Environmental Virtual Observatories for Connective Action (EVOCA)

RESPONSIBLE LIFE-SCIENCE INNOVATION IN THE DIGITAL AGE

Citizen Science and More
EVOCA's Theoretical Framework

Katarzyna Cieslik
Postdoctoral Fellow
kcieslik@ulb.ac.be

and the EVOCA WUR team

Wageningen University
SSG – CPT – KTI

WAGENINGEN UR
For quality of life

Overview

1. Citizen science from scientist citizen to citizen scientists

2. Evolution/revolution – increasing degrees of participation

3. First generation, second generation and EVO-CA
    - The social science component
    - Addressing complex problems
    - What is connective action?

4. How do we want to do this?
    - Coupled and de-coupled ecologies
    - Action research
    - Responsible innovation in the digital age

5. Challenges and prospects ahead
    - Social science epistemology

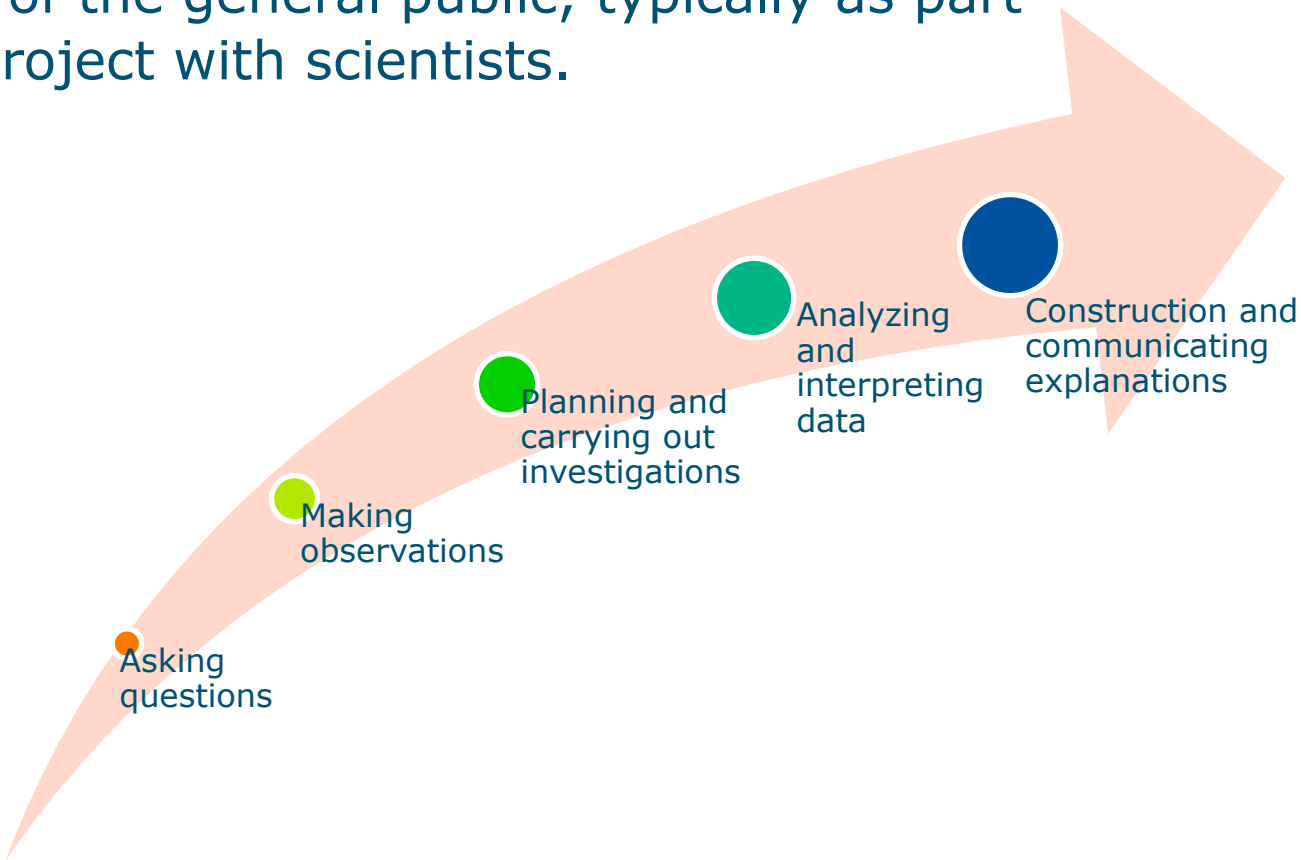
Scientists as Citizens, Citizens as Scientists

CITIZEN SCIENCE AND EVOS – ORIGINS AND FUTURE DIRECTIONS

What is Citizen Science?

Citizen Science:

The collection and analysis of data relating to natural world by members of the general public, typically as part of a collaborative project with scientists.



WAGENINGEN UR
For quality of life

Citizen science around the world

EarthCube

eBird

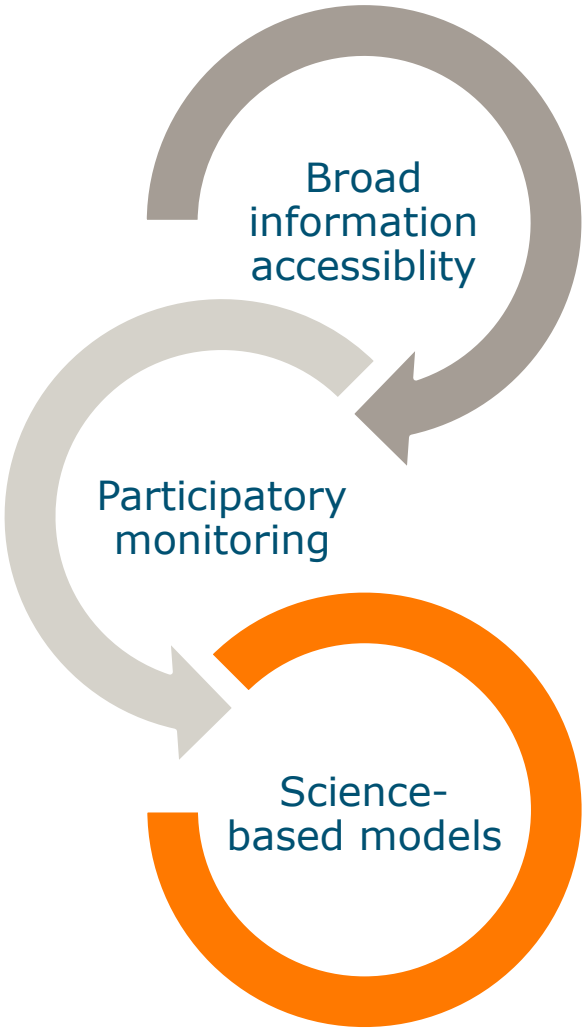
HealthMap
Global Health, Local Information

RapidPro

EVO
Environmental
Virtual
Observatory

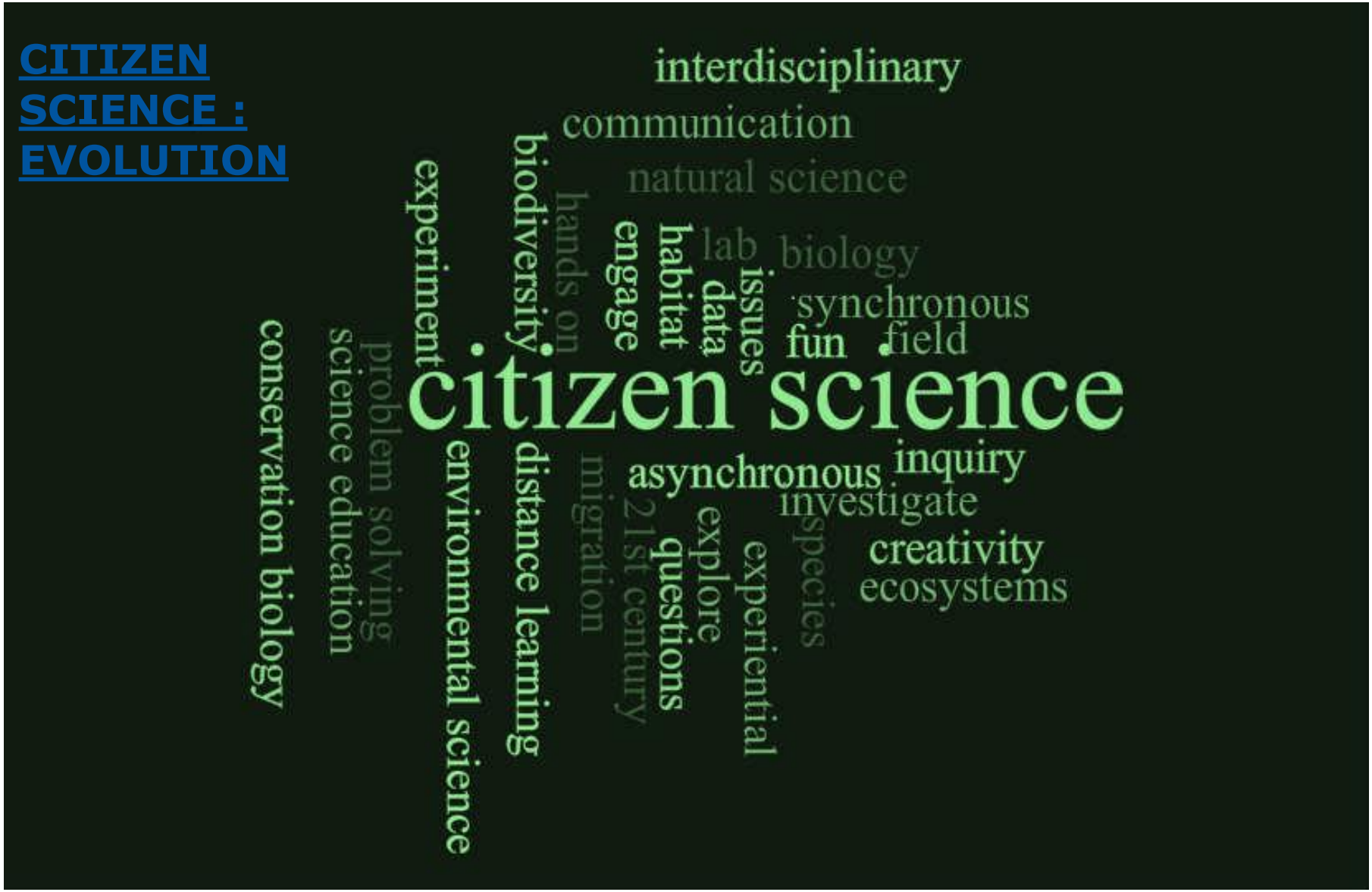
WAGENINGEN UR
For quality of life

EVOs' components



Citizen science

CITIZEN SCIENCE : EVOLUTION

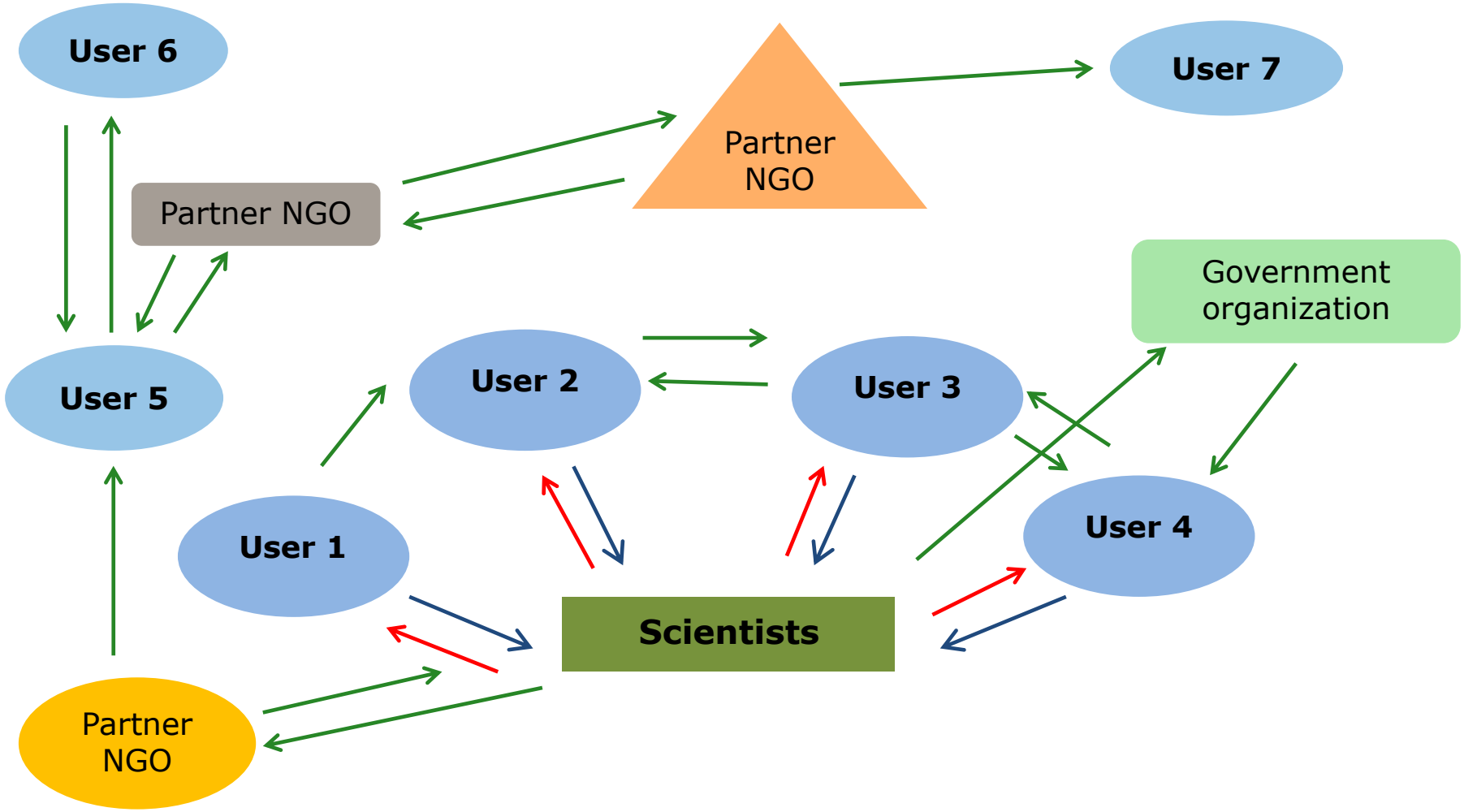


Citizen Science – Levels of Participation

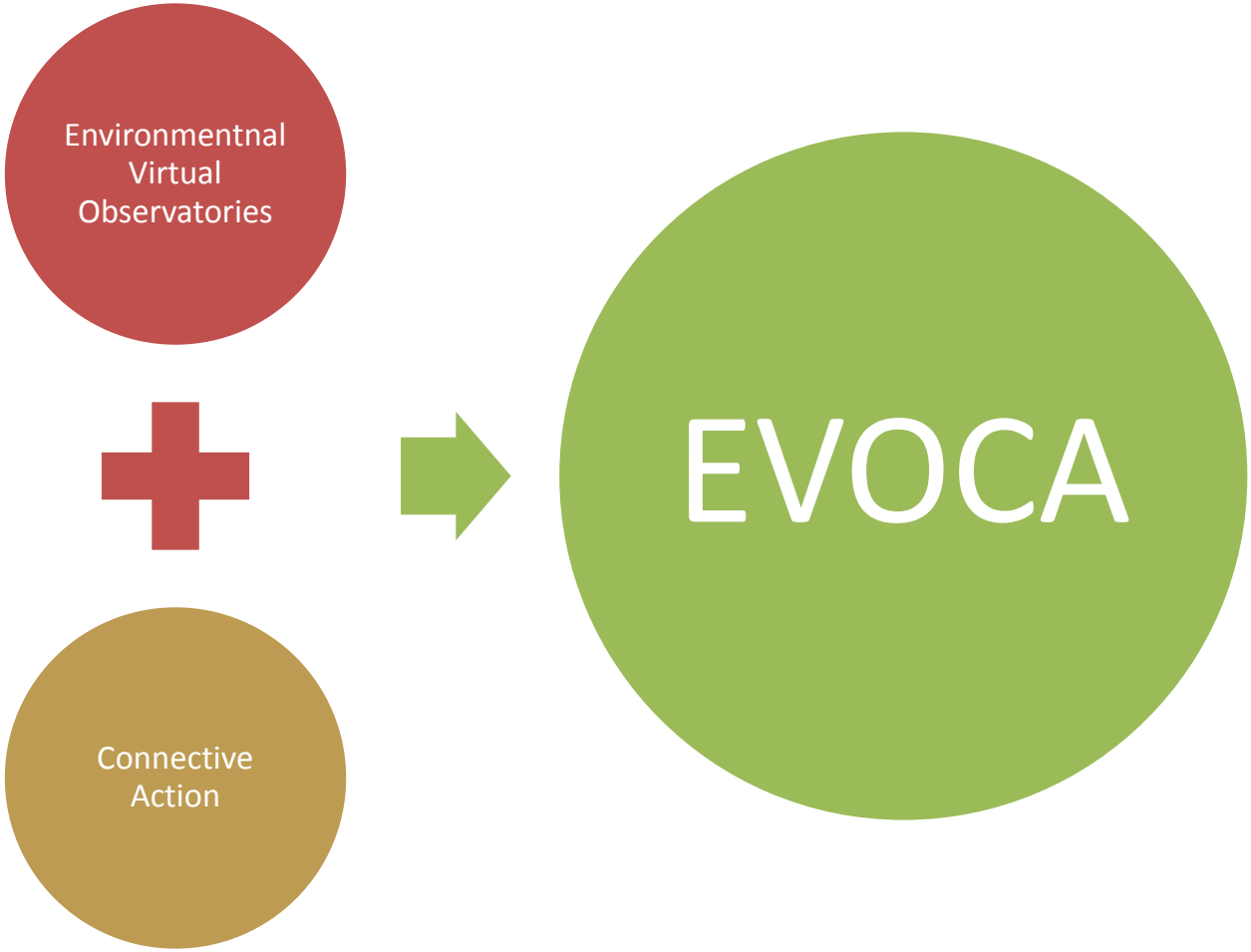
LEVEL 4 Extreme Citizen Science	• Collaboratory science
LEVEL 3 Participatory Science	• Participation in problem definition and data creation
LEVEL 2 Distributed Intelligence	• Citizens as basic interpreters
LEVEL 1 Crowdsourcing	• Citizens as sensors

Classification of citizen science projects; after: Haklay, M. (2013). Citizen Science and Volunteered Geographic Information – overview and typology of participation. In: Sui, D.Z., Elwood, S. and M.F. Goodchild (eds.), 2013. Crowdsourcing Geographic Knowledge. Berlin: Springer.

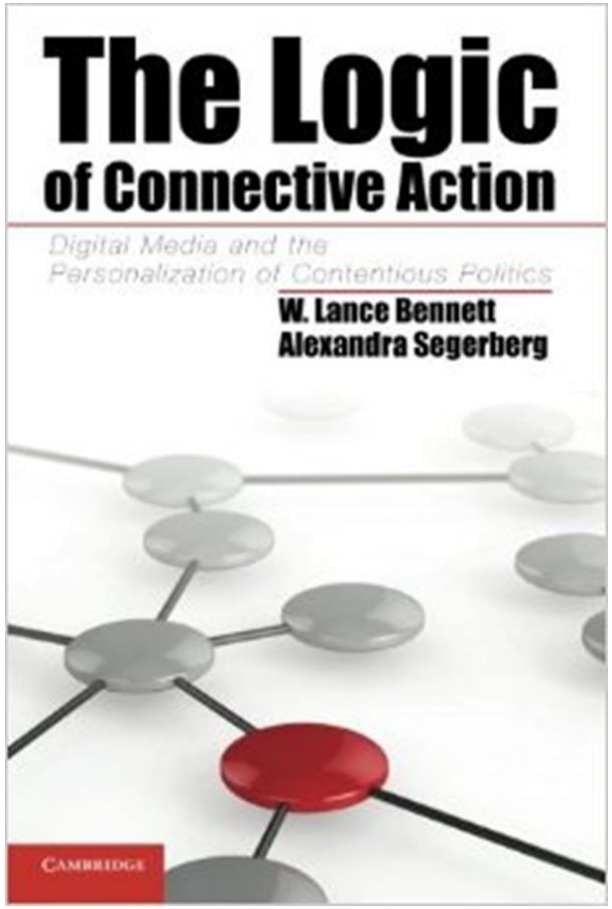
1st, 2nd generation EVOs, and EVOCA



EVOCA – the 3rd Generation EVO



Connective action

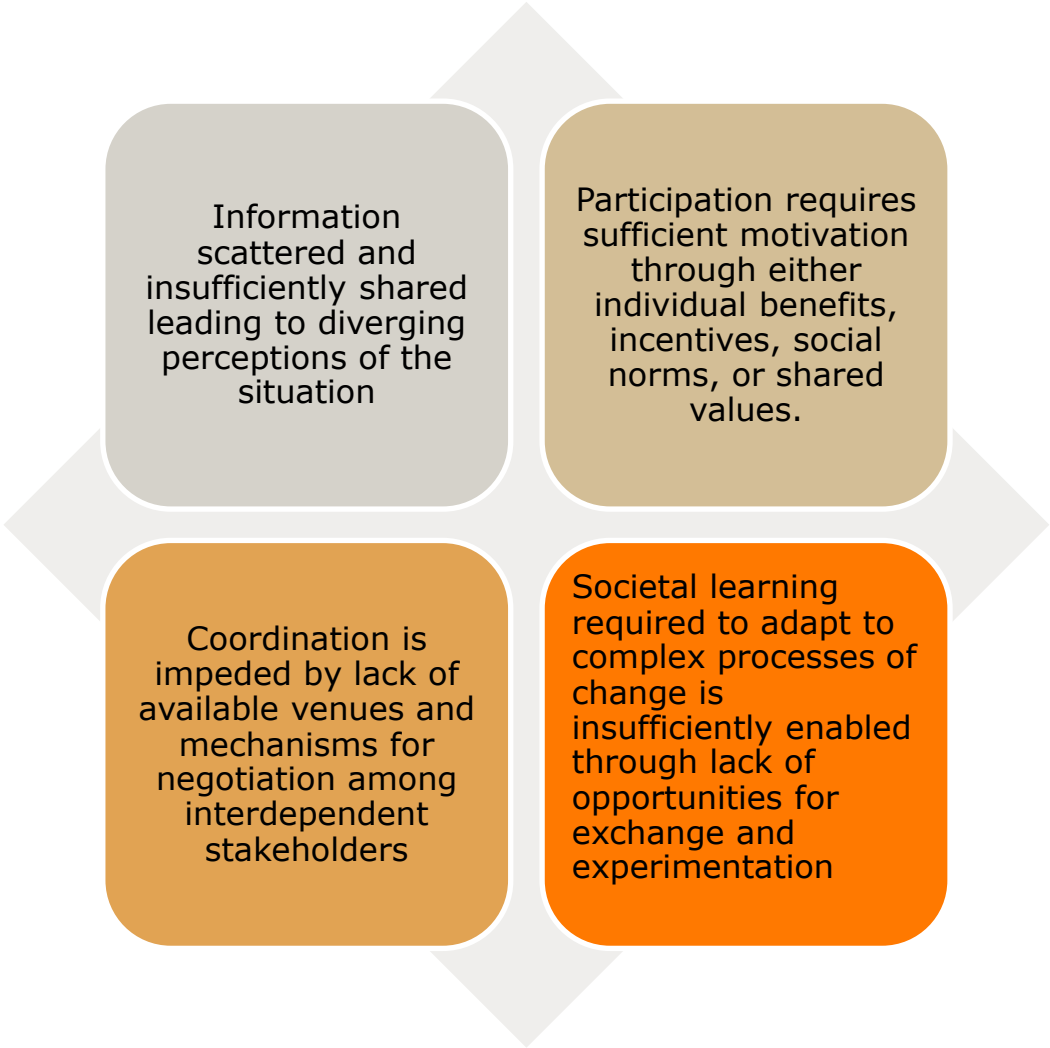


Collective engaging in targeted action, shaped through connecting: the uploading and sharing of information, images or frames

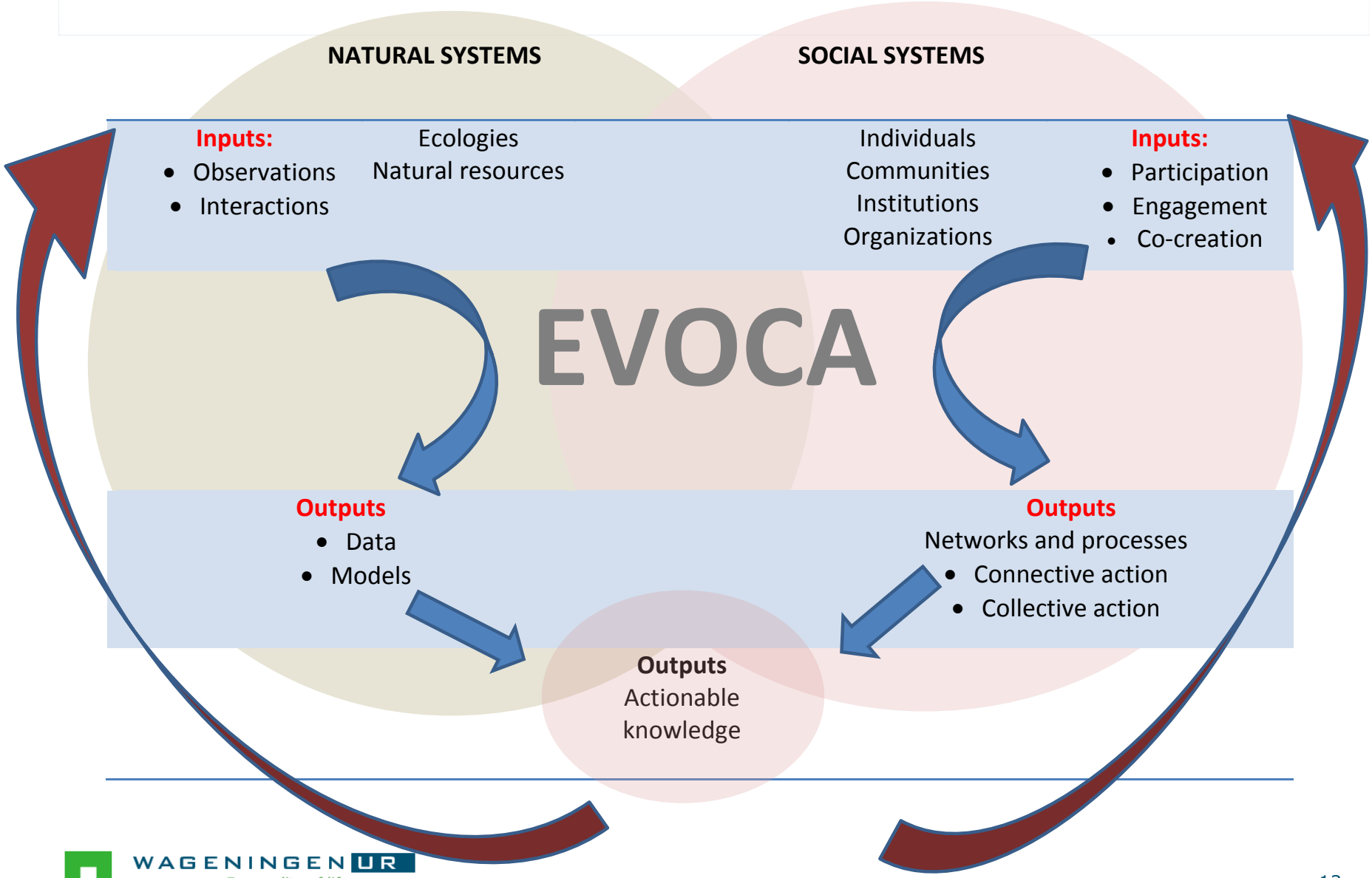
- Minimal need for formal organization
- Fast, low-cost, large scale access to and exchange of information
- Peer-to-peer mobilization through personal networks

EVOs and Complex Problems

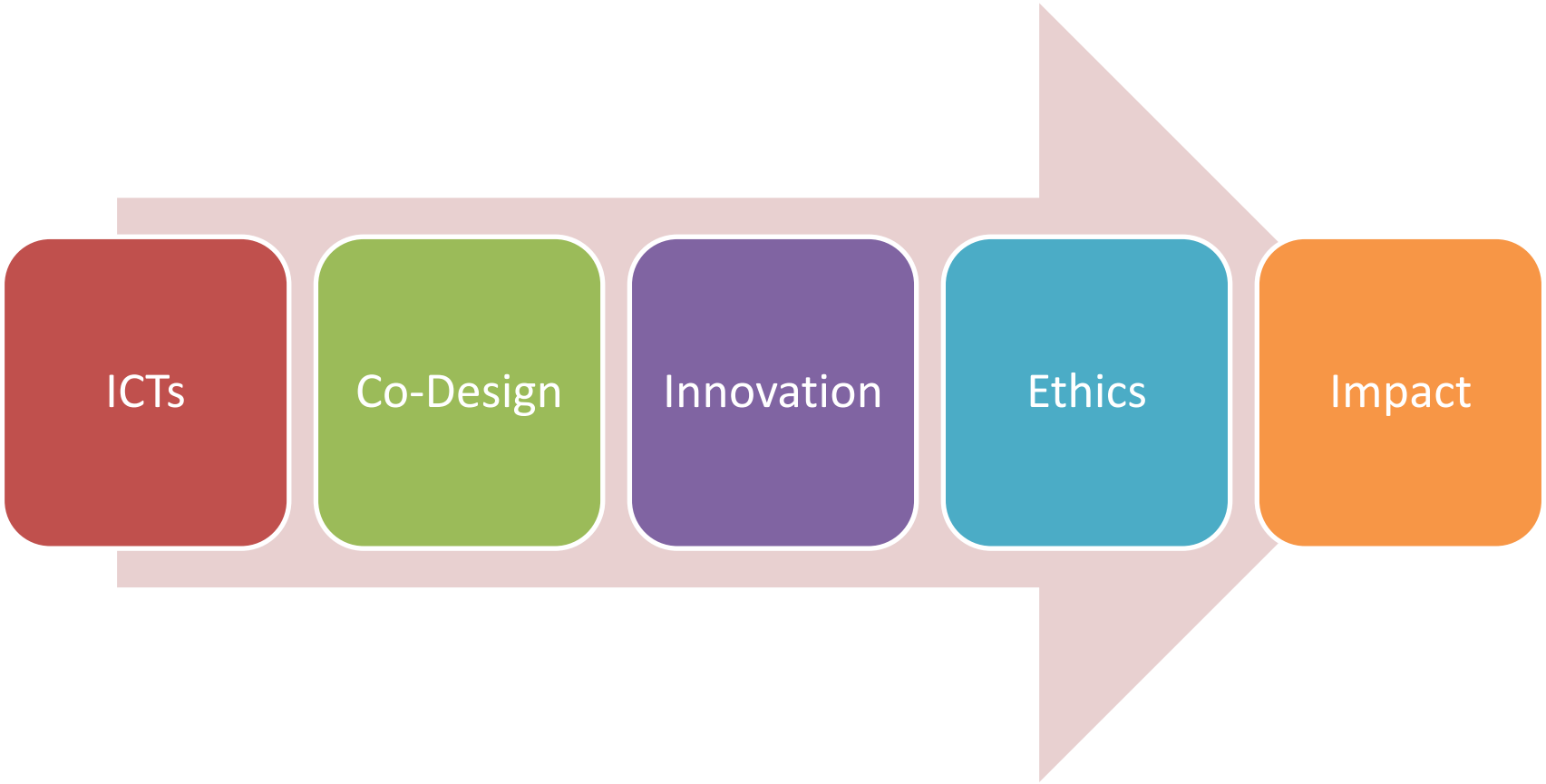
EVOCA:
Fast, low-cost, large scale information exchange



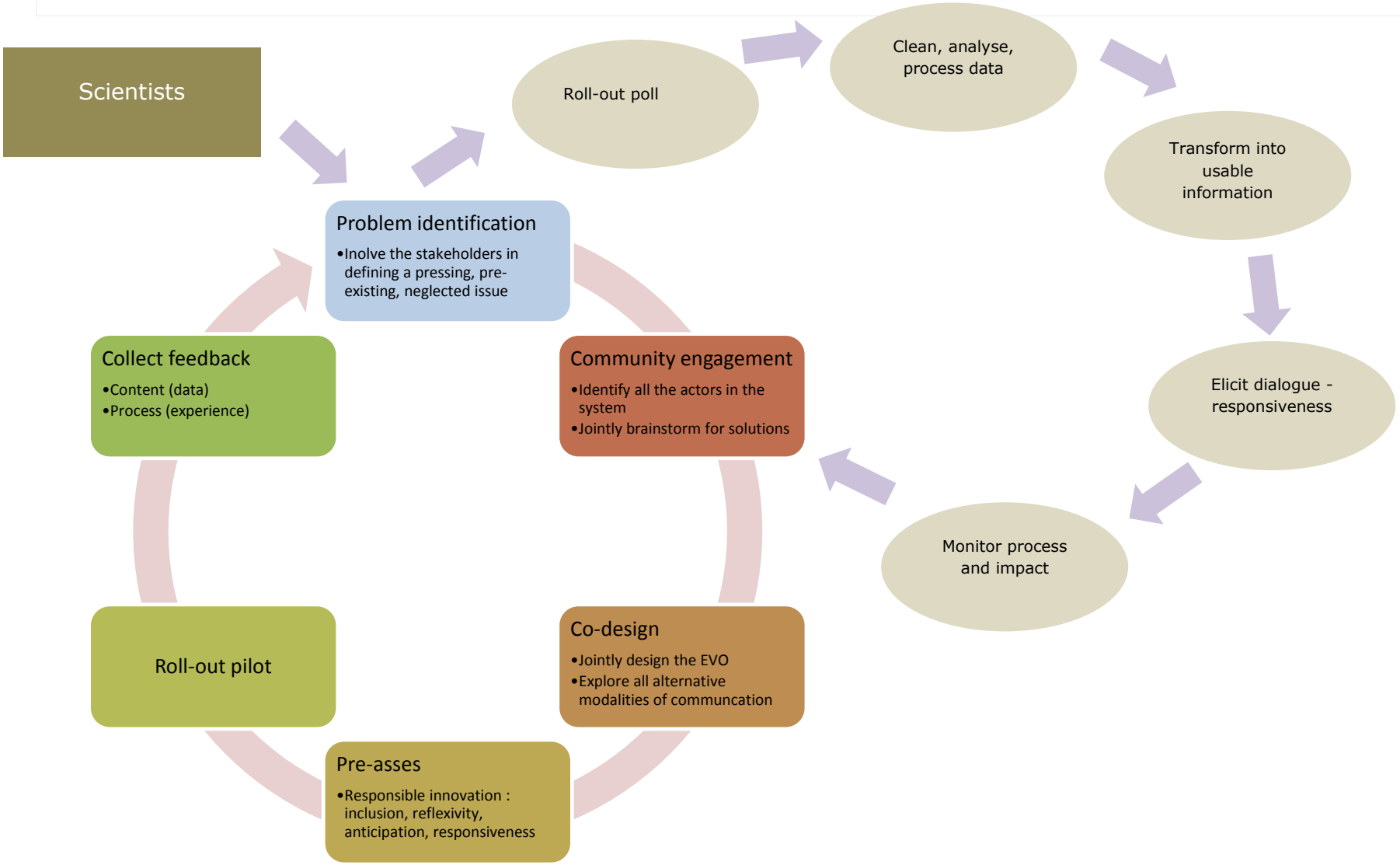
EVOCA


NATURAL SYSTEMS
SOCIAL SYSTEMS
Inputs:
Observations
Interactions
Ecologies
Natural resources
Individuals
Communities
Institutions
Organizations
Inputs:
Participation
Engagement
Co-creation
EVOCA
Outputs
Data
Models
Outputs
Networks and processes
Connective action
Collective action
Outputs
Actionable knowledge

Multi and interdisciplinary, process oriented research



EVO Design Scheme

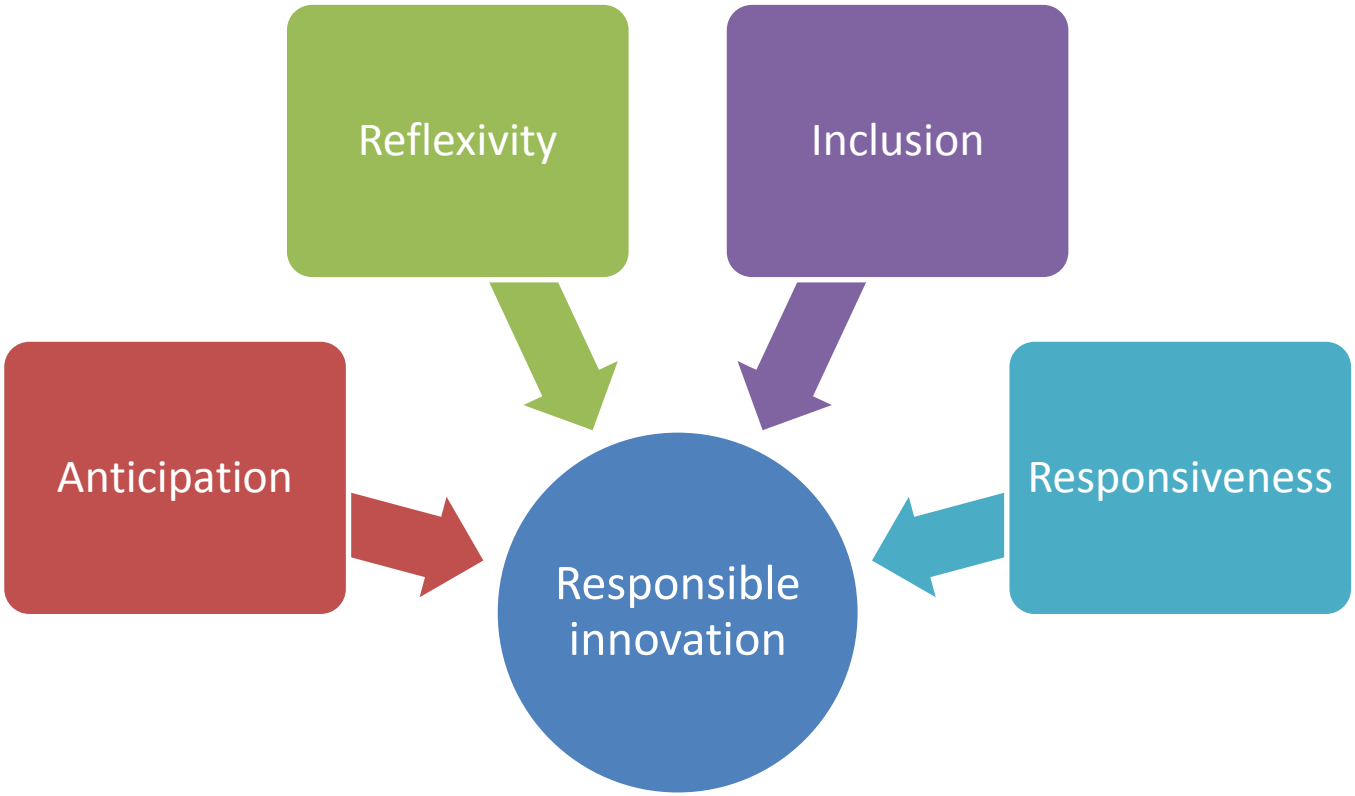


How to innovate?

RESPONSIBLE INNOVATION RECOMMENDATIONS
1. Design with the User
2. Understand the Existing Ecosystem
3. Design for Scale
4. Build for Sustainability
5. Be Data Driven
6. Use Open Standards, Open Data, Open Source, and Open Innovation
7. Reuse and Improve
8. Do no harm
9. Be Collaborative

The United Nations Responsible Innovation Guidelines 2015

The Responsible Innovation Framework



Challenges ahead? EVO - sceptics

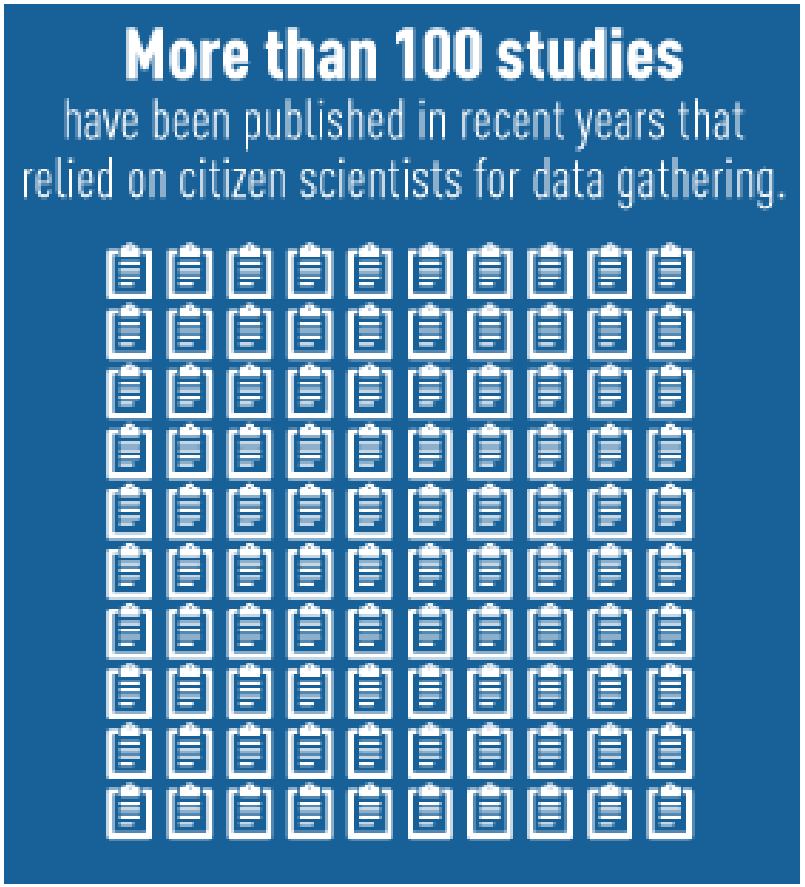
- Is our data ‘professional’ enough?
- Reliability?
- Validity?
- Does citizen science create a different kind of knowledge?
- Democratization of science?

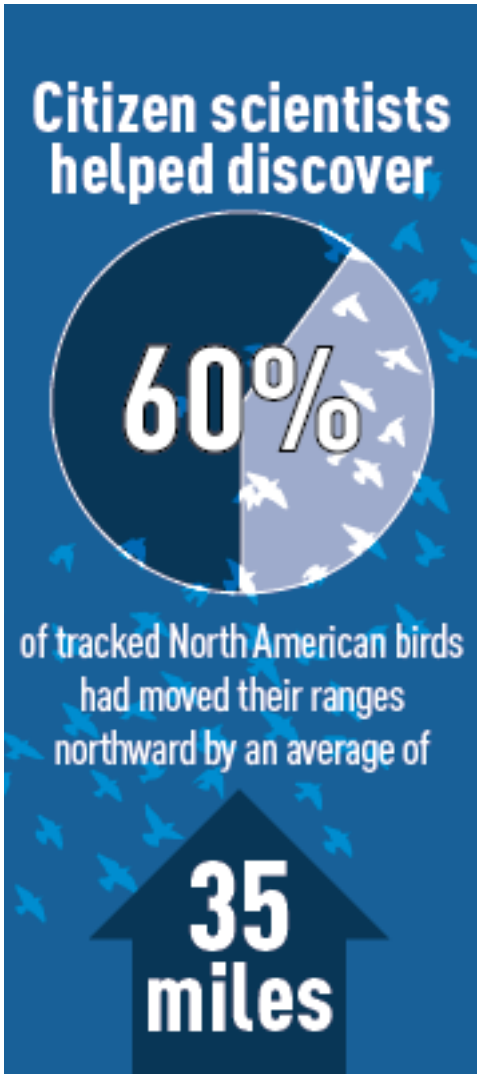
But Does it Even Work?

Reef Covertype	Volunteer Collected Data	PI Collected Data
Hard Coral	7,7%	7,2%
Algae	82,1%	84,3%
Soft Coral	5,6%	4,9%
Sand	1,3%	1,1%
Rock	2,8%	2,9%
Sponge	0,4%	0,5%
Other (e.g., tunicate, etc.)	0,1%	0,0%
N	2031	597

Rollino, J. (2012). Reliability and long-term monitoring using citizen science – a case study. Earth Watch Institute Research Project: Bahamian Reef Survey

Citizen Science Trivia





Long Live EVOCA!

"Using citizens is not a panacea; it doesn't solve all scientific problems any more than using microscopes (…) But citizen science provides a way of harnessing the energy, the creativity, the knowledge, passion and insights of far more people than would ordinarily be involved in a scientific research project."

Thomas Malone, director of the MIT Center for Collective Intelligence