

Citizen Science Research & Methodology

AU, 2 October 2023

Gitte Kragh & Kristian H. Nielsen,
Centre for Science Studies, AU



TIME4CS

SUPPORTING SUSTAINABLE
INSTITUTIONAL CHANGES
TO PROMOTE CITIZEN SCIENCE IN
SCIENCE AND TECHNOLOGY



H2020: Science with and for Society



TIME4CS

SUPPORTING SUSTAINABLE
INSTITUTIONAL CHANGES
TO PROMOTE CITIZEN SCIENCE IN
SCIENCE AND TECHNOLOGY

General Objectives

- to support and facilitate the implementation of sustainable **Institutional Changes** in Research Performing Organisations (RPOs)
- to promote **Public Engagement** (citizens and citizens associations) and **Citizen Science** in science and technology

3 years: 1 January 2021 - 31 December 2023



TIME4CS Citizen Science Research & Methodology

Time	Activities
14:00-14:05	<ul style="list-style-type: none">• Welcome and introduction
14:05-14:20	<ul style="list-style-type: none">• Citizen Science Methodologies
14:20-14:30	<ul style="list-style-type: none">• Determining whether citizen science is right for your research project
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15:50-16:00	<ul style="list-style-type: none">• Wrap up and evaluation

TIME4CS Eyewire – example

Mapping eye neurons

Launched 2012 >225.000 players >150 countries

- Build a community – Know your community partners
 - Make it fun. Engage with your volunteers. Be social!
- Sustain and Improve – Communicate effectively
 - Use social media, blog posts, emails; images have bigger impact
- Sustain and Improve – Build flexibility into your project
 - Continue improving your project; take suggestions from volunteers!



Marvelous Eyewirers →

	today	week	month
rank	username	points	
1	jaro87 🇸🇮	21687	
2	Ylandy2 🇩🇰	4975	
3	Crabardaf 🇫🇷	2286	
4	katerynacha... 🇪🇸	2006	
5	dravedoggo 🇺🇸	1880	
6	lisainsandy 🇺🇸	1548	
7	larabadara19 🇺🇸	1414	
8	brabender 🇪🇸	1214	
9	retepaskab 🇮🇩	952	
10	shardana 🇪🇺	872	

ARTICLE

doi:10.1038/nature13240

Space–time wiring specificity supports direction selectivity in the retina

Jinseop S. Kim^{1*}, Matthew J. Greene^{1*}, Aleksandar Zlateski², Kisuk I. Michael Purcaro¹, Matthew Balkam¹, ... Robinson¹, Bardia F. Beha¹, I. Sebastian Seung^{1,4} & the EyeWirers⁵ *Nature* **509**, 331–336 (2014)



Eyewire.org

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Citizen Science Methodologies

Gitte Kragh
Aarhus University, Denmark



TIME4CS

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TIME4CS Many types of citizen science - examples

- Make computer power available for projects
- Solve tasks online
- Play games with research content online
- Crowdfunding for science
- Participate in public debates -> influence decisions
- Participate in prioritization re. research
- Hacker/maker spaces (DYI labs)
- Helping archives
- Helping with fieldwork
- Community science

Citizen science – the term emerges

Amateur contributions to science

*Audubon Society (1989) &
Rick Bonney (1996)*

- Citizens collecting and analysing rain samples
- Birdwatchers submitting sightings
- *Participants are instruments*



Biodiversity monitoring



Democratisation of science

Alan Irwin (1995)

- Democratic, participatory science
- Science to address needs and concerns of citizens
- Citizens could develop process of producing reliable knowledge themselves
- *Participants can influence and transform science*



Activist science

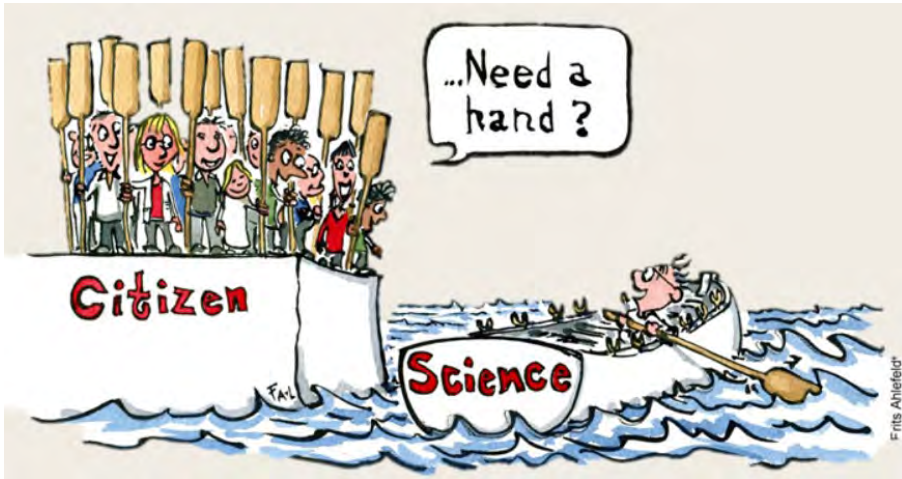
Participatory action research

Community-based natural resource management

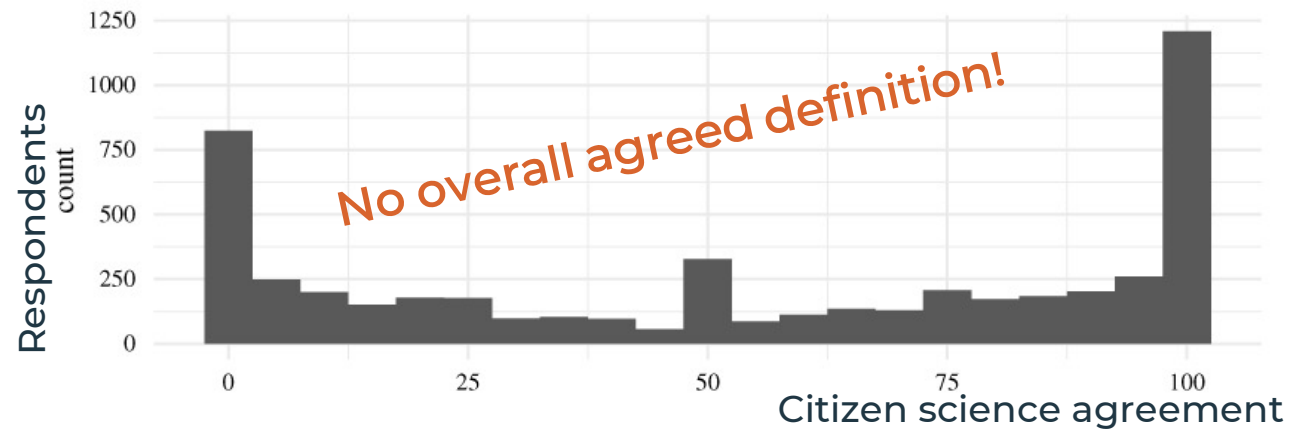
Public and Patient Involvement (PPI)



What is citizen science today?



“Scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists or scientific institutions”
(Oxford English Dictionary)



[Contours of Citizen Science](#) (Haklay et al. 2021)

- Public participation in scientific research
- Crowdsourcing and crowdfunding
- Distributed (hybrid) intelligence
- Community science
- Action (or activist) science

- Wide range of activities
- Within a wide range of scientific fields

Wide range of fields



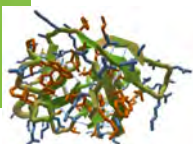
"SDG monitoring"



Ecology

GIV DE UNGE ORDET
Forskningsprojekt

Health



Astronomy



CLOUDSPOTTING ON MARS

Citizen science

Archaeology



Social science

Meteorology

Physics





Seeing beyond

Discover a new world of birding...

[▶ Learn more](#)[Get started](#)

Cedar Waxwing *Bombycilla cedrorum* © Sean Hollowell Macaulay Library | eBird

FEATURES



Find more birds

Explore birds and hotspots near you and wherever you go, all based on the latest sightings from around the world.



Share your sightings

Join the world's largest birding community. Every sighting matters. Contribute yours.



Track your lists

What's your latest life bird? What bird lists do you care about? eBird tallies them for you and archives your photos and sounds—all for free.

- Worldwide
- 100s of partner groups
- 100 million obs / year
- 20% growth year on year
- Birds are ecological indicators
- Scope Your Problem – Engage stakeholders (both government and NGOs)
- Build a Community – Know your community partners (participate in bird meetings & festivals)
- Sustain & Improve – Adapt to cycles of participation (evaluate and adapt)

TIME4CS Crowdsourcing platform: Zooniverse

WELCOME TO THE ZOONIVERSE
People-powered research

See All Projects

THE ZOONIVERSE WORKS

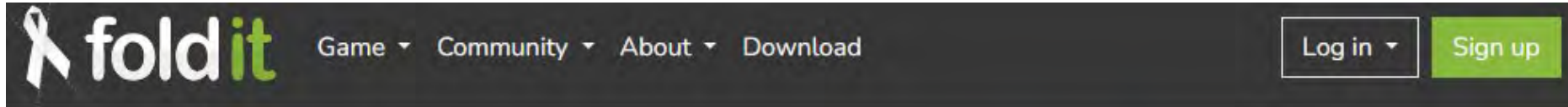
771,523,814

CLASSIFICATIONS SO FAR BY
2,654,785 REGISTERED VOLUNTEERS

A screenshot of the Zooniverse project selection interface. At the top, there is a navigation bar with icons for various fields: ART, HISTORY, LANGUAGE, LITERATURE, MEDICINE, NATURE, PHYSICS, SOCIAL SCIENCE, and SPACE. Below this is a search bar with the text "Most Recently Launched" and "Showing 21-27 of 27 projects found." A grid of project cards is displayed, each with a thumbnail image and a title: "PLANET HUNTERS TESS", "SUPERWASP VARIABLE STARS", "GALAXY ZOO", "ASTRONOMY REWIND", "BACKYARD WORLDS: PLANET 8", "GRAVITY SPY", and "RADIO METEOR ZOO". A green arrow points from the "GALAXY ZOO" card to the right-hand screenshot.

A screenshot of the Galaxy Zoo classification task interface. The top navigation bar includes the "Galaxy Zoo" logo and links for "ABOUT", "CLASSIFY", "TALK", and "COLLECT". A blue banner at the top right contains the text: "6 June 2023: A new dataset is now live with some of the most distant galaxies we've ever featured, imaged by JWST. More information at this blog post. Thank you for classifying!". The main area shows a large image of a galaxy with a zoom-in tool on the left. On the right, there is a "TASK" panel with the question: "Is the central galaxy simply smooth and rounded, with no sign of a disk?". Three radio button options are provided: "Smooth", "Features or Disk", and "Star, Artifact, or Bad Zoom". Below the options is a link "NEED SOME HELP WITH THIS TASK?" and two buttons: "Done & Talk" and "Done". A vertical "FIELD GUIDE" button is on the far right. A small notification at the bottom left says "you should sign in!".

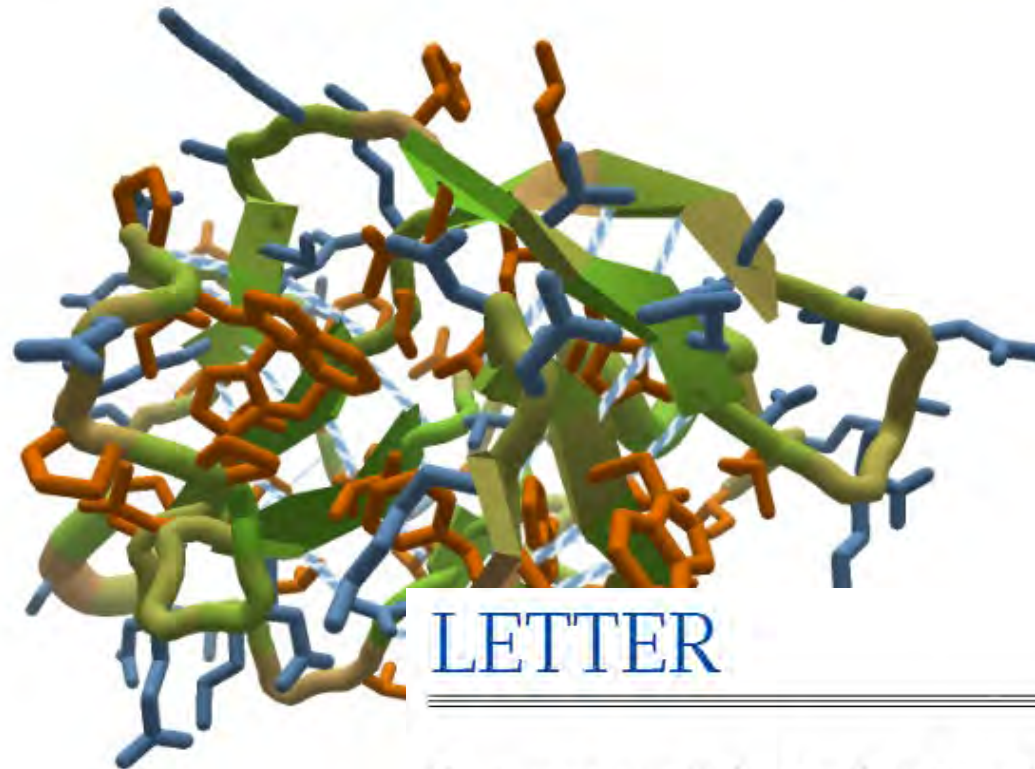
TIME4CS Gamification of research tasks - Foldit



Foldit is a revolutionary crowdsourcing computer game enabling you to contribute to scientific research. Learn the science behind Foldit and how your playing can help.

About Foldit

Start Playing



See Who's Leading

Soloists Groups

	1. Sandrix72 Lv 1	5,968
	2. LociOiling Lv 1	5,890
	3. Bruno Kestemont Lv 1	5,418
	4. Galaxie Lv 1	5,273
	5. MicElephant Lv 1	4,587

→ View all leaderboards

Top New Players

<https://doi.org/10.1038/s41586-019-1274-4>

De novo protein design by citizen scientists

Brian Koepnick^{1,2}, Jeff Flatten³, Tamir Husain³, Alex Ford^{1,2}, Daniel -Adriano Silva^{1,2}, Matthew J. Bick^{1,2}, Aaron Bauer³,
Gemma Liu^{4,5}, Yojiro Ishida⁶, Alexander Boykov¹¹, Roger D. Estep¹¹, Susan Kleinfelter¹¹, Toke Nørgård -Solano¹¹, Linda Wei¹¹,
Foldit Players¹⁶, Gaetano T. Montelione^{4,6}, Frank DiMaio^{1,2}, Zoran Popović³, Firas Khatib⁷, Seth Cooper⁸ & David Baker^{1,2,9*}

NATURE | VOL 570 | 20 JUNE 2019



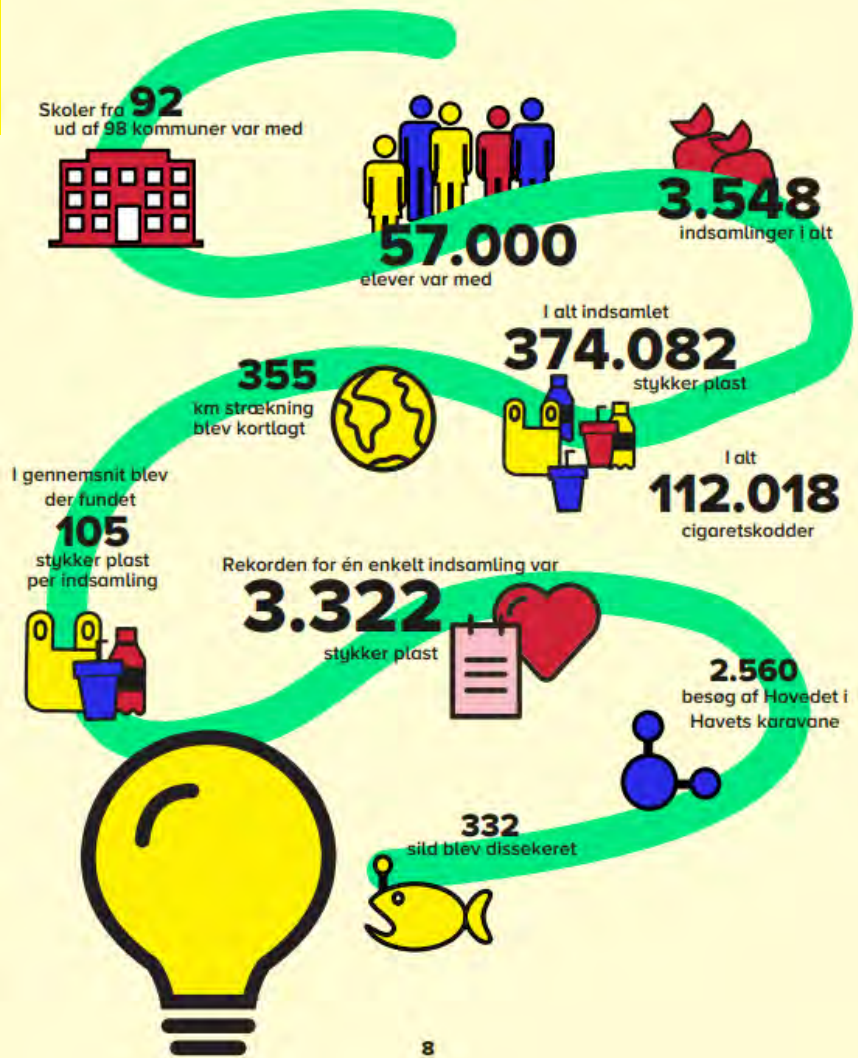
TIME4CS Masseeksperimentet (The Mass Experiment)

Plast- forurening i Danmark



Små stykker plast, vi ikke kan se, hvor stammer fra, er den type plast, vi finder næstmest af.

Masseeksperiment 2019 i runde tal



Identifikation af Polymerer i plaststykker var en af aktiviteterne i Masseeksperimentet.

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Article | [Open Access](#) | [Published: 20 October 2020](#)

A nationwide assessment of plastic pollution in the Danish realm using citizen science

[Kristian Syberg](#) , [Annemette Palmqvist](#), [Farhan R. Khan](#), [Jakob Strand](#), [Jes Vollertsen](#), [Lauge Peter](#)

TIME4CS Give Youth a Voice

- 3½ year project
- Mental health, communication & data with and for youth
- 1775 young people involved (14-22 years old)
 - Unique youth perspective
 - Young peer-to-peer dialogues
- 2 tiers of involvement

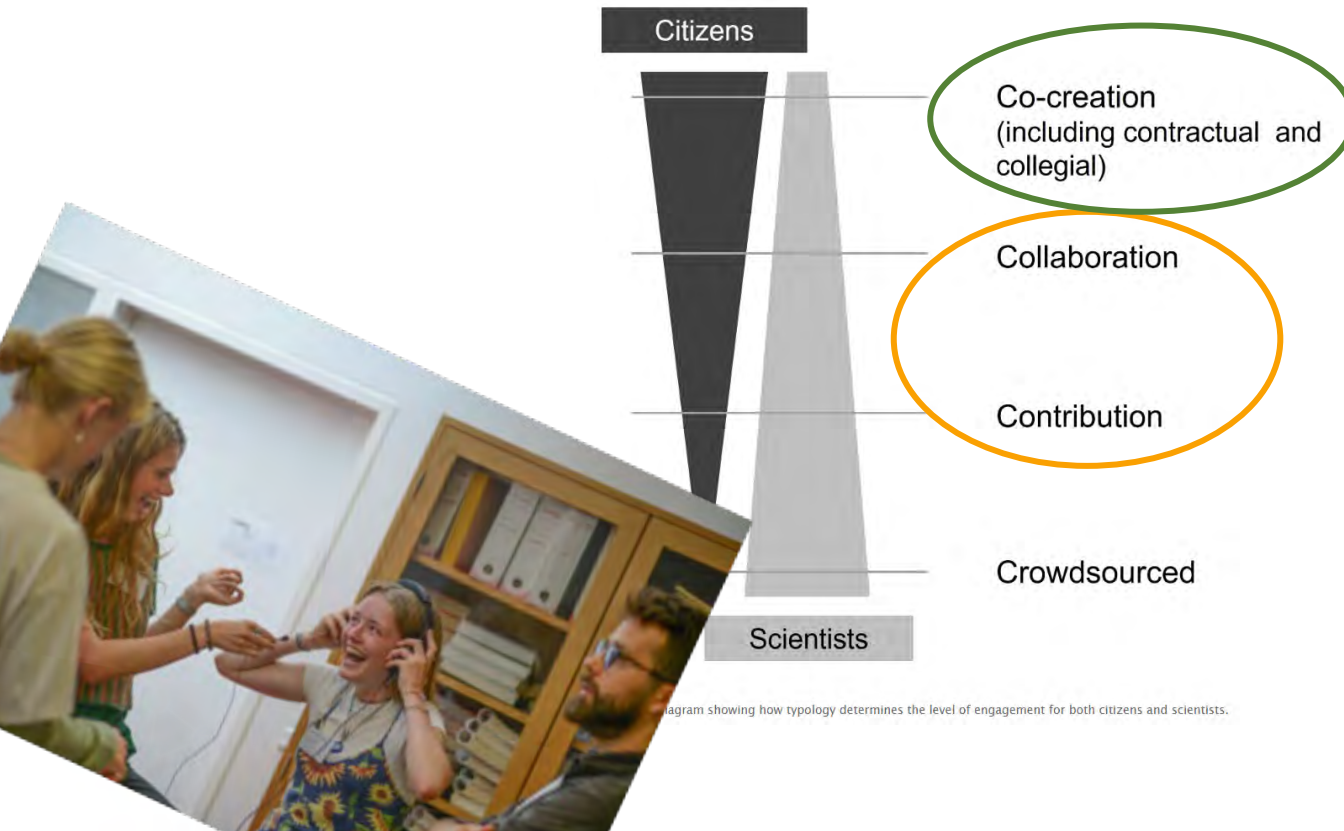


Diagram showing how typology determines the level of engagement for both citizens and scientists.



Covid lockdown coping mechanisms

Make your bed

You have to communicate more actively than before

Create your own spaces

Create daily structure, e.g. clear separation of 'work space' and 'free time space'



TIME4CS Co-creation, participatory, and community-based approaches



Contributory citizen science

(Majority of early online citizen science projects)



VS.



Scientist as project designer

Participatory technology or strategy

Citizens as data gatherers

Citizens' & CSOs' real-world problems

Scientist as co-designer and facilitator

Shared, open, and reflexive research process

TIME4CS Citizen science methodologies by levels of participation

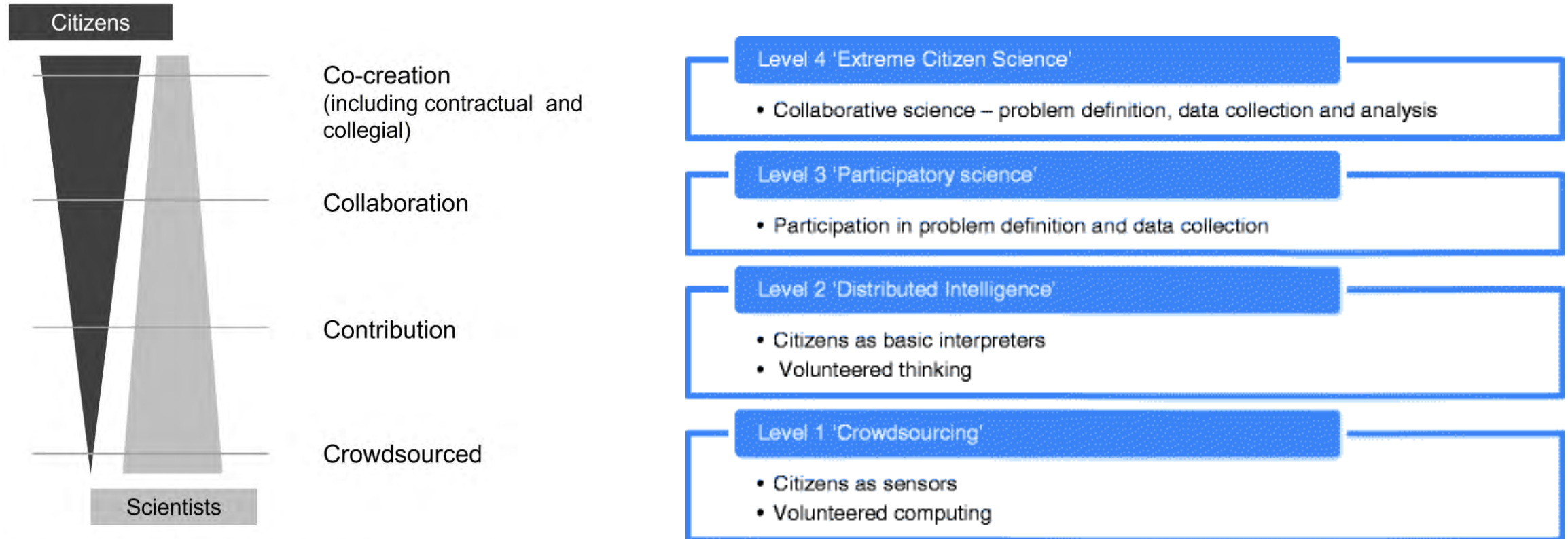
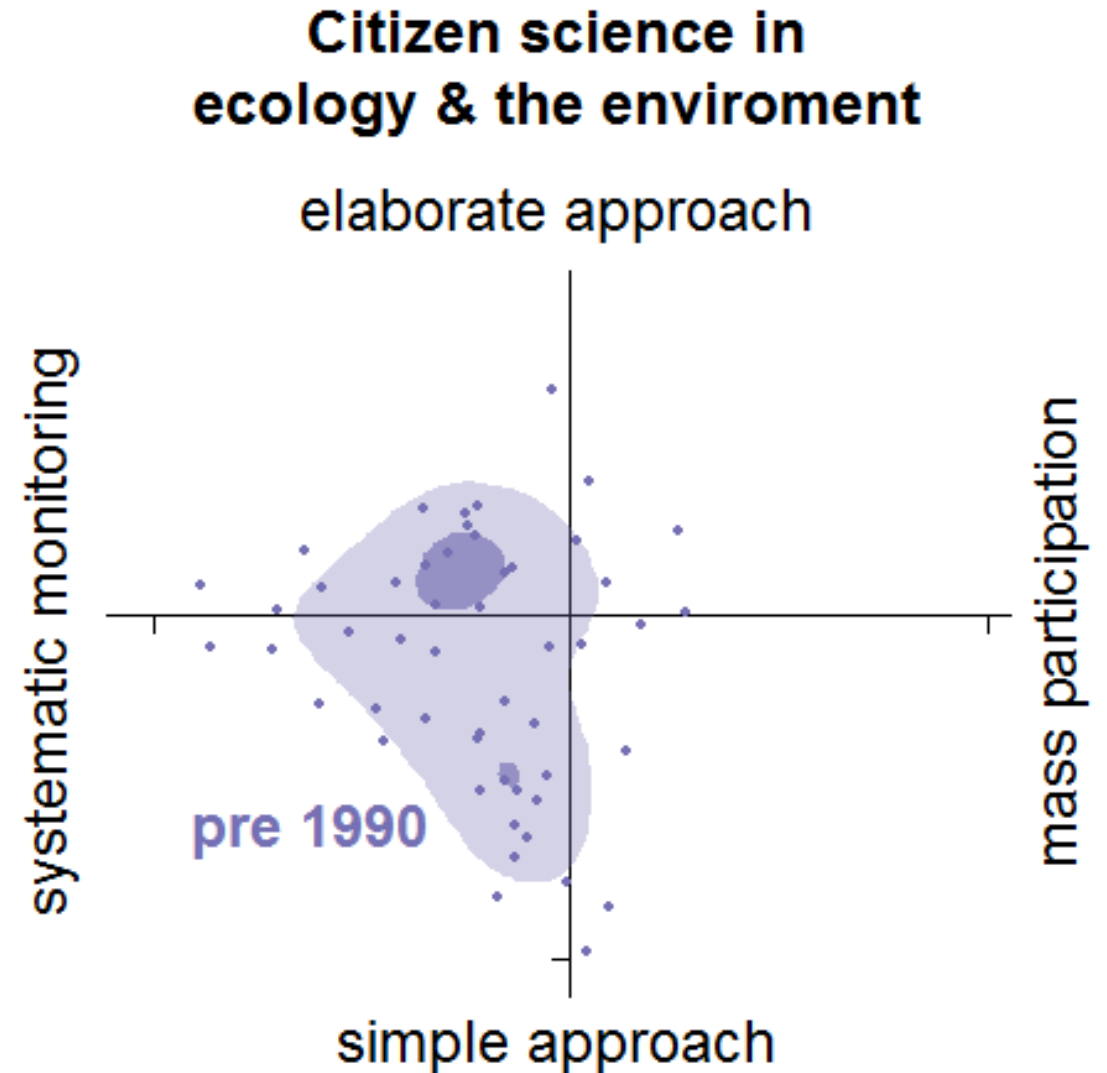


Figure 1: Diagram showing how typology determines the level of engagement for both citizens and scientists.

TIME4CS CS project types change over time

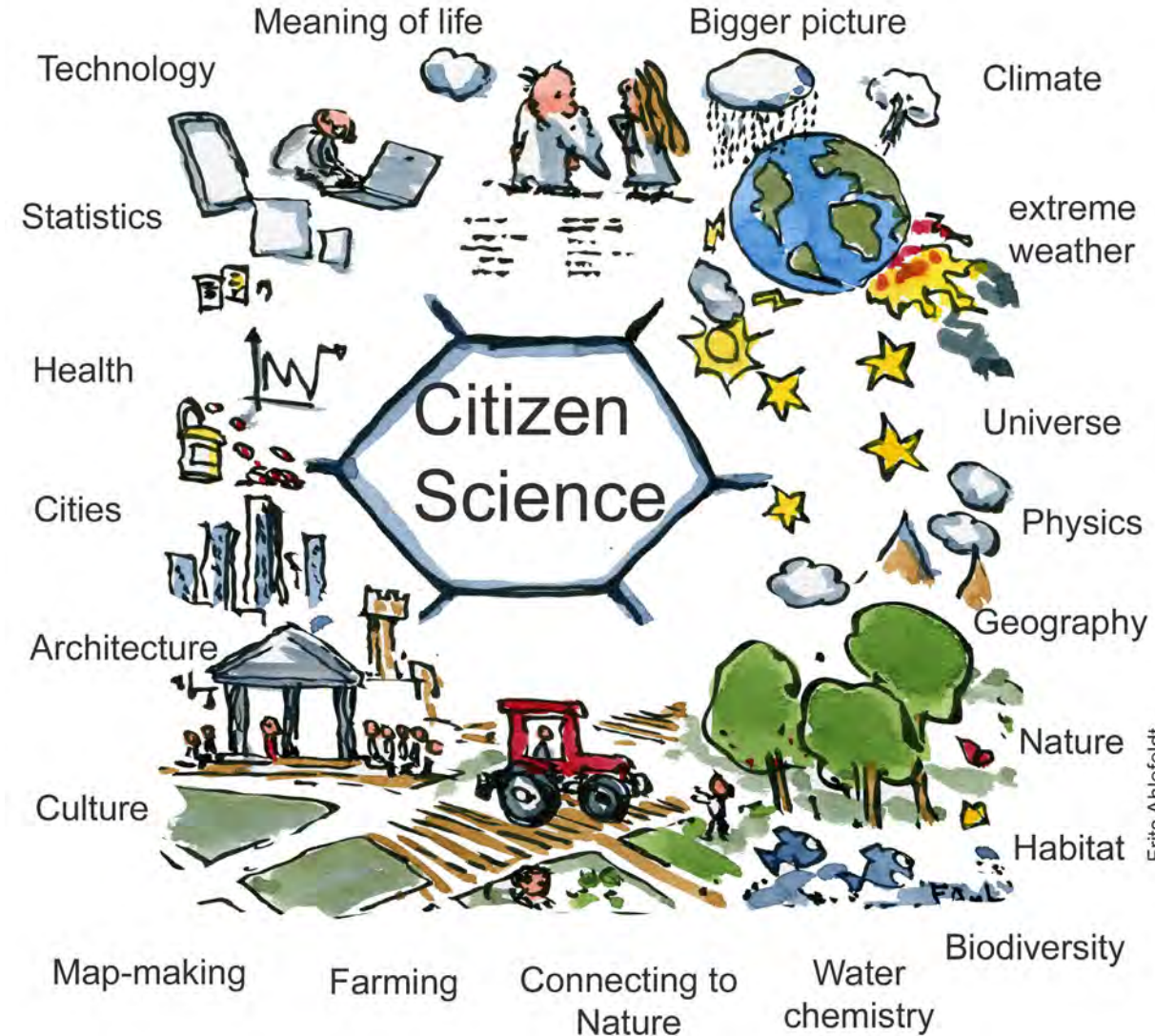
- CS methods are not static but continuously evolve
- Clear trend pre-1990 to 2014: from systematic and elaborate to mass participation and simple



TIME4CS Summary

- Many types of citizen science
 - From making computer power available, solving tasks & playing games online
 - To participation in debates and prioritization of research
 - And participation in the field and community science
- Citizen science is an umbrella term for many different approaches to involving the public in research processes

Citizen science - some areas:



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Determining whether citizen science is right for your research project

Reasons for choosing CS, defining project aims, importance of participation, volunteer motivations, decision framework



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TIME4CS Reasons for choosing citizen science (or not)

CS advantageous when...

- Training required not too technical
- Public involvement serves goals
- You want to promote STEM learning
- You need data across large areas or over long time
- You need many eyes on the ground
- You need to analyse large amounts of data or images
- Tasks can be completed online

CS not advantageous when...

- Training or equipment is highly technical
- Other goals to engage the public are more suited to your organization's goals
- Sampling needs to occur infrequently
- Data collection is in remote /inaccessible areas
- Risks for participants are identified

TIME4CS Defining project aims

Work out what you are trying to achieve

- What do you want to study?
- What is the problem, question or issue you are trying to resolve?
- Do you want or need to reach a certain number of volunteers?
- Promote student learning?
- Involve a particular group of people?
- What data will you collect, and how will it help you achieve your goal(s)?
- How will you display your results to clearly show the connection to your aims?
- How will you evaluate your project against your stated aims?

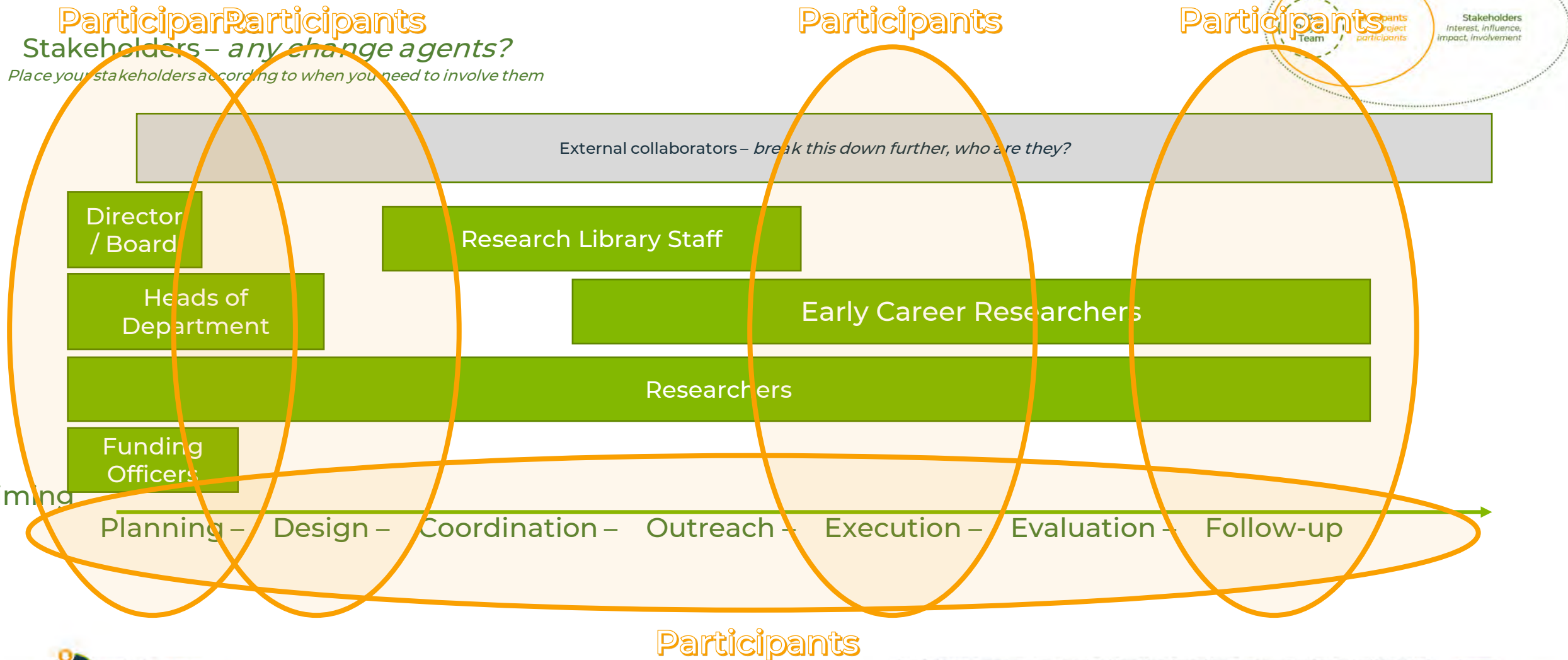
- Make a timeline for your project



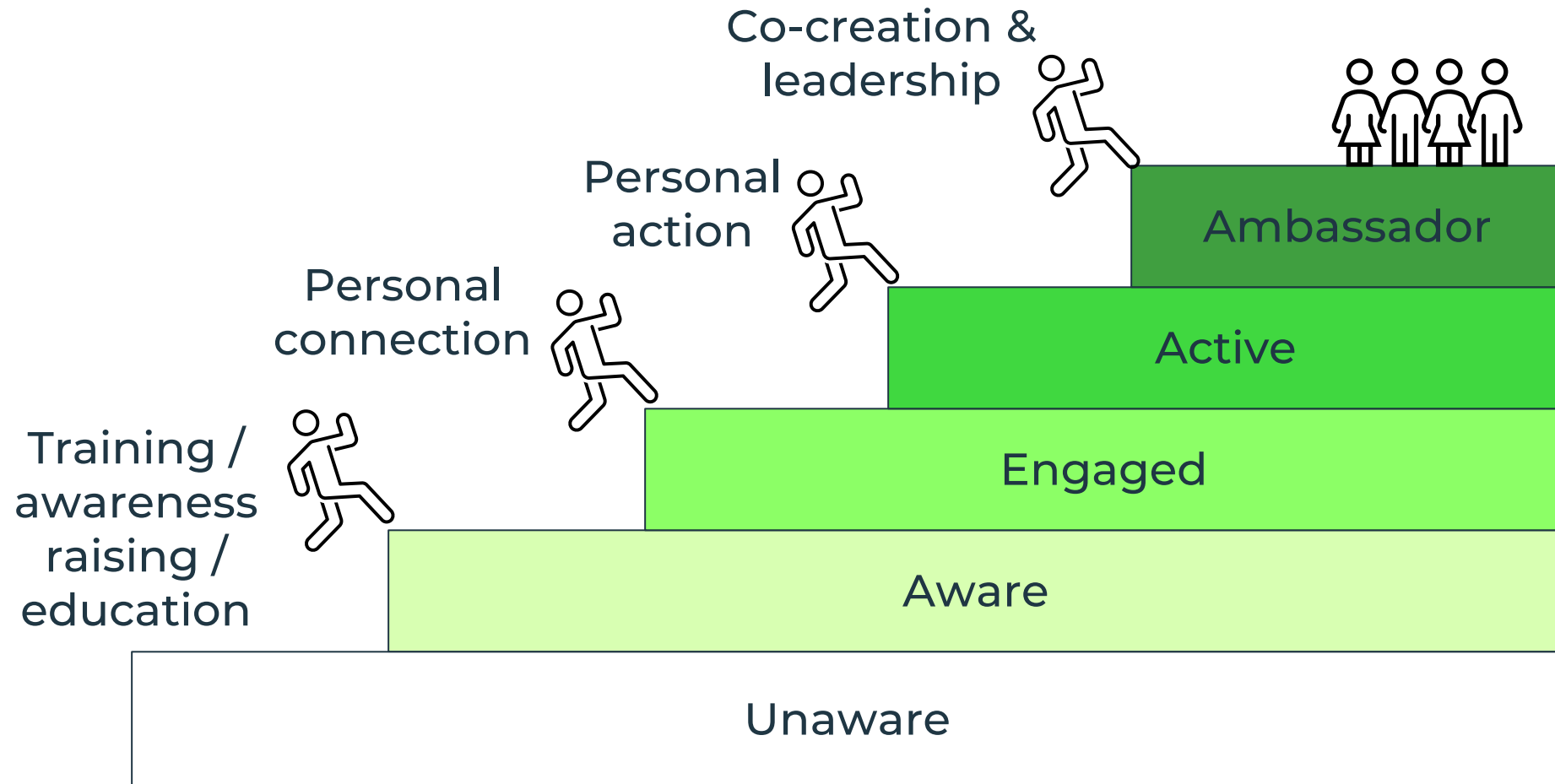
Science as co-creation

TIME4CS Stakeholder Analysis example: Timing/Stakeholders

Stakeholder mapping for Citizen Science project implementation

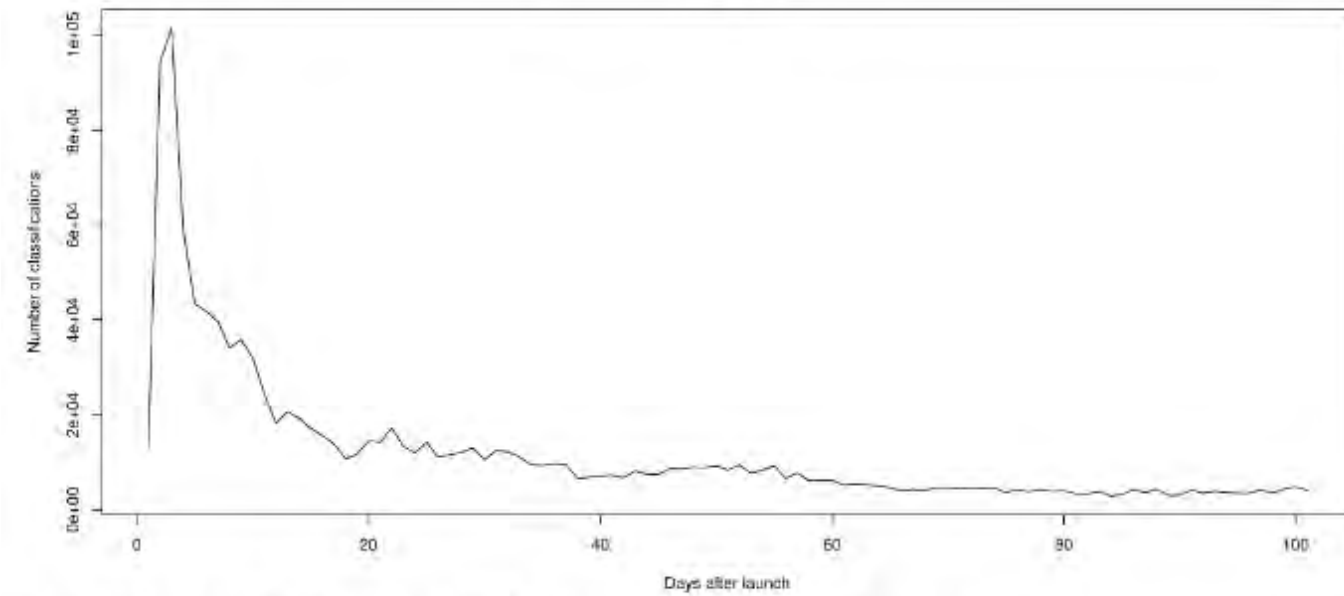


TIME4CS Ladder of Participation for both participants AND researchers!



a) Number of classifications a day on Asteroid Zoo.

Asteroid Zoo

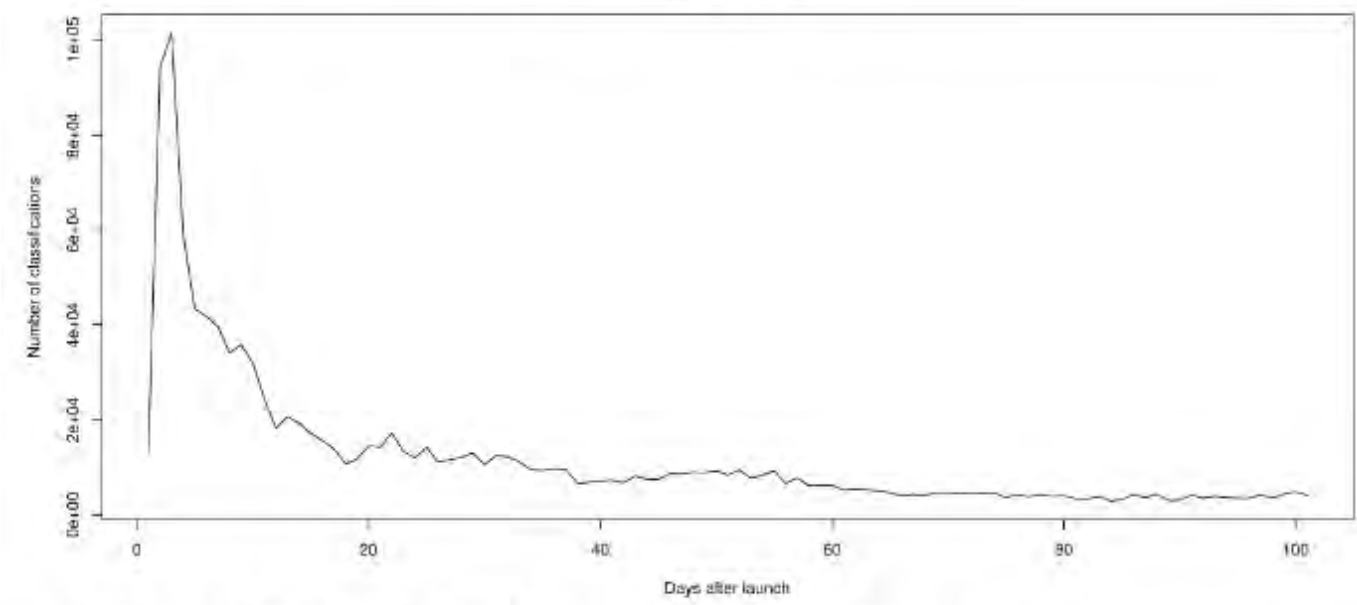


Asteroid Zoo



a) Number of classifications a day on Asteroid Zoo.

Asteroid Zoo



Asteroid Zoo



b) Number of classifications a day on Supernova Hunters.

Supernova Hunters

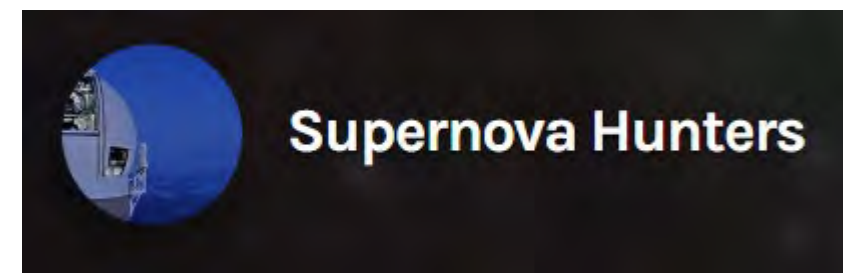
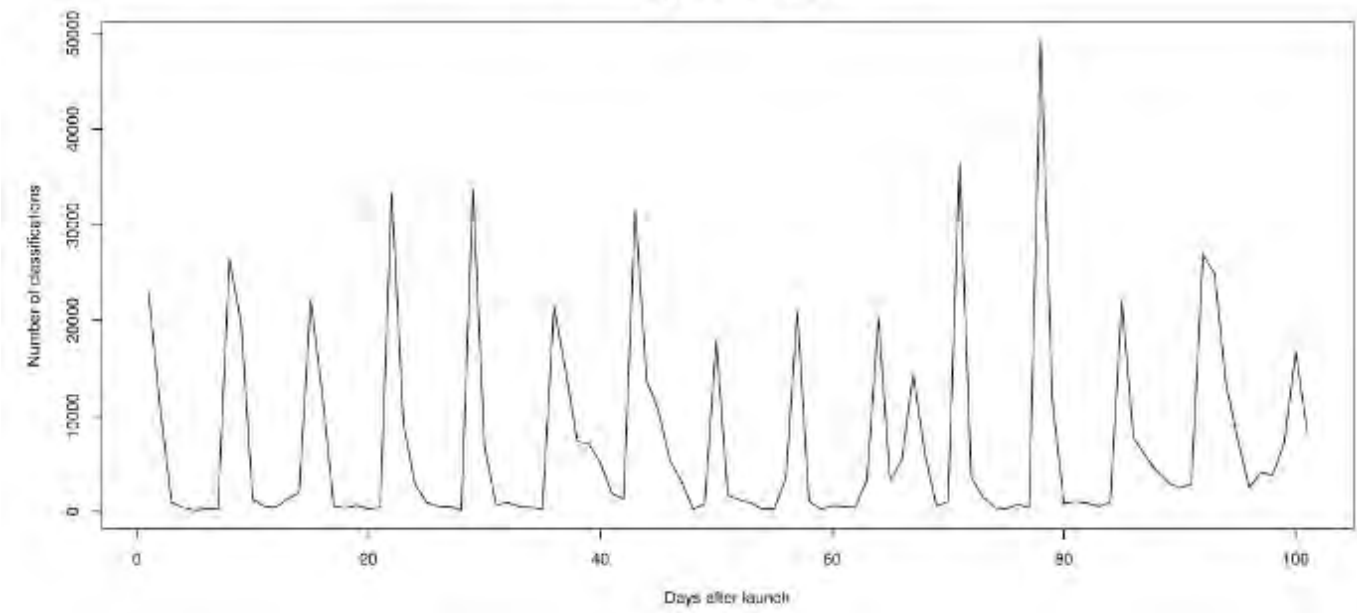


Figure 4 : *Supernova Hunters* has a distinctive classification curve. A typical Zooniverse project has a classification curve displaying a peak of activity after launch that rapidly declines a), however there are exceptions to this observation, the most striking of which is the classification curve of the *Supernova Hunters*

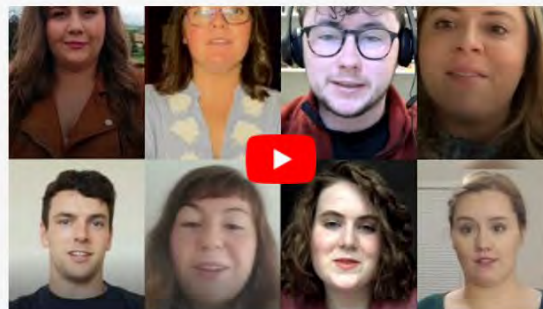


TIME4CS Public & Patient Involvement (PPI)

TABLE 1 | Characteristics of citizen science projects in prevention.

Project characteristics	n	%
Aims of citizen science projects		
Identify problems	29	40%
Generate or prioritize solutions	21	29%
Develop or deliver intervention	21	29%
Monitor and/or evaluate interventions	20	27%
Community empowerment or capacity building	15	21%
Access novel data	11	15%
Influence health knowledge, attitudes, or behaviors	5	7%
Scale		
Small (<50 participants)	43	61%
Medium (50 to 299 participants)	11	16%
Large (> 300 participants)	16	23%

Marks et al. 2022: [A Scoping Review of Citizen Science Approaches in Chronic Disease Prevention](#)



PPI IGNITE NETWORK

Improving outcomes for young adults living with type 1 diabetes

DI Now is a project that aims to improve outcomes for young adults living with type 1 diabetes (T1D). The project has been running since 2014, during which time we have developed, refined and pilot tested the DI Now intervention. You can read more about the study [on our website](#).

I joined with the hope of being able to contribute positively to the group and its research through reflecting on my own experiences and personal challenges as a young person with T1D. Knowing what we go through as young adults with T1D, it is very rewarding to know that we are directly impacting and improving patient experiences however big or small that might be for some.

Diarmuid, YAP member since 2019

Building capacity for meaningful PPI in research in Ireland

Professor Sean Dinneen, PPI Ignite Network Lead, delivers an excellent talk on building capacity f...

[Learn More](#)

Podcasts of interest to the PPI Community

Have you ever produced or contributed to a podcast? If so, you will know that creating and publish...

[Learn More](#)

PPI Ignite Network Values and Principles Framework

This resource defines the values and principles underpinning the work of the PPI Ignite Network a...

[Learn More](#)

Finding PPI Contributors. It's Easier Than You Think

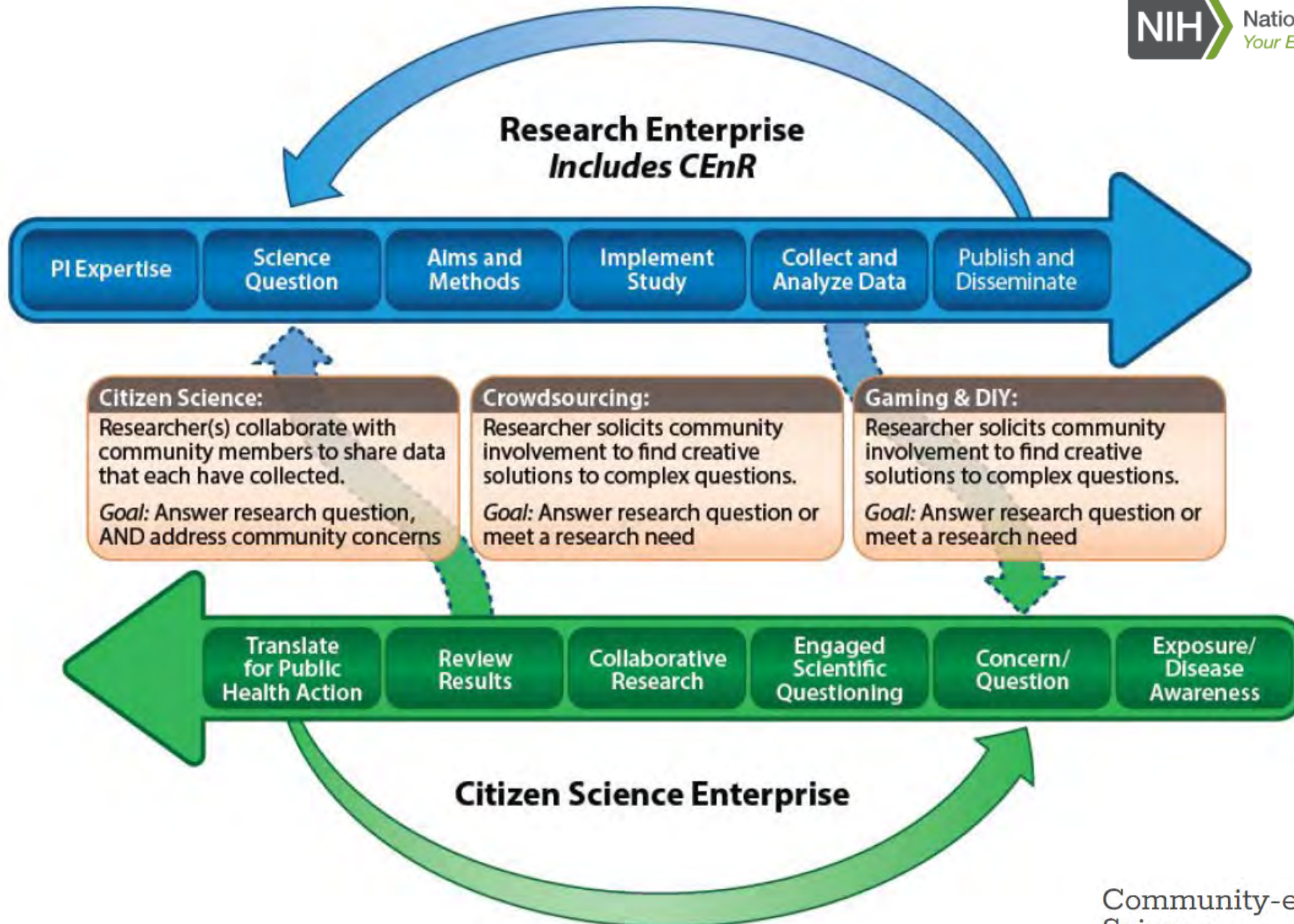
Guide to Public and Patient Involvement in HSE Research

Podcast: Why involve the public and patients in research

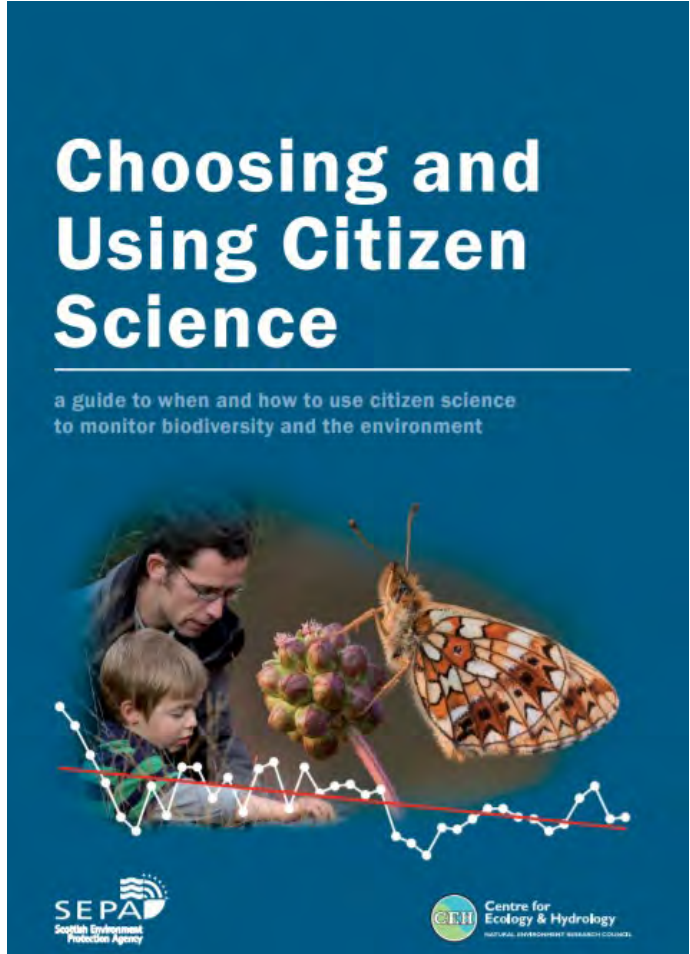
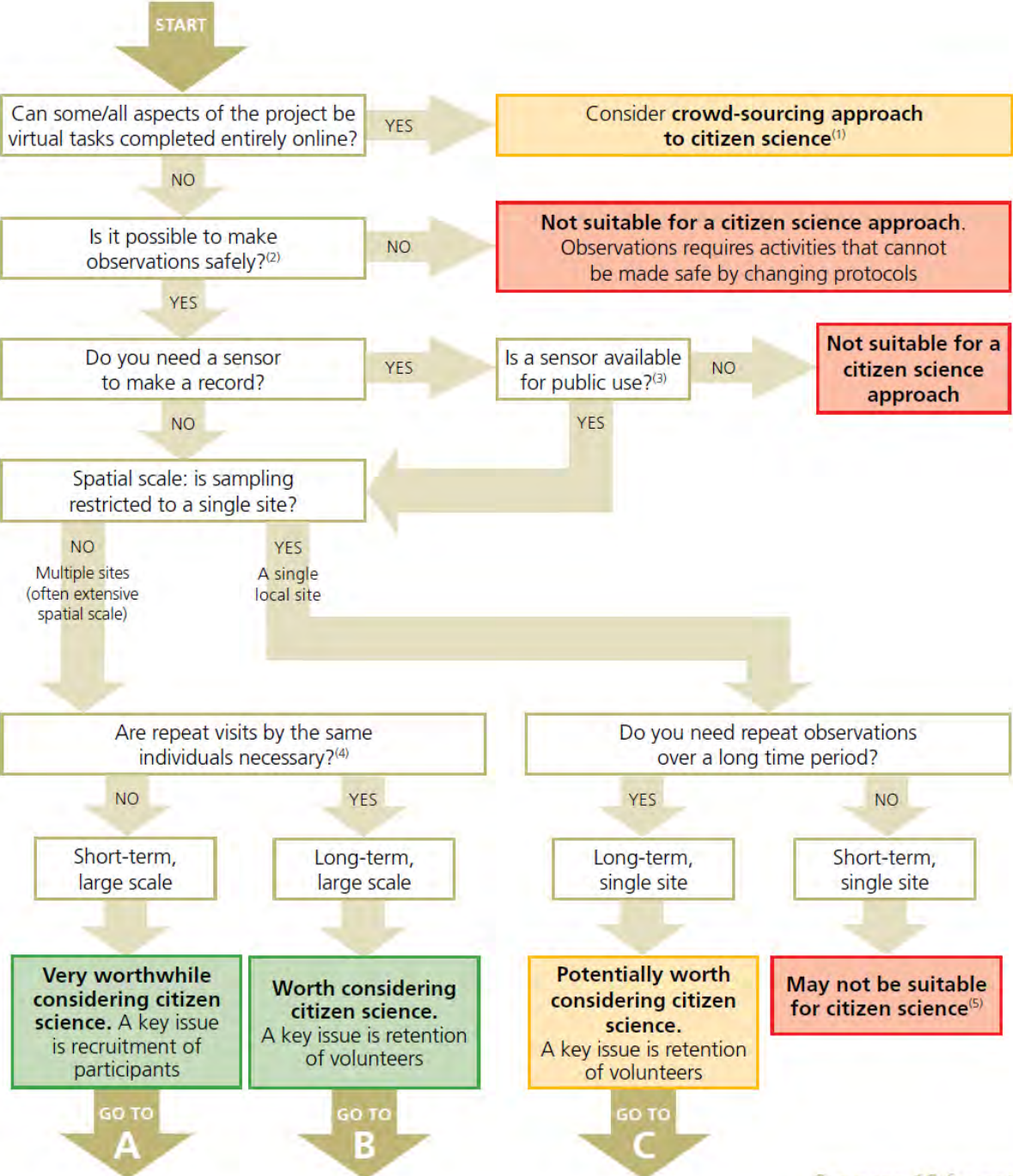
TIME4CS Citizen scientists' motivations

Environmental monitoring projects

Motivational function	Specific motivation	Sources
Values	Interest in wildlife Concern for the environment, wildlife or conservation	Weston et al. 2006, Davies et al. 2011, Hobbs and White 2012, Johnson et al. 2014, Wright et al. 2015, Geoghegan et al. 2016, Martin et al. 2016
	Contribution to science and data collection	Davies et al. 2011, Hobbs and White 2012, Wright et al. 2015, Geoghegan et al. 2016, Martin et al. 2016
Understanding	Desire to learn and exchange knowledge	Bell et al. 2008, Thiel et al. 2014, Martin et al. 2016
Recreation / Enhancement	Opportunity to spend time in nature or outdoors	Bell et al. 2008, Johnson et al. 2014, Wright et al. 2015
	Gaining public recognition for their efforts	Thiel et al. 2014
Social	Social interactions	Bell et al. 2008
	Collectivism	Rotman et al. 2012



*CS is a method like any other scientific method
– only use when appropriate!*



Pocock et al. 2014: <https://www.ceh.ac.uk/citizen-science-best-practice-guide>

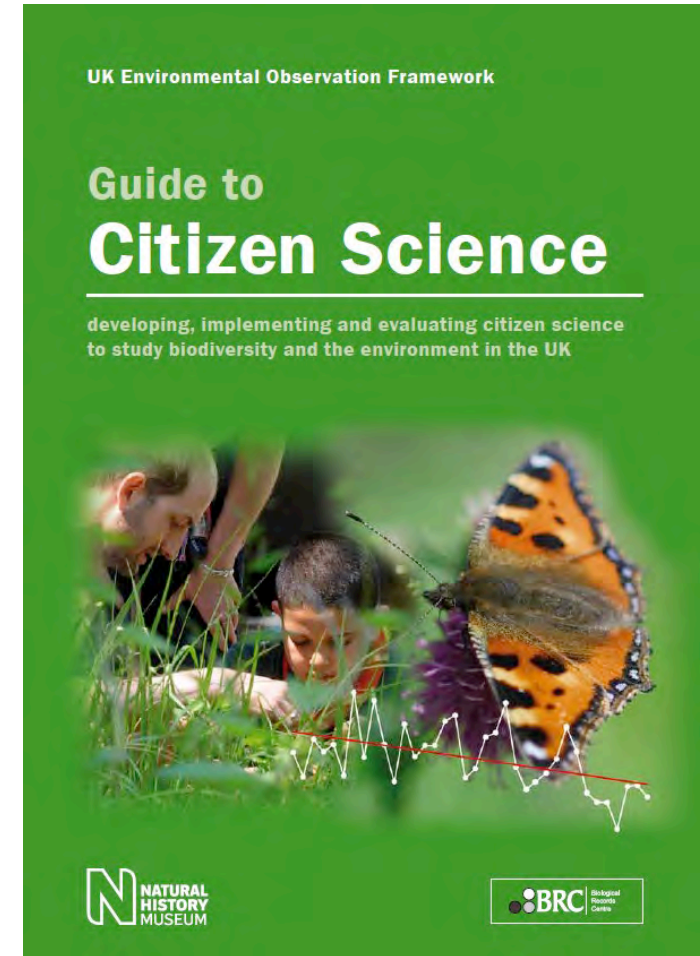
The TIME4CS project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006201



TIME4CS Setting up for success

1	Before you start	
	Is citizen science the best approach?	2
	Choose a citizen science approach	4
2	First steps	
	Establish project team	7
	Define project aims	8
	Identify funding and resources	9
3	Development phase	
	Identify and understand target participants	10
	Design the survey or scheme	12
	Consider data requirements	14
	Consider technological requirements	16
4	Live phase	
	Develop supporting materials	17
	Test and modify protocols	19
5	Analysis and reporting phase	
	Promote and publicise the project	21
	Accept data and provide rapid feedback	22
	Plan and complete data analysis and interpretation	23
	Report results	24
	Share data and take action in response to data	25
	Evaluate to maximise lessons learned	26
Resources and links		

*CS is a method like any other scientific method
– only use when appropriate!*



Pocock et al. 2014: <https://www.ceh.ac.uk/citizen-science-best-practice-guide>

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TIME4CS Exploring citizen science methodologies for research

Interactive session – 20 min

- Present yourself and your citizen science project or project idea
- Please consult the handouts in terms of levels of citizen participation and decision framework for choosing and using citizen science
- Discuss opportunities and challenges for researchers, participants and other stakeholders in using CS methodologies for one or more of your presented projects / project ideas

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Planning your citizen science project



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Existing resources, building your team,
project design, volunteer management,
evaluation and impact



TIME4CS ECSCA's 10 principles of citizen science

Ten principles of citizen science

1. Citizen science projects actively involve citizens in scientific endeavour that generates new knowledge or understanding.
2. Genuine science outcome.
3. Both scientists and citizen scientists benefit.
4. Participation in multiple stages of the scientific process.
5. Citizen scientists receive feedback.
6. Citizen science is considered a research approach like any other.
7. Data and metadata are made publicly available, results are published in an open-access format.
8. Citizen scientists are acknowledged.
9. Citizen science programmes are evaluated.
10. Legal and ethical issues considered.

[ECSCA's 10 principles online](#)

[ECSCA's Characteristics of Citizen Science \(Zenodo\)](#) & [Contours of Citizen Science \(Royal Society\)](#)

Citizen science is a flexible concept which can be adapted and applied within diverse situations and disciplines. The statements below were developed by the 'Sharing best practice and building capacity' working group of the **European Citizen Science Association**, led by the Natural History Museum London with input from many members of the Association, to set out some of the key principles which as a community we believe underlie good practice in citizen science.

1. **Citizen science projects actively involve citizens in scientific endeavour that generates new knowledge or understanding.** Citizens may act as contributors, collaborators, or as project leader and have a meaningful role in the project.
2. **Citizen science projects have a genuine science outcome.** For example, answering a research question or informing conservation action, management decisions or environmental policy.
3. **Both the professional scientists and the citizen scientists benefit from taking part.** Benefits may include the publication of research outputs, learning opportunities, personal enjoyment, social benefits, satisfaction through contributing to scientific evidence e.g. to address local, national and international issues, and through that, the potential to influence policy.
4. **Citizen scientists may, if they wish, participate in multiple stages of the scientific process.** This may include developing the research question, designing the method, gathering and analysing data, and communicating the results.
5. **Citizen scientists receive feedback from the project.** For example, how their data are being used and what the research, policy or societal outcomes are.
6. **Citizen science is considered a research approach like any other, with limitations and biases that should be considered and controlled for.** However unlike traditional research approaches, citizen science provides opportunity for greater public engagement and democratisation of science.
7. **Citizen science project data and meta-data are made publicly available and where possible, results are published in an open access format.** Data sharing may occur during or after the project, unless there are security or privacy concerns that prevent this.
8. **Citizen scientists are acknowledged in project results and publications.**
9. **Citizen science programmes are evaluated for their scientific output, data quality, participant experience and wider societal or policy impact.**
10. **The leaders of citizen science projects take into consideration legal and ethical issues surrounding copyright, intellectual property, data sharing agreements, confidentiality, attribution, and the environmental impact of any activities.**

TIME4CS Infrastructures

Examples

- [EU-citizen.science](https://eu-citizen.science)



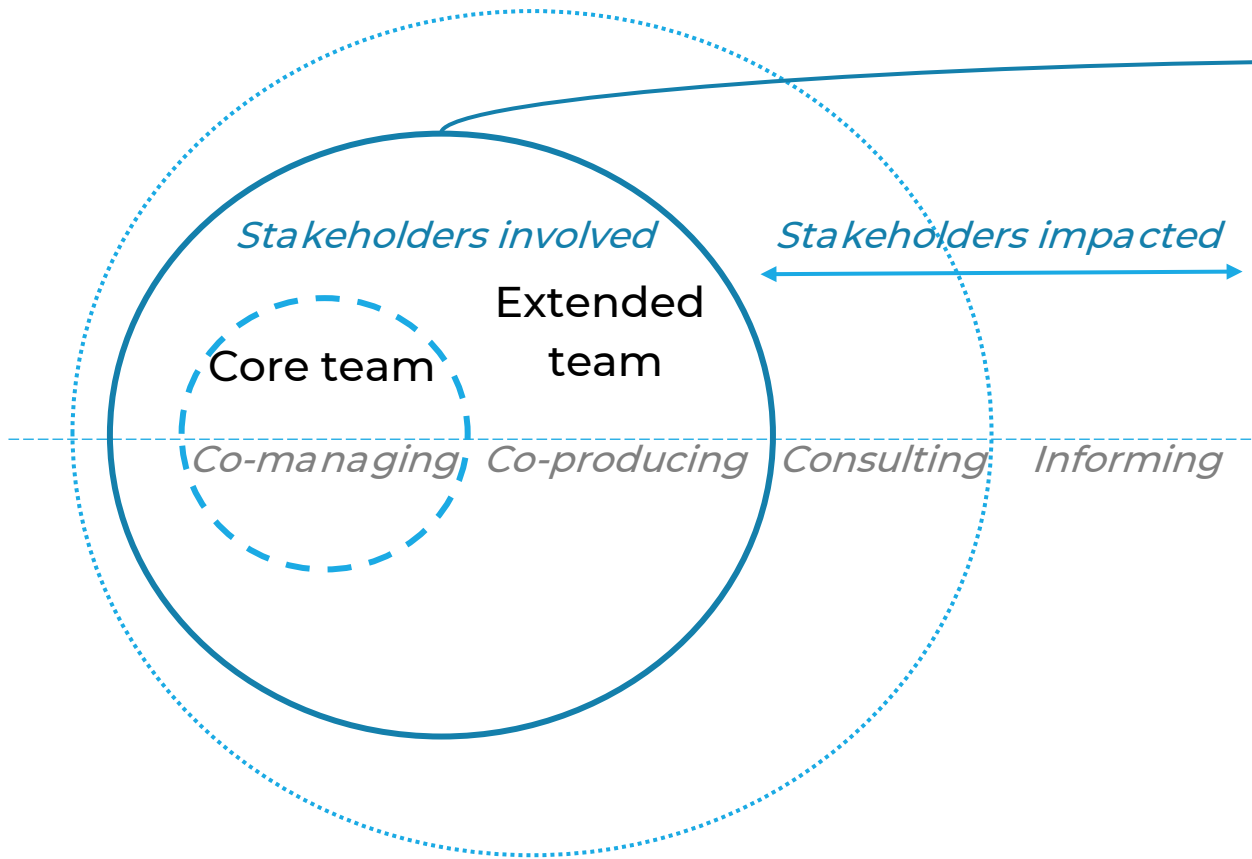
The screenshot shows the homepage of eu-citizen.science. At the top, there is a navigation bar with links for Search, Blog, Events, Moocs, Forum, FAQ, and About. Below the navigation bar, the text "eu-citizen.science" is displayed in a large, green font. Underneath, a welcome message reads: "Welcome to the platform for sharing citizen science projects, resources, tools, training and much more". A horizontal menu contains icons and labels for Projects, Resources, Training, Organisations, Platforms, and Users. A search bar is located below the menu. The main visual is a colorful illustration of a diverse group of people, including an elderly man with a cane, a woman with a child, a woman in a wheelchair, and a young girl, standing together. The text "Join the community and participate" is written in blue and black at the bottom left of the illustration.

- [Cos4Cloud](https://cos4cloud.eu) (part of European Open Science Cloud, [EOSC](https://eosc.eu))



The screenshot shows the homepage of Cos4Cloud. At the top, there is a navigation bar with links for The Project, Citizen Science innovation, Cos4Cloud Services, Co-design & testing, Education, and News & Events. Below the navigation bar, the text "Cos4Cloud" is displayed in a large, blue font. Underneath, a headline reads: "Cos4Cloud, a European Horizon 2020 project to boost citizen science technologies". Below the headline, a paragraph of text states: "We are developing thirteen technological services to improve citizen observatories by helping them to increase the quantity and the quality of observations." A blue button with the text "LEARN MORE" and a right-pointing arrow is located at the bottom right of the main content area. The background of the main content area is a large, circular image showing a network of people connected by lines, representing a community or network.

TIME4CS Build your team



Change agents:

- Active individuals, based on personal motivations.
- Dynamic informal groups or networks, such as student associations, existing science clubs
- Committed citizen science or open science officers, librarians
- Supportive institutional figures, such top-managers; middle-managers; PIs

TIME4CS Prepare for volunteers: Gatekeepers

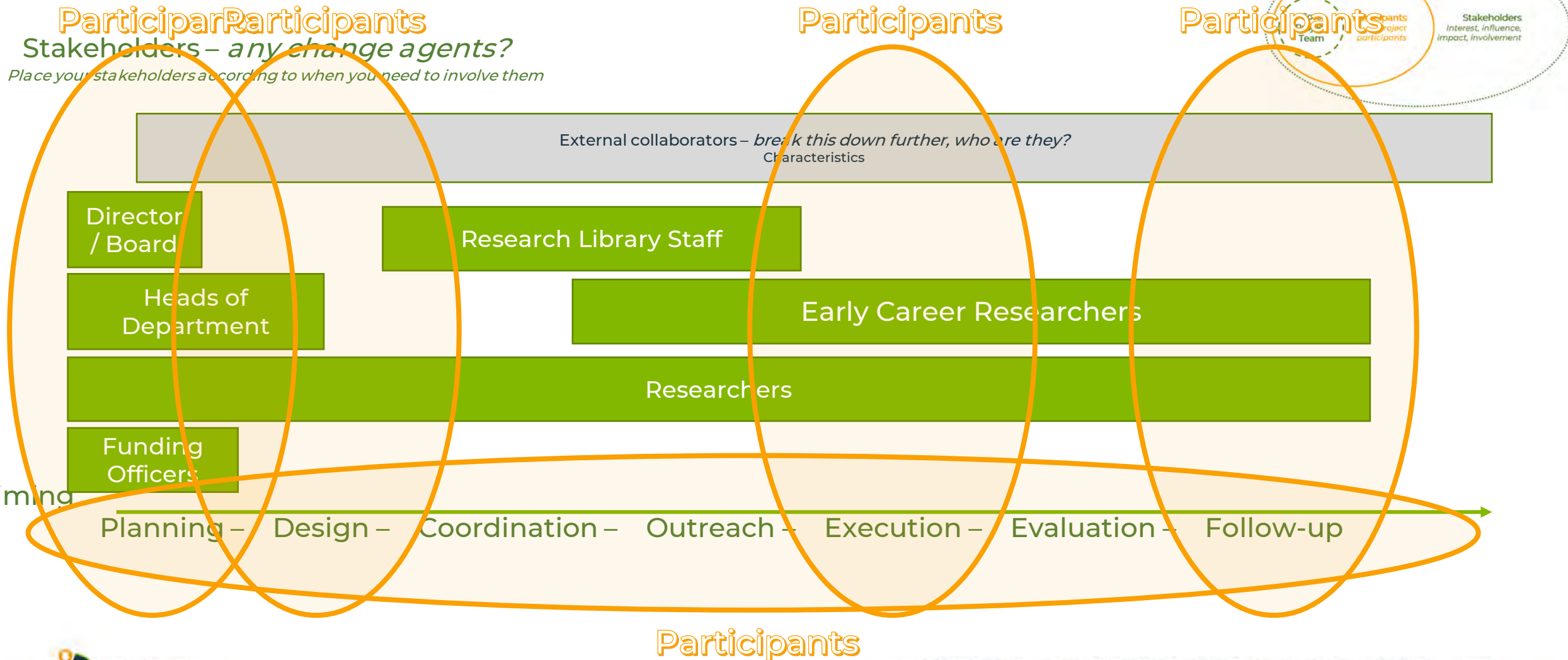


Frits Ahlefeldt

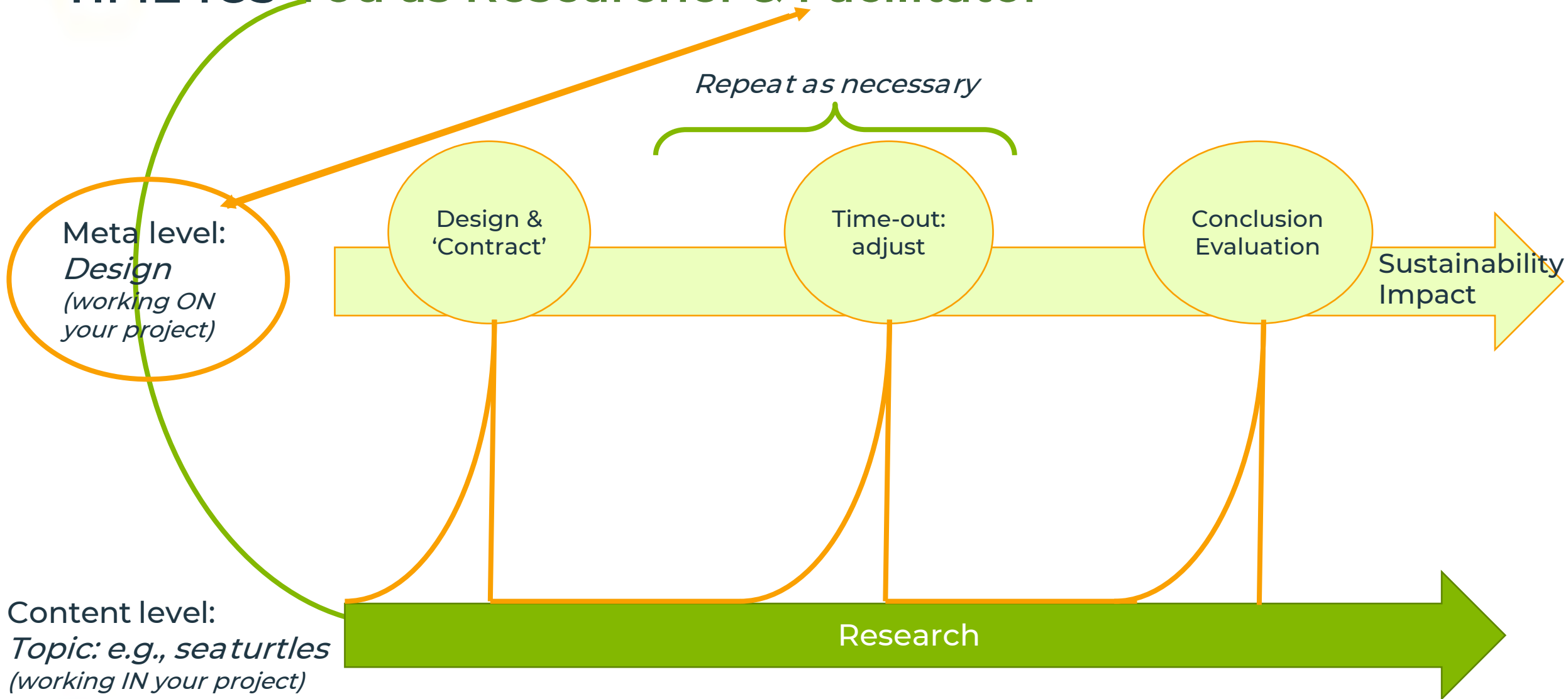
Hitch a ride on existing networks, events or organisations

TIME4CS Stakeholder Analysis example: Timing/Stakeholders

Stakeholder mapping for Citizen Science project implementation



TIME4CS You as Researcher & Facilitator





LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY



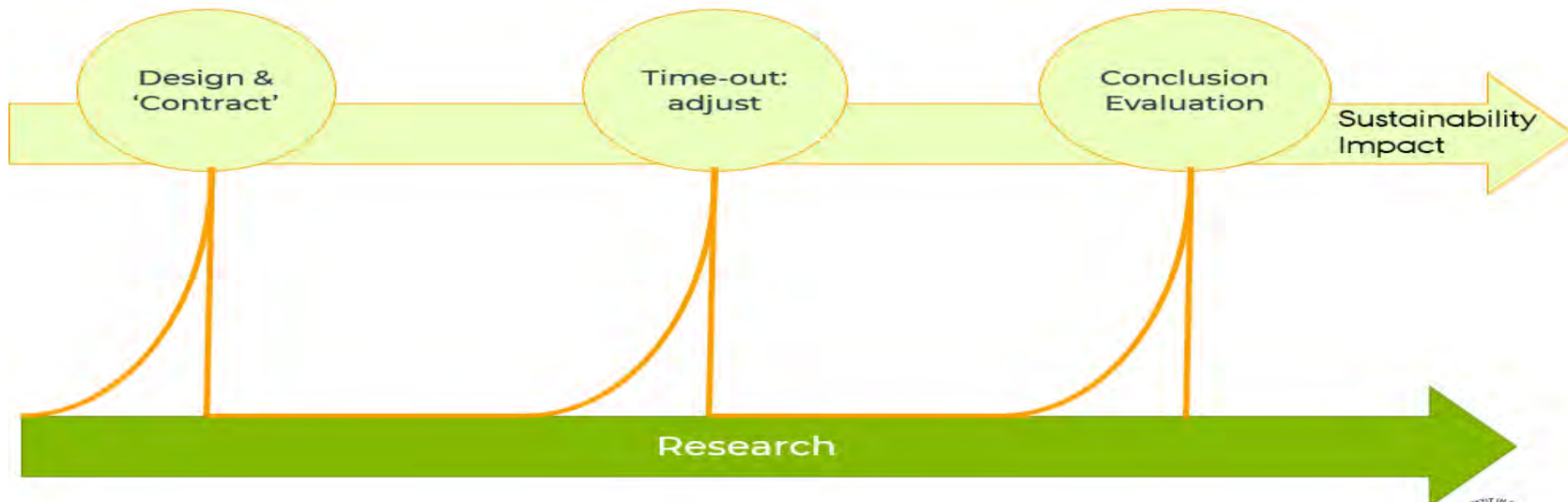
City Nature Challenge

Design: Bioblitz, 2 days

'Contract': record sightings on iNaturalist during Bioblitz within certain area (Farmer orchards in Luxembourg)

Time-out/adjust:
On day 1: quick adjustments, catching some bugs to show on stands
Day 2: No intro-video

Evaluation:
Feedback from participants
Lessons learned, discussion



First results (02/05/2022 11:00)

Total results: 10% of observations from Luxembourg!



Ramborn Orchard Hiking

701 OBSERVATIONS 249 ESPÈCES 129 IDENTIFICATEURS 72 OBSERVATEURS

Carte Grille Liste Endroits intéressants Refaire la recherche sur la carte

Ixodes ricinus
(Tique du Mouton)
Born, Mompach, Dis... • Hier
1h

Genre *Heracleum*
Born, Mompach, Dis... • Hier
1h

Pararge aegeria
(Tircis)
Born, Mompach, Dis... • Hier
Niveau de recherche 1h

Buteo buteo
(Buse Variable)
Born, Pétzwee, 666... • Hier
Niveau de recherche 13 h

Nedyus quadrimaculatus

TIME4CS Project evaluation

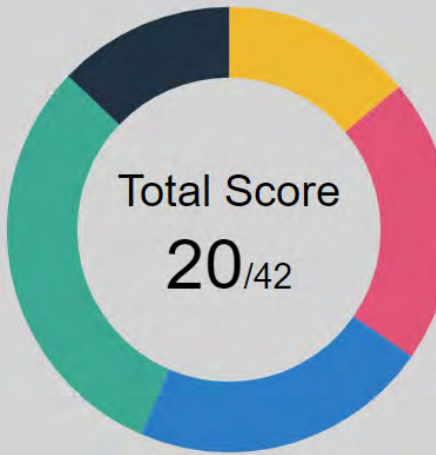
It starts when the project starts! Not only at the end...

Formative evaluation

- At project start – what are the expectations for the project for all involved?
- How will that shape ('form') the project?
- At regular intervals during the project – what have you learned? What works well? What might need to be adapted / changed?

Summative evaluation

- At project end – were expectations fulfilled for all involved?
- What are the results, how to disseminate and build on them?
- Is there basis for a follow-on project? How about further funding?



- Home
- About
- Impact guidance
- Project catalogue
- Log in
- Register

+ Create project

MICS: Measuring the impact of citizen science

MICS allows you to:

(see the [how-to guide](#) for more details)

Assess the impact of a citizen-science project, through metrics and indicators across different domains.

Look at different projects in the same discipline and **compare** their impact.

Evaluate the impact of a project from conception to realisation and beyond, seeing how impact **changes over time**.

Produce an impact summary to **share** with communities, stakeholders, funders and policy makers.

Science

Environment

Economy

Governance

Society

Project catalogue - Take a look at other projects and their impact

Domain	Indicator Cluster	Indicator Title
Science & Technology	Data collection and management	Date and system (indicator data)
	Collaborative science	Collaborative and synergic scientific research Scientific participation in research Scientific contribution (1) Scientific contribution (2) Scientific value of data Written material Knowledge democracy Scientific openness Management and policy Scientific outcomes
	Contribution to science	Scientific outcomes Communication material Science innovation & impact Education and adaptation
	Decision making	Scientific outcomes Communication material Science innovation & impact Education and adaptation
Economy	Business	Business
	Employment	Employment
Environment	Environment	Environment
	Environment	Environment
Governance	Governance	Governance
	Governance	Governance

Featured projects

Sort projects by:

All projects

Arts (1)

Biology (4)

Climate (3)

History (1)

Language (0)

Literature (0)

Medicine (3)

Nature (5)

Dark Sky Meter

D-NOSES

FreshWater Watch

iMars

Marzenego (MICS)

Roadkill

TIME4CS Citizen Science Research & Methodology

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15:50-16:00	<ul style="list-style-type: none">• Wrap up and evaluation



Data management and open science practices in citizen science projects

How to enhance accessibility and collaboration, promote transparency and reproducibility, boost public engagement and trust, and foster innovation and capacity-building

TIME4CS

SUPPORTING SUSTAINABLE INSTITUTIONAL CHANGES TO PROMOTE CITIZEN SCIENCE IN SCIENCE AND TECHNOLOGY



TIME4CS The benefits of open science

Open science offers an array of benefits across five domains

- Supporting the growth of the knowledge economy/society
 - Reciprocity between research, innovation, civil society, and governance
- Improving the integrity, reliability, and transparency of research
 - Enhanced credibility and legitimacy for scientific research
- Generating social and public benefit
 - Social needs articulated by the public inform greater share of research
- Strengthening scientific literacy and education
 - A rigorous and inquisitive approach and better informed decisions
- Improving public policy and democracy
 - Flow of knowledge from science into policy-making and deliberation

TIME4CS Components of open science

Citizen science as open science

- Engagement with societal actors and stakeholders
 - Enhanced dialogue between scientists, policymakers and practitioners, entrepreneurs and community members (knowledge holders)
- Access to infrastructures of scientific knowledge production and dissemination
 - Shared repositories for data and code, publication platforms, open labs, etc.



TIME4CS What is FAIR Data? Why is FAIR Data important to citizen science?

FAIR = Findable, Accessible, Interoperable, Reuseable

- Enhanced findability, accessibility, and learning opportunities
 - Enables diverse participation and fosters inclusivity and learning
- Increased engagement, collaboration, and innovation
 - Facilitates effective collaboration leading to innovative solutions and the development of new research projects
- Improved data quality and validation
 - Allows broader scrutiny for error identification and correction, and enables validation through replication and reanalysis
- Public value and impact
 - Promotes the broader dissemination of research, informing decision-making and enabling advocacy for community changes

Guide to Data Charter for Citizen Science

v1.0

A basic set of principles
to support open and
interoperable
citizen-science data



Flanders
State of
the Art

SCivil
Citizen Science
Vlaanderen

2021

Note

obtaining '5-star open data'

Globally, there is a growing trend towards publishing '5-star open data', also known as 'Linked Open Data' (LOD).

This involves structuring and defining data in such a way that you can easily link it digitally (within the boundaries of privacy and security regulations) and in which data exchange becomes easier. Sir Tim Berners-Lee, the inventor of the world wide web, translated this so-called **interoperability** into a graduated scale (see Figure 2).

The higher you are on the scale, the easier it is for others to reuse your project data.

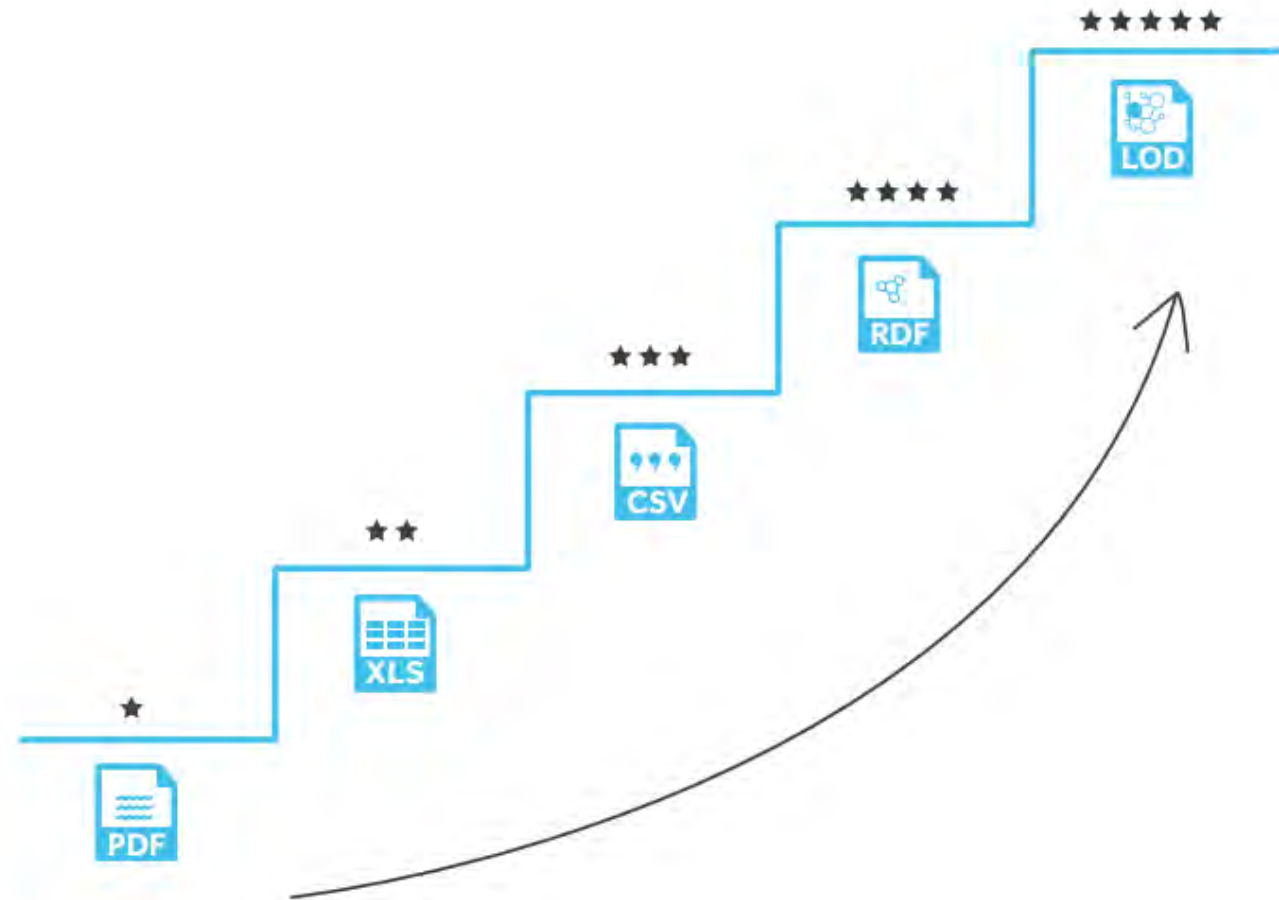


Figure 2
'5-Star Open Data'

TIME4CS Introducing the open attitude

How to make your citizen science “stuff” available on the web (whatever format) under an open license

- Aim to publish your data openly on the web, or give a clear and well-founded reason if this is not possible
- Publish your data under an open licence that you choose from a short, recommended list
 - For example, the Creative Commons license or the Open Data Commons
- Publish your research results and findings where possible in Open Access Journals
 - Where possible, also publish the software you develop under open licences
- Actively seek for open data – and seek advice from support services
 - For example, the library or open science officers

TIME4CS Privacy and ethics challenges

How to maintain adherence to privacy and ethics standards in citizen science projects

- Informed content and transparent communication
 - Prioritize obtaining clear and informed consent from participants, ensuring they are fully aware of the project's goals, risks, and their rights
 - Maintain open and transparent communication about project goals, data usage, and results, forstering trust and collaboration
- Data protection measures
 - Implement robust data protection measures such as encryption and anonymization to safeguard sensitive information (GDPR compliance)
- Diversity and inclusivity
 - Promote diversity and inclusivity in project participation, making it accessible and equitable to different demographics, and considering diverse needs and perspectives in project design and implementation

How to ensure the cleanliness, accuracy, and quality of citizen-science data within a database or information system

- Data validation and regular data audits and cleaning
 - Apply rigorous data validation techniques to ensure the accuracy and consistency of the collected data
 - Identify and rectify errors, duplicates, and inconsistencies to maintain data integrity and prevent the propagation of incorrect information
- Maintain data security and privacy
 - Employ robust security measures and privacy protocols to protect data from unauthorized access, loss, or corruption
- Standardize data collection and management
 - Develop and adhere to standardized protocols for data collection, entry, and management, ensuring uniformity and consistency in data handling, facilitating easier analysis, and interpretation of citizen-contributed data

How to secure the coherence, reliability, and enhanced usability of the collected data

- Clear, consistent and standardized data protocols
 - Establish and communicate clear data collection, processing, and management protocols, ensuring standardized guidelines and procedures
 - Adopt and enforce data standardization norms and formats to ensure uniformity and consistency across datasets, facilitating seamless integration, analysis, and interpretation of the collected data
- Metadata management and the linking of datasets, if possible
 - Emphasize the creation and management of comprehensive metadata to provide detailed descriptions of the data, offering context and enhancing the understandability, discoverability, and usability of the datasets
 - Facilitate the integration and linking of datasets across different projects, promoting interoperability and collaboration



Summary: A decision- framework approach to data management in citizen science

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TO PROMOTE CITIZEN SCIENCE IN
SCIENCE AND TECHNOLOGY



TIME4CS Data management in citizen science

A decision-framework approach to data management providing a structure to evaluate alternatives systematically

- Define data management objectives
 - Ensure data management objectives align with the overall goals of the citizen science project: specifying the type, quality, and format of data to be collected, managed, and analyzed
- Establish data standards and protocols
 - Define the acceptable formats, quality criteria, and metadata requirements, enabling uniformity and enhancing the usability and interoperability of the collected data
- Evaluate and optimize data management practices
 - Monitor compliance with the established standards and protocols, addressing any discrepancies, and adapting practices as needed to accommodate evolving project needs and technological advancements

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Volunteer management, communication, and public engagement in citizen science projects

How to foster engagement, community, and learning to promote trust, credibility and project success



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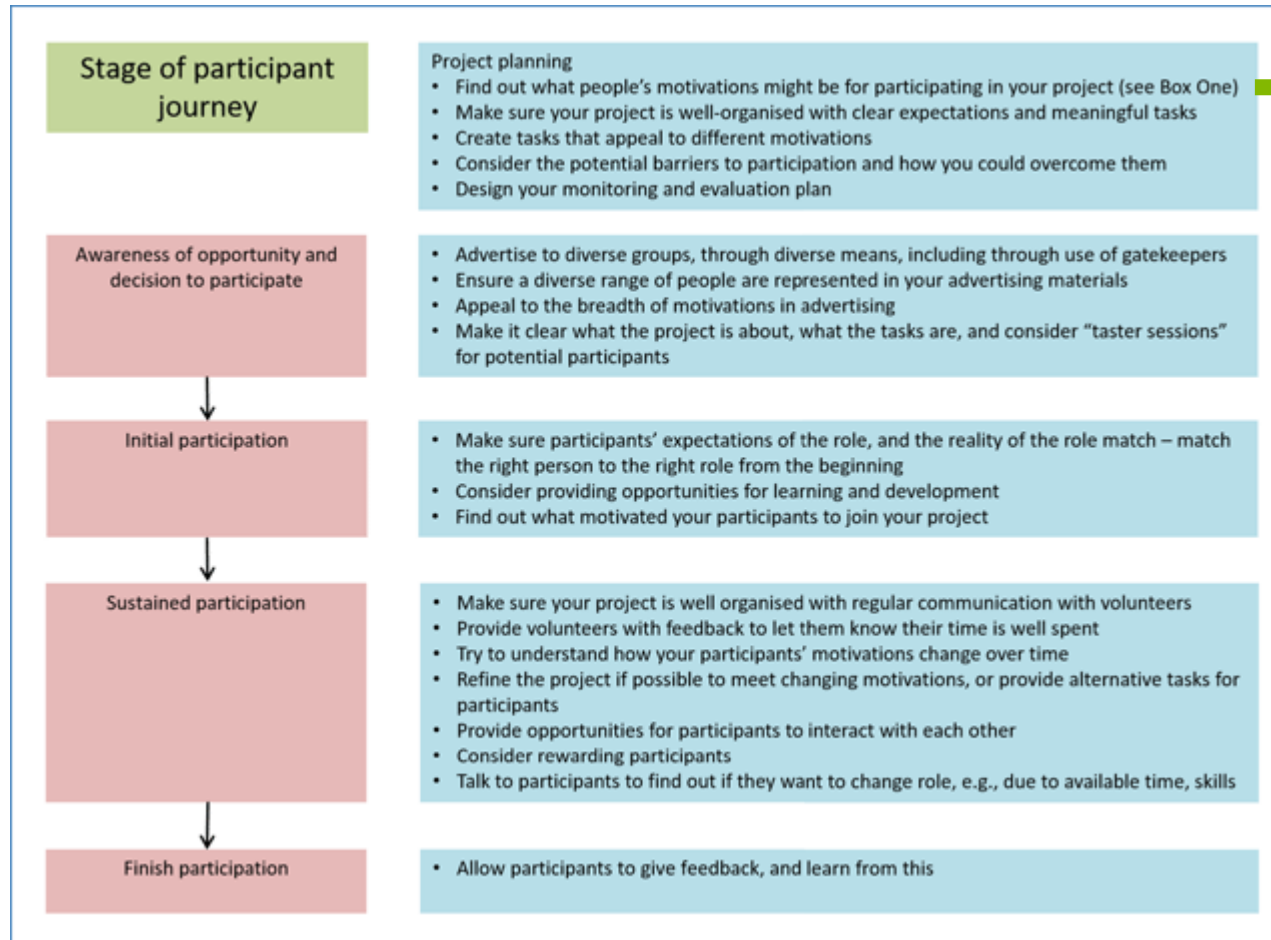


TIME4CS Volunteer management

What is volunteer management? Why is it important to citizen science?

- Definition of volunteer management
 - Volunteer management in citizen science refers to the systematic coordination and organization of volunteer contributions, including the recruitment, training, support, and development of volunteers, to optimize their involvement and ensure the effective execution of the project
- Enhancement of volunteer contribution
 - Effective volunteer management is crucial as it optimizes the engagement and contributions of volunteers, ensuring their skills and efforts are utilized productively and contribute effectively to the achievement of project goals
- Sustaining volunteer participation
 - High levels of volunteer motivation and satisfaction help to ensure the retention of participants and foster a sense of community and belonging

TIME4CS Factors that influence the volunteers' journey



Intrinsic Motivations (Finkelstien 2009)

- Understanding (Clary and Snyder 1999)
 - Wanting to learn new things (Bell et al. 2008)
 - Wanting to share existing knowledge with others (Bell et al. 2008)
- Values (Clary and Snyder)
 - Helping other people (Raddick et al. 2013)
 - Helping science (Raddick et al. 2013)
 - Helping the environment (Hobbs and White 2012)
 - Help a particular site (Jacobsen et al. 2012)
- Social (Clary and Snyder 1999)
- Enhancement (Clary and Snyder 1999)
- Protective (Clary and Snyder)

Extrinsic Motivations (Finkelstein 2009)

- Career (Clary and Snyder 1999)

The motivations of volunteers in citizen science

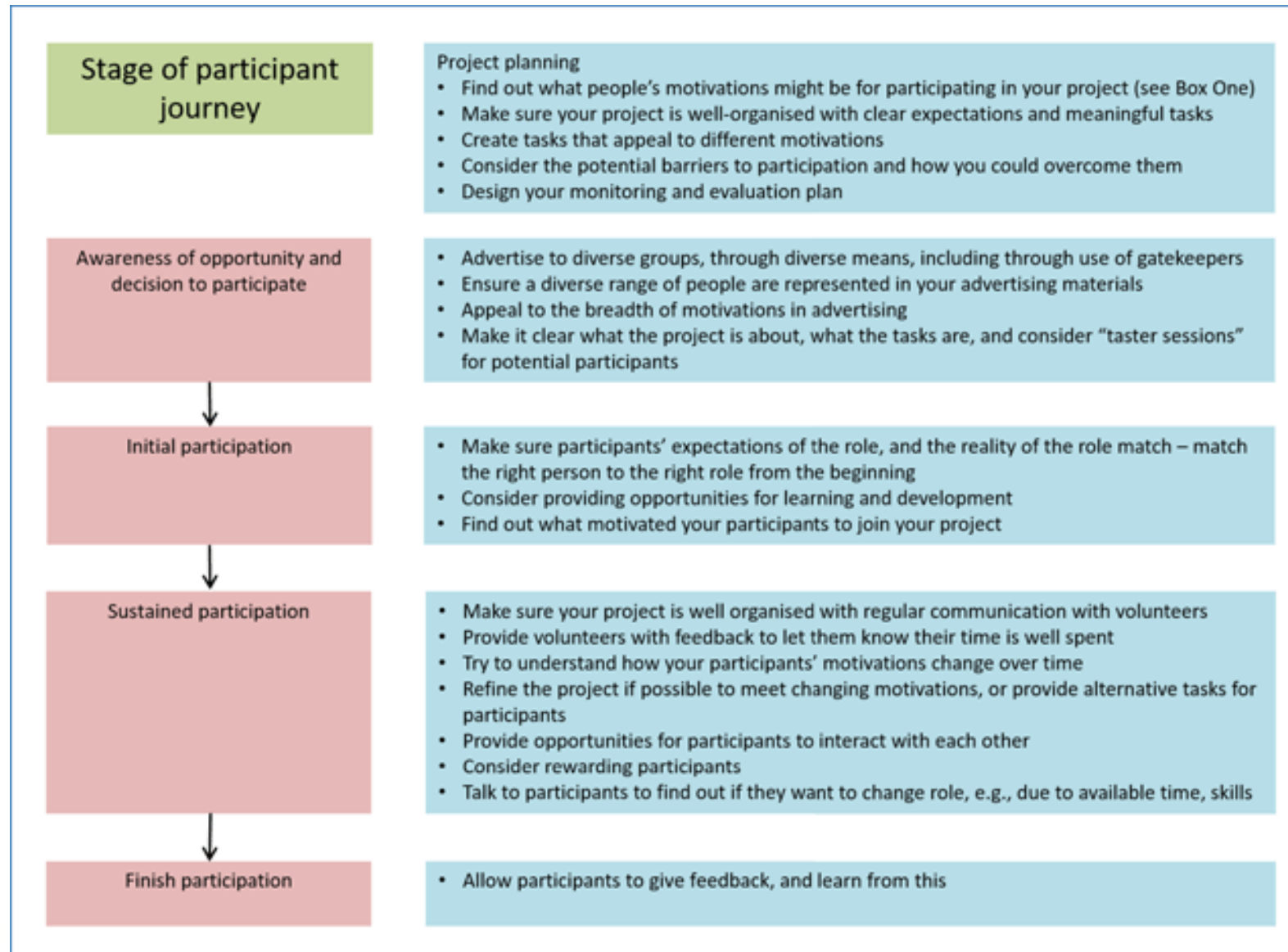
Gitte Kragh discusses the motivations that drive volunteers to participate in citizen science.

“Because citizen science projects depend on their volunteers, understanding the motivations of volunteers can enhance recruitment, ensure good retention rates and ultimately make the citizen science project a success.”

▼ **Table 1. Self-directed and altruistic motives of volunteers in citizen science. Often volunteers have more than one reason for participating in citizen science, and often it is a combination of self-directed and altruistic motives.**

Self-directed motives	<ul style="list-style-type: none">• Have a personal interest in the topic studied^{10,11,12,13,14,15,16}• Desire to learn something new^{9,17}• Desire to discover something new^{11,18}• Desire to spend time in nature^{9,10,12}• Socialising with like-minded people⁹
Altruistic motives	<ul style="list-style-type: none">• Desire to volunteer for a cause^{10,12,13,15,19}• Wish to contribute to science^{11,12,14,15,16}• Feel it is important to help¹⁴

TIME4CS Checklist for project organizers



TIME4CS Volunteer management in citizen science

How to create an informed and motivated environment conducive to the success of citizen science projects

- Implement efficient onboarding processes
 - Develop and implement comprehensive onboarding and training sessions to ensure clarity and understanding of project goals and to equip volunteers with the necessary skills and knowledge, fostering a sense of confidence and preparedness amongst participants
- Maintain regular communication
 - Establish consistent communication channels for ongoing engagement, providing regular updates, feedback, and support, to keep volunteers informed, motivated, and valued, thereby sustaining participation and enthusiasm

TIME4CS Volunteer management in citizen science

How to create an informed and motivated environment conducive to the success of citizen science projects

- Adopt effective organizational practices and tools
 - Embrace organizational practices that are structured and efficient to enhance volunteer engagement, such as clearly defined roles, responsibilities, and workflows, enabling volunteers to contribute more effectively and feel a stronger connection to the project
 - Leverage volunteer management software to organize, coordinate, and monitor volunteer activities efficiently
- Recognize and value contributions
 - Regularly acknowledge and appreciate volunteer efforts and contributions, fostering a sense of value and accomplishment, which boosts morale, encourages ongoing participation, and aids in volunteer retention

Designing a communication plan to ensure clarity, relevance, learning and continued engagement



TIME4CS

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TO PROMOTE CITIZEN SCIENCE IN
SCIENCE AND TECHNOLOGY**



TIME4CS Communication and engagement

How to foster engagement, build trust and community, and facilitate ongoing learning and improvement

- Five phases to design a communication plan
 1. Define projects aims, decide the level of engagement, and set clear communication objectives
 2. Identify target audience (volunteers and others) in terms of their interests, expectations and motivations to participate
 3. Choose appropriate channels and tools to leverage accessible and interactive platforms that best reach the intended audience
 4. Establish regular and transparent communication with consistent updates, sharing progress, and being open about challenges and changes, keeping volunteers informed, engaged, and motivated, enhancing their learning and sense of connection and commitment to the project
 5. Evaluate and adjust strategy, considering feedback and changing circumstances to enhance its impact



Interactive session: Navigating data and volunteer management in citizen science

Engage in understanding and discussing the integral aspects of data and volunteer management within citizen science projects

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TO PROMOTE CITIZEN SCIENCE IN
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TIME4CS Navigating data and volunteer management (incl. communication) in citizen science projects

Interactive session, app. 20 minutes

- Divide your group's flip chart into three categories: 1. Data Management, 2. Volunteer Management, and 3. Communication
- Within each category, list principal terms that represent the best practices in citizen science projects
- Engage in a discussion about the challenges faced by organizers versus participants of citizen science projects concerning all three areas

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Developing institutional roadmaps for integration of citizen science in RPOs

Organisational changes, Reflection tool and Roadmapping



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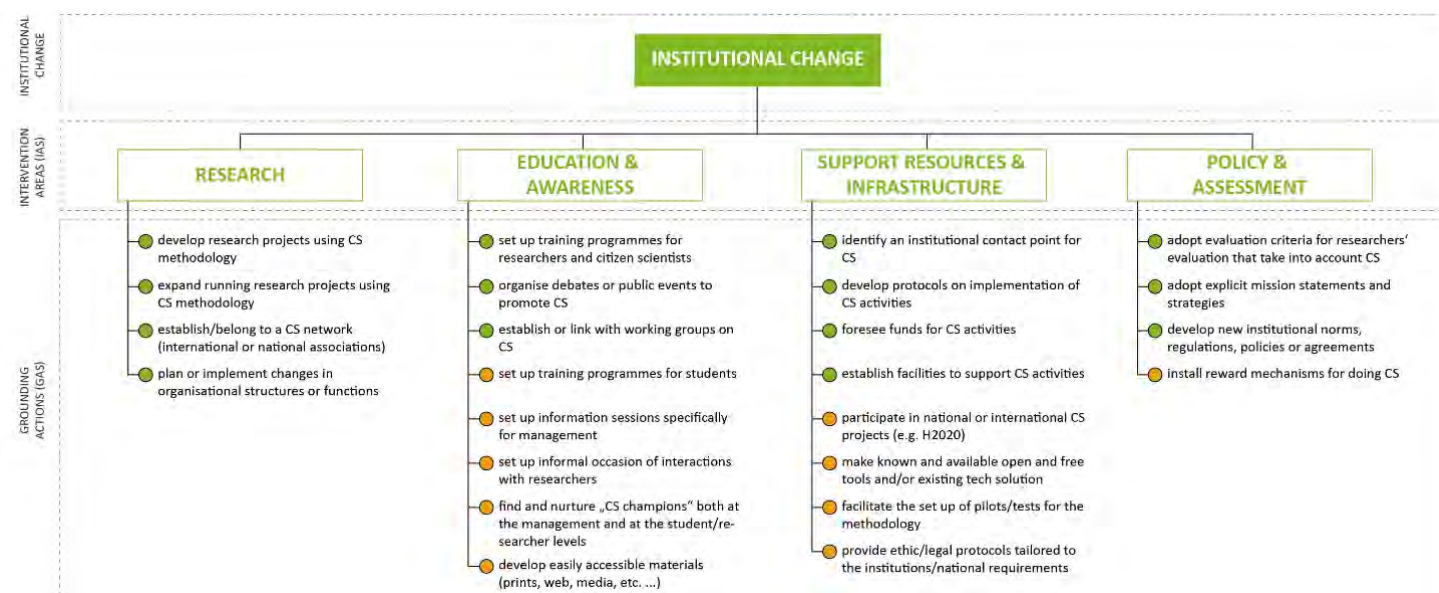


REFLECTION TOOL

for Institutional Changes in Citizen Science

January 2022

Prepared by
Eugenia Vilarchao
Marie Fleck
Ildiko Ipolyi



Disclaimer: The information and views set out in this report are those of the author(s) and do not necessarily reflect the official opinion of the European Union. Neither the European Union institutions and bodies nor any person acting on their behalf may be held responsible for the use which may be made of the information contained herein.



TIME4CS What are organisational changes?

Individual level / social approach

- Starts from modification of social patterns (cognitive, emotional or relational)
- Uses personal commitment to change own behaviours, views, mindsets
- Mostly (usually) bottom-up approach

Organisational level / organisational approach

- Aims to modify organisational structures (norms, procedures, protocols)
- More responsibility on leaders / management, using hierarchical relations to change norms
- Top-down approach, but can support social approach

TIME4CS Reflection Tool Step 1: Stock-taking exercise

1. General info: Identify Opportunities & Barriers to implementing and accepting CS
2. Re. **Research**:
 1. Any CS projects/proposals within institution? How many and descriptions?
 2. Any publications related to CS within institution? How many? Links?
3. Re. **Education & Awareness**:
 1. Capacity building: how is the awareness of CS and CS expertise? Any CS trainings available?
 2. Communication & Debate: Any info channels inviting the public to participate, in projects, debates, dialogues, discussions on CS? Describe them, or find link
4. Re. **Support Resources & Infrastructures**:
 1. Networks: in any active networks, collaborations, organisations related to CS (e.g., ECSA)? Member of national CS network? Institutional member of ECSA?
 2. Funding: Any CS funding opportunities you know of or use?
 3. CS Champions: are there any CS Champions driving CS forward in your institution? A CS coordinator? Dedicated contact point / person for CS?
 4. Infrastructure: Technical solutions used for CS? Open data archives? Legal/ethical protocols?
5. Re. **Policy & Assessment**
 1. Strategy: Public engagement in strategy? Open science policies? CS in any policy/regulation?
 2. Researcher evaluation: Is public engagement/CS part of researcher assessment?
 3. Management: Any CS Champions at high level? Presentations to management on CS?

TIME4CS AU Citizen Science



AU Citizen Science

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AU Citizen Science

- People and Collaborators
- Citizen science projects
- Upcoming events
- Past events
- Citizen Science Training
- Resources, networks and links
- Media about AU citizen science



Frits Ahlefeldt, Hiking.org

AU CS mailing list

Sign up to our internal AU CS mailing list here

[➤](#)



European Citizen Science Association Member



Welcome! 😊

BREAKING DOWN BARRIERS FOR CITIZEN SCIENCE AT AU

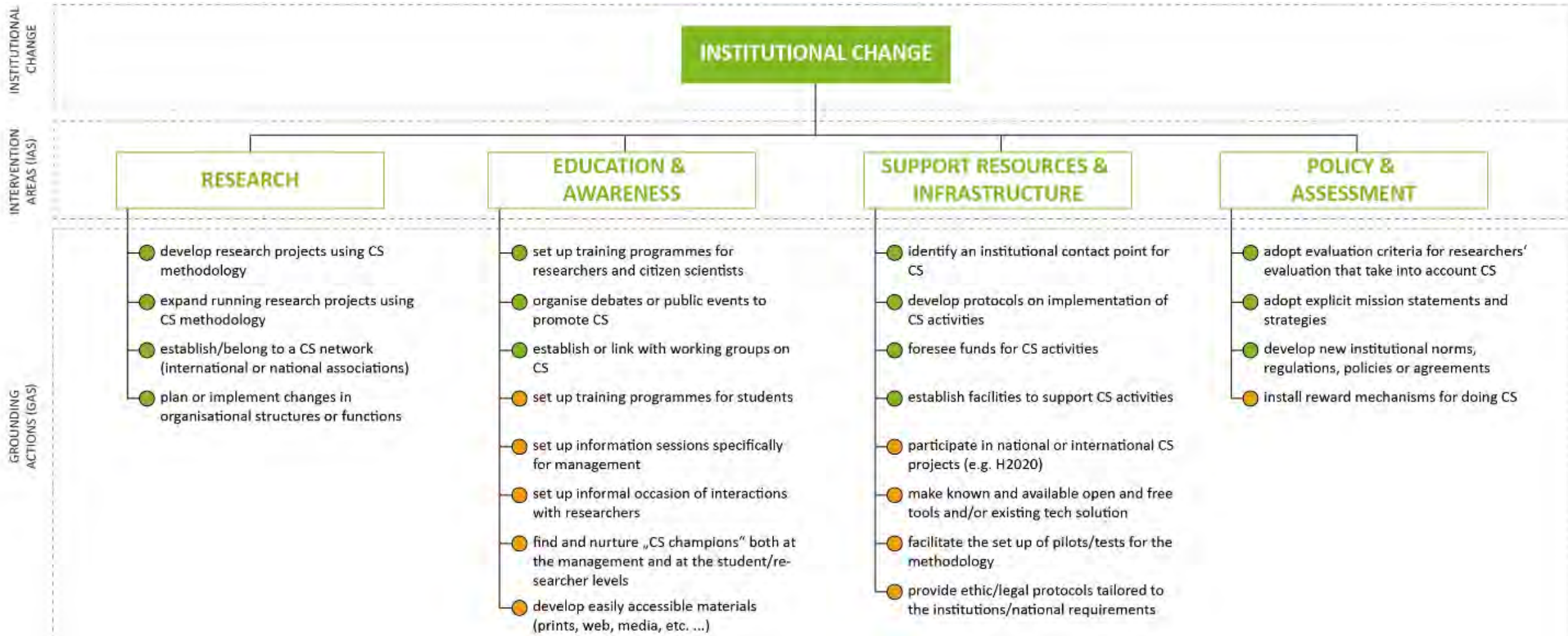
1. Help yourself to lunch
2. Have a chat with the others to... identify barriers you experience in doing CS at AU
3. Write your identified barriers on post-its

AARHUS UNIVERSITY
Department of Mathematics - Centre for Science Education

BRKING DOWN BARRIERS FOR CS
13 JANUARY 2023

GITTE KROGH
MATHS@AU.DK

TIME4CS Reflection Tool Step 2: Selecting Grounding Actions and describe plan of action



TIME4CS Step 2: Make plan



REFLECTION TOOL

for Institutional Changes
in Citizen Science

grounding action #1

name of the grounding action:

.....

short description:

.....

.....

.....

.....

under which intervention area(s)
would you place it?

- Research
- Education and Awareness
- Support resources and Infrastructures
- Policy and assessment
- Other:

.....

.....

TIME4CS Reflection Tool Step 3: Compiling the grounding actions into a Roadmap

- Add all your chosen Grounding Actions (GAs) to timeline
- Check for duplication
- Find synergies across GAs
- List all defined goals for all GAs



Goals	Grounding Action	Intervention Area	Type of Goal
			E.g. STG, MTG or LIG.

GA1 – [name GA1] GA2 – [name GA2] GA3 – [name GA3] GA4 – [name GA4]				
Year 1				
Month 1	E.g.: The Core team prepares a survey to be shared with the research community			
Month 2				
Month ...				
Month 12				
Year 2				
Month 1				
Month 2				
Month ...				
Month 12				
Year 3				
Month 1				
Month 2				
Month ...				
Month 12				

TIME4CS International Community of Practice

- Citizen Science Global Partnership
- Regional associations – working groups & newsletters
 - European Citizen Science Association (ECSA, 2013)
 - Citizen Science Association (CSA, 2012/2014)
 - Australian Citizen Science Association (ACSA, 2014)
 - African Citizen Science Association (2017/2021)
 - South African Citizen Science Association (2023)
 - Asian Citizen Science Association (2018)
 - Red Iberoamericana de Ciencia Participativa (RICAP, 2019)
- National Citizen Science Networks (approx. 17 just in Europe)



TIME4CS Knowledge exchange & inspiration

➤ Upcoming Conferences:

- [European Citizen Science Association](#): 2024 (in-person), Vienna



➤ Working groups, e.g. ECSA

➤ ECSA [newsletter sign-up](#)

➤ [EU-citizen.science](#)

➤ eCOST Actions, e.g. [Alien CSI](#)

➤ [citsci listserv](#) (CSA)



Air quality



BioBlitz



Citizen science and open science



Citizen science and universities



Citizen science for health



Citizen science networks



Green spaces and citizen science



Empowerment, inclusiveness and equity



European Citizen Science Platform



Agri-food



Learning and education in citizen science



Projects, data, tools and technology



Policy, strategy, governance and partnerships



Sharing best practice and building capacity



Storytelling and other arts



Global Mosquito Alert



TIME4CS Citizen Science Research & Methodology

Time	Activities
14:00-14:05	<ul style="list-style-type: none">• Welcome and introduction
14:05-14:20	<ul style="list-style-type: none">• Citizen Science Methodologies
14:20-14:30	<ul style="list-style-type: none">• Determining whether citizen science is right for your research project
14:30-14:50	<ul style="list-style-type: none">• <i>Interactive session:</i> Exploring citizen science methodologies for research
14:50-15:00	<ul style="list-style-type: none">• Planning your citizen science project
15:00-15:10	<ul style="list-style-type: none">• Data management and open science practices in citizen science projects
15:10-15:20	<ul style="list-style-type: none">• Communication, public engagement, and volunteer management in relation to citizen science projects
15:20-15:40	<ul style="list-style-type: none">• <i>Interactive session:</i> Navigating data and volunteer management in citizen science
15:40-15:50	<ul style="list-style-type: none">• Developing institutional roadmaps for integration of citizen science in PROs
15:50-16:00	<ul style="list-style-type: none">• Wrap up and evaluation

TIME4CS Next workshops

Friday, 27
October 2023
Citizen Science Education & Awareness-raising for Research Performing Organisations

Tuesday, 7
November 2023
Citizen Science Support Resources & Infrastructure

Monday, 27
November 2023
Citizen Science Policy & Assessment

[Read more and register](#) for workshops

AU Citizen Science

[Projects](#) > [AU Citizen Science](#) > [Upcoming events](#) > Citizen Science Workshops 2023

AU Citizen Science

- > People and Collaborators
- > Citizen science projects
- >> Upcoming events
 - > [Citizen Science Workshops 2023](#)
- >> Past events
- > Citizen Science Training
- > Resources, networks and links
- > Media about AU citizen science

Citizen Science Workshops 2023

Citizen Science Workshops @AU 2023

As part of the [TIME4CS project](#), AU has developed a range of [citizen science training materials](#) and has run citizen science training workshops for researchers and research performing organisations' admin and management teams in four European countries. Building on this, we now offer four workshops at AU (Preben Hornung Stuen, Bldg. 1422 / 132, Fredrik Nielsens Vej 2-4, 8000 Aarhus C) this autumn, all 2-4pm:

Monday, 2 October 2023	Citizen Science Research & Methodology
Friday, 27 October 2023	Citizen Science Education & Awareness-raising for Research Performing Organisations
Tuesday, 7 November 2023	Citizen Science Support Resources & Infrastructure
Monday, 27 November 2023	Citizen Science Policy & Assessment


If you are interested in attending one or more workshops, please register [here](#).

Participation is free (*no refreshments or food will be provided*) and all workshops will be conducted in English.

Workshop facilitators: [Kristian H. Nielsen](#) and [Gitte Kragh](#)



 www.time4cs.eu

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#TIME4CS



Thank you for your attention !

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