Citizen Science: Design and Engagement

Citizen Science as a New Way to do Science

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This is me

Social scientist (sociology and information science)

- Currently I study how citizens use **Games with a Purpose (GWAPs)** to solve scientific problems and contribute to social causes. Some of these games aim at integrating what humans and computers, respectively, can do well. In this respect, I have an interest in **human computation** and the design of cooperative human-machine systems. However, my focus is not restricted to games and I am interested in the use of digital technologies to support citizen science and processes of co-creation.

Some Vignettes

*“In the deep jungle a group of pygmies out for a hunt stop and gather around the shattered remains of trees strewn across the jungle floor. One of the hunters pulls out a small GPS device and marks the spot. Thousands of miles away in an office at University College London a researcher adds the coordinates to an online map of the Congo already speckled with reported signs of illegal logging activity. Across the Atlantic, in Seattle, a teenager plays a computer game carefully manipulating the branch like shapes of proteins watching her score rise and fall as she optimizes their configurations. Across town, researchers at the University of Washington harness her folding skills to identify protein configurations that might help them synthesize more effective drugs to fight AIDS, cancer, or Alzheimer’s”
(Wynn, 2017).*

What is Citizen Science?

- Collaboration between citizens and professional scientists

Projects that involve citizens often continue over longer periods and have a larger scale and scope than professional scientists could typically achieve alone, because of the short-term nature of scientific research funding.

What's new?
Not the idea:

Darwin was an
ordinary citizen

Different forms of collaboration

Shirk et al.'s
Taxonomy
(2012):

	<i>Contributory</i>	<i>Collaborative</i>	<i>Co-created</i>
Stage of Inquiry			
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.

What's new? Technologies are:

- low-cost sensors (example to monitor air quality)
- smart-phones (share and annotate pictures of flora and fauna) and tablets
- untapped computing power in laptops (BOINC, <https://boinc.berkeley.edu/>)
- drones
- games

Use of technologies in citizen science – Some examples

Robotic telescope/Mobile technologies

star classification
(Galaxy Zoo)

Game

protein folding
(Foldit)
malaria parasite
detection (Malaria
Spot)

Tools for
visualization

visualize and
analyze light
measurements
(MySkyatNight)

Power Law

Sauermann &
Franzoni
(2014):

Most participants contribute only once and with little effort, leaving the top **10%** of contributors responsible for almost **80%** of total classifications.

Two pillars:

- Openness
- Participation

**Openness and participation
can be tied into CS to
reimagine what it means to
take science outside of a lab**

Openness can:

Warning:
**Conditions for broad
participations in
designing projects are
as important as creating
artifacts themselves**

Public Participation as Contested Concept (Gallie, 1956)

Five fundamental aspects of PD

(Halskov & Hansen, 2012)

Aspect	Description
Politics	People who are affected by a decision should have an opportunity to influence it
People	People play critical roles in design by being experts in their own lives
Context	The use of “situation” is the fundamental starting point for the design process
Methods	Methods are means for participants to gain influence in design processes
Product	The goal of participation is to design alternatives, improving quality of life

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Thank you.
Keep in
touch.

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