

# Crowdsourcing: Improving the Quality of Scientific Data Through Social Networking

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Board on Research Data and Information  
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# Questions via Twitter

- Please add #NASCrowd to any tweets
- Any questions not answered here will be addressed later via twitter, @gdphelan
- Copies of this presentation will be posted on LinkedIn and can be accessed searching for “Gregory Phelan”

# How we get our Information.

- The number of people who actively get their news from print media is decreasing.
- In 2010, 24 out of the top 25 newspapers in the United States saw a decrease in circulation.
  - New York Times (-8.5% weekday / -5.2% on Sunday)
  - Chicago Tribune (-9.8% weekday / -7.5% on Sunday)
  - Los Angeles Times (-14.6% weekday / 7.6% on Sunday)
  - USA Today (-13.6% weekday)
  - San Francisco Chronicle (-22.7% weekday)
  - Wall Street Journal (+0.5% when including digital subscriptions)

# Paradigm Shift

- Changes are due to many factors:
  - Changes in business models for newspapers
  - Fewer people are reading newspapers. According to a study conducted by Pew Research Center in 2010 40% of Americans read a newspaper three times a week compared to 52% in 2006.
  - A Pew Project for Excellence in Journalism found in 2010 that more people got their news online and more money was spent for online access versus print subscriptions.

# Historical Approach to Data Sharing

- Research leading to peer review publication.
- Fellow researchers look for relevant information.
  - Go to the library.
  - Request reprints.
  - Electronic access (or lack thereof).
  - Open Source Publications.
  - Other online resources?

# The Evolution of the Internet

- Growth of Social Media
  - Facebook has more than 500 million active users
  - 50% of active users log on daily
  - Average user creates 90 pieces of content per month.
  - 70 different translations with ~70% of users not in the United States.
  - (300,000 Facebook users participated in the translation project through an onsite application.)



# What is Crowdsourcing

- “Crowdsourcing is the act of outsourcing tasks, traditionally performed by an employee or contractor, to an undefined, large group of people or community (a "crowd"), through an open call,” Wikipedia.
- The term is attributed to Jeff Howe in June 2006 from a *Wired* magazine article.

# The collective wisdom of the crowd

- Some early examples of Crowdsourcing
  - I) Longitude prize.
  - II) Human Genome Project.
  - III) Work to identify the cause Severe Acute Respiratory Syndrome (SARS).

# I) Longitude Prize

- Problem: Historically the measurement of longitude at sea was problematic.
- Starting in 1567 monetary rewards were offered to solve the problem.
- The *Académie Royale de Sciences* was founded in 1666 and charged with advancing the science of navigation.
- The Scilly Naval Disaster 1707

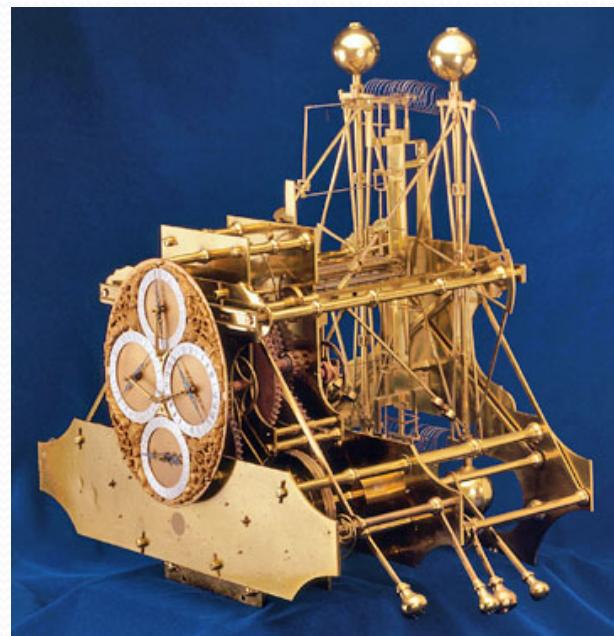
(image from Wikipedia)



## II) Longitude Prize cont.

- Galileo, Halley, Werner, Newton and many other scientists of this age worked on this problem.
- John Harrison a clockmaker and carpenter from England ultimately received the first prize 1737-1765.

- Model of Harrison's H1 timepiece  
(image from NewScientist:NMM)



## II) Human Genome Project

- Work was undertaken in identifying the base pairs of human DNA.
- This work was completed at laboratories as part of publically funded projects in United States, parts of Europe and parts of Asia.
- The project also had impacts on many other areas including intellectual property law.

## III) Severe Acute Respiratory Syndrome

- In 2003 reports of a new respiratory disease had sickened more than 300 Chinese were brought to the attention of the World Health Organization.
- Disease was similar to the flu but no source could be found.
- Eleven research labs around the world were recruited to participate in the effort to identify the SARS virus.
- The formation of this “collaborative multicenter research project” helped the rapid identification, sequencing, and testing of this coronavirus.

# Do you really need a crowd?

- Ultimately this is task defined. If the task is changing a part on your car, a single expert will suffice. More complex challenges also can be solved by individuals.
- According to Scott E. Page at Michigan a diverse group with members that have distinct tools and abilities will exceed the sum of their parts and usually outperform more singular expert entities given the correct challenge.
- It is also important to note that crowds police themselves.

# Researchers and Crowdsourcing

- Many of the above projects may be considered *pro bono publica*.
- There are many businesses that are looking for crowdmembers.
  - Solve a problem or work on a team to solve a problem and receive a benefit.
- There are a growing number of sites that offer to connect researchers with others to share information.

# Business opportunities

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- The basic idea is that a “challenge” is posted and experts or teams of individual experts submit ideas.
- Due to intellectual property concerns true sharing can be limited. Rather than a true crowd, work can be done by individuals operating without influence.
- Payments can range from \$1,000 - \$1,000,000 USD

# Networking of Researchers

- Peer review publication model?
- Unequal access to research exists in this country as well as around the world.
- The business model of peer review journals has adopted the electronic access and corresponding reduction in print copies but access and cost issues still limit who can see and use this research.
- The Digital Divide.

# Networking of Researchers cont.

- Combining the previous points about the trend that more people are using the internet and the rise of social media we see the potential for the improvement to the ways in which the results of research is shared.
- There are no shortage of existing social media, chat rooms, blogs, podcasts, etc... for researchers to participate in.

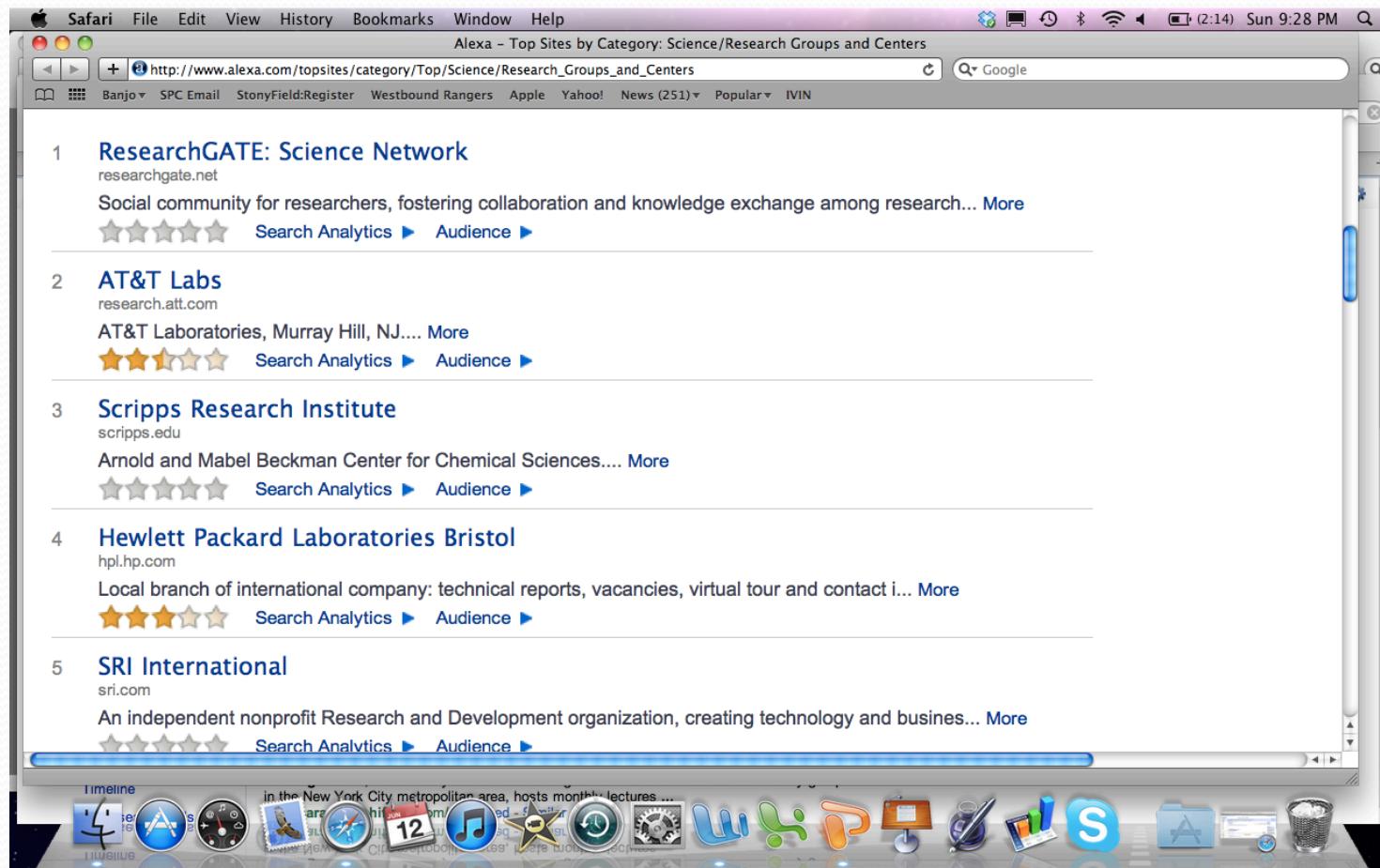
# The Use of Social Networking

- Websites such as ResearchGate, Nature Network, BioMed Experts, Scientists Without Borders, ResearchID, CiteULike are actively looking for ways for researchers to share information/resources and solve problems.
- Interaction is through discussion boards, direct email, online chats, and instant messaging.

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# Alexa ranking of Science/Research Groups and Centers



1 **ResearchGATE: Science Network**  
researchgate.net  
Social community for researchers, fostering collaboration and knowledge exchange among research... [More](#)  
 [Search Analytics](#) ► [Audience](#) ►

2 **AT&T Labs**  
research.att.com  
AT&T Laboratories, Murray Hill, NJ.... [More](#)  
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4 **Hewlett Packard Laboratories Bristol**  
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5 **SRI International**  
sri.com  
An independent nonprofit Research and Development organization, creating technology and busines... [More](#)  
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# ResearchGate Profile

Recent Activity

Social Points

Publications / Patent info

Basic info

Research Interests

Gregory Phelan

State University of New York College at Cortland · Chemistry Physics, Chemistry, Engineering

14 Impact Points 5 Publications 18 Followers 8 Following

Publications

Acceptor compounds useful for making hyperpolarizable organic chromophores

Authors: Nick Baker, Brenden Carlson, Larry Dalton, Todd Ewy, Diyun Huang, Alex Jen, Ti Londergan, Greg Phelan  
Ref. No: 7,507,840  
Year: 2009

Barometric sensitive coatings based upon osmium complexes dissolved in a fluoroacrylic polymer

Authors: Brenden Carlson, John P Bullock, Timothy M Hance, Gregory D Phelan  
Analytical chemistry, 02/2009; 81(1):262–7. (published)

Pressure sensitive paints (PSP) that measure the changes in air pressure have proved to be useful in the design of aircraft and other vehicles. In this study we incorporate highly luminescent... [Show more](#)

Personal Information

Looking for / interested in: Discussion partners

Past advisor(s): Larry Dalton, Martin Gouermann, Harry Frisch

Info Publications Blog

Ch En Py

Academic Degrees Ph.D., M.S., M.Ed., B.S.

Research Keywords Education, Nanotechnology, Entrepreneurship, Nanophotonics, Technology Commercialization, OLED, Analytical Chemistry, Materials Science, Materials Chemistry, Inorganic Chemistry, sensors, Intellectual Property generation, NLO

Research Skills Traditional wet Chemistry lab skills, OLED manufacture,

Current Location Cortland, United States of

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# Noyce Scholars on Facebook

Recent Posts

The screenshot shows the Facebook group page for 'Robert Noyce Scholars'. The page has 176 members. The news feed displays recent posts from group members, including messages from Sara Ashley, Kym Gresham, Steven Brooks, and Kevin Hammond. The right sidebar provides options to add friends to the group, chat with group members, and view group statistics.

176 Group Members

Add info to the group

# Noyce Facebook cont...

Multimedia  
Posts



March 18 at 4:57pm · Like · Comment · Subscribe

**Brendan Noon**  
Science demo of the Day: Simple Harmonic Gummi Bears



**Gummi Bear Physics**  
gdata.youtube.com

We saved big bucks by making our own wave simulator out of skewers and Gummi Bears.  
Learn more at:  
<http://www.sciencewithmnoon.com/>

March 17 at 8:21am · Like · Comment · Subscribe

**Ann Wright-Mockler**  
Noyce Scholars California, Colorado, Maryland, Virginia, Washington (state) or Washington, DC can apply to be a STaR fellow in a paid summer research internship. Early application increases your chance of selection. Deadline for STaR is January 31, 2011. Program dates are June 13 to August 12, 2011. Please share.



**CESaME – Cal Poly > Programs – STAR Program**  
[www.cesame.calpoly.edu](http://www.cesame.calpoly.edu)  
department's description goes here

December 3, 2010 at 1:32pm · Like · Comment · Subscribe

**Ann Wright-Mockler**  
Applications for paid summer research internships for pre-service and new in-service STEM (Science, Technology, Engineering and Mathematics) teachers are being accepted now. Early application increases your chance of selection. Noyce Scholars California, Colorado, Maryland, Virginia, Washington (state) or Washington, DC can also apply as STaR fellows (see additional post).



**PNNL: Science & Engineering Education – DOE Pre-Service Teacher (PST) Internships**  
[science-ed.pnl.gov](http://science-ed.pnl.gov)  
DOE Pre-Service Teacher (PST) Internships

December 3, 2010 at 1:29pm · Like · Comment · Subscribe

**Joan Pasco**  
Is anyone doing research on systemic change in school districts that is being initiated by leadership from classroom teachers? If so, I would love to hear from you.





# The Future

- I) Biopunk movement
- II) Entrepreneurship & Incubators
- III) Crowdsourcing and DARPA

# I) The Biopunks

- A group of do it yourselfers who work in the fields of biological science and use Crowdsourcing to solve problems.
- Using small scale “garage science” these groups have developed inexpensive equipment and testing protocols. OpenPCR sells a PCR machine for \$512

## II) Entrepreneurship & Incubators

- Start-up companies are driving the need for the creation of additional technical laboratory and incubator spaces where research is being done without academic and corporate influence.
- BioCurious Community Lab is fund raising to create an active laboratory space for Biopunks in the Bay Area. In effect, attempting to bring the crowd together to create in-person interactions and growth.

### III) Crowdsourcing and DARPA

- DARPA is sponsoring a project with Local Motors in Phoenix to use Crowdsourcing to design an armored off-road vehicle.



# Armored Off-Road Vehicle

- Using off-the-shelf parts the vehicle was designed and built in a matter of months as opposed to the typical 1-3 year cycle.
- Maintained a live camera and blog site where anyone could add comments.

# Challenges

- Who gets credit for the “invention” or innovation can be challenging in some cases.
- What incentives are there for academic researchers?
- What incentives are there for corporate researchers?
- Who owns the intellectual property that is generated?



# What is needed for wider participation?

- A global crisis?
- Better cash prizes?
- More success stories?



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