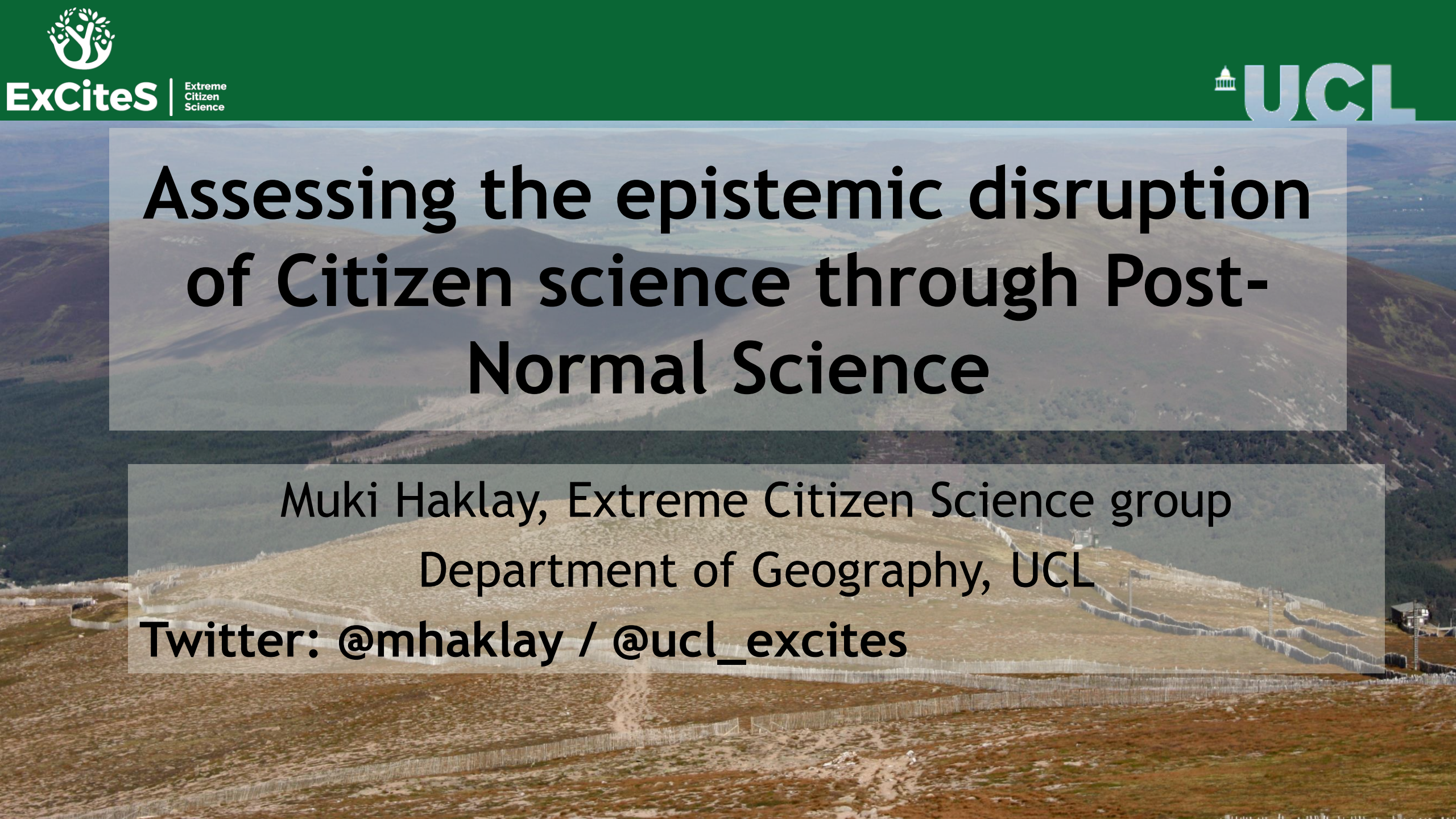

Assessing the epistemic disruption of Citizen science through Post-Normal Science

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Department of Geography, UCL
Twitter: @mhaklay / @ucl_excites

Synopsis

- Post-Normal Science
- Typologies of citizen science and PNS
- Mapping typologies
- Insights
- Trajectories and the epistemic disruption of citizen science

Citizen science & Post-normal science

citizen science & STS

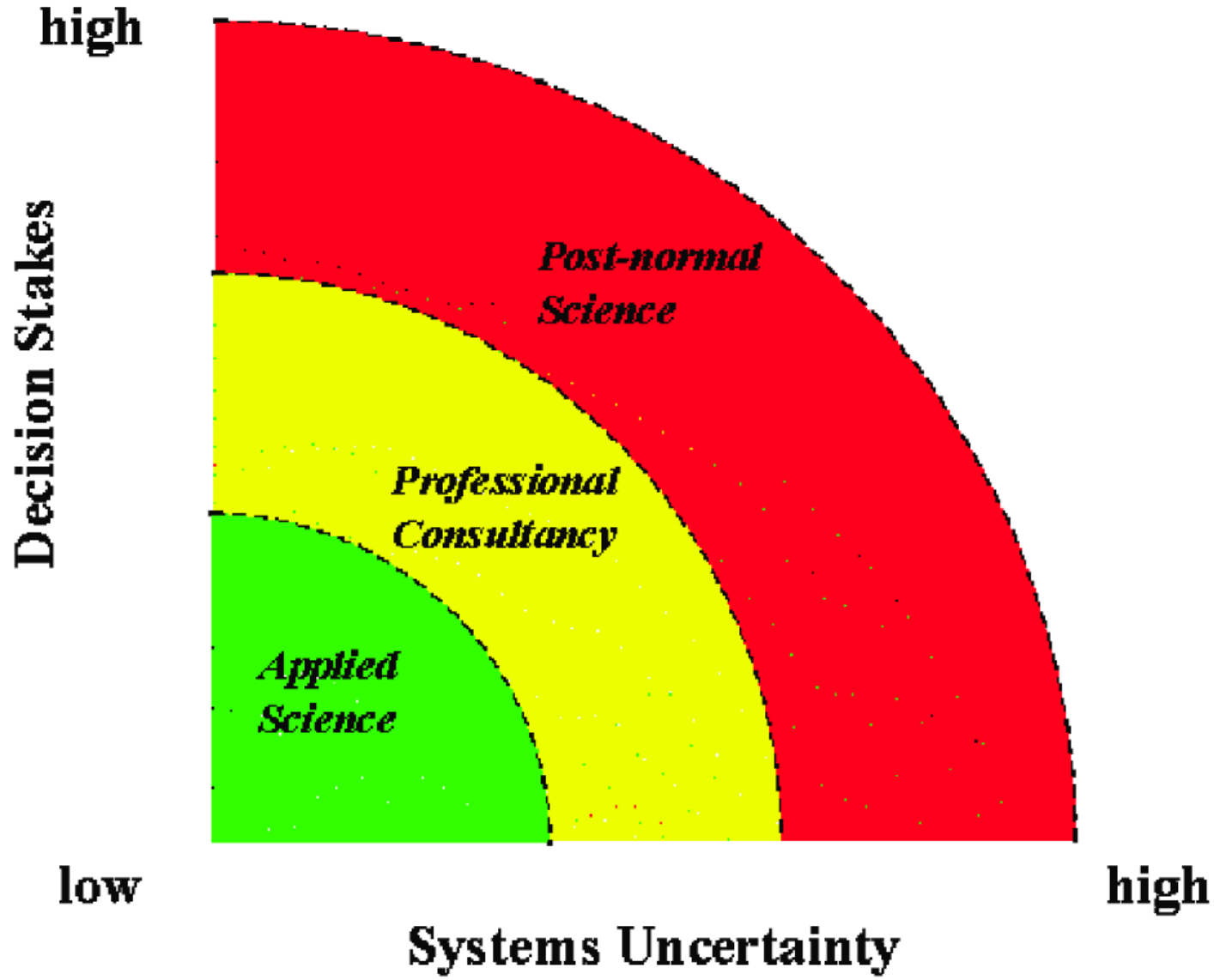
Post-normal science

- Developed by Silvio Funtowicz and Jerome Ravetz in the 1990s.
- Aimed at addressing science-policy interactions and highlights the complex and increasingly controversial role that science has to play in public life when dealing with problem that are common today
- This is a reflective approach that tries to address aspects that are normally left out of ‘normal’ science such when:

“Facts are uncertain, values in dispute, stakes are high, and decisions are urgent“

By Saltean - Own work, CC BY-SA 4.0

Decision stakes and uncertainty



Extended-peer communities

- “[It] consisting not merely of persons with some form or other of institutional accreditation, but rather of all those with a desire to participate in the resolution of the issue”. p.7
- Extending the peer review progress of science towards the public.
- Methods such as citizens’ juries, focus groups, consensus conferences.

Citizen science – Typologies & Mapping

citizen science & STS

Citizen Science

Long running Citizen Science

- Ecology & biodiversity
- Meteorology
- Archaeology

Citizen Cyberscience

- Volunteer computing
- Volunteer thinking
- Passive Sensing

Community Science

- Participatory sensing
- DIY Science
- Civic Science

Haklay, Mazumdar & Wardlaw, 2018, Citizen Science for Observing and Understanding the Earth, *Earth Observation, Open Science, and Innovation*

Wiggins & Crowston 2011 - primary goals and physical environment

- **Action oriented** - encourage participant intervention in local concerns, using scientific research as a tool to support civic agendas.
- **Conservation-** support stewardship and natural resource management goals, primarily in the area of ecology.
- **Investigation** - focused on scientific research goals requiring data collection from the physical environment.
- **Virtual** - all project activities are ICT-mediated with no physical elements whatsoever.
- **Education** - education and outreach primary goals, all of which include relevant aspects of place.

Shirk et al. 2012 - 5 Cs classification

- **Contractual** - communities ask professional researchers to conduct a specific scientific investigation and report on the results;
- **Contributory** - generally designed by scientists and members of the public primarily contribute data;
- **Collaborative** - generally designed by scientists and members of the public contribute data, refine project design, analyse data, disseminate findings;
- **Co-Created -** designed by scientists and members of the public working together, some of the public participants are actively involved in most aspects of the research process; and
- **Collegial** - non-credentialed individuals conduct research independently with varying degrees of expected recognition by institutionalised science.

des of Citizen Science

Mode 4 ‘Extreme’

- Collaborative Science – problem definition, data collection and analysis

Mode 3 ‘Participatory science’

- Participation in problem definition and data collection

Mode 2 ‘Distributed Intelligence’

- Citizens as basic interpreters

Mode 1 ‘Crowdsourcing’

- Citizens as sensors

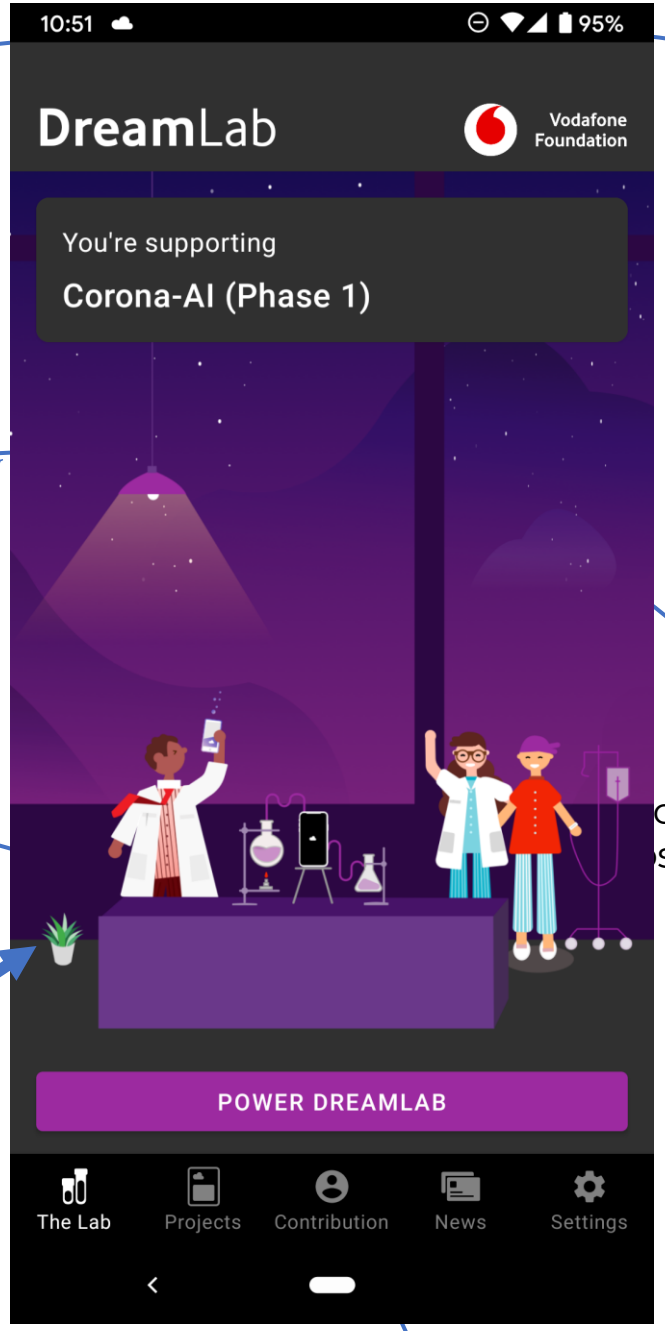
Post-Normal Science

Professional consultancy

Applied science

Decision stakes

Uncertainty



Volunteer computing

Community/Civic science

cological servations

DIY science

Self quant

Shirk et al. 2012

Haklay 2013

Haklay et al. 2018

Wiggins & Crowston 2011

Post-Normal Science

Professional consultancy

Applied science

Decision stakes

Uncertainty

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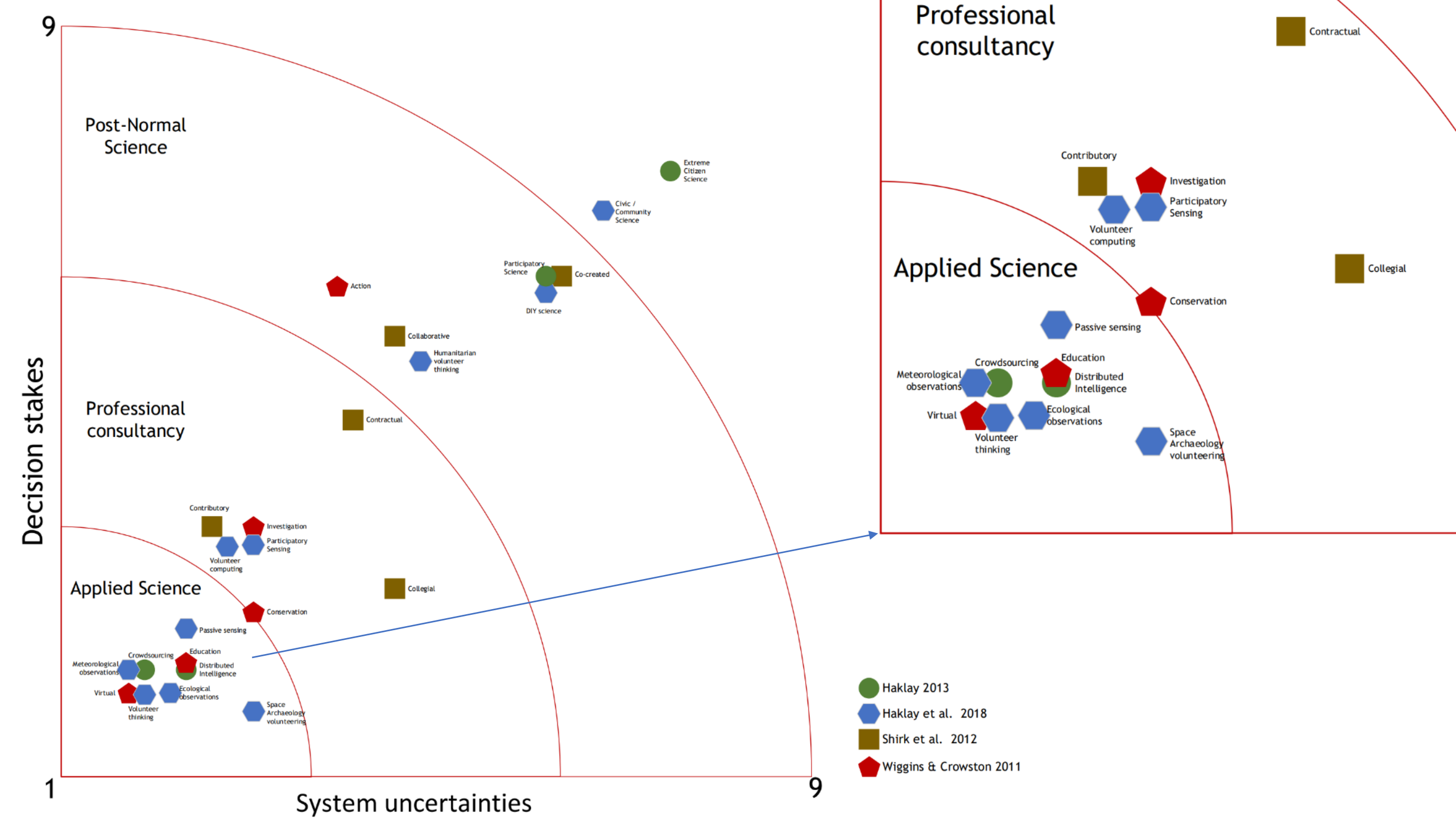
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Post-Normal Science
Professional consultancy
Applied Science
Decision stakes
1
9
System uncertainties
Extreme Citizen Science
Civic / Community Science
Participatory Science
Co-created
DIY science
Action
Collaborative
Humanitarian volunteer thinking
Contractual
Collegial
Contributory
Investigation
Participatory Sensing
Volunteer computing
Conservation
Passive sensing
Crowdsourcing
Education
Meteorological observations
Distributed Intelligence
Virtual
Ecological observations
Volunteer thinking
Space Archaeology volunteering
Professional consultancy
Contractual
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Volunteer thinking
Space Archaeology volunteering
Haklay 2013
Haklay et al. 2018
Shirk et al. 2012
Wiggins & Crowston 2011

Observations

- A lot (maybe most) citizen science activities are within the realm of normal science
- In terms of number of projects and participants, most are in the lower uncertainty and stakes, maybe due to the conceptual/organisational/status challenges from the project owner point of view
- Within the normal science, the democratisation is in the “who is allowed” and to a very limited degree in “how”, so not challenging ontology and methodology.

Citizen science, PNS & trajectories

citizen science & STS

Decision stakes

Urban air quality
1960s

Uncertainty

Decision stakes

Urban air quality
1970s

Urban air quality
1960s

Uncertainty

The New York Times

NEW YORK, THURSDAY, APRIL 23, 1970

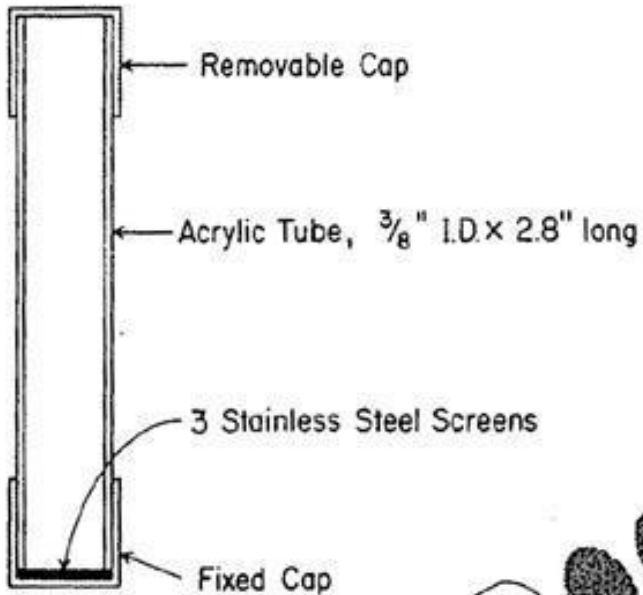
Millions Join Earth Day Observances Across the Nation

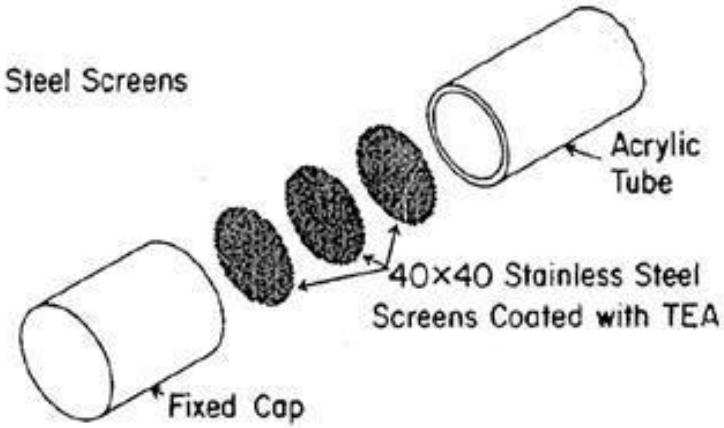
Decision stakes

Urban air quality
1970s

Urban air quality
1980s

Urban air quality
1960s





Uncertainty

Decision stakes

Urban air quality
1980s

Urban air quality
2000s

Urban air quality
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Uncertainty

Urban air quality
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Urban air quality
1980s

Urban air quality
Citizen Science

Urban air quality
2000s

Urban air quality
1990s

Urban air quality
1960s

Decision stakes

Uncertainty

Conclusions

- **Practical aspects of your work** - which method of CS is useful for each problem-solving strategy zone
- **Challenges at the intersection between STS and CS** –

  concepts such as extended peer community are more fuzzy and assumptions about them are lacking reliance on empirical data

  trajectories analysis points to an epistemic disruption power of citizen science, which can explains the reluctance of scientists to allow it in