Open Science and Citizen Science

Prof. Milena Dobreva,
Prof.Alan Deidun

Open access is only one aspect…

- A whole suite of open concepts:
  - Open access
  - Open science
    (check this video
    https://www.youtube.com/watch?v=0GbXjWLKqG0)
  - Open data
  - Open methodologies

In a nutshell…

- Change in research: from 'standing on the shoulders of giants' to 'picking the brains' of these giants
- *But who is really interested to 'pick the brains'?*
- Strengths and challenges
- Citizen science

One historical example

- In July 1857 the 'Unregistered Words Committee' of the Philological Society of London issued a circular asking for volunteers to read particular books and copy out quotations illustrating 'unregistered' words and. The volume of the "unregistered" material was such that in January 1858, The Philological Society decided that "efforts should be directed toward the compilation of a complete dictionary, and one of unprecedented comprehensiveness." It took a while, but in April 1879, the newly-appointed editor James Murray issued a new appeal to the public, asking for volunteers to read specific books in search of quotations to be included in the future dictionary. Within a year there were close to 800 volunteers and over the next three years, 3,500,000 quotation slips were received and processed by the OED team.

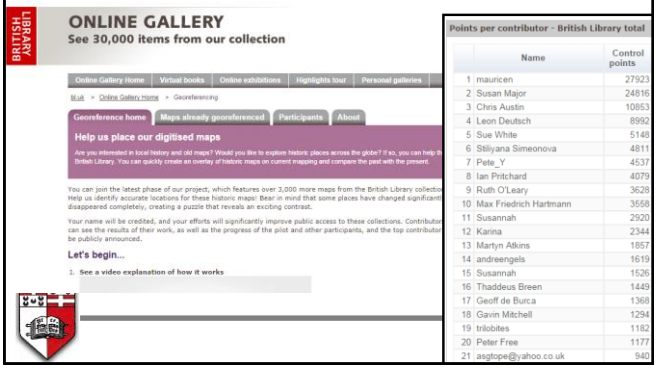
Sir James Murray before 1910 in the Scriptorium, Banbury Road

4

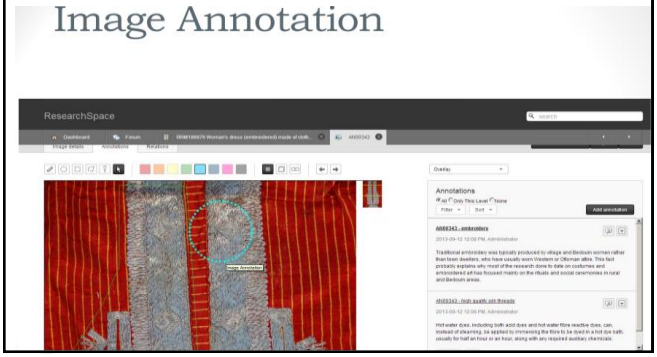
From Ireland: Letters of 1916

5

The British Library: Georeferencing historical maps



ResearchSpace (British Museum)



Some findings from previous research

- The inclusion of the citizen in research studies contributed to a rise in interest in the area. When the data of a research is made public, the citizens are encouraged to interpret and study this data in order to come to their own conclusions. This is one of the most educational features of citizen science.
- Citizen science is a good way to get cheap or free labour, skills and computation power. This could also potentially be a source of finance.
- This kind of research is the best way for citizens to understand and appreciate science. (They also get to see how their tax money is being utilized)

8

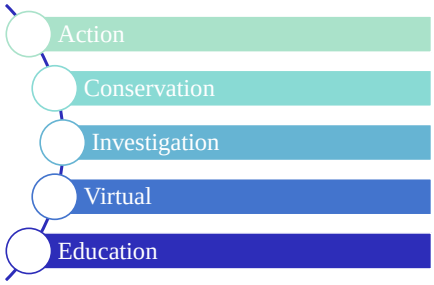
Typical goals of projects

- Data appropriate for specific purposes (2)
- "Scientific literacy"
- "Get people outdoors and enjoying nature"
- "Get the public thinking about the process of biological evolution"
- "Spread ideas through a social network"
- "Positive youth development"
- "Enhance and support local volunteer programs"
- "Greater involvement in science, enhanced connection and feeling of ownership of environment"
- "Good science with no agendas to contaminate the findings"

9

Typology of citizen science

- Andrea Wiggins, Kevin Crowston



10

Tasks aligned with models of citizen

.

Stage of Inquiry	Contributory	Collaborative	Co-created
Define question			■
Gather information			■
Develop hypotheses			■
Design study		☒	■
Data collection	■	■	■
Analyze samples		■	■
Analyze data	☒	■	■
Interpret data		☒	■
Draw conclusions		☒	■
Disseminate results	☒	☒	■
Discuss results & ask new questions			■

TABLE II
THREE PARTICIPATORY SCIENCE MODELS (FROM [23]).
■ = PUBLIC INCLUDED; ☒ = PUBLIC SOMETIMES INCLUDED.

11

Summary of use of technological tools: TECHNOLOGY USED

- New or additional data analysis tools (6)
- Smartphone/mobile apps (8)
- New or improved websites (9)
- Video for training (3)
- Online data entry
- Facebook accounts (2)
- Mapping capabilities (2)
- Database improvements (2)
- Support materials (2)
- None (4)

12

Summary of use of technological tools: FUTURE TECHNOLOGIES

- Mobile applications for data entry (7)
- Real-time, interactive, and dynamic data visualizations (4)
- Animated and interactive maps (3)
- Use of GPS units by most participants
- Decision-support recommendations for management activities
- Google Earth/3D technology
- Complete revision of project database, website, and data entry application
- Web-based analysis tools for digital photos

- Observation: 63
- Species identification: 50
- Classification or tagging: 16
- Data entry: 58
- Finding entities (in images or natural habitats): 22
- Measurement: 31
- Specimen/sample collection: 21
- Sample analysis: 14
- Site selection and/or description: 27
- Geolocation: 19
- Photography: 25
- Data analysis: 22

Additional activities

- Posing new questions, lit reviews, paper writing, etc.
- Videography
- Monitoring
- Insect rearing
- Organization and landowner coordination
- Identifying animal tracks
- Manual labor, habitat construction, shell recycling
- Creating maps
- Communication with other participants and scientists
- Sharing observations and findings at meetings of related groups

Project outcomes: intended vs actual

- Data sets: 56
- Data analysis: 46
- Academic publications : 43
- Technical reports: 25
- New discoveries: 31
- New research methods: 17
- New inquiry: 21
- Policy changes: 21
- Community action: 38
- Environmental restoration: 23
- Individual learning: 47

- Data sets: 48
- Data analysis: 40
- Academic publications and presentations: 33
- Technical reports: 21
- New discoveries: 22
- New research methods: 11
- New inquiry: 14
- Policy changes: 11
- Community action: 26
- Environmental restoration: 17
- Individual learning: 42

Data ownership

- No policy: 11
- Currently developing policy: 4
- Researchers own the data: 15
- Project contributors own the data: 13
- Third party owns the data: 1
- Public owns the data: 23
- Not sure/don't know: 6

Citizen science: where? (applied vs pure/basic research)

Quest for fundamental understanding?	Yes	Pure basic research (**Bohr**)	Use-inspired basic research (**Pasteur**)
	No	–	Pure applied research (**Edison**)
		No	Yes
		Considerations of use?	

Some challenges

- Matching projects and people
  - Competitiveness for people? (e.g. 800 000 people are estimated to participate in the Zooniverse platform)
- Division of labour and integration of contributions (contribution, collaboration, cocreation)
- Trust in citizens' contributions
- Motivation and its fluctuations
- What do the citizens gain (in terms of "scientific literacy")
- Practical issues: how/what domains are addressed in citizen science projects; issues of quality and quantity of research output; data ownership and data interoperability still not sufficiently addressed

Group task

- Discuss a scenario
  - Cultural heritage
  - Bird monitoring
  - Pollution monitoring
- Report back

Scenario: cultural heritage

A cultural heritage institution is embarking on a citizen science project which aims to add descriptions of objects and provide stories related to the digital collection of the institution. Please discuss:

- How citizen scientists will be recruited?
- What would be their tasks?
- What technological tools would be necessary to support them?
- How are citizens going to access relevant academic publications?
- Who will be responsible for the quality of the outcome?
- Who will have the copyright on the data gathered by citizens?

Scenario: bird monitoring

An environmental non-governmental organisation is launching a citizen science project which aims to gather data on birds and the geographic coordinates where they have been noticed. Please discuss:

- How citizen scientists will be recruited?
- What would be their tasks?
- What technological tools would be necessary to support them?
- How are citizens going to access relevant academic publications?
- Who will be responsible for the quality of the outcome?
- Who will have the copyright on the data gathered by citizens?

Scenario: measuring pollution

A local authority is planning to launch a citizen science project which aims to gather regularly data on the air pollution in the locality. Please discuss:

- How citizen scientists will be recruited?
- What would be their tasks?
- What technological tools would be necessary to support them?
- How are citizens going to access relevant academic publications?
- Who will be responsible for the quality of the outcome?
- Who will have the copyright on the data gathered by citizens?

References

1. European Commission; Green Paper on Citizen Science (2013). Available on: http://www.socientize.eu/sites/default/files/Green%20Paper%20on%20Citizen%20Science%202013.pdf
2. Franzoni, C., H.Sauermann (2014) Crowd Science: The Organization of Scientific Research in Open Collaborative Projects. Research Policy, 2014, Vol. 43 (1), pp. 1-20.
3. Wiggins, A., K. Crowston. (2012). Describing Public Participation in Scientific Research, iConference 2012 Toronto, Ontario, Canada. Available: http://crowston.syr.edu/system/files/iConference2012.pdf