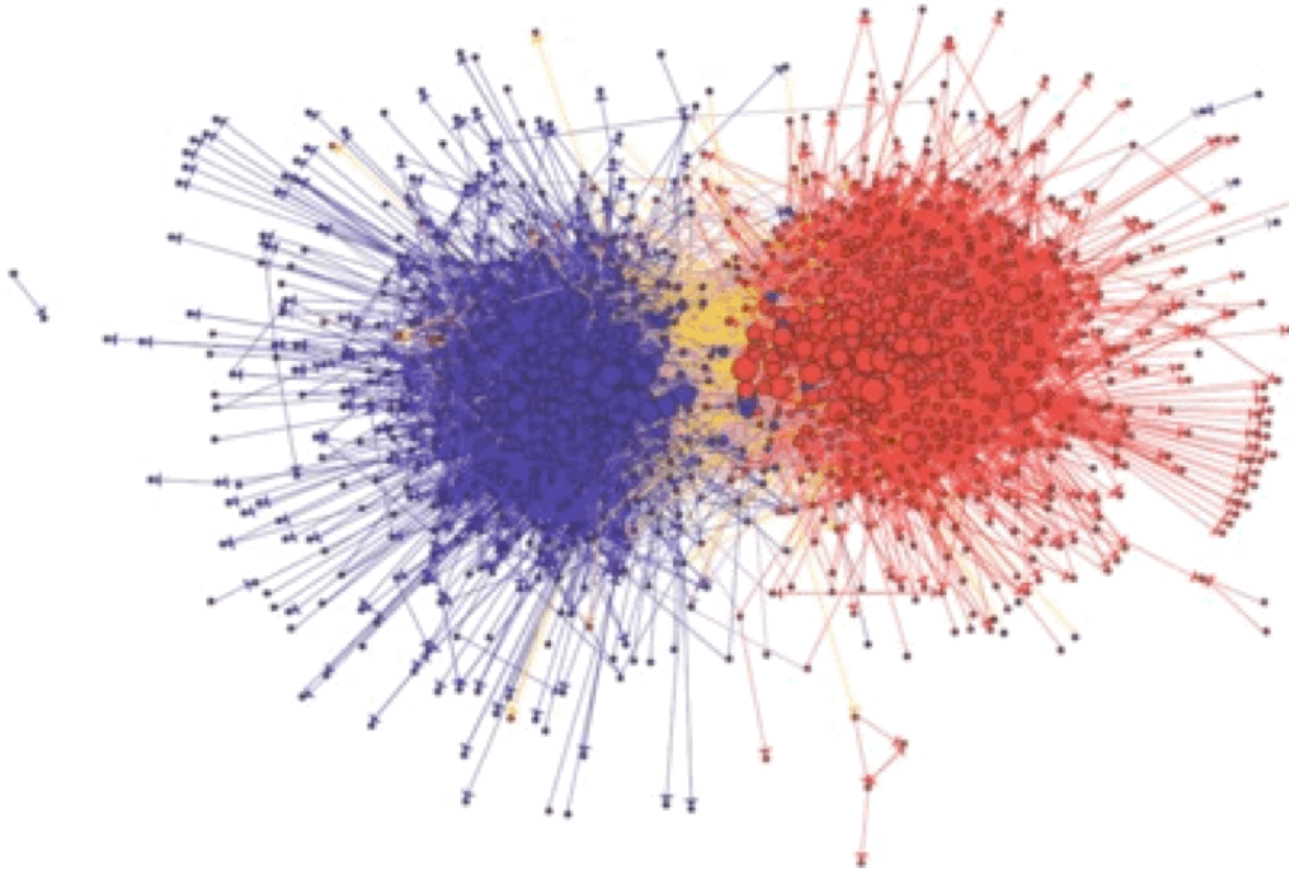
# Low Signal-to-Noise

- About 3-30% of the ideas from open innovation engagements are considered, by the customers, as being high quality

Example	Contributions	Contributors	Notes
Intel Jam	1K	300	160 person-hours summary time
Dell Ideastorm	21K		Implemented ~2% of submitted ideas
New Zealand Police Act revision	30K		Most comments thoughtless, closed site
IBM Web Jam	46K	150K	IBM flew 100 executives to New York to filter ideas; filtering took several weeks
Obama Open to Questions	70K	100K	Shut down due to overload
Google contest	150K	100K	3,000 volunteers & 9 months to filter/sort ideas

*Blohm, I., Köroglu, O., Leimeister, J. M., & Krcmar, H. (2011). Absorptive capacity for open innovation communities-learnings from theory and practice. Proceedings of the Academy of Management Annual Meeting.*

# Balkanization



*Lazer et al. Computational Social Science. Science Vol 323 Feb 6, 2009*

# Shallow Ideation

---

- Ideas are typically generated quickly by single individuals without reference to other submitted ideas
- Users tend to submit lots of simple ideas, instead of a few detailed ones

# The future..

- From hierarchical organizations to Peer structures
  - Artificial Intelligence is the new industrial revolution → extreme capitalism → max productivity
  - Collective Intelligence as a natural movement for changing the structure of power
    - From hierarchies to Peer structure
    - Changes
      - Political: crowd organization might preclude government. Maybe a new socialism
      - Economical: the crowd chooses the projects to get financed
      - Social: from the individual enclosed in itself to people getting together to determine their lives
      - Psychological: individuals get empowered by the crowd; individuals perceiving they can make a change

# Selected Readings

## • Books

- Sunstein, C. R. (2006) *Infotopia: How Many Minds Produce Knowledge*. Oxford University Press
- Shirky, C. (2009) *Here Comes Everybody: The Power of Organizing Without Organizations*.
- Surowiecki, J. (2005) *The Wisdom of Crowds*. Anchor.
- Tapscott, D. & Williams, A. W. (2008) *Wikinomics: How Mass Collaboration Changes Everything*. Portfolio.
- Benkler, Y. (2011) *The Penguin and the Leviathan: How Cooperation Triumphs over Self-Interest*. Crown Business.
- Malone, T. & Bernstein M. S. (2015) *Handbook of Collective Intelligence*, The MIT Press.
- Law, E. & von Ahn, L. (2011) *Human Computation*. Morgan & Claypool Publishers.
- Zittrain, J. L. (2015) *Minds for Sale*. Audible edition.

## • Journals

- Social Media for Organizations. <http://www2.mitre.org/public/jsmo/>
- Human Computation. <http://hcjournal.org/>
- Computer Supported Cooperative Work. <http://www.springer.com/computer/journal/10606>
- Decision Support Systems. <http://www.journals.elsevier.com/decision-support-systems/>
- Human-Computer Studies. <http://www.journals.elsevier.com/international-journal-of-human-computer-studies/>

## • Conferences

- Collective Intelligence
- Computer-Human Interface
- Computer Supported Cooperative Work
- Social Computing
- Weblogs and Social Media

# References

- Bernstein, M., Little, G., Miller, R.C., Hartmann, B., Ackerman, M., Karger, D.R. (2003). BettingPaper. [http://www.unc.edu/~cigar/papers/BettingPaper\\_10Nov2003\\_long2.pdf](http://www.unc.edu/~cigar/papers/BettingPaper_10Nov2003_long2.pdf)\*Burbank, N., Dutta, D., Ashish, G., Lee, D., Marschner, E., and Shivakumar, N. (2011). Widescope - A social platform for serious conversations on the Web. *arXiv preprint arXiv:1111.1958* (2011).
- Cheng, J. and Bernstein, M. (2014). Catalyst: Triggering Collective Action with Thresholds. In *Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing* (CSCW '14). ACM, New York, NY, USA, 1211–1221.
- Cranshaw, J., Schwartz, R., Hong, J. I., and Sadeh, N. (2012). The Livelihoods Project: Utilizing Social Media to Understand the Dynamics of a City. In *Proc. 6th International Conference on Weblogs and Social Media*.
- Crowell, D., and Panovich, K. (2010) Soylent: A Word Processor with a Crowd Inside. In *Proceedings UIST '10*, pp-313-322
- Culliss, G. (2000): The Direct Hit Popularity Engine Technology. A White Paper. [http://web.archive.org/web/20010619013748/www.directhit.com/about/products/technology\\_whitepaper.html](http://web.archive.org/web/20010619013748/www.directhit.com/about/products/technology_whitepaper.html) [10.2.2004]
- Cranshaw, J. and Kittur, A. (2011). "[The polymath project: lessons from a successful online collaboration in mathematics](#)". *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '11)*. New York: ACM. pp. 1865–74
- Hartmann, B., MacDougall, D., Brandt, J., and Klemmer, S.R. (2010). What would other programmers do: suggesting solutions to error messages. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 1019–1028.
- Hellerstein, J.M. and Tennenhouse, D.L. (2011). Searching for Jim Gray: a technical overview. *Communications of the ACM* 54, 7 (July 2011), 77–87.
- Hill, B.M. and Monroy-Hernandez, A. (2013). The cost of collaboration for code and art: Evidence from a remixing community. In *Proceedings of the 2013 conference on Computer supported cooperative work*. ACM, 1035–1046.
- Hill, W.C., Hollan, J.D., Wroblewski, D., and McCandless, T. (1992). Edit wear and read wear. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 3–9.
- Kittur, A., Suh, B., Bryan, A. Pendleton, and Ed H. Chi. (2007). He says, she says: conflict and coordination in Wikipedia. In *Proc. CHI '07*.
- Klein, M. (2011). How to *harvest collective* wisdom on complex issues: The MIT deliberatorium. Cambridge: MIT Center for Collective Intelligence.

# References

- Kriplean, T., Morgan, J.T., Freelon, D., Borning, A., and Bennett, L. (2011a). ConsiderIt: Improving structured public deliberation. In *CHI'11 Extended Abstracts on Human Factors in Computing Systems*. ACM, 1831–1836.
- Kriplean, T., Toomim, M., Morgan, J.T., Borning, A., and Ko, A.J. (2011b). REFLECT: Supporting active listening and grounding on the Web through restatement. *Proc. CSCW11 Horizon* (2011).
- Livne, A., Simmons, M.P., Adar, E., and Adamic, L.A. (2011). The Party Is Over Here: Structure and Content in the 2010 Election.. In *ICWSM*.
- Okolloh, O. (2009). Ushahidi, or 'testimony': Web 2.0 tools for crowdsourcing crisis information. *Participatory Learning and Action* 59, 1 (2009), 65–70.
- Page, S. (2008) *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies*. Princeton University Press.
- Resnick, M., Maloney, J., Monroy-Hernandez, A., Rusk, N., Eastmond, E., Brennan, K., Millner, A., Rosenbaum, E., Silver, J., Silverman, B. (2009.) Scratch: programming for all. *Commun. ACM* 52, 11 (2009), 60–67.
- Sadilek, A., Kautz, H. A., and Silenzio, V. (2012). Modeling Spread of Disease from Social Interactions. In *ICWSM*.
- Singh, P., Lin, T., Mueller, E.T., Lim, G., Perkins, T., and Li Zhu, W. 2002. Open Mind Common Sense: Knowledge acquisition from the general public. *On the Move to Meaningful Internet Systems 2002: CoopIS, DOA, and ODBASE* (2002), 1223–1237.
- Surowiecki, J. (2004). *The wisdom of crowds*. New York: Random House Large Print and Doubleday.
- Vieweg, S., Palen, L., Liu, S.B., Hughes, A.L. & Sutton, J. (2008) Collective Intelligence in Disaster: Examination of the Phenomenon in the Aftermath of the 2007 Virginia Tech Shooting. *Proceedings of the Conference on Information Systems for Crisis Response & Management (ISCRAM)*.
- Von Ahn, L. and Dabbish. L. (2004). Labeling images with a computer game. In *Proceedings CHI '04*. \*Von Ahn, L., Liu, R. and Blum, M. Peekaboom: A Game for Locating Objects in Images. In *ACM Conference on Human Factors in Computing Systems*, CHI 2006. Pages 55-64.
- Zittrain, J. (2009) *Minds for Sale*. <https://www.youtube.com/watch?v=Dw3h-rae3uo>