



# Applying Crowdsourcing Methods in Social Science Research

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# Organization of this Presentation

- Definition of Crowdsourcing
- How RTI uses crowdsourcing
  - Open Innovation
  - Targeted Data Collection
  - Sentiment Analysis
- Emerging Best Practices
- Conclusion

# Selected Definitions of Crowdsourcing

- Seminal article by Jeff Howe, called *The Rise of Crowdsourcing*, was published in Wired Magazine in 2006.
  - Outsourcing tasks to a large number of people.
  - “It’s not outsourcing, it’s crowdsourcing.”
- Steve King described it as “tapping into the collective intelligence of the public to complete a task.” (King 2009)
- “A type of participative online activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task.” (Estellés-Arolas 2012)

# Definitions of Crowdsourcing



Image Source: <http://www.auburn.edu/~cnl0004/leydeBeginningLiteracy.htm>

- Vague definitions make it difficult for researchers to conceptualize how one might use crowdsourcing methods.
- Our goal is to help to everyone get a better picture of how crowdsourcing can be used to make our research better.

# Defining through Application

- Currently we apply crowdsourcing in three primary ways.
  - **Open Innovation** – challenges that encourage public participation in research and lower barriers to entry.
  - **Data Collection** – collect targeted datasets at low cost to supplement and add depth to traditional survey research data.
  - **Analysis** – use humans to do sentiment analysis of social media data.
- This field is rapidly evolving and new applications and opportunities emerge regularly.

# Open Innovation

# Open Innovation

- **The Goal:** Lower or eliminate barriers to entry in research.
  - Use open innovation in the research design process.
  - Challenge all members of research communities to contribute to idea generation and research solutions.
- Diversify your perspectives on research.
  - Experts are smart, but they do not always have the answers.
  - You may discover an idea you never would have thought of.
- Position yourself for better outcomes.

# Open Innovation Case Study

## ■ RTI 2012 Research Challenge

- Collaborated with a data collection team planning an omnibus survey in Chicago.
- Asked researchers from a variety of subject areas to contribute to the survey.
  - Two page synopsis of your idea
  - Up to 10 survey questions
- 23 days to submit proposals.
- Received 76 entries.
- Broad range of topics:
  - Emerging tobacco products
  - Testing astrological theories
  - Perceptions of law enforcement





# Judging



(for research)

# Judging

- Judges had no idea who wrote the research proposals.
- They only discussed the quality of the research ideas and survey questions.
- Scored based upon evaluation criteria in the rules.
  - Quality of research idea
  - Quality of survey questions
  - Relevance to Chicago
- Methodically narrowed down entries.
- Eventually they selected nine winners.



# Best Practices in Open Innovation

- Hash out very detailed legal terms and conditions.
  - Legitimize your challenge.
  - Protect participants and legally state that you will not “steal” their ideas if they do not win.
  - Protect your agency or organization from unforeseen events.
    - Change in survey methodology
    - Delays in the schedule
- If possible, try to keep the barriers to entry low.
  - Make challenges accessible to as many people as possible.
  - Entry into a challenge should be easy and intuitive.
- Be creative with your incentives.
  - Data is very valuable in our field.
  - Getting work in front of an expert in the field will motivate.

# Data Collection

# Crowdsourcing Data Collection

- Currently crowdsourcing is not a cheap replacement for traditional survey research.
  - You have a convenience sample on your hands.
  - You cannot generalize your results.
- Be pragmatic and think beyond traditional survey data.
- Ask yourself the question, “Are there supplemental datasets that will add depth to my research?”

## Case Study: Snus Data Collection

- One of the 2012 Research Challenge winners focused on perceptions of snus tobacco.
- Demand side dynamics are very good to know, but...
- What about the local supply side dynamics?
- We used Amazon Mechanical Turk to answer this question.



Image source: <http://cphpost.dk/sites/default/files/styles/400x300/public/snus.jpg>



Image source: [http://farm8.staticflickr.com/7167/6770909597\\_fdd939f6f5\\_z.jpg](http://farm8.staticflickr.com/7167/6770909597_fdd939f6f5_z.jpg)

# What is Amazon Mechanical Turk?

- Microtask workforce
- Many jobs are still done better by humans than computers
- Scale your workforce up and down in a matter of seconds.
- It is *really* fast.
  - 2,000 jobs in a few hours

## 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:**

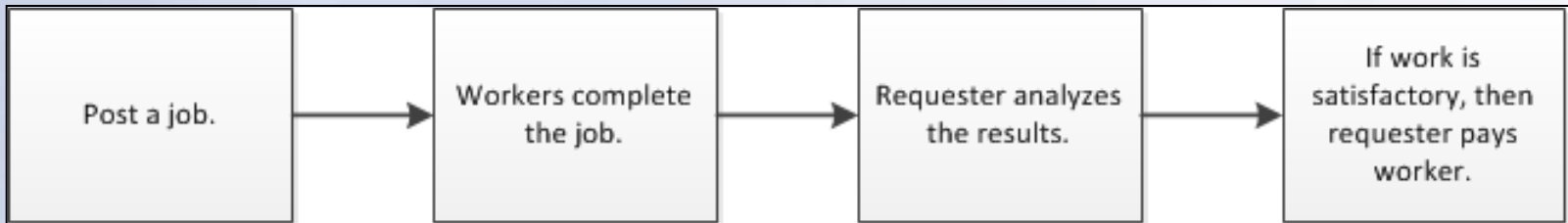
- Have access to a global, on-demand, 24 x 7 workforce
- Get thousands of HITs completed in minutes
- Pay only when you're satisfied with the results

**Fund your account**      **Load your tasks**      **Get results**

[Get Started](#)

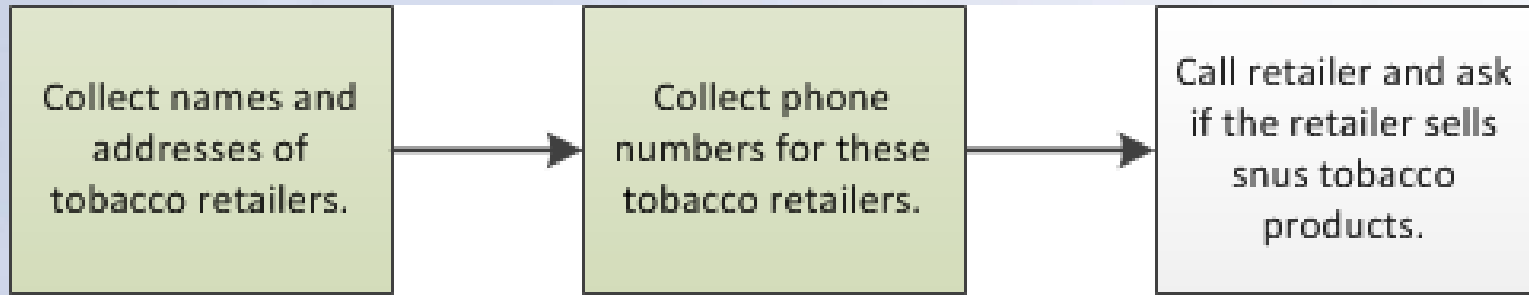


# How Amazon Mechanical Turk Works



1. Design your HIT template.
2. Set your payment level.
3. Launch your HITs.
4. Review data results.
5. Approve good work for payment, reject work that is unsatisfactory work.

## Data Collection Process: Steps 1 and 2



- Remember, these are microtasks.
- Not everything gets done in one step.
- There is a skill to breaking down complex jobs into small tasks.

# Data Collection Process

- Obtained public list of Chicago tobacco retailers.
- List did not contain retailer phone numbers.
- Used Mechanical Turk workers to look up phone numbers.

## Find the Phone Number for this Retailer

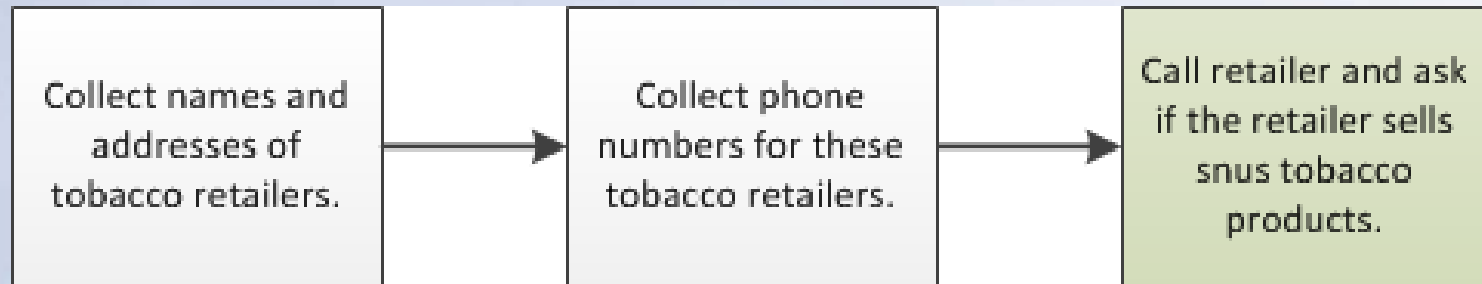
- For this retailer below, enter the phone number for the retailer.
- Include the full phone number with area code, e.g. 123-456-7890
- Use this phone number format, including dashes: 123-456-7890 (no parentheses, please!)
- Include direct phone numbers to the specific retail location, not to corporate headquarters. For example, find the phone number for a specific CVS store, not for CVS headquarters.

Retailer Name: **S{name}**

Address: **S{address}**

Phone Number:

## Data Collection Process: Step 3



# Data Collection Process

- Mechanical Turk workers called retailers to ask if they sold snus.
- Answered yes or no to the question.

## Find out if this retailer sells Snus

- For this retailer below, call the phone number to find out if the location sells a tobacco product called **snus**
- **Snus** is pronounced '**snoose**,' similar to the word 'goose.'
- Snus is a smokless tobacco product, and it is commonly an alternative to dip and traditional "chewing" tobacco.
- Answer yes or no to the question below.

Retailer Name: **S{name}**

Retailer Address: **S{address}**

Phone Number: **S{phone}**

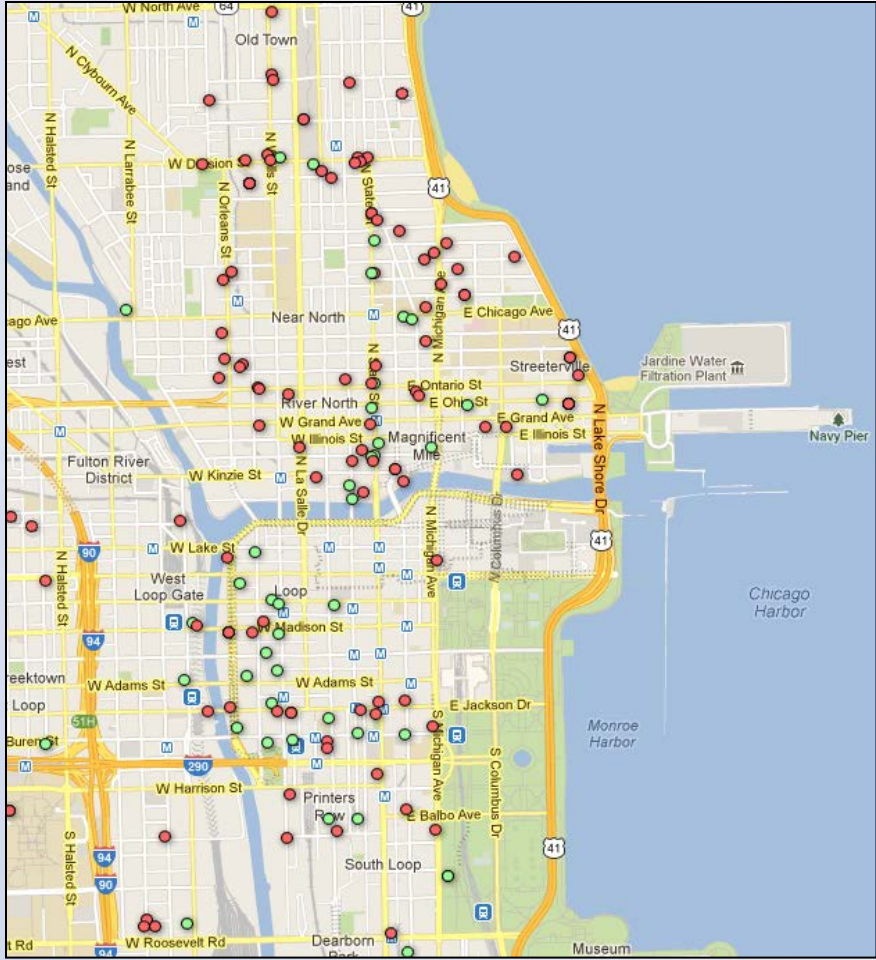
**Does this retailer sell snus (yes or no)?**

This work is for a research study.

Case ID: **S{id}**

Submit

# Visualizing the Results



**Green dot:** There is snus

**Red dot:** No snus

# Emerging Best Practices: Data Quality

- You need to have data quality procedures in place before you undertake this type of data collection.
- Many Mechanical Turk workers are honest, but there is falsification and there are bots.
- Risk mitigation strategies:
  - Raise worker qualifications.
    - Minimum approval ratings
    - Number of HIT's completed
  - Multiple workers need to do the same case.
  - Embed dummy cases to catch falsification.
  - Analyze overall agreement statistics of workers.
- Have your team members complete a few of the cases, and check for agreement with workers.

# Emerging Best Practices: Worker Payment

- Everybody loves to be efficient.
- Crowdsourcing should not be a race to the bottom.
- Pay people appropriately!
- Quick way to figure out payment levels:
  - On average, how long does it take to complete your task?
  - How much were you planning to pay per HIT?
  - Calculate the equivalent hourly wage.
- We are not in the business of virtual sweatshops.
- Do higher payment levels increase the chances that people will try to falsify?
  - Sometimes, and that is why data quality procedures are so important.



## Potential OMB Implications

- Our case study had more than 9 cases with same instrument and data collection task.
- We would need to apply for OMB clearance.
- Could attempt to get a generic clearance for supplemental data collection methods.
  - Faster review of specific applications.
- Targeted data collection was not considered to be human subjects research by RTI's IRB.

# Sentiment Analysis

# Sentiment Analysis

- Analysis of social media data is growing.
- Text analytics software is getting better, but it still has some problems.
  - Cannot always detect sarcasm.
  - Does not always understand slang.
- Humans are still the best at language processing.
- How do we deal with large amounts of social media data?
  - Mechanical Turk has a sentiment app and categorization app
  - Ask workers to code Tweets.
  - Get it done quickly.

## Emerging Best Practices: Sentiment Analysis

- Generally, we have found high reliability between Mechanical Turk coding and internal coding.
- Some topics are better for external coding than others.
  - Sentiment of Chocolate ice cream is easy.
  - Sentiment on specific parts of the Affordable Care Act will be more challenging.
- Your instructions must be clear and in layman's terms.
- Have at least 5 people code the sentiment of Tweets.
- Best practices are similar to targeted data collection
  - Data quality procedures
  - Adequately pay workers

## There Is More...

- The examples in this presentation do not encompass all the applications.
- **Hybrid Applications**
  - University of Pennsylvania MyHeartMap Challenge
  - Census Mail Return Rates Challenge
- Be creative when you consider how crowdsourcing might help to improve your research.

## In Conclusion

- Definitions of crowdsourcing are still vague, making it difficult for many researchers to think of ways to constructively use crowdsourcing in their work.
- Crowdsourcing can enhance all parts of the research process.
  - **Open Innovation** – Design
  - **Targeted Data Collection** – Implementation
  - **Sentiment Analysis** – Analysis
- In this field, peer reviewed literature is still very thin.
- We believe that defining crowdsourcing through specific application lays a foundation for best practices and a methodological framework future implementations.

## More Information

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