From smartphone supported Citizen Health Science to Cooperative Citizen Test Lab

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AARHUS UNIVERSITY

Engaging Citizen Science Conference 2022

25-26th April

Sponsored by:

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AALBORG UNIVERSITY

Contents

Welcome

The Engaging Citizen Science Conference welcomes 250 scholars, students, and practitioners in the field citizen science to the city of Aarhus, Denmark. The conference includes a wide range of formats to ensure a lively space for engaging participants in sharing of knowledge, experiences, and enthusiasm for citizen science.

Workshop sessions (Monday and Tuesday) focus on just one theme or research question. They include up to four invited speakers with ample time allocated for discussion and interactions that will engage the workshop participants as much as possible. A joint workshop on Communities in Citizen Science intended for all conference participants will take place on Tuesday morning in the Aula meeting hall.

Demos (or demonstrations, Monday afternoon) highlight on-going citizen science projects. They typically allow for hands-on engagement with apps, sampling or monitoring devices, schemes for data management, online research games, etc. Conference participants are encouraged to circulate among the many demo stands, exploring a lively marketplace of projects and their methods and tools.

Dialogue roundtables (Tuesday afternoon) provides room for discussion and mutual learning around a certain topic or challenge. Some dialogue roundtables will present solutions to problems encountered in individual projects. Others will address common challenges for citizen science, or ask questions that facilitate interdisciplinary dialogues. Others again engage participants in building conceptual structures that are useful across projects and institutions.

Poster session (Monday afternoon) provides room for authors to present and discuss research results, experiences from ongoing projects, and/or theoretical reflections on themes relating to citizen science with session attendees. Posters and poster presentations will be evaluated by both attendees and the Advisory Panel and prizes presented at the final conference session.

We are proud to announce two esteemed international scholars as our keynote speakers:

- **Professor Heidi Ballard** from UC Davis School of Education. Heidi Ballard works on environmental education that links communities, science, environmental action and learners of all ages. She is Founder and Faculty Director of the Center for Community and Citizen Science at UC Davis.
- **Professor Dick Kasperowski** from University of Gothenburg. Dick Kasperowski's work on citizen science is informed by current perspectives in science and technology studies. He managed a large Swedish project on citizen science, ARenas for Cooperation through Citizen Science (ARCS), which among other things resulted in a national portal for citizen science projects Medborgarforskning.se.

We hope you enjoy the Engaging Citizen Science Conference 2022!

The Conference Organizers and Advisory Panel

Conference Organizers and Advisory Panel

Conference Organizers

Kristian H. Nielsen (Aarhus University)
Gitte Kragh (Aarhus University)

Organizer of Communities in Citizen Science Session

Rikke Magnussen (Aalborg University)

Advisory Panel

Allan Vestergaard (The Danish National Archives)
Carina Antonia Hallin (IT University of Copenhagen)
Christian Skov (Technical University of Denmark)
Finn Danielsen (NORDECO)
Jacob Sherson (Aarhus University)
Julie Koch Sheard (University of Copenhagen)
Kristian Syberg (Roskilde University)
Marianne Achiam (University of Copenhagen)
Marion Poetz (Copenhagen Business School)
Merete Sanderhoff (SMK - National Gallery of Denmark)
Michael Søgaard Jørgensen (Aalborg University)
Pernille Tanggaard Andersen (University of Southern Denmark)
Rikke Magnussen (Aalborg University)
Thomas Kaarsted (University of Southern Denmark)

The organizers would like to thank all members of the advisory committee for their support and review of all submissions. Thanks to you, we have support from all Danish universities, the Danish National Archives, the National Gallery, NORDECO, and other organizations.

Conference Proceedings

All presenters and convenors are invited to submit their workshop session, demo, dialogue roundtable, or poster as a full-length paper for the conference proceedings.

Papers may report on results and ideas obtained before or during the conference (for example, inputs from workshops or dialogues).

The proceedings will be published online with Proceedings of Science (PoS), the Open-Access portal for conference proceedings provided by SISSA, the International School for Advanced Studies based in Trieste.

Authors must create a profile on the PoS platform and use their template (available in Latex and Word). Submissions should be uploaded to the PoS platform before the deadline.

Only submissions formatted according to the template will be accepted. Maximum length is 2000 words excluding notes and bibliography. We recommend uploading supplementary data files to an appropriate public data repository.

All submissions will be peer reviewed. Accepted papers will be copy edited.

Deadline for submissions: 31 May 2022

Programme Overview - Monday, 25 April 2022

8:15-9:00	**Vandrehallen**: Registration and Coffee						
9:00-10:30	**Aula**: Welcome by Dean Kristian Pedersen, and Keynote: Heidi Ballard						
10:30-11:00	**Vandrehallen**: Coffee break						
11:00-12:30 Workshop Sessions	**Mogens Zieler Room**	**Preben Hornung Room**	**Richard Mortensen Room**	**M1**			
	Exploring CrowdBots: a new evolutionary pathway for Citizen Science projects	Institutional Changes required to support CS in RPOs	Co-creating the citizen news interface for the 21st century	Citizen science in support of the SDGs			
12:30-13:30	**Stakladen**: Lunch / **Mogens Zieler:** Citizen Science Speed-dating (13:00-13:20)						
13:30-15:00 Workshop Sessions	**Mogens Zieler Room**	**Preben Hornung Room**	**Richard Mortensen Room**	**M1**	**M2.3**		
	Co-creation in practice: from bottom up to top down	REINFORCE-ing Citizen Science	OdourCollect: The inclusive App for changing the paradigm in odour pollution based on Citizen Science	Co-creation in citizen science for the development of climate adaptation measurements	Mental Models in Citizen Science		
15:00-15:30	**Stakladen & outside Rooms**: Coffee break						
15:30-17:30 Poster Session and Demos	**Stakladen**	**Mogens Zieler Room**	**Preben Hornung Room**	**Richard Mortensen Room**	**M1**	**M2**	**M2.3**
	Poster session	Platforms for citizen science	New technology for citizen science	Spatial citizen science	Environmental citizen science	Citizen science app course Cancelled	GBIF course
19:00-23:00	**Conference Dinner** at MIB Pakhusene, Mariane Thomsens Gade 4B, 8000 Aarhus C						

Programme Overview - Tuesday, 26 April 2022

8:15-9:00	**Vandrehallen**: Registration and Coffee							
9:00-10:30	**Aula**: Communities in Citizen Science							
10:30-11:00	**Vandrehallen**: Coffee break							
11:00-12:30 Workshop Sessions	**Mogens Zieler Room**	**Preben Hornung Room**	**Richard Mortensen Room**	**M1**	**M2.2**			
	Start Making Sence	Co-designing citizen science for impact	Empowering youth through youth citizen (social) science - possibilities and challenges	Creating community – how can citizen science projects enhance existing communities and create new ones?	How to get citizen science data accepted by the scientific community? Developing research questions and data quality mechanisms			
12:30-13:30	**Stakladen**: Lunch / **Mogens Zieler:** Citizen Science Speed-dating (13:00-13:20)							
13:30-15:00 Dialogue Roundtable Session	**Mogens Zieler Room**	**Preben Hornung Room**	**Richard Mortensen Room**	**M1**	**M1.1**	**M2**	**M2.2**	**Stakladen**
	Ethics and Evaluation	Environment and Empowerment	Citizen Science in Institutions	Citizen Health Science	Citizen Science in Cultural Heritage	Citizen Food Science	Citizen Science for Energy Transition	Engagement & Communication in Citizen Science
15:00-15:30	**Vandrehallen**: Coffee break							
15:30-17:00	**Aula**: Keynote: Dick Kasperowski, and Interactive Panel Debate							
17:00-17:30	**Aula:** Closing session: poster prizes, wrap up and goodbye							

Poster Session Overview - Monday, 25 April 2022 15:30-17:30, Stakladen

	Approaches to co-creation in citizen science	Citizen Health Science	Citizen science across different research fields or sectors	Citizen science in ecology and the environment	Making technology work for citizen science
15:32-15:42	1 Citizen science approach using co-analysis of research data by citizens.	8 Who Shall Decide What to Research? Health Research Priority Setting as the New Future?	15 Individual Learning Outcomes in Citizen Science Projects	22 Covid-19-lockdown-measures decrease reports on road-killed animals in Austria	29 amai! Co-creating AI-based solutions for societal challenges
15:44-15:54	2 Co-creating science communication and research with young people about their mental health during the covid-19 crisis	9 "The support needs to be part of the system" – Designing Inclusive eHealth Applications for Older Adults with Low eHealth Literacy	16 Citizen science in Denmark: A national survey across research fields, institutions, and projects	23 A national scale "BioBlitz" using citizen science and eDNA metabarcoding for monitoring coastal marine fish	30 Assembling spheres: Aligning human computation systems in citizen science
15:56-16:06	3 Co-Creating the Museum Exhibition 'The Body as Data with Young People	10 Ketotic hypoglycemia in Down syndrome	17 Hungarian citizen science in the making	24 Coastal fish monitoring through citizen science in Denmark	31 CREDO.science ↔ global Citizen Science
16:08-16:18	4 Safe Space Cancelled	11 Cognitive Abilities in the Wild: Population-scale Game-Based Cognitive Assessment	18 Making citizen science a sustainable institutional practice	25 Find a lake	32 Cyber-physical localization and annotation of audio-visual archives
16:20-16:30	5 Engaging urban youth as citizen scientists in co-designing sustainable and youth-friendly societies	12 Citizen science in environmental epidemiology: experiences from CitieS-Health Ljubljana pilot	19 A new framework to qualify citizen science projects while giving due regard to diversity	26 Patterns of opportunistic citizen science participation in a recreational natural area	33 Tinkering for Peace
16:32-16:42	6 Forest protection by indigenous communities in Cambodia - CS-based environmental monitoring	13 Participants Inclusiveness and Empowerment: Results from an Environmental Epidemiological Citizens Science Study in Kaunas City	20 Science of Citizen Science - Exploring the research in the field of Citizen Science through a systematic literature review	27 Sourdough in participatory sciences: How milling technics and bakery environments drive microbial evolutionary dynamic and what are the consequences on bread organoleptic and nutritional value?	34 « A tiny box that can do a lot » Lessons learned from the use of Raspberry Shakes in a citizen seismology experiment in Haiti
16:44-16:54	7 Frivillig digitalisering på Rigsarkivet: Selvforklarende er værdiskabende Cancelled	14 Crowdsourcing the 1918 pandemic	21 STEP CHANGE - Exploring the potential of Citizen Science	28 Development steps of Ria Formosa Virtual Observation Laboratory – LOV Ria	35 Who's Who: Getting to Know Flemish Citizen Scientists and Project Initiators

Poster Session Overview - Monday, 25 April 2022 15:30-17:30, Stakladen

	Empowerment, participatory democracy and inclusiveness in citizen science	From science communication to engagement in citizen science	Lessons learned on recruitment and engagement	Citizen science in education	Public participation - from the dual perspectives of participants and project leaders
15:32-15:42	36 Practical Challenges of Citizen Social Science: A Call for a Modest View	42 Defining citizen science communication strategies to engage citizens - NEWSERA Lab	46 Opportunities and challenges of electronic citizen science platforms as methods to collect data from recreational fisheries; Lessons learned from Fangstjournalen.	52 WeatherBlur: Blurring the lines between science, environmental literacy, education and civic action through citizen science and computational thinking skills	57 Who's Who: Getting to Know Flemish Citizen Scientists and Project Initiators
15:44-15:54	37 Diamonds on the soles of their feet	43 Re-thinking Science Communication to increase Citizen Science Projects' Engagement	47 Potential and motivation in insect monitoring using citizen science	53 CREDO-Maze Project - after-school activities in contemporary physics for talented high school students	58 Hidden Figures: Motivations and Outcomes of Stakeholders
15:56-16:06	38 Citizen science and data justice: A human rights approach to ethical concerns regarding public participation in science	44 Participatory Science Theatre: From Science Communication and Action Research to CItizen Social Science	48 Scaling up Engagement – Poster presenting insights into the ongoing research accompanying the Europe-wide citizen science project "Plastic Pirates - Go Europe!"	54 How can we test plastic pollution perceptions and behavior? A feasibility study on Danish students participating in "the Mass Experiment"	59 Enabling Transdisciplinary Collaboration: Stakeholder Views on Working Researchers
16:08-16:18	39 Emerging Opportunity and Development Strategy for Citizen Science in China	45 Engaging Citizen Seismologists and Earthquake Eyewitnesses through a Global and Multichannel information system.	49 Denmark Explores: Engaging citizens nation-wide using a multi-stakeholder approach to recruit citizens to monitor biological response to climate	55 Will high school students be scientific literate when participating a Citizen Science Project?	60 Co-creation practices and perceptions of citizen science: researchers' perspectives
16:20-16:30	40 Validating Collective Intelligence Gained AI/Natural Language Processing for Local Participatory Democracy Cancelled		50 In-vivo dynamical modelling of player engagement and skill in a Citizen Science game: Quantum Moves 2	56 Vores historie - samskabelse af ny viden med gymnasieelever	61 A bottom-up typology of scientific engagement
16:32-16:42	41 The Activities & Dimensions Grid of Citizen Science		51 Citizen science in the Global South: Motivational frameworks		62 History as co-creation? Public participation in the project "SocialMediaHistory"

Demo Sessions Overview - Monday, 25 April 2022 15:30-17:30

Platforms for citizen science Mogens Zieler Room	**New technology for citizen science** Preben Hornung Room	**Spatial citizen science** Richard Mortensen Room	**Environmental citizen science** M1	**GBIF course** M2.3
Meta-level Citizen Science: Analysing Citizen Science projects as a Citizen Science activity	Zeit.shift: Digital in yesterday's future A citizen humanities case study on historical Tyrolean newspapers	Giving citizens a voice in mobility planning: an innovative mapping tool to enable spatial co-creation	Lake suitcases as a citizen science tool	Sharing, Accessing, and Working with Open Citizen Science Data on the Global Biodiversity Information Facility
MICS: a platform to measure the impact of citizen science	A tour of ScienceAtHome; an online citizen science platform	Telraam citizens' platform	Arter – fællesskabsrum, fællesskabs-datavalideringer og alt biodiversitetsdata samlet et sted	
Should I have a Wiki? / NEW TITLE: Using Wikis to co-create knowledge resources	Demonstration of the use of mini drones in community monitoring of reforestation in Uganda	Towards a Sociological Understanding of Citizen Science by Participation (Ethnography)	udvikling af active Living Lab - eksperimenterende, inspirerende og fysisk aktive læringsaktiviteter om naturfag	
Wiki Labs demo - Learn how to use Wikipedia to build a strong knowledge-sharing community	Participatory Research at Hackuarium in the time of the pandemic		Empowering Community Cleanups through Clean Swell: How Teachers anywhere can contribute to tackling plastic pollution	

Cancelled

Dialogue Roundtable Sessions Overview – Tuesday, 26 April 2022 13:30-15:00

Ethics and Evaluation Mogens Zieler Room	**Environment and Empowerment** Preben Hornung Room	**Citizen Science in Institutions** Richard Mortensen Room	**Citizen Health Science** M1
A Collaborative Endeavour to Develop Criteria for Citizen Science Platforms	Empowering the citizen in citizen science	Building spaces for reactive citizen science: from legal clinics, to a union, to innovative communication	A framework to evaluate citizen science for health: what makes health different from other fields?
Power and limits of Citizen Science when the very notion of citizenship is being eroded	How to involve underserved schoolchildren in citizen science?	Citizen Science strategy: immediately caught in a paradox	Stimulating deep co-creation in responsible crowdsourcing: the case of JoinUs4Health
"First use no humans" - The Ethical Implications of Hybrid Intelligence in Citizen Science	Citizen science for monitoring odour pollution: connecting citizens and policymakers	Citizen participation for Biomedicine innovation	From smartphone supported Citizen Health Science to Cooperative Citizen Test Lab
As open as possible, as closed as necessary: how to find the right balance in sharing citizen science data for health?	How can low-cost sensor technologies and citizen science make air pollution visible and shape policies towards healthier cities.	Open Innovation in Science Impact Labs: Co-creating sustainable futures	Giving persons with dementia a voice in research about everyday life in a nursing home
			The Dynamics of Citizen Science for Health

Citizen Science in Cultural Heritage M1.1	**Citizen Food Science** M2	**Citizen Science for Energy Transition** M2.2	**Engagement & Communication in Citizen Science** Stakladen
Frivilligdigitalisering på Rigsarkivet: Samskabelse er værdiskabende	– WHAT'S NEXT FOR FOOD CITIZEN SCIENCE –	Citizen Science to address Energy Transition in Europe	Keeping participants engaged in citizen science projects: the role of science communication strategies
Citizen Science in archaeology – uncovering the past with a cross disciplinary approach			Identifying CS stakeholder profiles and developing multi-level and sustainable engagement strategies

Our approach and session type descriptions

Our approach

The aim of the conference is to engage citizen science researchers, practitioners, community members, and others in sharing research results, experiences, ideas, and innovations. We will achieve this through a variety of interactive sessions, focusing on engaging and activating session participants. We hope you will enjoy the engaging session formats we have chosen for this interdisciplinary citizen science conference.

Citizen Science Speed-dating

These networking sessions will take place both days at 13:00-13:20 in the Mogens Zieler Stuen. During these sessions, you will have the chance to meet and discuss your citizen science interests with people you have not met before. The concept will be that you talk to a person you don't know for 4 minutes, then everyone changes to talk to a different person – in true speed-dating fashion!

Workshop sessions

Workshops are meant to be organized around one theme or research question and to engage the participants. Individual workshops are designed to have specific outcomes in terms of what the participants will do at the workshop and/or take away from it. These sessions can have up to four speakers to ensure that there is enough time for discussion and interactions that will engage the participants as much as possible. The general structure for these 1.5 hour sessions includes up to 40 minutes for speakers, 50 minutes for Q&A, and one or two planned activities for the participants. The maximum number of participants at workshops is 70; although a lower number may be specified by the workshop organizers. Please see individual workshop abstracts for more information on their themes or research questions, speakers, and activities and benefits intended for participants.

Dialogue roundtables

Dialogue roundtables are intended to provide a discussion space based around a certain theme or challenge. It could: present possible solutions to project/CS challenges for discussion (e.g. around data management, technology, participant engagement, inclusion, empowerment, etc.), discuss garnering support for and embedding CS (e.g. in policy circles, among funders, within institutions, networking, etc.), present ongoing citizen science projects with a focus on what has been learned and can serve as inspiration for other/new projects, ideas for new collaborative projects, etc. The structure of these sessions includes two 20-minute slots in which participants engage deeply with two dialogue roundtables of their choice, where organizers provide a 3-5 minute introduction to open up the dialogue with participants. Participants are free to visit several roundtables and converse with different dialogue roundtable organizers during the last 40 minutes. We envisage the whole dialogue roundtable session to appear as a lively marketplace of ideas, discussions and activities.

Posters

Posters will be used to present research results, experiences from ongoing projects, and/or theoretical reflections on themes relating to citizen science. The posters will hang on poster stands in Stakladen (see map below) throughout the conference. During a two-hour session dedicated to poster presentations, the author(s) are expected to be available and present their poster for a smaller audience in allocated time slots (5 minutes for presentation and 5 minutes for Q&A). Between every poster presentation, audiences move from one poster to the next (self-selection of posters). Based on the presentations and posters, the advisory board will announce three posters that deserve special recognition. Prizes will be awarded to the winners.

Demos

Demos (i.e. demonstrations) can be used to showcase an on-going CS project, or technologies or methodologies that could enhance, help or support CS projects. Demos are hands-on engagement of conference participants, for example through mobile devices, demonstrations of sampling or monitoring, online research games, etc. In the session dedicated to demos, conference participants are free to circulate and explore all demos.

Venue, Practical Info and Maps

Venue and Practical Info

The **AU Conference Centre** is part of and located on the main campus of Aarhus University. Main sessions such as welcome and closing sessions as well as keynotes will take place in the Aula Meeting Hall, with a lovely view of the university parklands. Parallel sessions and lunch will take place in the Conference Centre Rooms, accessible via an underground passage from the Aula.

Jesper Rais, AU foto

AU Conference Centre
Fredrik Nielsens Vej 2-4, building 1421-23
8000 Aarhus C

Aula and Vandrehallen (check-in/registration)
Nordre Ringgade 4, building 1412
8000 Aarhus C

Check-in/Registration and Information

Check-in for the conference will take place in **Vandrehallen** and will double as information centre during the conference. Please go here with any questions you may have. It will be open:
Monday April 25th 8:15am - 6pm
Tuesday April 26th 8:15am - 3:30pm
Additionally, a number of student helpers will be on hand at the conference to help with any questions.

Wardrobe: Just down the stairs from the hallway area between Vandrehallen and the Aula is the wardrobe ("Garderobe"). It will be possible to leave luggage and coats here and it will be staffed during the whole conference. It will not be possible to leave anything overnight, so please ensure you collect your belongings at the end of each day. It will be open and staffed both days 8:15am - 6:30pm.

Wireless network

Internet connection is available throughout AU either on the Eduroam network (for anyone with an Eduroam account) or via a guest login. For guest login, select the 'AU-Guest' wireless network. Open an internet browser and the login page will be displayed. Choose an option to log in either through an account or receive a login via text message. Details: https://conferences.au.dk/wireless-network

Public transport

Bus: you should note that in Aarhus passengers enter through the back door(s) and exit through any door, including the front. Every bus is equipped with a ticket machine and a validation machine at the back or in the middle of the bus. You can buy a single ticket with cash (only) on the bus, in Midttrafik app or as a print out ticket.

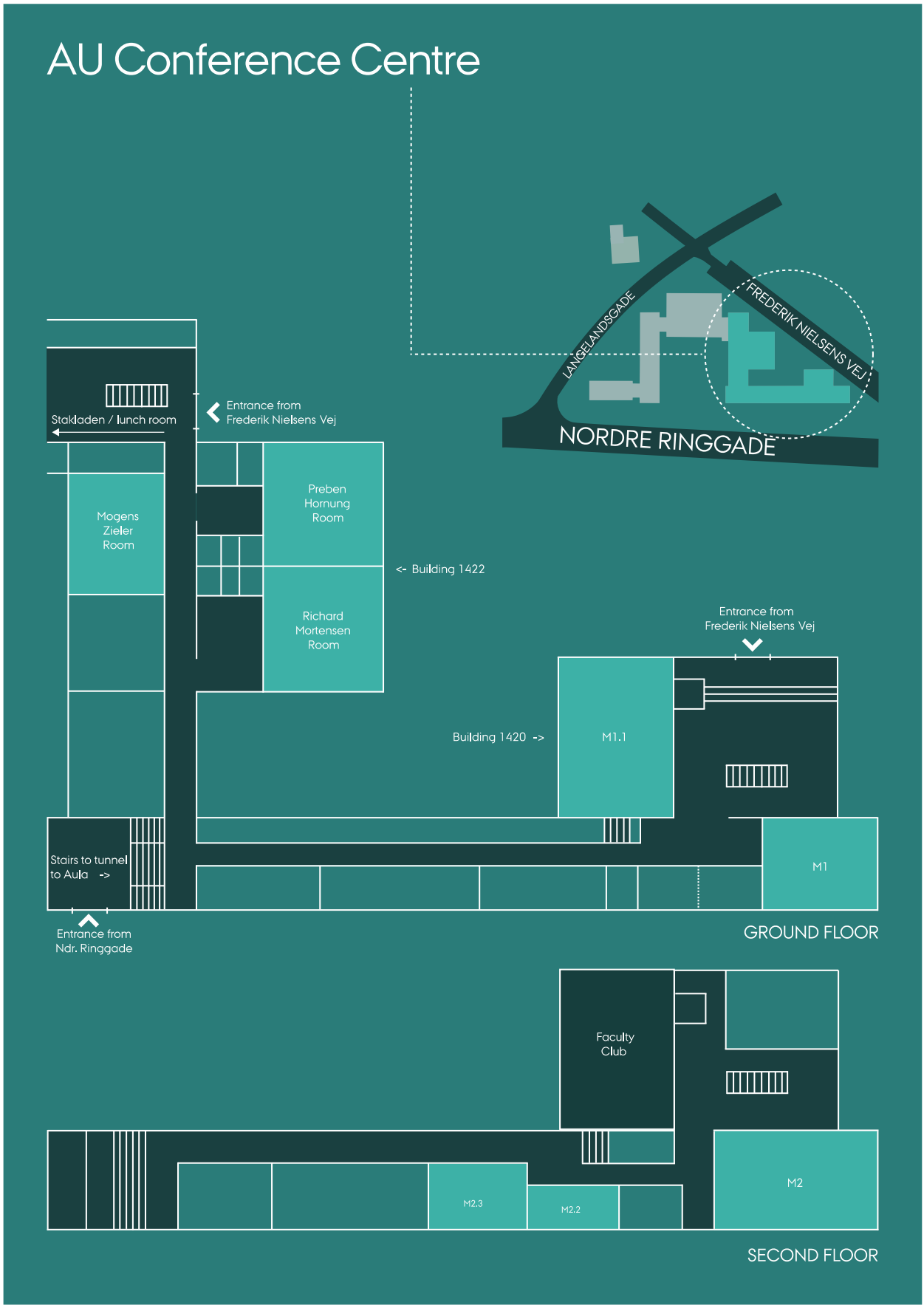
Light rail (Letbanen): You can buy a single ticket at the ticket machine at one of the light rail stations. Here you can only pay with card – not with cash. Note that you must buy your ticket before boarding the light rail, as you cannot buy tickets on board.

Further information about Getting around in Aarhus available on the conference website.

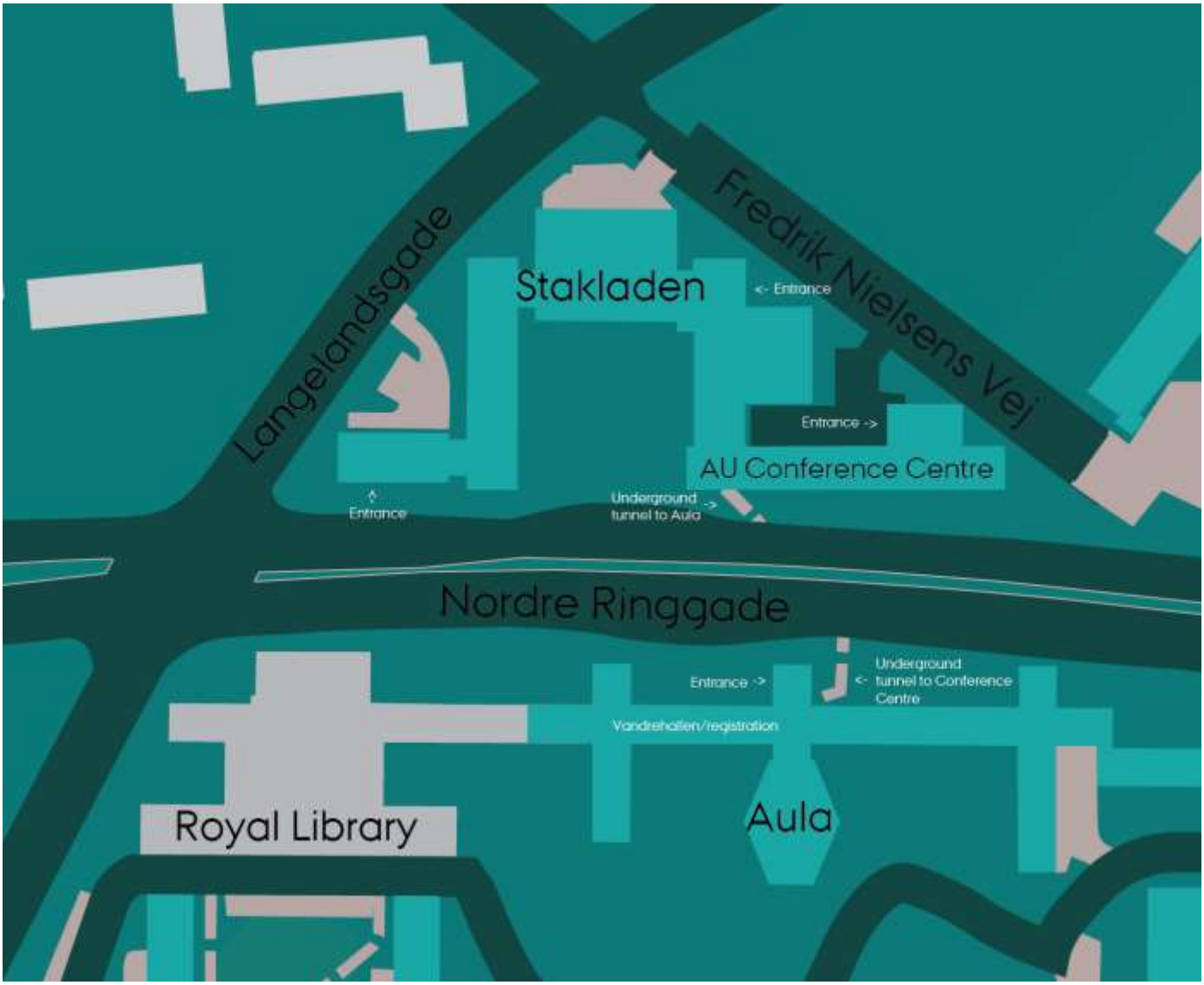
Photos and privacy

If you do not wish to be included in photos/videos taken during the conference, you must inform the photographer at the time and place that you see a photo being taken. Please be considerate of others when taking photos yourself.

Map of AU Conference Centre and Stakladen



Map of AU Conference Centre and the underground passage to Aula and Vandrehallen



Locations during the conference

Vandrehallen: Check-in/registration/information, morning coffee both days

Aula - Main meeting hall: Welcome and closing sessions, Communities in Citizen Science Session

Stakladen: Lunch both days, poster session.

AU Conference Centre, various rooms (map on previous page): workshops, demos, dialogue roundtable sessions

Conference Dinner & Party

The Conference Dinner will take place at **MIB Pakhusene, Mariane Thomsens Gade 4B**, 8000 Aarhus C, about 3 km from the AU Conference Centre. It is a nice, easy walk downhill.

Please arrive between 18:30 and 19:00 – *and be ready for a party!* 😊

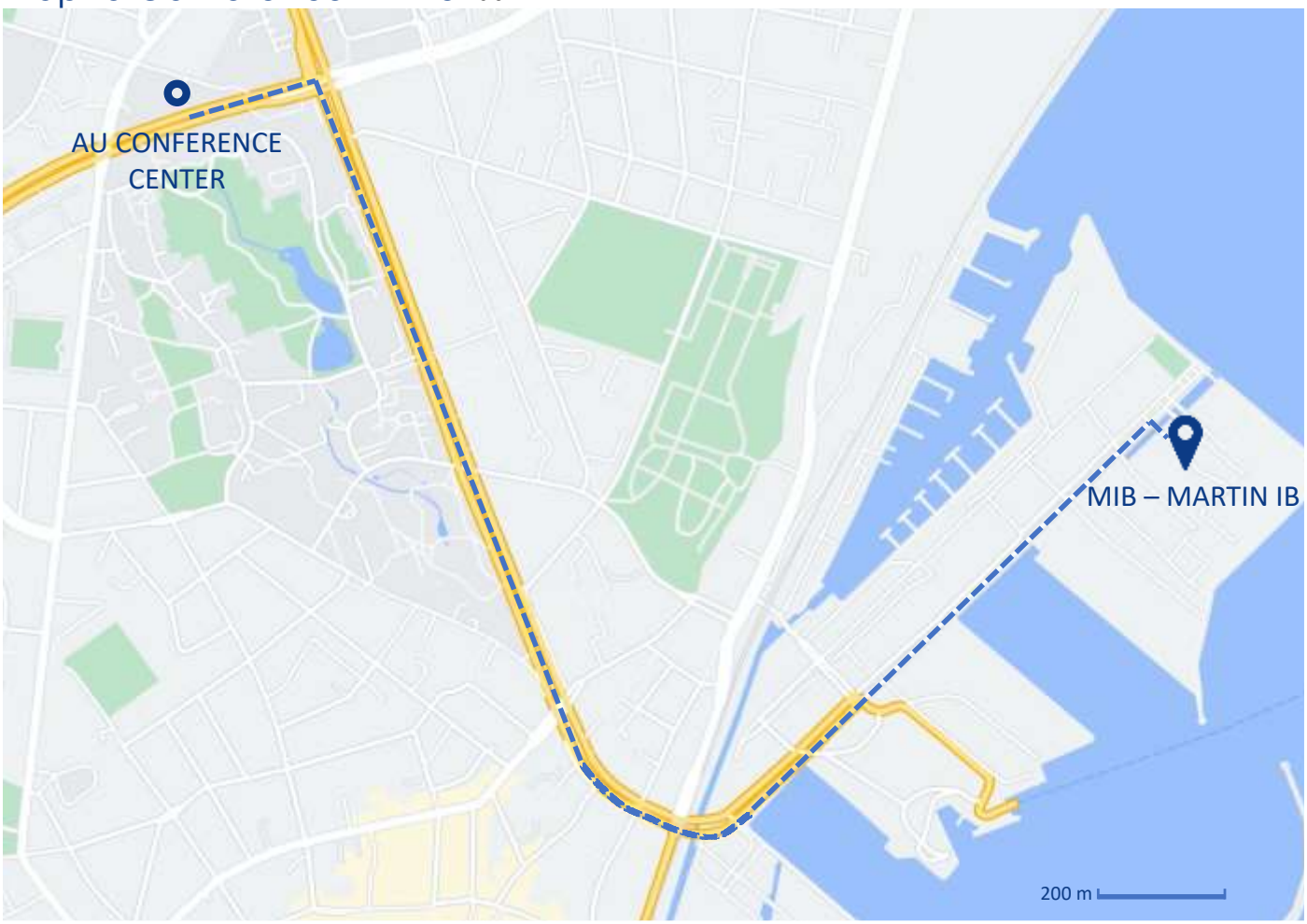
In your registration pack you will find a drinks voucher for 3 free drinks (beer, wine or soft drink). You must bring your voucher to claim your drinks. The bar will be open for you to buy additional or other types of drinks.

In your registration pack you will also find either a red or a green paper slip. Please bring this with you and place next to your plate. This will ensure you receive the correct meal based on your choice.

After the dinner at about 21:00 ***the party starts!*** A local live orchestra takes the stage and plays all our favourite tunes – from rock'n'roll to pop – from the last five decades!

The party wraps up at 23:00.

Map to Conference Dinner at MIB – MARTIN IB



Heidi Ballard

Professor, Founder and Faculty Director of the Center for Community and Citizen Science, UC Davis

Keynote Monday, April 25 at 9:00

Engagement and Learning through Community and Citizen Science: Why, How, and Evidence of Outcomes

In the context of increasing wicked problems facing society and global planetary health, citizen science and other forms of public participation in scientific research and monitoring, which I term "Community and Citizen Science (CCS)", have the potential to engage and bring people together in new ways to learn and answer scientific questions that address these problems. In fact, this burgeoning field has advanced beyond the "promise and potential" for CCS as a way to improve scientific literacy and broaden participation in science; there is ample evidence for not only the learning and engagement outcomes of CCS as well as the scientific outcomes of this work. But most importantly, one size does not fit all, and not all projects achieve the same outcomes for all audiences. I will present concrete examples and evidence from my own research and others for the specific approaches to CCS in environmental contexts that achieve particular learning and engagement outcomes, and offer lessons for how best to design and implement CCS projects for particular audiences, whether youth or adults.

Bio

Heidi Ballard is interested in environmental education that links communities, science, environmental action and learners of all ages. Particularly she is interested in what and how people learn through public participation in scientific research (PPSR) as a form of informal science education. From citizen science-type projects for conservation to participatory action research for natural resources management and environmental justice, PPSR projects can create unique opportunities for learning by participants and scientists. Understanding the outcomes and processes of these projects can contribute to better practices in environmental and science education, and better conservation and natural resource management.

Dick Kasperowski

Professor, Linguistics, Logic and Theory of Science, University of Gothenburg

Keynote Tuesday, April 26 at 15:30

Scientific and civic engagements in citizen science

Why does citizen science engage scientists and citizens? How do we as citizen science practitioners and researchers make sure that citizen science will continue to be engaging - and engaged in the creation of new scientific knowledge, while also addressing issues of public concern?

Science has always involved collective and distributed practices. Since the professionalization of science in the mid-19th century, scientists and science managers, often assisted or encouraged by new technologies, have sought to enroll non-scientists in many different kinds of scientific projects. More recently, this legacy of citizen engagement in science joined forces with new democratic demands for increased public participation in science. Today, citizen science is an umbrella term encompassing scientific ambitions but also ideas about a more inclusive and more socially responsible science as well as forms of citizen activism, resistance, and opposition.

Understanding the diverse engagements of citizen science today means engaging with diverse communities of practice, a diverse range of stakeholders, and diverging objectives. Science policies and scientific institutions require scientists to strive for scientific excellence and meet social responsibilities, whereas neoliberal modes of democratic governance turn citizens and communities into entrepreneurial actors in order to enable citizen-focused policy-making. Engaging citizen science for scientists and citizens remains no easy task.

Bio

Informed by current perspectives in science and technology studies (STS), Dick Kasperowski's main interests are in the area of governance of science, scientific citizenship and the management of uncertainty in public scientific controversies. The analytical focus of his research concerns how political and scientific representations are related to each other and how (scientific) citizenship is connected to research policy and scientific practices. More specifically this relates to how rights and obligations toward science and research are attributed and appropriated by different actors when uncertainty is introduced and the different modes of governance this entails.

Dick Kasperowski is leading the Swedish project Arenas for Co-operation through Citizen (Arenor för relationsbyggande samverkan genom medborgarforskning, ARCS). The aim of the project is to help Swedish universities to use citizen science in a responsible and sustainable way, i.e. to interact with society. In the course of the project, a national web portal for Swedish citizen science – medborgarforskning.se - has been developed. It features tools, guidelines and forums for researchers and other stakeholders who want to get involved in citizen science. There is also an interactive directory of all citizen science projects currently running in Sweden. The portal aims to be the national hub and a resource for everyone interested in citizen science.

Dick Kasperowski has published extensively on citizen science. He was co-editor of the 2019 special issue of *Science and Technology Studies* on the many modes of citizen science.

Rikke Magnussen, Associate Professor, Aalborg University, Copenhagen

Abstract

Community Science and Citizen Science have traditionally been areas related to public participation in research activities, with citizens and community members actively contributing to science and professional development by contributing local knowledge or tools and resources (Ballard, Dixon & Harris, 2017). The concept of Community and Citizen Science (CCS) connects the concepts of citizen science and community science with a methodological focus on involving communities as partners in research and development processes. The Citizen science field includes many different ways to involve citizens and non-professionals in research. CCS distinguishes itself by having an expanded focus on local communities as partners in several phases from involvement in project development to the design of the research process itself, e.g. with joint development of research questions, collection and analysis of data and dissemination of results (Harris et al., 2019). In CCS, the focus is on communities from a socio-cultural perspective and the concept therefore focuses on the different possible types of communities involved in CCS . This includes communities of professionals or researchers, and communities of lay people or citizen groups. This workshop focuses on introducing the concept of Community and Citizen Science (CCS), as well as sharing experiences with different forms of collaboration between communities in different types of citizen science projects. In the workshop, the panel members will discuss how communities develop in their citizen science projects, and what impact they have on knowledge processes and outcomes.

Speakers and Panel

Heidi Ballard, Founder and Faculty Director of the Center for Community and Citizen Science, University of California, Davis

Professor Heidi Ballard is Founder and Faculty Director of the prestigious Center for Community and Citizen Science at University of California, Davis. Her research interests are in environmental education that links communities, science, environmental action and learners of all ages. Her research work focuses on what and how people learn through public participation in scientific research (PPSR) as a form of informal science education. From citizen science-type projects for conservation to participatory action research for natural resources management and environmental justice, PPSR projects can create unique opportunities for learning by participants and scientists.

Michael Køie Poulsen, ecologist, co-founder of Nordic Foundation for Environment and Development (NORDECO)
Michael is a co-founder of the Nordic Foundation for Environment and Development (NORDECO), an NGO that works with capacity building in participatory management of nature and natural resources both domestically and internationally. He has extensive experience in developing capacity in tools that can promote democratic citizen involvement in resource management.

TBC, Biologist at the Danish Ornithological Society (DOF)
DOF/BirdLife Denmark has a large community of citizen scientists.

Rikke Magnussen, Associate Professor, Faculty of Humanities, Department of Communication and Psychology, Aalborg University (panel participant and facilitator)

Rikke does research on community and citizen science / community-based civic science with a focus on how digital learning design can open up new forms of collaborative practices and education for sustainable development, e.g. in the Community Drive project.

Workshop Sessions – Monday, 25 April, 11:00 - 12:30

Exploring CrowdBots: a new evolutionary pathway for Citizen Science projects

Pietro Michelucci, Executive Director, Human Computation Institute
Laura Onac, Machine Learning Researcher, Human Computation Institute

Collective hybrid intelligence may serve as an effective progression in the evolution of crowd-powered systems such as citizen science projects, which rely on human cognition. Supervised machine learning has been treated as a panacea for automated image classification under the assumption that prediction performance depends primarily on the quality and volume of the training corpus, which is often obtained through crowdsourcing. We have observed that this assumption may fall short when accurate classification depends upon contextual knowledge that is not encoded in the pixels or on the inference needed to apply that knowledge. 37,000 volunteers on our “Stall Catchers” citizen science platform have contributed over 12 million classification labels for a biomedical research application. Bespoke "wisdom of the crowd" methods, which effectively create ensemble models out of humans, combined multiple individual labels for the same input to produce 1.5 million research grade labels. These gold standard data were used by over 900 participants in a machine learning competition to train 55 unique models exhibiting a range of performance characteristics. Though none of these models exhibits classification performance sufficient to replace Stall Catchers, the sensitivity and bias distributions of these models are remarkably similar to those of human volunteers, suggesting the models' suitability for crowd-based participation. We endowed one of the winning models, named GAIA, with sufficient agency to participate as humans do on our citizen science platform and discovered that our wisdom of the crowd algorithm was effective in extracting research grade classifications when GAIA was a member of the crowd. We are conducting further studies to examine the extent to which such human/AI ensembles may give purpose to imperfect ML models as an intermediate practicable step toward fully automated solutions. This workshop seeks to communicate these methods and findings via a 30-minute talk followed by a one-hour Hybrid AI simulation game, in which workshop participants break out into teams to design hybrid AI architectures that employ CrowdBots for existing and imagined citizen science scenarios. This workshop will seed a collection of novel information processing configurations that leverage this new approach to combining AI and human cognition, the proceedings of which will be communicated via the journal Human Computation.

Location: Mogens Zieler Room (max. 70 participants)

Institutional Changes required to support CS in RPOs

Claudia Iasillo, Project Manager, Agency for Promotion of European Research (APRE)
Matteo Di Rosa (APRE), senior project manager.
Muki Haklay (UCL), professor.
Maria Rosa Mondardini (UZH), Managing Director.
Dr. Eugenia Vilarchao (ESF), Junior Science Officer

Background

CS is experiencing an increase in number of actors, projects, initiatives, with a wide range of models and outcomes. Funding bodies have also encouraged the development of a multitude of guidelines, indicators and quality criteria. Despite such growth, the majority of Research Performing Organizations (RPOs) (e.g. universities, institutes of technology, research institutions, and similar organisations) in Europe still does not support the official implementation of CS by fostering institutional transformations, based on a combination of social (more bottom-up) and organisational (more top-down) changes.

TIME4CS is a H2020 project that aims at exploring the Institutional Changes needed to embed CS in RPOs, building on the concept of personalised institutional roadmaps to promote sustainable institutional changes. TIME4CS has identified 4 Intervention Areas (IAs) that, alone or combined, can stimulate the institutional changes necessary to promote CS: Research, Education & Awareness, Support resources & Infrastructure, and Policy & Assessment. For each IA, specific Grounding Actions (GAs) have been defined as actions that can be concretely carried out within research institutions, paving the way to institutional changes. Within the project, 4 RPOs (called Implementers) are currently facing the challenge of introducing CS in their structures. To support this process, 3 more experienced organizations, within the consortium, (called Front-Runners) will provide advice and mentoring on a personalized institutional roadmap for each Implementer RPO, that details a set of tailored GAs.

Aim and outcomes of Workshop

This workshop will provide participants with an extensive overview of the concept of institutional roadmaps and possible GAs that can be carried out within RPOs to stimulate the institutional change necessary to promote the adoption of CS as research methodology. Participants will have the opportunity to interact with TIME4CS partners (both Front-Runners and Implementers), learn more about the GAs and get inspired about possible steps to be replicated within their context.

The workshop is divided in 2 parts: an introduction to the project methodology and the reflection tool for the personalized roadmaps followed by an interactive work with participants in small groups according to the four TIME4CS IAs. Each group will work with TIME4CS experts, focusing on participants' challenges in implementing CS in their organizations, discussing how the TIME4CS reflection tool and roadmaps can help to overcome them. In the end, participants will have some concrete examples and suggestions on how to stimulate institutional changes to promote CS.

Location: Preben Hornung Room (max. 50 participants)

Co-creating the citizen news interface for the 21st century

Dr. Christoph Raetzsch, Associate Professor Journalism Studies and Digital Methods, Department of Media and Journalism Studies, Aarhus University. Principal Investigator "Interfaces and Infrastructures of Publics" project (funded by AUFF).
Lars Kabel, Associate Professor at Danish School of Media and Journalism (DMJX).
Dr. Jessica Gabriele Walter, Post-doctoral Researcher, Department of Media and Journalism Studies, Datalab- Center for Digital Social Research, Aarhus University.
Diogo Henriques, Post-doctoral Researcher "Interfaces and Infrastructures of Publics", Department of Media and Journalism Studies, Aarhus University.

The field of journalism is increasingly forced to acknowledge that news consumers and citizens are paying less attention to journalistic media. Tuning out from the news and a rich source of choices in social media and online fora make some dimensions of journalism less central (and often less important) to serve its central democratic function (Peters & Witschge 2014). As one step to face this challenge we are convinced that citizen engagement is a crucial point. In this workshop, we want to bring together citizens (e.g. students or traditional news consumers), media practitioners and citizen science researchers. The aim is to reflect on the kinds of citizen engagement with journalism and other channels of public communication, involving citizens as co-creators of a new kind of (speculative) news interface based on their demands and preferences. Inspired by perceptions of citizens' daily habits of navigating media, the workshop will be a starting point to rethink the role that journalistic media has in society and democracy, for example in negotiations over pressing social and political issues. We therefore propose to employ a citizen science framework to rethink the participation in civic communication in a complex media environment (D'Ignazio & Zuckermann 2017; Allan & Ewart 2015, Robinson & Wang 2018).

The preferred language will be in English and we aim for up to 20 participants. The 1.5 hour of the workshop will be organised in three parts: (1) presentations with Q&A (30min); (2) co-creation exercise (30 min); and (3) discussion of results (30 min):

The first part of this workshop will be structured around three/four presentations and discussions engaging with all the participants.

The second part of the workshop will be a co-creation activity, where participants will 1) map their daily news and communication habits and 2) speculate on a news interface that would satisfy their needs as citizens to be informed and engaged with society. The third part of the workshop will be a discussion with participants of the results of the exercise and an exploration of how journalistic media in Aarhus could get involved in further activities. A documentation of the workshop in open access format will be pursued by the organisers.

Location: Richard Mortensen Room (max. 70 participants)

Citizen science in support of the SDGs

Dilek Fraisl, Research Scholar, International Institute for Applied Systems Analysis (IIASA)
Steve MacFeely, Director of Data and Analytics, WHO
Maciej Truszczynski, Chief Advisor, Statistics Denmark
Linda See, Senior Research Scholar, IIASA

The UN Sustainable Development Goals (SDGs) were adopted by the UN General Assembly in 2015 as a call to action to tackle the world's greatest challenges such as poverty and climate change. With its 17 goals, 169 targets and 247 indicators, the SDGs reflect a data-driven and society-oriented framework that requires a collaborative effort from all levels of society to achieve the ***future we want*** and to ***leave no one behind***.

The key question is how to do this when most of our data are outdated and not comprehensive enough to make timely decisions to enhance people's wellbeing. Or how can we achieve this ambitious agenda if we fail to communicate its value to people and engage them in its implementation?

Coupled with traditional sources of data such as household surveys, citizen science has an immense potential to address these data gaps in the SDG framework. For example, our recent study (Fraisl et al., 2020) shows that citizen science data have the potential to contribute data to 33% of the SDG indicators.

However, the potential of citizen science for measuring progress towards the SDGs and achieving them is not yet realized by UN agencies, National Statistical Offices (NSOs), policy makers and by the citizen science community itself. There is an urgent need to raise awareness among citizen science practitioners and the research community at large regarding the synergies between their citizen science activities and the SDGs.

Our workshop aims to address this need by providing a hands-on introduction to and guidance for the citizen science community on the SDG framework, and how it is linked to citizen science. It is designed for those who are interested in exploring the connections between their citizen science activities and the global goals in terms of data and social outcomes.

We will begin our interactive exercise with a quick game on the SDGs based on the background and the needs of the audience. Then, we will deep-dive into the SDG indicator framework, and discuss the tools, methods and materials needed to explore the synergies between participants' own citizen science initiatives and the SDGs. We will provide examples of where citizen science data are contributing and could contribute to SDG monitoring and reporting processes. We will then discuss the challenges of integrating citizen science data into official statistics and policy processes through an interactive discussion, and present best practices of how partnerships can be created for citizen science data to contribute to the SDGs. Finally, together with UN and NSO representatives, we will suggest concrete recommendations for how the value of citizen science for the SDGs can be demonstrated and realized. We will also inform the participants about the existing efforts and communities active in the field of citizen science and the SDGs to which they could join.

The outcomes of the workshop will be increased knowledge on the SDG framework, raised awareness of the synergies between citizen science and the SDGs, and concrete recommendations for next steps.

Location: M1 (max. 70 participants)

Workshop Sessions – Monday, 25 April, 13:30 - 15:00

Co-creation in practice: from bottom up to top down

Rosy Mondardini, Managing Director, Citizen Science Center Zurich
Margaret Gold, Coordinator, Citizen Science Lab, Leiden University
Anne Kathrine Overgaard, Head of Office, Citizen Science Knowledge Center, SDU
Thomas Kaarsted, Deputy Library Director, Citizen Science Knowledge Center, SDU

Citizen Science in practice can be hard to achieve and has various pitfalls. In recent years CS centers have opened in order to facilitate public engagement with science. They cover everything from the perspective of the citizen, services towards researchers and assist building communities for the benefit for all.

Citizen science as an interdisciplinary field holds promises for boosting scientific research. But increasing public participation in research, and empowering citizens in their everyday life is a method and design that is never one size fits all.

In this workshop three Citizen Science Centers share their perspectives and working methods. In connection, the presenters will work with participants in order to discuss, design and develop their ideas or projects. In connection, all three centers work with and strategicly support the UN Sustainability Goals.

The CS Center in Zürich provides support with digital tools, methodology, processes, and community management. It supports and promote the collaboration of academic scientists and the general public to implement co-created Citizen Science projects

The CS Lab in Leiden supports researchers, citizens and societal organizations to generate new knowledge together. It supports the different stakeholders with setting up a project together and run a number of projects across a cross various research areas.

The CS Knowledge Center at SDU provides infrastructure, cross-disciplinary workshops, project development, management, communication, community building and data management support. The Center work closely with a number of media partners.

This workshop offers clear objectives and original reflections on engaging workshop participants.
The 90-minute participatory session will include:
Part One (30 min). Three perspectives and methods for co-creation from Zürich, Leiden and SDU including Q&A.Part Two (60 min). Three side session (interactions) where participants can grow their ideas for Citizen Science projects, troubleshoot potential problems, get tips for public engagement, and work consciously with the input, knowledge, and collective power of citizens.

In conclusion, participants would leave with a hands on experience that could foster empowerment and inclusiveness in their work with citizen science.

The target group is Citizen Science researchers from all fields that are curious on the community, communication and co-creation elements of Citizen Science. Also, interested non-CS-researchers, NGO's, admin staff, librarians and teachers could benefit.

Location: Mogens Zieler Room (max. 50 participants)

REINFORCE-ing Citizen Science

Francesca Spagnuolo, European Gravitational Observatory
Christine Kourkoumelis, National and Kapodistrian University of Athens & REINFORCE (lead WP5- Large Scale Citizen Science Demonstrator: Search for new particles at LHC)
Massimiliano Razzano, University of Pisa & REINFORCE (lead WP3-Large Scale Citizen Science Demonstrator: Gravitational Wave Noise Hunting)
Manolis Chaniotakis, Ellinogermaniki Agogi & REINFORCE citizen engagement lead
Francesco Di Renzo, University of Pisa & REINFORCE researcher

REINFORCE is a "Science with and for society" (SwafS) project, funded by the EU-H2020 research programme. It aims to reinforce the science capital of society by engaging and supporting 100,000 citizens in different fields of frontier physics. To this end, REINFORCE partners have developed a series of four demonstrators; online citizen science projects on Zooniverse, the world's largest platform for online citizen science. Two of the four projects will be presented by their developers during the workshop session.

The first of these, which was developed by a team of researchers at the Institute of Accelerating Systems and Applications, in Athens, is the "Search for new particles at CERN" demonstrator. By using specialised software, developed by the IASA team, citizens will look for evidence of undiscovered particles in data from the ATLAS experiment. They do not only classify static images, but also interact with the event display, select specific tracks, identify particle traces in the ATLAS detector, star-rate Higgs decays to photons and/or look for long-lived particles predicted by certain theories. The second, "GWitchHunters", was developed by researchers at the University of Pisa and involves citizen scientists in the improvement of the sensitivity of gravitational-wave detectors. Citizen scientists identify sources of noise that limit this sensitivity, with particular attention to short noises, known as 'glitches'. The focus of the workshop will be on short presentations and live demonstrations of the two citizen-science projects. The attendees will have the possibility to engage with the two demonstrators through planned activities, including a hands-on introduction to identification of particles and glitches.

In order to achieve a high level of citizen engagement in REINFORCE, the project has adopted a strategy based on an optimum inclusive-design approach, aimed particularly at engaging citizens with visual impairments, elderly people and people with low science capital. Citizen empowerment and participatory engagement activities will be explored and discussed during the workshop, with the discussion led by the REINFORCE participatory engagement activities lead, and will focus on the challenges encountered and the lessons learned. In real time, as well as subsequent to the planned activities, recommendations will be collated into a live conclusions document.

Location: Preben Hornung Room (max. 70 participants)

OdourCollect: The inclusive App for changing the paradigm in odour pollution based on Citizen Science.

Carla Perucca Iannitelli[1], Joana Magalhães[1], Johana Burbano[1], Blanca Guasch[1], Rosa Arias[1]
1) Science for Change (SfC), Calle Vic 1, Ático 2ª, 08901 L'Hospitalet de Llobregat, Barcelona, Spain

OdourCollect is a free app that enables the co-creation of collaborative odour maps and facilitates data analysis of odour observations reported by affected communities to inform environmental authorities and industries about the nuisance in real time. Its methodology has been tested in the framework of H2020 project D-NOSES in 10 pilot case studies around the world, and proved as a remarkable example of community engagement and citizen science highly replicable to other projects. For doing that, the workshop will be carried out by 4 team members of Science for Change. The workshops will be divided in 2 sessions: **Session 1) Raising awareness**: The first session will introduce odours through the broken telephone game. The session will consist of 4 different groups coordinated by each facilitator. Each group will have 1 type of odour to describe with 4 banned words (e.g. describe sea odour without saying fish, beach, boat, coast). Listeners will try to correctly describe the odour, and the last person in the line says it out loud. The objective is to understand the variety of existing odour descriptors. Also, the relevance of using agreed odour descriptors when understanding odour issues. **Session 2) Inclusive engagement**: Through a real-puzzle challenge. 4 groups of maximum 10 people will be guided by each of our speakers. Each group will have a different citizen science project related to odours where they will try to co-create an engagement strategy through pieces of puzzle, with images and words such as agents, actions, challenges and opportunities (see footnote from image).

As in every real Citizen Science project, unexpected circumstances may happen, and participants will need to re-adapt their strategy. To simulate these situations, a dice with a new social challenge (e.g. elections were held, and the policymakers involved in your project are no longer part of the institution) will be thrown during the workshop, pushing participants to re-adapt their engagement strategy.

Acknowledgments: The D-NOSES project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 789315. Odour Collect has received funding from the Spanish Foundation for Science and Technology (FECYT), Ministry of Science and Innovation Ref: FCT-20-16371. The COS4CLOUD project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 863463.

Location: Richard Mortensen Room (max. 40 participants)

Co-creation in citizen science for the development of climate adaptation measurements - Which success factors promote, and which barriers hinder a fruitful collaboration and co-creation process between scientists and volunteers?

Denise Meyer, M.Sc., Reutlingen University
Reiner Braun
Jan Fauser

Desired Outcomes:
- Participants will have the opportunity to interact, exchange and discuss ideas with other (citizen) scientists in an interactive workshop format. This offers the potential for cross-project exchange between researchers, project managers and citizen scientists.
- Participants will gain insight into possible obstacles and success factors in the development of successful collaborative and co-creative CS formats. Insights that they can take with them beyond the conference and guide them in (co-)developing their CS projects.
- Participants support the development of a co-creative best-practice approach.

Workshop Procedure (90' in total):
presenters: Jan Fauser and colleague (tbd)
1) input by speaker (20')
- Short introduction to the research project (5')
- Presentation of the concept of co-creation as a possibility for joint development of adaptation measures to climate change (10')
- Explanation of the workshop procedure (5')
2) ideation workshop / input from participants (60' à 5 x (10' group discussion + 2' time to switch))
- Participants will be working in groups of around 8-12 people collecting and discussing ideas and potential solutions to the following research questions:
    a) Which success factors promote co-creation?
    b) Which barriers hinder a fruitful co-creation?
- To make it easier for participants to get to grips of the research question and at the same time to give them the opportunity to address different topics, 5 subject areas are presented. The participants switch in their groups every 10 minutes between the following topics:
    a) Social factors that promote vs. hinder co-creation
    b) Motivational factors that promote vs. hinder co-creation
    c) Organisational factors that promote vs. hinder co-creation
    d) Technical/technological factors that promote vs. hinder co-creation
    e) Legal factors that promote vs. hinder co-creation
3) wrap-up session (10')
- The session host gives a short summary about the results of the discussion rounds.
- An outlook is given on how the results will be processed and communicated.
- Possibility to ask questions and give feedback.

Background information:
- CS Project: "ParKli - Participatory Climate Impact Adaptation". The aim of the project is to make the consequences of climate change on local natural and living spaces tangible through CS activities and to (further) develop local early warning systems for climate protection together with citizens.
- Institutions: Reutlingen University and open science for open societies

Location: M1 (max. 60 participants)

Mental Models in Citizen Science

Dr. Ekaterina Egorova, Faculty of Geo-information Science and Earth Observation, University of Twente
Karin van den Driesche, MA, DesignLab, TOPFIT Citizenlab, University of Twente

Citizen science projects increasingly involve citizens on levels of participation that go beyond data collection, and entail the co-creation of research questions and methods. Success of such projects depends on the establishment of shared knowledge, a task that can be challenging in projects that deal with complex societal issues and the so-called wicked problems. We argue that to address this challenge, citizen science should engage more with research on mental models – cognitive representations of the external reality, which allow our minds to make inferences about what will happen in a particular situation in the future (Gentner and Stevens, 1983). The objective of this workshop is to explore both "traditional" and co-creation techniques for the elicitation and analysis of mental models, and to discuss possibilities for their use at the initial stages of citizen science projects. As a case study, we will use materials from a running project on energy transition that leverages different approaches in the study of mental models (from interviews to crowdsourcing). The workshop will consist of three parts. The first two parts will introduce the key theory on mental models and the case study, and will engage participants in two activities to provide them with a first-hand experience with the co-creation techniques, leading to a critical discussion in the third part:

Part I:
- Talk: Ekaterina Egorova. Mental models research: elicitation and analytical techniques. Energy transition case study.
- Activity: Affinity diagramming (Holtzblatt & Beyer, 1997) using interviews on energy transition.

Part II:
- Talk: Karin van den Driesche. Co-creation techniques for the elicitation and visualization of knowledge for analysis.
- Activity: Creating a group mental model (Indi Young).

Part III:
- Reflection on the activities, discussion (Examples of questions: 1. Are there core elements of mental models that should be explored in all citizen science projects on complex societal issues? 2. What is the added value of the co-creation methods borrowed from the design thinking? 3. What are the areas that will particularly benefit from a deeper engagement with research on mental models?)

The outcome of the workshop includes a short paper summarizing the discussion, and the establishment of a working group (to be further proposed to the ECSA) that will collaborate on the "Mental Models in Citizen Science" working package (in the form of a handbook on tools and resources), to be shared with the wider research community. The workshop will be of interest to participants who work, or plan to work with mental models, and are eager to understand the value of different methods of (co-)creation of mental models.

Location: M2.3 (max. 20 participants)

Defining citizen science communication strategies to engage citizens - NEWSERA Lab

Joana Magalhães[1], Blanca Guasch[1], Rosa Arias[1], Cristina Luís[2]

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"Defining citizen science communication strategies addressed to engage citizens - NEWSERA LAB" is one of the main goals of the pilot workshops being undertaken at the citizen science communication Labs (#CitSciComm) from NEWSERA, a H2020 SwafS-19 funded project. NEWSERA aims to demonstrate that citizen science is the new paradigm of science communication by showing the virtues of citizen science as an inclusive, broad and powerful science communication mechanism that can increase trust in science, while opening up science and innovation to society, raising awareness and educating in science, and reducing the chances of incurring in fake news, by means of promoting critical thinking. For this, NEWSERA established the #CitSciComm Labs where 38 citizen science initiatives are involved in communities of practice to co-design, implement and validate innovative strategies of science communication addressed to a specific stakeholder group from the quadruple helix model (academics, citizens, policy makers and industry). At the same time, NEWSERA analyzes and evaluates the innovative scicomm strategies aimed at each specific agent of the quadruple helix engagement model, in citizen science projects, in order to improve their communication practices and their impact on each stakeholder.

The first round of workshops methodology is divided in two steps accordingly: the first, oriented to discuss the main challenges of communicating to different stakeholders; the second, as a practical and hands-on group co-creation exercise centered on working in specific citizen science projects as case-studies, where participants discuss barriers when addressing citizens as a stakeholder target group, and identify communication opportunities to increase or maintain citizen participation. Based on these, possible communication actions can be defined, from which benefits for both the CS project and citizens are detected. A communication plan can then be defined with prioritized and detailed actions. Finally, a quiz is conducted, and take-away ideas based on the #CitSciComm Labs are shared.

This multi-step, participatory methodological approach can be applied to empower citizen science initiatives to develop and/or improve their communication strategy and in overall their projects' impact.

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Re-thinking Science Communication to increase Citizen Science Projects' Engagement

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Ana Elorza, Ph.D., Spanish Foundation for Science and Technology (FECYT)
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NEWSERA is a SwafS-19 funded project that analyses and evaluates the complex and multidirectional science communication strategies - including digital and non-digital - by addressing the quadruple helix stakeholders in Citizen Science (CS) initiatives (CSi) as the new paradigm for science communication. The aim of NEWSERA is to show the virtues of CS as an inclusive, broad and powerful science communication mechanism that can increase trust in science communication while opening up science and innovation to society, raising awareness and educating in science, and reducing the chances of incurring in fake news by means of promoting critical thinking.

For this purpose, NEWSERA set up a series of virtual co-creation workshops, the #CitSciComm Labs, where 38 ongoing CSi from Spain, Italy and Portugal are participating as "pilots". In each Lab, CSi representatives work under communities of practice that involve specific quadruple helix stakeholders (citizens, academic scientists, policy makers, industries and SMEs), science communicators, science and data journalists, and NEWSERA members to co-design innovative strategies of science communication for the CSi to reach target stakeholders, by defining a specific plan of action, tasks and indicators to follow their effectiveness and impact in social perception.

As a result of the participatory and mutual learning experiences gathered during the first round of the #CitSciComm Labs, a Policy Brief has been developed addressing the challenges that CSi may face when reaching out the quadruple helix stakeholders and science and data journalists, and pinpointing innovative ideas to overcome difficulties and adapt to a changing science communication environment.

How different actors perceive, trust and engage with CSi varies in a vast landscape. For instance groups, such as policy makers and entrepreneurs, can be difficult to reach but they can be paramount for a given CSi. Teaming up with policy makers and industries can turn CS into a catalyst of innovation, and might also be a way to aim for openness and accountability in the public and private sector.

Regarding academic scientists, sharing information might benefit them and their research. Open science improves the quality, efficiency, and responsiveness of any research. When partners from across academia, industry, public authorities and citizens are invited to participate in the research and innovation process, creativity and trust in science increases, social innovation blooms and science is aligned with societal needs.

Science and data journalists are a common underestimated stakeholder: the data gathered or produced by citizen scientists can be a great source for newsable stories, especially local ones. Being aware of the media environment can also help to spread the word about the projects, increasing their participation, impact and raising public awareness. This work gathers further examples of the detected challenges, as well as the innovative communication actions arisen from the first round of the NEWSERA #CitSciComm Labs, in order to inspire the citizen science community.

Acknowledgments: This project has received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement n. 873125.

Participatory Science Theatre: From Science Communication and Action Research to CItizen Social Science

Daniel Green Marques, MSc, Center for Science Studies, Aarhus University, Denmark

Public engagement in science and technology (PES) takes shape in a diversity of practices, from science communication to citizen science and action research. While the social and democratic values of PES have been a foundational motivation for scholars, practitioners and policy-makers, recently, more and more spaces, actors, and practices are recognized as belonging to the domain of PES. In general, PES and other modes of science communication are now seen as part of culture in modern 'scientific societies'. However, at the same time, inequality and exclusion phenomena are increasingly revealed in the science communication spectrum. Additionally, exclusion exists not only in the audience's demographics, but also in the 'how' and 'what' of the message which is communicated. For instance, most science communication practices are top-down and expert-led approaches. Science theater appears as a current science communication tool that has the power to communicate beyond cognition, doing so also through emotions, aesthetics and complex identification. Participatory science theater (PST), in particular, calls for the participation of citizens in the interaction with, preparation, and/or enactment of live public performances. The 'artistic' expression affords the inclusion of agonistic perspectives and knowledges, and encourages open interpretability and meaning-making. Here, I propose that PST can be used to offer an insight in what it means for people 'to live with' modern science and technology as part of a citizen social science (CSS) methodology of both research and communication. In participatory action research, PST has been successfully used in combination with more positivistic approaches (e.g. statistics) to understand, give voice to, and transform social issues and power relations. CSS and PST's inclusion of citizen's voices and focus on the experiential perspective of science and technology constitutes an opportunity to enquire into the very representations and meanings of science and technology (in their many particular aspects) in our everyday lives and in the public sphere. By working with local communities, social groups, average or engaged citizens, PST in CSS has the potential to bring together artists, scientists, citizens and citizens scientists, and to offer insights into the human nature of science and technology in our world.

Engaging Citizen Seismologists and Earthquake Eyewitnesses through a Global and Multichannel information system.

Rémy Bossu, General Secretary of EMSC, EMSC
Laure Fallou, EMSC
Jean-Marc Cheny, EMSC
Marina Corradini, EMSC
Matthieu Landes, EMSC
Julien Roch, EMSC
Frederic Roussel, EMSC
Robert Steed, EMSC

LastQuake is a citizen-seismology based rapid information system comprising websites, a Twitter quakebot, and a smartphone app for global earthquake eyewitnesses. Developed by the Euro-Mediterranean Seismological Center (EMSC), its aim is twofold: to offer timely and appropriate information in regions where an earthquake is felt and to collect high numbers of eyewitnesses' direct and indirect observations to improve rapid situation awareness.

As for many citizen science projects, engaging strategy is key. Therefore, the EMSC has been empirically developing an engagement strategy that had to adapt to (1) constantly emerging communities (because eyewitnesses only exist once the earthquake has occurred) and (2) a global audience. LastQuake engagement with eyewitnesses is based on the rapid provision of tremor detection (between few tens of seconds to a couple of minutes) which is derived from the analysis of indirect information, i.e., Internet and social media searches by eyewitnesses eager to find out the cause of the tremor. Crowdsourced data is then fed back into the ongoing information product improvement and situation awareness which, in turn, attracts more eyewitnesses through a viral spread. The multi-channel system allows for adaptation to a variety of technological and risk cultures. Finally, translation of tools by volunteers and intensive use of visual communication has proven useful to ensure a global usability.

This engagement strategy has proven successful as LastQuake now gathers 1 M users around the world. Moreover, 16K felt reports were collected through the system for the M6.4 Petrinja (Croatia) earthquake in December 2020. And this also works for small earthquakes, as 2,000 citizen seismologists left a felt report within 4 min of M1.7!

In order to go further within citizen seismology and based on continuous users feedback and support, the LastQuake app now includes timely geo-targeted safety checks and safety tips to describe behaviors to be encouraged or avoided after violent tremors. The Twitter Bot has also been improved to include more educational tweets for citizens and fight earthquake misinformation. Additionally, the EMSC developed a forum to gather the LastQuake community and offer its members a place to exchange about seismology and seismic risk.

Citizen science approach using co-analysis of research data by citizens.

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Context: Traditionally the approach of co-creation within a design process enables a non- specialized audience to contribute to the formulation and solution of a problem. Bonney et al. (2009) point out the need to go beyond this contributory approach within the model of citizen science and involve the citizen in the design process of the research, in ways that are more deliberative and accessible. It is thus important to understand how co-analysis of data in a co-creation setting can be an opportunity for empowerment and inclusiveness for all participants in a citizen science approach.

Project: Ongoing citizen science project to support informal caregivers working in healthcare in balancing work and caregiving in a healthy way. For this project, a bottom-up approach for the co-analysing of five semi-structured interviews held with informal caregivers working in healthcare was developed. To accomplish an overview of existing experiences and knowledge from the interviews an affinity diagram for co-analysis was used. An affinity diagram is a bottom-up visualisation of any kind of data but is mostly used for categorizing quotes from interviews. The three stakeholder groups: informal caregivers working in healthcare, human resource advisors and professional researchers, created each an affinity diagram for comparison purposes. Before the first online co-analysis session stakeholders received an explanation on and support during working in Microsoft Teams and Miro, a free online whiteboard.

The visualisation of the quotes from the interviews in an affinity diagram not only helped to organize large amount of data but also created a common language to support equal cooperation among all stakeholders. Furthermore, the co-analysis method re-opened predefined research questions and outcomes enabling all stakeholders to effectively co-create the research plan.

Poster: The poster (landscape) will show the outline of the process, feedback from co-researchers, three affinity diagrams and the scenarios for possible solutions from the follow up co-creation sessions. Together these elements demonstrate how (online) research works for co-analysis of data by citizens.

Co-creating science communication and research with young people about their mental health during the covid-19 crisis

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3) Former ATY student
4) The Academy of Talented Youth (ATY)

Introduction
A lot of young citizens experienced mental health challenges during the covid-19 lockdown as their everyday life was changed radically. They had to stay at home and were excluded from normal social activities. As part of the project "Giving young people a voice", we initiated science communication with young people about their mental health - as well as co-creation of coping strategies for empowerment. To enforce this process, we engaged in a close collaboration with a group of young people as co-researchers in planning and execution of a co-creation workshop, data collection, analysis, and communication.

Aim:
- To present our experiences with science communication and research co-creation with young people about mental health during the covid-19 lockdown.
- To share insights from a co-researcher collaboration with young citizens.

Methods
We involved 70 young people aged 17-22 in an online co-creation workshop on February 10, 2021. The participants were current or former students from The Academy of Talented Youth (ATY). We used the online game "Corona Minister" as conversation starter and mixed methods for documentation: survey (n=45), interviews (n=12) and notes from observations and a digital Miro-board. Furthermore, the methods were co-created and co-implemented with five young co-researchers (former ATY-students) and our collaboration with them evaluated via interviews (n=5).

Results
Main products from the workshop were: A list of five coping strategies, a video with animations and a strategy for communication with young people. In addition, our data provide insights about how to engage young people in two-way science communication about mental health in a co-creation workshop and how to use an online game as conversation starter. We succeeded in initiating a safe dialogue with the participants but experienced difficulties in co-creation of generic coping strategies. The collaboration with the co-researchers turned out to be a successful approach to engage young people in the research project and support joint ownership. Our main learnings were that it calls for participation in the whole research process, careful planning, matching of expectations, a regular meeting schedule, consistent communication on all levels and a specific focus on how to utilize the unique possibilities of co-researchers in the research process.

Discussion
We discuss involvement of and co-creation with young people in science communication as well as challenges with representation and diversity. Additionally, we discuss collaboration with young co-researchers and how they can contribute to the research process.

Conclusion
Our results indicate value creation for all participating parties and provide input for improving two-way science communication and co-creation. We suggest that co-researchers can be an effective approach for participation of young people in research.

Co-Creating the Museum Exhibition 'The Body as Data with Young People

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Sia Søndergaard Kristensen, Project Manager, VIA University College
Ulrik Bak Kirk, Project Manager, Aarhus University
Signe Herbers Poulsen, Head of Office, PhD, Aarhus University
Nina Maindal, Student researcher, Aarhus University

Introduction
Museums have evolved from from primarily conserving our cultural history and their collections of objects, to utilize their collections to educate society. In later years, this obligation to educate the world has further evolved from museums as mirrors of the world towards a new role as agents providing specific foci. Creating museum exhibitions is thus changing from curated collections as a representation of the world towards a research process in and of itself providing a specific perspective on the world.

As part of the citizen science project 'Giving Youth a Voice', we wanted to co-create a cross-media museum exhibition with young individuals about data sharing and the body as data in relation to public mental health. However, the goal of the process was dual: to co-create an exhibition and to do so while subjecting the process to research.

Aim
- To present our experiences with co-creating together with young people the museum exhibition 'The Body as Data?'.
- To share possibilities and pitfalls of co-creating a museum exhibition with young people, researchers, and curators.

Methods
We involved more than 400 young individuals in the process at different levels. The participants were current or former students from The Academy of Talented Youth (ATY) as well as K12 pupils in public schools. The data collection included: small focus groups, large scale workshops, online co-creation of interaction, feedback sessions, interviews, surveys, log-books and minutes from meetings.

Results
The main products from the workshops and interviews were: templates co-created and drawn by participants, test and inputs to an interaction in the exhibition, log-book notes and interviews with participants as well as other involved parties.

The co-creation approach showed successful in engaging young individuals in the process of developing a museum exhibition and support joint ownership. We found that it calls for careful planning, matching of expectations, a regular meeting schedule, (meta) communication on all levels and a specific focus on how to utilize the unique possibilities of co-creation in the process.

Discussion & Conclusion
We will discuss co-creation of a cross-media museum exhibition with young people and emphasize representation and diversity as well as possibilities and pitfalls.

We contend that museums would be more attractive to both researchers and audiences if we consider exhibitions as knowledge-in-the-making rather than platforms for disseminating already-established insights. We propose co-creation as an effective approach for participation of a target audience to guide and design of exhibitions.

Safe Space

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Carsten Lyng Obel, Department of Public Health, AU
Signe Herbers Poulsen, Department of Public Health,AU
Craig Native, Department of Public Health, AU

Introduction
The latest report from the Danish Knowledge Council for Prevention on children's and young people's mental health from 2020 presents a comprehensive analysis of data collected from Danish registers and representative questionnaire studies and calls for urgent action of mental health promotion efforts in places where children and young people live their daily lives (Jeppesen et al., 2020).

In this respect youth clubs a[illegible]vious arena but are not very well researched in Denmark as a platform to promote mental health[illegible] gener[illegible], there is in fact a lack of research within this field (Eriksen & Seland, 2021; Ringskou & Graves[illegible] 2020). Nevertheless, the clubs seem to represent a more unstructured and informal environment for s[illegible]al activi[illegible]s than schools with more time for developing communities in a physical setting, creative and p[illegible]ctivities, as well as to build strong relationships between the young people and the youth club work[illegible]

The aim of the pilot project Safe Spac[illegible]s to i[illegible]estigate the youth clubs in Aarhus Municipality as an arena to strengthen social and mental health a[illegible]g c[illegible]en and young people through an innovative collaboration between the young people, pe[illegible]gogu[illegible]s and club leaders, students from Kolding Design school and researchers at the Department of P[illegible]blic H[illegible]h, AU.

Process
The project began in the spring of 2021, where preli[illegible]ary w[illegible]ksh[illegible]ps were held with pedagogues and leaders from five different youth clubs in UnglAarhus (Aa[illegible]us M[illegible]icipality).

We conducted a total of nine qualitative interviews with pedag[illegible]s a[illegible]d leaders from all the clubs with the aim to get in-depth understanding of their experiences of the y[illegible]ng p[illegible]ple's mental health, as well as their own work with supporting the young people's mental wellbeing.

As a result of the qualitative data analysis, we identified five intervention a[illegible]as. Based on the five themes 30 international master students from Kolding Design school began a five-week project with Safe Space as their headline. The students' projects resulted in several different creative design concepts, all of which are oriented towards working with young people's mental health in the clubs.

The current status is that the pedagogues from the five clubs are working to integrate and apply one or more design concepts in practice. During the spring of 2022 we expect to use the designs to collect data about the young people's mental health and evaluate the initiatives in a co-creation workshop in collaboration with the pedagogues and the young people. The purpose of the workshop is furthermore to collaborate with the young people and pedagogues about further development and integration of the design ideas into practice.

Genskab – Co-designing inclusive and youth friendly societies through civic engagement in circular economy activities

Cathrine Marie Skovbo Winther, PhD student, Aalborg University
Michael Søgaard Jørgensen, associate professor, Aalborg University

Young people all over the world are at risk of getting excluded from their society. There is a threat of high youth unemployment, migration, or emigration in many European countries, where almost 30% of young people aged 18-25 years are at risk of poverty. This problem is also applicable in Denmark. The old part of South Harbor is one of Copenhagen's vulnerable urban areas. Around 18% of the 18–29-year-old in South Harbor receive public support compared to 2-3% on average for Copenhagen. Genskab is a local part of the YouCount project, an EU-funded project contributing to the theoretical field of Citizens Social Science (CSS) by developing new knowledge on how to co-create more inclusive and youth-friendly societies with the youth, at risk of exclusion, as citizen scientists. In YouCount, a multiple case study of Y-CSS (Young Citizen Social Science) projects will be performed in nine different countries around Europe. One of the cases is based in South Harbour Copenhagen and will investigate how and if Circular Economy activities in a local social setting can intervein with the status quo (exclusion) and co-design new network constellations that can empower youth to contribute to the local community (inclusion). It is analysed whether circular economy as concept, its connection to climate change and its practical dimensions of for example repairing and sharing products could be a way to create empowerment among youth. The case study is applying a design framework of Citizen Social Science, Co-design, and ANT (Actor-Network Theory) to investigate the conditions for the youth in South Harbor and what is needed to empower them to try influencing their local community through Circular Economy activities.

A poster format will present the work done in the Danish intervention and the results and experiences from 2021-2022 discussing the following research question:

- How can local, co-created circular economy activities based on citizen science create empowerment and inclusion of the youth in a vulnerable neighbourhood?

Methods like fieldwork, observations, interviews and various interventions (like workshops, design games and mapping) will be used to investigate these questions. Furthermore, the project will investigate if the use of non-human actors such as intermediary objects can support the dialogue with the youth about their concerns and applying Circular economy as means towards social inclusion.

The poster will be presented in English, but it will be possible to discuss and ask questions in Danish. It is an ambition to engage the audience in the presentation. Methods developed through the project will be used to create citizen science live in action and make the research tangible for the audience. If possible, young citizen scientists from the project will be invited to participate in presenting the results at the conference.

Forest protection by indigenous communities in Cambodia - CS-based environmental monitoring

Dimitris Argyriou, Forest & Peoples Organization
Ida Theilade, Professor, Copenhagen University

Indigenous peoples and local communities are playing a significant role in preserving nature and forest by protecting their ancestral lands. This is increasingly being recognised in the international climate-policy debate. The poster will showcase citizen science as a cost-effective approach to collect and report data on tropical forests. Such data can support decision making at different levels while providing significant social co-benefits to local people.

The poster will present the case of a network of local communities (PLCN) that co-created a Citizen Science approach, by using smartphones and a specially designed app to collect data on forest crimes and forest resources in Cambodia. The app is used by local and indigenous people for systematic data collection. The app records GPS coordinates, photos and audio information. The app has proven a powerful tool to include marginalized indigenous communities in the environmental debate, empower citizens and disclose the status of Prey Lang Forest in Cambodia.

Our findings show that local communities with little formal education are able to monitor forest crimes and forest resources using smartphones. Community members are able to collect large amounts of data regardless of their gender or age. The use of information and communication technology (ICT) for data collection has opened up new opportunities for communities wishing to engage in environmental monitoring. The cost resembles other community-based programs but is considerably less than for monitoring by professional foresters. The data collected using ICT has facilitated advocacy and awareness-raising on social media which led to Cambodia's government drafting a sub-decree to gazette Prey Lang as a Wildlife Sanctuary.

Subsequently, the data has been used in an innovative forest monitoring platform: the Integrated Forest Observatory System (IFOROS) coupled with satellite data stemming from the Forest Canopy Disturbance Monitoring tool (developed by the Joint Research Centre of European Commission) as well as the Tree Cover Loss dataset from Global Forest Watch and university of Maryland. The collected ground data are used to assess hotspots of deforestation, document the importance of the forest to local livelihoods, promote wildlife protection as well as biodiversity conservation for the whole region, and inform the public and policy makers and authorities for the environmental status of protected areas of Cambodia.

In practical terms, we have experienced technical and cultural challenges of implementing ICT in an area with limited access to power and cell phone connection, and a non-existent background for using advanced technology. We have also experienced political and safety-related challenges of confronting organised crime in a country with wide spread corruption and state-led persecution of environmental defenders.

Frivilligdigitalisering på Rigsarkivet: Samskabelse er værdiskabende

Astrid Tove Nejstgaard Larsen, Arkivar, Rigsarkivet (Danish National Archives)

De sidste 30 år har frivillige [illegible]er, indtastere og korrekturlæsere doneret tid, kræfter og fingerspidser til digitaliseringen af Rigsar[illegible]ets sam[illegible]nger. Den indsats har affødt millioner af online-tilgængelige billeder af arkivalier, og oparbejdni[illegible] af store strukturerede datasæt, såsom Dansk Demografisk Databases kirkebøger og folketællinger, og Indta[illegible]ingspor[illegible]lens cs-projekter, fx dødsattester og fængselsstambøger.

Fællesnævneren for de cs-proje[illegible]der [illegible]r størst – om mest vedvarende – tilslutning i Rigsarkivet, er at de tilrettelægges, koordineres og søsætte[illegible]tæ[illegible]amarbejde med - eller på opfordring af - projektets slutbrugere. Forskellige borgergruppe[illegible] moti[illegible]res af forskellige endemål: Slægtsforskeren, der ønsker at kortlægge sine aner, finder ofte en ande[illegible]her[illegible]ndtastningen af folketællinger, end forskeren, der ønsker strukturerede data til sine undersøgel[illegible]. De [illegible]ndtastningsprocedurer og datasæt, som Rigsarkivet designer, skal – så vidt muligt - kunne omfavn[illegible]beg[illegible]gsscenarier, og CS-teamets rolle (Rigsarkivets rolle) bliver hér, at agere bindeled mellem to brug[illegible]g[illegible]p[illegible]er, d[illegible]kke altid er enige.

Når denne tilgang til citizen science prioriteres, er det for[illegible]di[illegible]roje[illegible]nes samskabende natur tillægges en værdi i sig selv. Ambitionen er således ikke eksklusivt, at [illegible]ene[illegible]e enorme mængder rådata (her findes andre oplagte alternativer), men også undervejs at invitere [illegible]ug[illegible]l "hands on" fordybelse i de digitale magasiner, og til at dele deres erfaringer, oplevelser og viden m[illegible]a[illegible]e ligesindede. I dette henseende, argumenterer vi, er samskabelse afgjort værdiskabende.

Via vores poster vil vi her grafisk demonstrere hvordan den frivillige in[illegible]ste[illegible]ndtastninger spreder sig som ringe i vandet og hvordan dette influerer vores andre bruger-relaterede p[illegible]jekter tilknyttet Rigsarkivet. Hermed vises det hvordan vores brugerskabte data kan være et redskab til at skabe flere data.

Topic: Lessons Learned on Recruitment and Engagement

Scaling up Engagement – Poster presenting insights into the ongoing research accompanying the Europe-wide citizen science project "Plastic Pirates - Go Europe!"

Valerie Knapp, M.A., Ruhr-University Bochum, Germany, Chair of Research on Learning and Instruction
Vanessa van den Bogaert, Ruhr-University Bochum, Germany, Chair of Research on Learning and Instruction;
Joachim Wirth, Ruhr-University Bochum, Germany, Chair of Research on Learning and Instruction

What are facilitating factors for success and potential pitfalls when implementing a Europe-wide citizen science project? How do they vary depending on the regional and cultural context in which the citizen science project is set? And what do we know about the participants and the effects of participating in a citizen science project? Drawing on both quantitative and qualitative methods, the accompanying research answers these questions using the "Plastic Pirates - Go Europe!" campaign as an exemplary case for the field of citizen science, with the aim to generate findings that can be transferred to other project settings.

Scope of the Study
Under the Trio Presidency 2020-21 of Germany, Slovenia and Portugal of the EU Council the citizen science campaign "Plastic Pirates - Go Europe!" ran in these three countries. Young people collected data on the input of micro- and macro-plastics via rivers and streams into the seas and oceans and recorded them on a digital map on the internet. With more countries expected to participate in the future, the objectives of the campaign are to strengthen scientific cooperation in Europe, to promote citizens' engagement in science and to raise awareness for a conscious and sustainable approach to the environment. The aim of the research accompanying the rollout of "Plastic Pirates - Go Europe!" in multiple European countries is to gain knowledge about the specific effects of certain characteristics of the campaign on the participants and hence to help meet the increasing demand for scientific contributions to the discourse on citizen science.

Materials and Methods
The accompanying research project describes a holistic approach to the field and allows for, on the one hand, insights into effects on participants, i.e., on teachers and their students, of the citizen science campaign through a novel research design combining panel surveys and experimental studies. On the other hand, through interviews the research project creates the opportunity to learn more about the conditions for success and obstacles to the rollout from the perspective of different stakeholder groups, such as members of the project team and members of the executing agency. Thus, the accompanying research gives a prime example of how quantitative and qualitative research methods may both assist in the fruitful exploration of citizen science as a research subject. With the research project we have succeeded in providing a unique scientific documentation of the campaign over three survey periods. The project demonstrates how the different methodological approaches as well as the thereby generated insights complement each other. We will use the poster session as a forum to discuss the topic of research on citizen science with a larger audience.

Opportunities and challenges of electronic citizen science platforms as methods to collect data from recreational fisheries; Lessons learned from Fangstjournalen.

Christian Skov, Associate professor, Section of Freshwater Fisheries and Ecology, Technical University of Denmark, DTU Aqua, Silkeborg, Denmark
Casper Gundelund, Research assistent, Section of Freshwater Fisheries and Ecology, Technical University of Denmark, DTU Aqua, Silkeborg, Denmark

Recreational fishing is a popular leisure activity that engages ~10% of the Danish population. Data collection from recreational fisheries is a logistical and financial challenge due to the disperse and diffuse nature of the activity. In general, little information is available for many areas and water bodies, which is a hindrance for successful implementation of management strategies and thus healthy fish stocks. Citizen science offer a potential solution to the data constraints, among other things, by engaging the anglers as data collectors. Additionally, the recent technological advances provide support for the usage of electronic citizen science platform, e.g., working as smartphone applications or webpages. This electronical approach also facilitate a way to educate and motivate participants. One such platform is the Danish electronic citizen science platform Fangstjournalen developed by DTU Aqua as a tool to aid research and management of recreational fisheries. Since the platform was launched in 2016, some 14.000 participants have registered approximately 60.000 fishing trips. Here we present the main results from a recent synthesis that evaluated aspects of participation (recruitment and retention) and data quality of the Fangstjournalen platform. Main challenges relate to participation, e.g., the inability to recruit participants that are representative of the general angling population and from all recreational fisheries. Despite this data quality evaluations indicated that data in several cases was good, i.e. similar to that of traditional survey methods. Further, the citizen science approach makes it possible to explore management topics that traditional survey methods would not have allowed for.

Potential and motivation in insect monitoring using citizen science

Jonas Colling Larsen, Project Manager, Natural History Museum of Denmark
Anders P. Tøttrup, Associate Professor, Project Owner, Natural History Museum of Denmark
Cecilie Skræp-Svenningsen, phd, Miljøstyrelsen

The poster will highlight experience on two important aspects of citizen science-based insect biodiversity monitoring projects:
1. Is citizen science a valid and reliable tool for monitoring insect biodiversity across time and space?
2. What are the most and least important factors (feedback) for participants in insect biodiversity monitoring citizen science-based projects?

The Insectmobile is a Citizen Science project started in 2017 at the Natural History Museum of Denmark. In 2018 and 2019 more than 400 volunteers collected insects with custom made, roof-mounted car nets, covering most regions of Denmark. The insect bulk samples were analyzed using DNA metabarcoding, resulting in a species distribution-map across different landscape types and degrees of urbanization. In 2018, iDiv in Leipzig, Germany, adapted The Insectmobile and carried out the project in smaller scale using the same protocol and methods. In Israel, The Butterfly Scheme has been running since 2009. Here volunteering citizen scienctists monitor presence, abundance and phenology of butterflies.

Based on two peer-reviewed papers we highlight the motivation amongst and potential of using citizen scientists as a tool for insect biodiversity monitoring.

Results:
The poster will present the following results using text and figures:

- Most and least important motivation factors for participating across the three citizen science projects (cross-country motivation factors)
- Most and least important motivation factors for citizen scientists in the Danish, German and Israeli project respectively
- The strongest intrinsic and extrinsic agreements across the Danish, German and Israeli project respectively
- Important aspects to consider in managing citizen science-based monitoring projects
- The value, challenges and advantages of using citizen science as a tool for monitoring flying insects compared to traditional methods
- Perspectives in the inclusion of citizen scientists in national insect monitoring schemes
- How citizen science can be used as a valid, scientific monitoring tool

Denmark Explores: Engaging citizens nation-wide using a multi-stakeholder approach to recruit citizens to monitor biological response to climate

Natalie Iwanycki Ahlstrand, Exhibition Content Scientist, Natural History Museum of Denmark
Jonas Colling Larsen, Project Manager, Natural History Museum of Denmark (NHMD)
Marie Rathcke Lillemark, Project Manager, NHMD
Anders P. Tøttrup, Associate Professor, Section Head of Citizen Science, and Vice Museum Director, NHMD

Citizen science projects often include the goal of empowering and educating citizens in topics such as nature conservation. However, citizen science participants are often characterized as amateur naturalists or individuals already activated in biodiversity conservation issues. In order to broaden the diversity of participants and obtain the full benefit of citizen science in terms of engaging and including all levels of society, new means of targeting citizens are being explored. We present the recent nature campaign "Vores Nature" (Our Nature) and its success in attracting and engaging citizens of all ages and experience levels. Vores Natur resulted from a partnership between natural history museums, Naturstyrelsen, Friluftrådet and Danish media groups (Danmarks Radio). The year 2020 was set as the year for nature in Denmark. Activities and events were created across the entire country to attract citizens to experience the benefits of nature–both on screen and out in nature–regardless of their prior connection to nature. Amongst the experiences offered to citizens was a new citizen science initiative called "Danmark Udforsker" (Denmark Explores) which engaged citizens in monitoring the timing of seasonal biological and cultural events to assist researchers in understanding how climate change and climatic differences across the country affect local biodiversity. The results of two years of data collected by citizens for the Danmark Udforsker programme are discussed in light of this partnership, and in the overarching program goals to empower and connect citizens to local nature.

Citizen science in the Global South: Motivational frameworks

Mercy Gloria Ashepet, Division of Invertebrates and Division of Natural hazards, Royal Museum for Central Africa and Division of Bioeconomics, Department of Earth and Environmental Sciences, Katholieke Universiteit Leuven
Dr. Liesbet Jacobs, Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam.
Dr. Tine Huyse, Division of Invertebrates, Department of Biology, Royal Museum for Central Africa.
Prof. Liesbet Vranken, Division of Bioeconomics, Department of Earth and Environmental Sciences, KU Leuven.
Dr. Caroline Michellier, Division of Natural hazards, Department of Earth Science, Royal Museum for Central Africa.

Background:
Citizen science as a practice, where members of the general public and professional scientists work together to respond to local or societal questions, is spreading fast in the Global South (Ashepet et al., 2020). One of the challenges inherent to citizen science is recruiting and retaining active participants over a long time span. Understanding why people contribute their time, energy and skills and why they (dis)continue to do so is therefore important. However, literature unravelling both citizen science methodologies and motivational factors of volunteers in general is skewed towards cases in the Global North. The dearth in longitudinal studies on motivation of citizen science participants (West and Pateman, 2016) hampers the establishment of sustainable and effective CS activities (Bonney et al, 2014). Within this study we outline the theoretical framework used to characterize participants motivational factors over time within citizen science projects in Uganda and present our preliminary findings of the baseline study.

Methods:
To identify the factors that drive or hinder participation in CS activities, all the central components of the volunteer functions inventory (VFI) and the Theory of planned behaviour (TPB) were included in the questionnaire. Measures of self-identity and moral obligation were added to extend the TPB. A questionnaire survey was administered to active participants (n = 74), and non-active participants (n= 86) of three CS projects in South-West Uganda using two different approaches (face to face and group interviews). Two of the CS networks report data on environmental hazards while the other reports on snail-borne diseases. The questions were presented in random order and measured on 7-point Likert scales.

Key findings:
The membership is biased towards young male individuals with a relatively high formal education level participating in the citizen science projects. Volunteers hold multiple motives for participating although initially personal development factors related to understanding (desire to learn) and career (enhance employment prospects) were the most important factors for the participants across all the groups. Continued participation was attributed to other socially oriented factors like a desire to help the community. Only age had an influence on the importance of motivational factors with younger participants mostly in the environmental hazard group finding career related factors of great importance than older participants. The participants had high intentions and favourable attitude towards the CS tasks but quite low behavioural control except the environmental hazard group. Conducting training sessions together with providing financial facilitation and equipment needed to carryout tasks are important support structures for the participants. Bad weather, sickness and lack of transport were identified as the major barriers to participation for participants across groups.

Lessons learnt:
Different CS activities/themes evoke different motivational factors and these also differ in populations. The components of the theories applied likely have complex multidimensional structures as opposed to the unidimensional structures suggested aprior. Reliability of the data (scoring consistency) is potentially influenced by questionnaire administration technique with group interviews resulting into more acceptable consistency.

In-vivo dynamical modelling of player engagement and skill in a Citizen Science game: Quantum Moves 2

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Many current Citizen Science games are built around solving complex tasks. In order to support the players, therefore typically a combination of tutorial tasks and user interface (UI) features is provided. However when choosing an optimal set of UI features, it is rarely true that more is better. Especially in the context of Citizen Science, too many features may simply confuse the users and/or distract them from the core task objective, leading either to degradation of their input or loss of interest in general.

Traditionally, the merit of UI features is evaluated in a so called A/B testing scheme, where different versions of the UI are served to smaller groups of users, and the effect of the included features can be comparatively evaluated (Longbotham and Kohavi, 2015). This methodology based on the classical randomized control trial (RCT) comes with large overheads in app development and data analysis, since it requires management of several versions of the app as well as ensuring that the versions are being tested on equivalent populations.

On this poster we present our approach of dynamically modelling player engagement and skill. Inspired by causal inference methodologies (Pearl, 2009), we have developed a generalizable model representing a variant of a Dynamic Bayesian Network (DBN) (Russel and Norvig, 2009). This model is attempting to infer causal effects between specific UI features, player performance/progression as well as retention. Our approach does not require multiple app versions and can be directly applied to apps that are already live and collect data. It also allows to model single players and extract their individual characteristics which can be used for player clustering/categorization and to understand dynamics of the player behavior.

As a case study, we demonstrate how the model can be applied in practice to one of our own Citizen Science games - Quantum Moves 2. We discuss the gained insights on significance of the features, player types and general characteristics of their progression. This information can not only be used to enhance the design of future versions of the app in general, but could also allow customized user interfaces optimized for the individual player.

Individual Learning Outcomes in Citizen Science Projects

Miriam Calvera-Isabal, PhD candidate, Universitat Pompeu Fabra
Marius Oesterheld - Researcher at Wissenschaft im Dialog (WiD)
Vincent Schmid-Loertzer - Researcher at Wissenschaft im Dialog (WiD)
Ishari Amarasinghe - PhD at Universitat Pompeu Fabra
Patricia Santos - PhD at Universitat Pompeu Fabra

Citizen Science (CS) is attracting increasing interest and attention from multiple sectors of society. What is still missing, however, is a systematic large-scale investigation of CS activities across thematic and national boundaries. It is this gap that CS Track, a research project funded by the European Union's Horizon 2020 research and innovation programme, is working to fill. CS can play an important role in promoting scientific literacy and critical thinking which is necessary to address today's societal challenges. Educational aspects in CS participation such as the development of scientific skills or creating awareness about environment conservation have been explored in previous publications. Still, there is a need for additional empirical evidence on the educational potential of CS activities. Therefore, one working group within the consortium is currently trying to find out what project descriptions can tell us about the potential learning outcomes associated with participation in citizen science projects. Taking as a point of departure the model of individual learning outcomes developed by Phillips et al. in 2018, which distinguishes six categories of learning (i.e. Interest, Self-efficacy, Motivation, Knowledge of the Nature of Science, Skills of Science Inquiry, and Behaviour and Stewardship), this study applies a combination of manual and computational text analysis methods to a corpus of project description stored in the CS Track database. Based on the classification and definition of learning outcomes proposed by Phillips et al., the team first created a coding scheme consisting of six main and 21 subcategories and manually assigned phrases, sentences and short paragraphs from a sample of 65 project descriptions to these categories. In a second step, distinctive and frequently occurring keywords were extracted from these text snippets. These keywords are currently being used to train Natural Language Processing (NLP) algorithms, which will ultimately allow us to automatically code all project descriptions stored in the CS database. With a sample size of 4.000+ this will be the most comprehensive investigation of individual learning outcomes in citizen science to date.

At the Engaging Citizen Science Conference 2022, we would like to present the findings of this study and discuss with other conference participants how they can be operationalized. In particular, we would be interested in exploring how our results can be translated into concrete recommendations that will help people coordinating CS activities attract, motivate and retain volunteers while at the same time maximizing the benefits said volunteers derive from their participation in CS projects. For example, our research so far indicates that it may be helpful to design templates and quality criteria for project descriptions, introduce standards for training and instruction of volunteers, and devote more attention to creating opportunities for citizen scientists to interact with each other and with the professional researchers throughout a citizen science project.

Hungarian citizen science in the making

Alexandra Czegledi, Mrs., Junior Research Fellow
Bálint Balázs, Senior Research Fellow, ESSRG

Citizen Science in Hungary has long been an unexplored field of research and underutilised methodology in science engagement, although more and more newspapers report its potential to involve citizens in scientific endeavour.

While participatory researcher models have a long history, mainly in the social sciences, citizen science is slowly but surely gaining acknowledgement among natural scientists. In the past two years, a growing number of citizen science initiatives emerged predominantly in biology, ecology, geography and science communication.

ESSRG researchers conducted 30 semi-structured interviews with the identified project coordinators, community managers, research performers, and research funders (policymakers) to better understand the propagation of citizen science across local research institutions and civil society. Media content analysis complemented the interviewing process to map citizen science themes and projects that received considerable visibility. The exploratory study relied on qualitative analysis of the interview and media contents, namely thematic coding and categorisation of interview and media content data (QCAmap).

The poster introduces the following five dimensions that the main research questions covered: (1) collaboration and co-creation; (2) knowledge production; (3) results and research outputs; (4) impact and challenges; (5) plans and visions. It presents the historical roots and state-of-art of citizen science. Also, it gives an overview of policy-level initiatives focusing on citizen science and its current and future potential. The EU-Citizen.Science platform project and the YouCount project supported the research process.

Citizen science in Denmark: A national survey across research fields, institutions, and projects

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Torben Esbo Agergaard, MSc, Aarhus University
Gitte Kragh, postdoc, Aarhus University

Citizen science is an international field based on widely accepted – although often contested – principles, typologies and definitions. In comparison, national and local differences get relatively little attention. Our poster offers insights into the field of citizen science in Denmark. We report on results from our 2020 study of citizen science activities in Denmark. The study included a literature review, a questionnaire distributed by email to members of known citizen science projects and allowing for access by means of self-enrollment (N=187), and a desk study of projects and actors with relation to the concept of citizen science (Agergaard, Kragh and Nielsen, 2020). We found an increase in the number of citizen science-related publications from Danish universities from 2014 onwards. Nearly all publications were research publication, and very few directed towards larger audiences. We also found that the field of citizen science in Denmark included all fields of scientific inquiry, including the social sciences and humanities. The majority of projects (65%) dealt with nature – biology and ecology – as an object of study. Nearly all projects used citizen science as a research method, and very few as a mode of public engagement or activism (Kasperowski and Kullenberg, 2018). Our survey respondents represented different stakeholders in citizen science: universities, research libraries, museums, public institutions (agencies, public libraries, etc.), NGOs, companies, and private citizens. They were generally interested in and knowledgeable about citizen science. Collectively, they identified the following problems for citizen science in Denmark: volunteer retention and recruitment, institutional backing, public awareness, ethical approval of projects, acceptance of citizen science as a research method, and human resources for doing citizen science. In conclusion, citizen science is an emerging field in Denmark, attracting interest and some support. Current challenges include increasing and maintaining institutional support, consolidating and extending existing organizational structures, creating incentives for researchers and citizens, information and advocacy, capacity-building, and ethical and legal attention.

Science of Citizen Science - Exploring the research in the field of Citizen Science through a systematic literature review

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Laura Schmidt, Ruhr-University Bochum
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Citizen Science (CS) is increasingly attracting attention throughout the last few years. This is not only reflected by various CS projects but also by an increasing number of research articles (e.g. Web of Science, title: "Citizen Science", 2010: 14 results, 2020: 325 results). In order to keep track of the increasing number of research papers, we conducted a systematic literature review. The aim of this review is to provide a fine-grained portrayal of the nature of research on CS.

We searched the databases Web of Science and FIS Bildung for papers with the term "citizen science" in their title. Papers published until April 2020 written in German or English were included in the analysis resulting in a list of N = 1159 research articles that were subsequently coded for their main focus. A coding scheme was developed by inductive and deductive processes that differentiated between (a) empirical scientific papers, (b) narrative projects descriptions and (c) theoretical conceptualizations of CS. Within category (a), we firstly coded papers reporting individual outcomes of participating in CS projects (a1). Further, we coded papers that analyze the quality of data gathered in CS projects (a2). Finally, papers that used CS data to answer scientific research questions in different disciplines were assigned another code (a3). Within category (b), we coded descriptions of one to three CS projects (b1) and descriptions of more than three CS projects (b2). Within category (c), we coded theoretical representations of CS (c1) and (technical) devices for CS projects (c2). An inter-rater reliability was determined (kappa= .778) based on 226 articles coded by two coders. All found articles were then sorted into these 7 categories based on the information given in their abstracts.

About 10% of the articles investigate the effect of CS on participants individual outcomes (a1). For instance, studies investigate the effect of CS on students regarding their interest and knowledge within the subject. The majority of projects in this category are in the field of biodiversity, and carried out in institutional contexts. With about 20%, the most articles in this review use CS data to answer scientific questions (a3); data, whose quality is addressed in many other studies (a2) and which in turn report an alignment of data derived by citizen scientists with that gathered by experts. Still, to overcome potential flaws of citizen-generated data, training on data collection skills or other less resource-intensive strategies are introduced to citizen-generated data quality. Further 20% of the articles scientifically and systematically describe a particular CS project and present results covering the number of samples and species that have been examined by the participants (b1) - less studies do so with regard to numerous studies (b2). The remaining articles either describe CS theoretically (c1) or introduce a tool to use in CS projects (c2). besides being a means of science communication leading to individual learning outcomes, CS contributes essentially to scientific knowledge in different disciplines as our review has shown.

A new framework to qualify citizen science projects while giving due regard to diversity

Delphine Mézière, PhD, in charge of promotion of Citizen Science projects, INRAE
Marco Barzman (PhD, in charge of citizen science development)
Sandra Denery (PhD, Crowdsroucing project manager)
Dominique Desclaux (PhD, participatory breeding researcher)
Caroline Falize (Facilitator engineer)
Philippe Loiseau-Dubosc (PhD, in charge of Science-Citizen relations)
Christophe Roturier (Chief of the Science and Society team)

INRAE, the French Research Institute for Agriculture, Food and the Environment, is a multidisciplinary institute that embraces fields that are very close to the daily, and even political, concerns of citizens. This is certainly the reason why the institute has a rich experience of more than 150 citizen science projects, with a wide variety of subjects, aims, methods, types of citizens involved, and levels of engagement ranging from crowdsourcing to participatory action research, from schoolchildren to senior citizens, from the merely curious to experienced or professional actors, etc.

A better understanding of the diversity of these projects is a challenge for the institute. Indeed, the institute has a directorate for open sciences, in which our team is responsible for supporting the development of participatory sciences and science-society relations. But it is a necessary first step to identify the specificities of each large group of projects (relative to their impacts, conditions of success, training needs for researchers, etc.), helpful in better anticipating the support needed by researchers who want to engage in citizen science. The existing typologies of citizen science projects are often based on a single criterion and are therefore not well adapted to our needs. We therefore developed, via multiple discipline contributions, our own frame of reference to better qualify citizen science projects. The frame is based on 13 criteria characterizing citizen science projects that makes it possible to qualify projects without resorting to an oversimplified pigeon-holing scheme. We will present the resulting typology as well as contrasting examples of projects.

MAKING CITIZEN SCIENCE A SUSTAINABLE INSTITUTIONAL PRACTICE

Abril Herrera Chavez, Miss, Extreme Citizen Science-University College London
Muki Haklay, Professor, Extreme Citizen Science-University College London

As a methodology, Citizen Science can be used to improve the engagement of the public in the Research and Innovation (R&I) process, and to better align scientific research and its outcomes with the values, needs and expectations of society. However, to achieve these important goals, and to make Citizen Science a sustainable practice, Research Performing Organisations (RPOs) such as universities and research centres require several internal transformations. Institutional changes in support of Citizen Science can adopt different shapes, from acknowledging the societal and scientific value of Citizen Science (e.g. supporting those who advocate for producing socially engaged research and celebrating their success) to adapting the whole social and organizational structures (e.g. by creating new organisational structures, models of governance and modes of operations). Overall, these transformations can strengthen the relationship between all actors involved in science production (researchers, policymakers, businesses and innovators, civil society organisations, educators, and so on), reducing the gap between the creation of scientific knowledge and society. This research investigates the different conditions required to embed Citizen Science in RPOs. We identified a series of factors that seem to play an important role in the adoption, maintenance and consolidation of Citizen Science initiatives in universities and research institutes. These factors consider not only the challenges that an interactive and collaborative methodology requires but also the different contexts, assets and conditions of RPOs. Informants from universities and research centres around the world were approached and invited to submit data about their use of a citizen science methodology (including but not limited to crowdsourcing, citizen sensing, participatory-action-research, co-creative and collaborative research, hackathons, makeathons), their networks of collaboration, the funding available and used for this type of research and the different institutional support available. The responses received allowed us to build up 30 case studies and to carry out a Qualitative Comparative Analysis (QCA). In the poster, we will report on the analysis of certain factors in their specific combination(s) with other factors and their impact on sustainable institutional changes allowing Citizen Science to flourish in the Scientific Ecosystem. Understanding the role of these factors in supporting or undermining institutional changes results vital for the implementation of sustainable Citizen Science initiatives.

STEP CHANGE - Exploring the potential of Citizen Science

Evanthia K. Schmidt, Associate professor, Aarhus University
Ebbe K. Graversen, Associate professor, Aarhus University

The project STEP CHANGE, funded by H2020 and launched in March 2021, is implementing five Citizen Science Initiatives (CSIs) in the fields of health, energy and environment. The CSIs will tackle the issues of wildlife conservation in Slovenia, non-alcoholic fatty liver disease in the UK, energy communities in Germany, infectious disease outbreak preparedness in Italy, and off-grid renewable energy in agriculture in Uganda. The project will bring novelty in citizen science research while contributing to broader science aspects. The overall objective of STEP CHANGE is in fact to explore the potential of citizen science and to formulate recommendations and instruments for better cementing this approach within R&I institutions as well as changing researchers' mindsets on its value. The project, which aims to make science more socially robust, inclusive, and democratic, will ensure that research institutes make the most of what citizen science has to offer, whilst also identifying, analysing, and limiting the associated risks.

Our presentation will include main features of the project, and provide an overview of the multifaceted methodology STEP CHANGE makes use of to foster alignment of CSIs with local contexts, nurture mutual learning, and encourage self-reflection through the means of participatory evaluation exercises. Hence, the presentation will provide details about the CSIs but also about the horizontal activities of the project (scoping exercise, mutual learning and training activities, participatory evaluation, stocktaking process), which have been designed to increase the relevance, inclusiveness and sustainability of the initiatives. In this respect, we will also focus on the three levels of participation of the CSIs (core team members, citizen scientists and stakeholders), to explain the mechanisms put in place to boost the level of engagement.

amai! Co-creating AI-based solutions for societal challenges

Karen Verstraelen, Project team member, Scivil (The Flemish Knowledge Centre for Citizen Science)
Annelies Duerinckx (Scivil - coordinator)
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Kristien Rombouts (Scivil - team member)
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Pieter Duysburgh (Knowledge Centre Data & Society Flanders - coordinator)
Michiel Vaes (Knowledge Centre Data & Society Flanders - team member)
Carina Veeckman (Knowledge Centre Data & Society Flanders - team member)

The project "amai!" ("Oh my" in Flemish) implements citizen science methods in order to more effectively develop AI-based solutions for societal challenges. The project focuses on four key domains (mobility, climate, health, and work) and encompasses four phases.

First, together with all stakeholders, key societal issues were identified, and it was determined whether AI can be part of a solution. During this phase, we collected 352 ideas from citizens on our online platform. Secondly, we gathered citizens and experts to co-define the scope of these issues, as well as the requirements of a possible AI-solution. In the third phase, a number of projects were co-selected for an open call and in the fourth phase, four consortia will be selected to co-create an AI-system as a solution to the societal issue at hand.

Throughout the project it is crucial that citizens, domain organizations and other stakeholders are maximally involved, e.g. by defining relevant issues for AI, co-defining the problem spaces, having a say in which issues and consortia will be selected, and being involved in the training of the AI-systems.

The primary stakeholders are "societal implementers": people who are not primarily interested in AI, but who are deeply concerned with current societal challenges. Introducing them to information and experts on AI, they can uncover the value of AI to their own professional and personal contexts. Conversely, AI experts can apply new AI systems on societal issues that rank high on the agenda of citizens and domain organizations.

Assembling spheres: Aligning human computation systems in citizen science

Libuše Hannah Vepřek, M.A., LMU Munich

Human Computation systems combine the strength of humans and algorithms to jointly solve problems that neither can solve alone. This rapidly developing approach is especially successful in the field of citizen science, where it allows participants to contribute to research in ways that had not been conceivable before. Here, projects are mostly designed as so-called games with a purpose (GWAP) (von Ahn/Dabbish 2008), in which participants generate surplus value for scientific research, as well as for "learning" AI algorithms, in a playful way. For these systems to fulfill their purpose, they rely heavily on the investment and active contribution of all parties—from the researchers to the developers and the participants—whose initial interests, motivations and ascribed meanings often diverge.

Based on ongoing ethnographic study of three different HC-based citizen science projects, this work analyzes how HC-based citizen science projects come into being in the interplay of different human actors and materialities. What practices surround the human-machine interactions in particular? What meaning do the different stakeholders ascribe to their own roles and the systems they are participating in?

Building on Gilles Deleuze and Felix Guattari's (1987) theoretical concept of "assemblage", it considers these systems as sociotechnical assemblages that not only form the sum of, but exceed their individual elements and become something unique and more powerful. This perspective allows capturing the systems not only in their multidimensionality, but also in their becoming, as they are never complete, but always in a mode of alteration. Here, this work argues, it is precisely the in-betweenness with regards to play and science that opens the space for these assemblages. As it becomes clear, multiple interwoven processes and practices of alignment and translation—specifically across the spheres of software and infrastructures, narrative and vision, and engagement and care—are necessary for the resilient and continuous formation of HC-based citizen science games.

« A tiny box that can do a lot » Lessons learned from the use of Raspberry Shakes in a citizen seismology experiment in Haiti

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On January 12th 2010, Haiti was hit by one of largest seismic disasters known to date. The disaster was amplified by a shortfall of preparedness from both citizens and scientists' side. Indeed, given the specific socio-cultural context, seismic risk culture and perception was low among the population and - due to the lack of seismic sensors in Haiti- so was seismological knowledge.

Low-cost, low-maintenance seismic sensors developed about 2 years ago were seized as an opportunity to build a citizen-seismology project whose aim was twofold: (1) complement the national seismic network and (2) enhance risk perception, preparedness level and scientific knowledge among the population. These are the goals of OSMOSE which, following the S2RHAI project, studies a paradigm shift under which we consider that seismic networks are
not only composed of sensors, but also of the humans gathering around these tools and information.

We present here the outcomes of this citizen seismology experiment in Haiti from three perspectives: (1) A seismological one, with insights from the 14th August 2021 earthquake, (2) A sociological one, based on a qualitative survey conducted among 15 Raspberry Shake (RS) hosts which enabled us to understand their motivations, difficulties and expectations; and (3) a citizen science project perspective, with lessons learned on how to improve the seismic information system, integrate volunteers better in the network, enrich the collaboration between citizens and seismologists and accompany them in their ambassador role with their community.

We conclude that, in a citizen seismology project understanding volunteers' motivations, obstacles and expectations is essential and enhances the chances of sustaining it, which in Haiti is crucial not only from a scientific perspective but also to contribute to efficient seismic risk reduction.

Cyber-physical localization and annotation of audio-visual archives

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Søren Kølholt Poder, PhD Student, Roskilde University

The Eurostars project AV-Treasure aims to improve the accessibility of documentary heritage by combining collective intelligence and artificial intelligence in the annotation, transcription and localization of audio-visual archives. Our ultimate aim is to integrate human and machine classifiers in order to achieve symbiotic human-computer interaction, and leverage the complementary strengths of machines and humans in a cyber-physical system.

Accessibility of documentary heritage and providing the means of discovery are the cornerstones of every memory institution. In recent decades, archives, libraries and museums have therefore invested substantial resources in digitizing their collections in order to enhance and democratize access to documentary heritage. At the same time, crowdsourcing has become a proven method for solving problems involving large quantities of data that require human pattern recognition capabilities. As a result, crowdsourcing is emerging as the most efficient method for harnessing human intelligence in the annotation of large datasets. Within the cultural heritage domain, citizen science crowdsourcing has been applied to the otherwise intractable task of adding metadata to vast collections of historical records, thus making documentary heritage accessible to a growing audience.

So far, however, the more than 30 million film hours of audio-visual content stored in European archives remain relatively unexplored and underutilized. Due to the sheer volume of film material and the format (~24 images per second), annotation, transcription and localization into multiple languages can only be efficiently performed by combining collective human intelligence with machine learning based algorithms.

To achieve this, the present project will demonstrate state-of-the-art techniques that satisfy the dual objectives of completing human intelligence tasks and training machine learning models. The project comprises two distinct workflows: (1) one workflow for annotation, and (2) another workflow for transcription and localization
of archived audio-visual content. A software solution is under development, which will include audio transcoding, sound detection, sound restoration, speech detection, speech recognition and automatic speech recognition captioning as well as crowdsourced correction of automatic speech recognition captioning and enhancement of neural machine translation. Citizen science and crowdsourcing communities will thus be engaged where artificial intelligence cannot yet perform reliably, thereby gaining efficiencies through the coupling of human and machine intelligence. Finally, a crowdsourcing and machine learning feedback loop mechanism will be developed to determine where crowd intervention is required, and leverage the complementary strengths of machines and humans as a cyber-physical system.

Tinkering for Peace

Kathrin Hadasch, B.Sc., IANUS Peacelab
Prof. Alfred Nordmann, co-author & initiator of IANUS Peacelab

On the themes "Addressing global crises through citizen science" as well as "Enacting participatory democracy with citizen science" we propose to create a Poster that motivates and showcases the work of IANUS Peacelab.

Situated within a local makerspace, IANUS peacelab serves as a platform for international discussion about "tinkering for peace". Citizen science and the community of hackers question many precepts of technological innovation, practically deliberating notions of sustainability, efficiency & empowerment.

We propose to add to the mix as a point of reference and orientation for technological development the idea of peaceful cooperation and conditions of life. Questions of sustainability, efficiency & empowerment require a
positive vision of how we might live together with the help of technology. However, as important and relevant "peace" can be for citizen science and technology, it also poses a great challenge to become tractable and concrete. Thus, concretization and conceptualization represents our entry point in advocating for anchoring peace-orientated technology-assessment and -design into the mind-sphere of the citizen scientific community.

Accordingly, we will present first initiatives and projects, inviting our peers to help us build a network around the notion of advancing peace through citizen science and technology.

CREDO.science ↔ global Citizen Science

Dr. Robert Kaminski, Institute of Nuclear Physics PAS

The scientific project CREDO (Cosmic Ray Extremely Distributed Observatory – (look at CREDO.science)) was established at the Institute of Nuclear Physics of the Polish Academy of Sciences 3 years ago and its operation is to record cosmic rays (cr) non-stop all over the Earth. The aim is, i.a., detection of global cr air showers that may indicate the existence of, for example, still unknown massive or very energetic particles, study of the structure of the universe and, for example, linking changes in cr registration with upcoming earthquakes. This is the first cr research project with such a global reach and with such a wide range of scientific opportunities. This project is already gaining and maintaining its global reach thanks to the working method - citizen science (CS) - which is not an added element to the project, but the essence of its operation from the very beginning. At the current stage registration is carried out using cameras in popular smartphones with the free CREDO application for Android and IoS installed. Thanks to this, such global registration is very cheap and available to all inhabitants of the Earth. In July 2021, almost 50 scientific institutions from 19 countries started cooperation with CREDO, over a dozen million data from registration under CS was collected, in which several thousand users of the CREDO application participated. In accordance with the principles of CS in CREDO, all data is completely available worldwide for anyone. All persons, regardless of their education, age and other individual characteristics, who in any way participated in the collection/analysis of data may be co-authors of serious scientific publications devoted to this data. All these works are carried out under the supervision of professional scientists from around the world, guaranteeing their credibility and high quality.

At every stage of the development of the CREDO project, its activity is related to the promotion of science and scientific activity among all social groups, starting from primary schools for which the project organizes the so-called "Particle Hunters" competitions. Numerous series of lectures and conferences are conducted for all social groups. It allows to receive feedback from them, which gives the opportunity to constantly adjust the form and content of the CREDO presentation to social requirements globally and locally.

From a sociological point of view, this access to science and participation in its production "live" with all non-scientists in the CS clearly reduces the existing cognitive and sociological gap between scientists and the rest of society. This opens up a range of options for choosing the direction of education for the youngest and facilitates the development of scientific careers for those who are more interested.

This presentation will provide a brief overview of the project's scientific objectives, methods and goals of CS activities around the world, and their scientific and social impact. There will also be a short demo movie about the connection of the scientific goals (and method) of cr registration with the activities of CS as a method of conducting serious and global scientific research.

European Citizen Science - New ways to new networks

Dorte Riemenschneider, managing director, ECSA
Claudia Fabo Cartas
(presented by Claire Murray)

EU-Citizen.Science is an online platform dedicated to the celebration and mainstreaming of citizen science in Europe. The vision for the platform is to become a mutual learning space, where projects and resources shared and curated by the community are accessible to the community. The platform puts an emphasis on the richness and diversity of citizen science projects as well as on high quality resources that can support anyone doing or wanting to do citizen science. At the same time, EU-Citizen.Science builds on the growing impact of citizens participating in research across the full range of scientific enquiry to mainstream citizen science in Europe and strengthen its application as an established means for the democratisation of science. The red thread that guides the project is "collaboration". The platform has been produced by a consortium of 23 different organisations dedicated to citizen science, based on a thorough analysis of the expectations and needs expressed by the overall community. It aspires to promote exchanges between various citizen science actors such as members of the society, policymakers, scientists, educators, SMEs & start-ups, by offering collaboration channels and networking tools. More than sharing knowledge through a catalogue of projects, resources and education materials, the platform provides relevant partnering features – including a community forum – which empowers citizen science enthusiasts to join forces and advance the field. A catalogue of training modules developed by projects partners on topics from volunteer engagement to measuring to impact of citizen science in which you can enrol round out the platform's main functionalities.

Topic: Empowerment, Participatory Democracy and Inclusiveness in Citizen Science

Practical Challenges of Citizen Social Science: A Call for a Modest View

Jörg Matthes, Professor, University of Vienna
Isabelle Freiling, PhD, University of Vienna

Citizen science is increasingly common in biology and environmental science, but less frequently pursued in the social sciences, where citizen science can be similarly useful (Heiss & Matthes, 2017). Citizen social science, however, comes with particular challenges, especially in collaborative and co-created projects. While previous research has pointed out some of these challenges, we lack a systematic reflection about the practical issues that social citizen science is facing.

In this talk, we revisit the consecutive steps of the entire research process. In each of these steps, we lay out particular challenges: When it comes to problem definition, we point to lacking institutionalized structures, unequal access to resources, the tension between the applied and the theoretical perspective, as well as disciplinary boundaries limiting the scope of citizen social science. As for literature review and theory development, there is a critical challenge to translate abstract social science language, and for methods and data collection, there are thorny issues with respect to a lack of training, data quality, limited generalizability, and methodological rigor. Data analysis and interpretation may be prone to particular biases, due to the social, political, or cultural orientation of citizen scientists. With respect of scientific and public dissemination, generating co-created top-level scientific output may be undesirable or difficult from the perspective of citizen scientists, and collaboration over a larger time span, necessary for publications, may not be possible. Also, the criteria for the evaluation of citizen social science may critically differ between citizen scientists and scientists, and the temporal sequence of evaluation steps may be challenging for a moving object such as collaborative and co-created projects. Finally, on a meta level, there are challenges regarding power relations, data ownership, and research ethics.

While some of these challenges can be addressed in a thorough analysis, others point to more fundamental issues. We close with three key propositions: First, we call for a more modest view on citizen social science, rather than unlimited enthusiasm. This involves a more careful weighting of the practical, methodological, and theoretical challenges against the prospects and gains of doing citizen science in the social sciences. Not all social science topics and research areas may be suited for a citizen science perspective, and not all that has been called "citizen social science" is actually citizen science. Second, citizen social science should be a means to an end, which is generating genuine scientific knowledge that is otherwise not attainable. Citizen social science, however, should not be an end in itself, that is pursued primarily on normative grounds, without critically evaluating the generated knowledge gains. Third, we argue that citizen social science should move beyond the case study level with limited theoretical and practical generalizability. We call for a renewed focus on theoretical and methodological rigor. These challenges notwithstanding, we end with a few forward-looking recommendations for the future of a bright citizen social science.

Diamonds on the soles of their feet

Jacqueline Goldin, Prof, University of the Western Cape

We present findings from a current project in the Hout Catchment, Limpopo Province in South Africa where citizen scientists are monitoring water in their wells in very remote rural settings. We propose participatory methods that are inclusive, just and fair with a focus on ethics and research integrity. We offer a citizen science frame to capture the idea of water literacy – where the material aspects of CS (dip-meters, rain gauges etc.) intersect with the more intangible goods that have to do with human well-being. In our application we redress the bias where the focus tends to be on the natural science aspect rather than the humanities where there is attention to human well-being and the recognition of difference and diversity. Considering CS within the frame of feminist philosophy we adopt an ethics of care approach, which is personally transformative with the element of 'surprise' - the end point is undetermined. We emphasise diversity and difference across segments and within segments in the catchment. Participatory parity has intrinsic value (equity and a more just social context) but also extrinsic value (addressing a hydrological void, better data and plotting of map features for remote rural areas otherwise difficult to access). We present methods which have to do with what we call 'authentic' learning. CS is a powerful emancipatory tool that is able to generate virtuous cycles of trust, inclusion and equality and the methods deployed to achieve participatory democracy, are intrinsic to the work that we do. Our CS frame promotes the emancipatory and transformative focus of citizen science. Citizen scientists move away from a passive state of non-engagement with science, to acting as scientists. People who are disempowered now have a sense of participating in the betterment of their world. Narrowing the divide between the natural and social sciences is crucial. In taking science from the laboratory into the field we make sure that we don't lose the human side of science.

Citizen science and data justice: A human rights approach to ethical concerns regarding public participation in science

Mary Elworth, PhD fellow, Centre for Science Studies, Aarhus University

The growing participation of citizens in scientific research brings new ethical and regulatory concerns for citizen science projects, particularly as they relate to data processes. While this active participation can help to democratize science by challenging the dominant modes of knowledge production, it also has implications for the issues regarding who benefits from such projects and the data that they produce. These concerns over public participation in science can be articulated in relation to the human rights outlined by the 1948 Universal Declaration of Human Rights (UDHR), which declares the right of every individual "to share in scientific advancement and its benefits" (Article 27). The current difficulty lies in interpreting this right in terms of an ethical framework that can be applied to citizen science (Vayena and Tasioulas 2015). In addition to this, the diversity found in the types and levels of active public participation in science creates even more difficulties for developing such a framework that is appropriate for citizen science. Various frameworks exist which seek to address the issues mentioned (Resnik et al. 2015, Christine and Thinyane 2021), but these also leave implicit gaps, especially regarding the rapid technological developments and datafication trends that impact citizen involvement in research. I address the data justice framework employed by Christine and Thinyane (2021) to account for data processes within citizen science by situating this framework within the landscape of ethical and regulatory concerns for citizen science. I also consider its limitations in relation to broader ethical issues relating to public participation in citizen science. In particular, the framework offers a comprehensive treatment of issues involving data justice, but does not account for ethical issues that fall beyond the framing of citizen science as a data-driven and data-intensive practice.

The poster will provide an overview of ethical and regulatory concerns for citizen science, with a focus on data justice, and includes a discussion of these issues in the perspective of the UDHR's standards for inclusive practices regarding scientific research and its benefits.

Emerging Opportunity and Development Strategy for Citizen Science in China

Siyu Fu, PhD Student, Aarhus University

In China, although citizen science is still in its very early stage and awaits further development, it has already contributed to environmental monitoring and biodiversity. However, Daniele Brombal (2018) summarized Chinese citizen science as contributory and highly data-focused, but lacking in emotional responsiveness and ecological awareness to environmental concerns. With the concern that citizen science might deviate from its democratic essence and strengthen the Chinese technocratic science system, she suggested that it could be transformed from contributory to collaborative (or even further co-creative). This study agrees with her ideas and discusses a further question: what could be strategies for citizen science in China to develop and transform, considering that citizen science's democratic essence might be against the Chinese authoritarian government's political agenda? This study suggests three strategies. **The first strategy** is to ride the wave of the Chinese government's ambitious plan in biodiversity management in 2021-2030. With the UN Biodiversity Conference (COP 15) opening in October 2021 in Kunming, China, for the first time, the government started to take biodiversity as one essential international political metric and is eager to build an image of a responsible global power by obtaining the position of a key leader in international biodiversity management. We expect that the Chinese government would be more tolerant/supportive of citizen science. Citizen science could take the chance to insert itself into all levels of implementation in this wave, and its absolute number could keep increasing. **The second strategy** is to build stronger bonds with the Chinese
environmentalism movement and promote the Chinese governing model to transform from "managerial" to"
participatory". The environmentalism movement has proved the ability to negotiate with the government, and if
citizen science needs a more tolerant environment, it better not fight alone. **The third strategy** is to strengthen its
connection in Chinese academia. So far, there were not many original Chinese CS research/publication, most of which are introductions & explanations of European/American studies. Chinese citizen science need roots in academia and could corporates more with academic communities who have common interests. For example, the Scientific Humanists community, a group of scholars who have expertise in science communication, launched the natural history revival movement in China. They share significant similarities with "transformative citizen science" (Brombal 2018) in ideas such as pursuits towards diversified metrics, emotional value and civic rights/empowerment. Right now, Chinese citizen science is highly instrumental. It only focuses on solving a specific problem and moving forward (such as monitoring a particular species and protecting a certain habitant) but barely diving into the discussion of broader social/cultural/political impact. The three strategies proposed could assist Chinese citizen science in developing new projects & alliances with other social movements and academia so that comprehensive and transformative practices and discussions will be encouraged.

Validating Collective Intelligence and AI/Natural Language Processing for Local Participatory Democracy

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Participatory democracy using crowdsourcing of citizen insights for policymaking has become prominent in both local and regional planning. Participatory democracy includes the development of new law reforms (Aitamurto and Landemore 2013), economic development, and challenges related to how to create inclusive social actions and interventions for better, healthier, and more prosperous local communities (Bentley and Pugalis, 2014). Study case observations, coupled with the increasing prevalence of internet-based communication, point to real benefits of implementing participatory democracies on a mass-scale in which citizens are invited to contribute their ideas, opinions, deliberations (Salganik and Levy 2012) or predictions (Hallin et al., 2017). By adopting collective intelligence platforms, public authorities can harness local knowledge from citizens to find a right 'policy mix' and to collaborate with the inhabitants and actors in the policymaking processes.

This study aims to validate the adoption of collective intelligence and artificial intelligence/natural language processing for effective local participatory democracy in the development of new health policies. The participatory democracy case is Slagelse Municipality in Denmark which is in the process of developing new health policies for its citizens. The project studies how citizen sourcing can strengthen the policy-making process through the inclusion of citizens' local insights, scaled by including AI/natural language processing.

The local government of Slagelse is in a reorganization process to change the interaction between government and citizens and involving citizens earlier in the policy-making process with the assumption that their insights can shape the policy formulation and lead to better policy outcomes

(Aitamurto and Chen, 2017). This process is focused on a decentralized and bottom-up approach both internally with employees and externally which aims to build a knowledge-bridge between the citizens and the municipality of Slagelse, bringing them closer together. For this purpose, the municipality developed a website for citizen engagement projects and contracted with the Citizenlab platform in Brussels. Citizenlab is a civic tech company that has worked with over 200 local governments across nine countries to digitalize governance and decision-making. The platform enables the municipality to post some of their challenges and invite either the whole municipality or a targeted group of citizens to contribute with their deliberations to health-related issues, such how to make Slagelse Municipality the healthiest municipality in Denmark. The AI/machine learning mechanism on the platform sorts and categorizes citizen insights and deliberation, making the analysis of citizen engagement more effective.

The expected implications of the study are to lay a foundation for a deeper understanding and validation of the challenges and benefits of combining citizens' collective intelligence with AI/Natural language processing over time to strengthen local participatory democratic processes. The theoretical foundations of the study are based on participatory democracy and citizen crowdsourcing. The study is ongoing and is expected to run until March 2023.

The Activities & Dimensions Grid of Citizen Science

Christine Urban, Senior researcher, Wissenschaftsladen Wien - Science Shop Vienna
Dr Michael Strähle / Wissenschaftsladen Wien - Science Shop Vienna

There are now at least as many typologies and categorisations of citizen science as there are ideas and explanations of what citizen science is. What counts as citizen science is not a foregone conclusion. In the Horizon 2020 project CS Track, the authors systematically examined different approaches to categorising citizen science activities and created a grid of citizen science activities and their dimensions, the Activities & Dimensions Grid of Citizen Science. The grid was based on the European Commission's broad concept of citizen science. More detailed and systematic than previous categorisations, it shows the complexity and contexts of citizen science, namely what can be citizen science and on which dimensions such as the location of participation, the requirements for participating in a citizen science activity, demographic aspects of who is participating, funding schemes and others, citizen science activities depend. The systematic consideration, the result of which is the grid, allows a better view of possible pitfalls and ethical questions, as well as questions of inclusion and exclusion in citizen science. Some of them only become visible through this, others only become sufficiently specific and thus accessible for an answer. The poster presents the above-mentioned grid, how the partly quite different categorisations of citizen science were incorporated and how it can be used for citizen science activities, for example, to identify possible pitfalls, ethical aspects as well as aspects of inclusion and exclusion of the respective citizen science activities.

Towards a Typology of Expertise with Citizen Science and Community Science

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Professor Rob Evans and Dr Jamie Lewis, The Wales Institute of Social and Economic Research, Data and Methods (WISERD), School of Social Sciences, Cardiff University

What is the nature of the expertise exhibited by citizen scientists and community scientists? Is it fixed or can it be fluid over time? And what are the barriers and enablers for individuals who choose to take community-based investigations into their own hands? In this demo, we present the early results from a two-year community science project from South Wales. A small group of individuals are concerned about localised air quality. They are supported by a nearby academic institution brokering a range of disciplinary inputs from academic experts. The group nonetheless remains in control of their investigation in terms of determining methods, data collection and analysis. In assessing the nature of these activities, we offer a typology of expertise for those involved in citizen science and community science.

Covid-19-lockdown-measures decrease reports on road-killed animals in Austria

Daniel Dörler, Dr., University of Natural Resources and Life Sciences, Vienna
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Roadkill is the term used to describe all animals killed in road traffic, including non-huntable wildlife such as hedgehogs, toads or grass snakes. Currently, in Austria data on animals killed in road traffic are mainly collected on so-called "huntable game". Data on all other animal species - including endangered species such as amphibians - are mostly missing. In Project Roadkill we use citizen science to create an overview of where which animals are road-killed in Austria and what reasons there might be for this. By compiling many individual roadkill reports by citizen scientists into one large data set, we aim to determine under which conditions (weather, season, ...), at which locations (forest, meadow, urban area, ...), on which road types, which animal species become roadkill. In addition to answering these scientific questions, we would like to identify "hotspots", i.e. road segments where roadkill is particularly frequent. In the future, we aim to mitigate these hotspots in cooperation with authorities, NGOs and communities. These aims can only be achieved through the collaboration with citizens that are travelling on roads on a daily basis and report encountered roadkills. However, in 2020 many countries have implemented strict lockdown measures for several weeks to avoid the uncontrolled spread of Covid-19. In Austria, the lockdown in early spring has led to a significant drop in human outdoor activities, especially in road traffic. In Project Roadkill we observed a significant decrease in reported roadkills. By asking the citizen scientists through a survey how their travelling routines were affected, we investigated if the observed decrease in roadkills was grounded in less animals being killed by traffic, or in citizen scientists staying at home and thus reporting less road-killed animals. A majority of the respondents stated that they felt to have reported less roadkills during the lockdown, regardless if they changed their travelling routine or not. This observation in combination with the overall decrease in road traffic indicates that fewer animals were killed during the lockdown. We conclude that when analyzing citizen science data, the effects of lockdown measures on reporting behaviour should be considered, because they can significantly affect data and interpretation of these data.

A national scale "BioBlitz" using citizen science and eDNA metabarcoding for monitoring coastal marine fish

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To understand the changes happening in ecosystems and to inform management, detailed monitoring of biodiversity across large spatial extents is needed. In an unprecedented study, we here combined citizen science with eDNA metabarcoding to map coastal fish biodiversity at a national scale.

The research project is named "HavBlitz" (English: SeaBlitz) (https://www.havblitz.dk) and represents a research collaboration between three universities and a Danish NGO. The Danish Society for Nature Conservation (DN), was in charge of recruitment of volunteers and communication with citizen scientists.

We engaged 360 citizen scientists to collect filtered sea water samples from 100 sites across Denmark over two seasons (1 pm on September 29th 2019 and May 10th 2020), and by sampling at the same day within the same hour across all 100 sites, we obtained an overview of fish biodiversity largely unaffected by temporal variation. This would have been logistically impossible for the involved scientists without the help of volunteer citizens. We reached a high return rate of 94% of the samples, and a total richness of 52 fish species, representing approximately 80% of coastal Danish fish species and approximately 25% of all Danish marine fish species.

These findings support the use of eDNA based citizen science to detect patterns in biodiversity, and our approach is readily scalable to other countries, or even regional and global scales.

Coastal fish monitoring through citizen science in Denmark

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Elliot John Brown, Researcher
Eva Maria Pedersen, senior consultant
Mette Kjellerup Schiønning, Coastal and Marine Management Advisor
Sissel Kolls Bertelsen, Msc student
Josianne Gatt Støttrup, Senior Scientist

All from National Institute of Aquatic Resources, Technical University of Denmark

Fish species and their populations in coastal areas constitute a socio-economic value for small-scale and recreational fisheries, divers, snorkelers, and sports-anglers. Yet, dedicated fish monitoring programs to cover the coastal zone are rarely available, and the large international trawl- and acoustic-surveys are designed for greater depths. Consequently, accounts from angler and fishermen are all we are left with, and when the same anglers and fishermen asks "where have all the fish gone?" then biologists have little data to answer this question with. The same goes for the managers. How can actions be taken if there is little data to base the decisions upon? Could citizen science provide a solution to this? In collaboration with locally organized recreational fishermen, a voluntary catch registration system was established in 2005 to regularly monitor fish catches from fixed sampling stations and with standardized gill-nets and fyke-nets. The project is called the Key-Fishermen project and now have 15 years of data, covering the majority of the Danish coastline, to show. Between 2017 and 2019 alone, 94 fishermen contributed regularly to the project and a total 1532 gill net fishing trips and 2429 fyke net fishing trips were conducted. The data from this project are now gradually being made operational, so that it can be used to monitor the status of coastal fish populations and provide managers with data and tools to underpin management actions and aid the development of management goals. Simultaneously, these volenteer fishers act as ambassadors for the coastal marine environment and responsible fishing practices. In 2022, the KystHjælper project will look into whether the method, protocols and lessons learned from the Key-Fishermen project also can be used to monitor marine habitat restoration initiatives driven by dedicated locals and schools.

Find a lake

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Denmark has several hundred thousand lakes and ponds. Many of them are unexplored. The citizen science project "Find a lake" helps gaining more knowledge about the water quality in some of them through water samples collected by members of the public in the lakes. The samples are registered by the app Find a lake and the samples are handed in at the local library or institution. The first version of Find a lake was completed during a 10-week campaign in 2020 and the campaigns are planned to continue at least until 2024. The main aims of the project are 1) to gain more knowledge on the water quality in different lake types through water samples collected by members of the public in as many lakes as possible, 2) to increase public knowledge and awareness of environmental challenges like water quality especially to children and young people and 3) to offer presentations and online access to materials and activities concerning lakes. In 2020 more than 400 water samples were handed in by members of the public, school children and high school students.

On the poster we will present data from the 2020-version of Find a lake. We will e.g., present the quality of data, the geographical distribution of data, lake types and sizes sampled as well as perspectives in running this type of citizen science projectstogether with children and young people. All data gained in the project is available online and can be viewed by the members of the public that have sampled them or they can be used for teaching purposes. Finally, we will present some of all the feedback received from the participants.

The project is from 2021 part of the Villum funded project "Lakes in spare time" (www.sdu.dk/søerifritiden) headed by University of Southern Denmark in cooperation with libraries, nature schools, societies organizing children and young people, and Aarhus University.

Patterns of opportunistic citizen science participation in a recreational natural area

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Erlend Nilsen, Professor, Nord University & Senior Researcher, Norwegian Institute for Nature Research
Anders Finstad, Professor, Norwegian University of Science and Technology Department of Natural History

As citizen science programs, ranging from local to global, continue to grow in popularity, citizen science biodiversity data are increasingly relied upon for research in ecology and conservation. A large proportion of these data are collected opportunistically, with minimal metadata and without a known sampling protocol. The high volume of opportunistic biodiversity data collected through digital citizen science platforms offers enormous research potential, but to use these data effectively requires an understanding of sampling intensity and biases that correlates with the scale of intended analyses. Recent research has revealed broad spatial trends in opportunistic citizen science activity: it is associated with proximity to population centers, roads, regions of high biodiversity, and protected areas with recreational access. Knowledge of these trends can be used to improve the analysis of citizen science data at broad spatial scales. But although recreationally popular natural areas are known to be common citizen science hotspots, little is known about local-scale trends in the distribution of citizen science activity within these areas. For this reason, it can be difficult to use opportunistic citizen science in local-scale analyses. As a result, this data type is underutilized in local area conservation and management, despite its abundance and accessibility. We used a small, popular natural area adjacent to Trondheim, Norway, to model landscape characteristics that are associated with citizen science activity at a local scale. We compared the distribution of citizen science activity with the distribution of both general recreational foot traffic and professional data collection, identifying spatial trends that characterize local citizen science sampling intensity. Finally, we put these results in context of ongoing research on trends in open data sharing and on the overall prevalence of citizen science in protected areas, suggesting that opportunistic citizen science has the potential to play a greater role in local conservation.

Development steps of Ria Formosa Virtual Observation Laboratory – LOV Ria

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Rui Cabral e Silva, Professor, University of Algarve

Using participatory science to monitor the Ria Formosa is the key idea of the TOSCI | LOVRia project, which intends to create a Ria Formosa Virtual Observation Laboratory based on scientific tourism. This project is developed in partnership with two digital technology companies in the Algarve and consists of monitoring the environment of the Ria Formosa Barrier island lagoon system in terms of landscape, sediment accumulation or erosion, vegetation cover and distribution of plastic waste. It is intended that this environmental monitoring is carried out in a participatory manner, using the interest and curiosity of people who pass through the Ria, to collect data. It is thus a project that links three pillars of regional development: research, technological development and tourism.

Knowing and understanding the evolution of this system is of paramount importance for the sustainable development of this ecosystem, which offers provision, regulation, support and leisure services. The project is, therefore, developing the digital technology that allows this citizen participation through a simple photograph. The internet of things and artificial intelligence are two of the methodologies used to treat photography in order to be able to locate it in time and space, automatically recognize the project's target plants or the presence of macroplastics in the environment and compare information in different times or different places.

Sourdough in participatory sciences: How milling technics and bakery environments drive microbial evolutionary dynamic and what are the consequences on bread organoleptic and nutritional value?

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1) La tite Ferme
2) Le Pain des Cairns
3) Pain Brut
4) La boule d'antan
5) Moulin du Rey
6) Moulin Pichard
7) Moulin Jouve
8) Ferme de la Salamandre
9) Ferme Thuronis
10) Ferme Biodélices
11) INRAE

Sourdough bread knows for several years a real craze. As a natural fermented food it answers the increased concern of people for nutritional quality and biodiversity. In many places around the word and particularly in Europe and North America, bakeries open to offer breads made with organic flours and fermented with sourdough. Sourdough is a natural dough leavening agent made of flour and water and sheltering communities of bacteria and yeasts. Diversity of these microorganisms, and their interactions during fermentation bring benefits to bread like a longer shelf life, a richer aroma profile and a higher nutritional value compared to bread made with commercial "baker yeast". In light of this, bakers have increasingly requests from their customers in terms of bread quality and are in need of science to understand microbial mechanisms that can bring answers. As part of a participatory research project, millers, bakers and researchers have worked together to better understand what drives the sourdough microbial colonization and evolution and the nutritional and organoleptic consequences on the bread. Together we chose to focus on the effect of milling techniques consisting in the operation to reduce cereals grains in flour. In France, "farmers bakers" use mainly stone milling while in a craft scale and industrial scale, roller milling is most used. These two technics produce flours that differ in their biochemical composition and this could have an effect for the nutrients of microorganisms, the aroma precursors and bread nutritional value. That's why we compared sourdoughs and breads made with wheat flours obtained with these two milling technics. In this poster we will present both the participatory research framework, design, and methods used to conduct the project and the research findings. We will ask the question of the potential of this participatory research to create meaningful knowledge and action.

Topic: Public Participation – From the Dual Perspectives of Participants and Project Leaders

Who's Who: Getting to Know Flemish Citizen Scientists and Project Initiators

Annelies Duerinckx, dr., Scivil
Charlotte Hens, Scivil;
Karen Verstraelen, Scivil;
Jef Van Laer, Scivil;
Sanne Kerckhoffs

Citizen science is strongly on the rise in Flanders. More and more citizen science projects are being set up and citizens are increasingly participating in them. Even though a fair share of European studies have investigated the characteristics of citizen scientists, both at the European level and in other countries, there is still little insight in the Flemish context. To fill in this gap, Scivil, the Flemish knowledge centre for Citizen Science, carried out a survey among citizen scientists in 2020 to gain insight in both personal characteristics, such as age and education, and their motivation to participate in a citizen science project.

Likewise, more and more Flemish researchers seem to foster an open attitude towards a citizen science approach. To investigate this evolution, Scivil also conducted a survey among Flemish scientists in 2020, probing their knowledge, experiences, and interest in citizen science. In 2015, a similar survey was already conducted among Flemish scientists by the Young Academy of Flanders. This allowed Scivil to map out the evolution of scientists' attitudes towards citizen science.

In this poster, we share and compare the results of both surveys. We present the demographics of both Flemish citizen scientists and researchers that completed the surveys. Specifically for citizen scientists, we look at the projects in which citizen scientists participated, and whether different types of projects (e.g. in themes, activities) attract different types of participants. We also highlight motivations and experiences of citizen scientists. As for the researchers, we present their experiences with citizen science as well as the perceived positive and negative aspects of citizen science. Finally, we summarize the researchers' thoughts on the future of citizen science.

By presenting the findings of both surveys in an integrated manner, we aim to contribute to contemporary reflections on citizen science's reach, within and beyond the Flemish context. Instead of merely identifying demographic or disciplinary caveats in the citizen science community, an integrated perspective can help to uncover shared opportunities between citizen scientists and researchers.

Hidden Figures: Motivations and Outcomes of Stakeholders

Catherine Wilson, Loughborough University
Dr Sarah Mills, Loughborough University
Professor Paul Wood, Loughborough University

The motivations and experiences of volunteers have become an established field of enquiry within the citizen science academic literature. However, volunteers are only one group of stakeholders within citizen science who enable projects to reach their full potential. The motivations and experiences of other stakeholder groups, including funders, practitioners, educators and government bodies, are largely neglected in scholarship. To address this research gap three questions were considered: (1) who are the stakeholders in citizen science, (2) what are the motivations and outcomes of stakeholders participating in citizen science and (3) what are the opinions of stakeholders regarding the ability of citizen scientists to collect and analyse meaningful scientific data? This project draws on evidence from twenty-seven online semi-structured interviews with ten different types of stakeholder
groups working in the field of biological citizen science within the United Kingdom. Through the use of template-driven thematic analysis, this poster will examine the diversity of stakeholders involved in citizen science and how the collaboration between project partners can determine the success of a project and the realisation of stakeholder goals. To further understand the different stakeholder goals, the motivations and outcomes discussed by interviewees are compared across different stakeholder groups. The motivations and outcomes identified can be classified into several groups including: scientific, personal, career-related or volunteer-driven. Finally, this poster will examine stakeholders views on the capabilities of citizen scientists engaged in projects to collect accurate, reliable and useful data. Key factors identified by stakeholders affecting the success of citizen science programs can be separated into three categories: (1) the ability of citizen scientists to participate, (2) the execution of the program and (3) the competence of the educators/support networks available to support the collection of data. By exploring the voices of stakeholders, rarely considered within the citizen science literature, a deeper understanding of the motivational drives and wider use of the scientific data derived from them can be understood.

Enabling Transdisciplinary Collaboration: Stakeholder Views on Working Researchers

Raphaela Kaisler, Dr., Open Innovation in Science Center – Ludwig Boltzmann Gesellschaft
Christiane Grill, Dr., Open Innovation in Science Center – Ludwig Boltzmann Gesellschaft
Adis Šerifović, Open Innovation in Science Center – Ludwig Boltzmann Gesellschaft

Working collaboratively and openly together with stakeholders has become a common phenomenon in research. While previous studies have gathered a clear picture on researchers' attitudes, motivations, and barriers for actively involving stakeholders in transdisciplinary research, the stakeholder perspective is yet unknown. Therefore, we set out to identify how stakeholders perceive transdisciplinary collaborations with researchers. In particular, we will reveal the enablers and barriers for such collaborations from the viewpoint of stakeholders. To do so, we look at how stakeholders, who were actively involved in the governance structure of two 'children with mentally ill parents' (COPMI) research groups in Austria, perceived their collaboration with researchers.

To that end, we used a mixed-method, quantitative-qualitative design. We conducted an online survey and interviews with the advisory board and competence group members of the two research groups (i.e., stakeholders of COPMI research). The stakeholders reported great satisfaction with the transdisciplinary collaboration and emphasized the value of different expertise. As the most important enablers for successful, transdisciplinary collaboration stakeholders highlighted researchers' open-mindedness towards new perspectives and approaches, flexibility to adapt to the research process along the way, and creativity dealing with diverse backgrounds and skills. Stakeholders further underlined the key role of an intermediary who facilitates the collaboration between researchers and stakeholders and helps to resolve any tensions and insecurities arising due to this collaboration. Lastly, we will present how transdisciplinary research collaboration with stakeholders can be successfully designed and how potential obstacles can be overcome.

Co-creation practices and perceptions of citizen science: researchers' perspectives

Tom Børsen, Associate Professor, Aalborg University
Professor Egle Butkeviciene, Kaunas University of Technology
Mr. Baptiste Eugene Jospeh Paqeuerau, Aalborg University
Dr. Tania Jenkins, University of Geneva

In citizen science, science is socially anchored as citizens and researchers are co-creating knowledge and solutions. Hence, co-creation is often mentioned in citizen science imaginaries such as EU documents and national research policies, but there is still a lack of knowledge on how they translate into real life collaboration practices.

In this poster we frame co-creation as participatory action research and citizen science as scientific activities in which non-professional scientists volunteer to participate in problem framing, data collection, analysis and / or dissemination of scientific findings (Haklay, M., 2013). Citizen science practices might be of different levels regarding citizen engagement and researchers' control, as suggested by Muki Hakley's typology: Crowdsourcing, Distributed intelligence, Participatory science, and Extreme citizen science (ibid.).

This poster will present findings from qualitative research conducted in two countries (Switzerland and Lithuania) on researchers' co-creation practices and perceptions of democratization of science and citizen science.

A literature review suggests that more knowledge is needed regarding researchers' co-creation practices and perceptions of CS. In CS there is often a cultural and epistemic clash between different social worlds of researchers and laypeople. Bridging this gap is a central challenge for democratisation of science and for the CS research community. Democratization of science and citizen science can be and are understood differently - not only do laypeople and researchers have different perceptions of CS and democratization of science, but there are also diverging perceptions among representatives from different disciplines. Often researchers are 'learning by doing' CS (Silvertown 2009), though their minds are not a "tabula rasa", an empty slate (Bachelard, 1985). They have underpinning assumptions, beliefs regarding democratization of science, co-creation and citizen sciences.

Therefore, our poster sets out to identify models of relationships between science and society emerging from scientists' side, as well as to understand their underpinning assumptions about co-creation and democratization of science. By doing this we hope to deliver a broad spectrum regarding how citizen science and co-creation is understood in practice.

A bottom-up typology of scientific engagement

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Engaging citizens with science is the most recent outcome in the long search for a dialogue between science and the lay public (Delicado, 2021). The participation of citizens in science and technology activities or related decision making is argued to serve a variety of aims, e.g. to democratically empower citizens, to inform and improve public access to scientific knowledge, to promote public acceptance of science, to enhance scientific innovation and scientific study curricula (Weingart et al., 2021). This academic emphasis on engagement poses demanding expectations on the citizens in terms, for example, of ability, interest, willingness or time. STS literature appears to be lacking empirical evidences on engagement from the point of view of the population. Among the principal missing pieces in the literature is an empirically based definition of engagement from the citizens' perspective. Conceptually, engagement appears in STS studies as an umbrella term, contextually defined according to the single study's aim, e.g. in terms of objectives, public's role, or type of activities (Weingart et al., 2021). Furthermore, typologies of engagement do exist, but generally have been elaborated by scholars in top-down efforts to, e.g., provoke a dialogue over engagement's purposes (Arnstein, 1969), theoretically derive efficient modes of engagement (Rowe & Frewer, 2005), or develop an interpretative framework to map its existing manifestations (Bucchi & Neresini, 2007). Thus, it appears that conceptual work has been done from researchers on developing the concept of engagement, but these attempts lack empirical validation from the concrete experiences of the general population. The present study aims at contributing to the field by elaborating a typology of citizens' experiences of scientific engagement. In order to do this, data from the Special Eurobarometer 516 about Europeans' attitudes towards science and technology will be employed (n=37097). Answers to a battery of 12 items corresponding to ways of engaging with science will be analyzed first through Principal Component Analysis (PCA) in order to unveil underlying factors grouping the items. By analyzing the items, the expectation is to observe the existence of 2 to 3 factors describing diverse modalities of scientific engagement already described in the literature: horizontal – activities fostering scientific knowledge and inter-personal learning, vertical – activities meant to address policy solutions (Mejlgaard & Stares, 2010) and activities of pure citizen science (Bonney et al., 2016). Subsequently, the respondents to the questionnaire will be clustered around these modes of engagement in order to observe any meaningful combination highlighting groups of respondents (Hair, 2009). This study will be part of a doctoral dissertation about the social embeddedness of scientific engagement and it is meant to set the field for subsequent studies. Further work will focus on the relationship between socio-economic status and science (non-)participation, thus the addition in this first research of a final part observing the possible link between clusters composition and socio-economic indicators is not to be excluded.

For the Engaging Citizen Science Conference 2021 this study will take the shape of a poster under the theme of "Empowerment and Inclusiveness in Citizen Science". The language of the study – and thus the poster – will be English.

History as co-creation? Public participation in the project "SocialMediaHistory"

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The popularity of Citizen science has increased steadily in recent years. This also applies to the humanities, where these approaches are accompanied by great promises and hopes. Citizen science is supposed to democratise science, reach new target groups and is seen as a cure for misinformation, populism, hate speech and numerous other problematic social developments. So far, however, Citizen science has not been systematically tested and, above all, reflected in the humanities. This can be seen, for example, in the historical sciences, where until now mostly contributive projects can be found that involve citizens, e.g. in the collection of sources or transcription of manuscripts. Collaborative and co-creative projects are rare - although they offer the opportunity to broadly include the competences, perspectives and experiences of citizens in the research process.

The potential of Citizen science approaches is particularly evident in the light of digitalisation, which has a considerable influence on the production, distribution and acquisition of knowledge. This leads to challenges - for society as a whole, but also for research. This is especially true for social media. The low production and access barriers have multiplied past-related content, actors and media practices which challenge the interpretative and discursive authority of established actors such as institutions or researchers. The pluralisation is creating a diverse, participatory memory landscape. New voices and topics become part of the discourse and negotiation processes become visible and analysable for historians. The diversification of actors ultimately implies a considerable democratisation, which has not yet been echoed in research. At a time when the boundaries between experts and amateurs are increasingly blurred or the roles are being reversed, we argue for participatory research in which not only the historical narratives are co-created, but also the research itself.

With our poster we want to present our experiences with Citizen science as an approach in the historical sciences. It enables collaborative and co-creative ways of knowledge production and takes diversity into account by attempting to mirror different perspectives, experiences and competences. We want to share preliminary findings and experiences from the project SocialMediaHistory, where we theorise, analyse and produce history on Instagram and TikTok together with citizens. In the joint project of the Universität Hamburg (public history), Ruhr-Universität Bochum (history didactics) and Kulturpixel e.V. (educational support), citizens can participate in all project levels through an advisory board. Depending on their individual interests and capacities, citizens can, for example, co-design the research questions and methods, the research process, science communication or the evaluation and publication of results. Or: shape conference contributions. In addition to the advisory board, lower-threshold forms of participation are also possible through participation in workshops or interaction in social media.

On the poster, we want to illustrate the project structure and the different levels of participation, as well as the dual perspectives of citizens and researchers. We want to look at motivations, expectations and experiences from both sides and also reflect on the potentials and challenges of co-creation in the humanities.

Topic: Citizen Science in Education

WeatherBlur: Blurring the lines between science, environmental literacy, education and civic action through citizen science and computational thinking skills

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WeatherBlur, a place-based, non-hierarchical citizen science online community, brings together students, educators, scientists and community members across varying communities and educational settings to collaboratively work together toward a common goal of developing questions based on observations students have made in their communities, designing scientific investigations to tackle these issues, and collecting data and sharing results with each other through an online platform unique to WeatherBlur. This citizen science, place-based educational program supports community-driven and scientific activities that build capacity and strengthen scientific inquiry and environmental literacy around complex environmental and social needs. WeatherBlur is currently in its thirteenth iteration and reaches elementary and middle school students along the coast of Maine and in the Gulf of Mexico. Students from these areas engage with peers and teachers, national environmental health scientists and local community stakeholders to develop research questions, collect data and develop an action project that will help their local communities thrive. WeatherBlur teachers and students use computational thinking skills and practices to refine questions, investigation protocols and data analysis. Over the course of its 13 years, WeatherBlur has been successful in empowering students to tackle difficult environmental challenges seen in their communities and get their voices heard. Topics such as microplastics, invasive species, water quality and sea level rise have all been investigated through WeatherBlur that otherwise would not have been explored in these classrooms. As program developers and managers, we have found that WeatherBlur promotes and enhances data and environmental literacy for all grade levels involved through its non-hierarchical design; students are the primary drivers of all scientific investigations. We have also found that this type of rigorous, hands-on, place-based learning is meaningful for the communities' students live in and ultimately benefit from students' increased interest in tackling these critical local environmental and social issues.

This poster session will allow participants to explore the different components of WeatherBlur by asking questions directly to the program coordinator and several educators, and learn more about how to join the WeatherBlur community.

CREDO-Maze Project - after-school activities in contemporary physics for talented high school students

Tadeusz Wibig, prof., Theoretical Physics Dept., University of Lodz

For several months now, we have been implementing an innovative educational project addressed primarily to high-school students. The concept is to use specially created for this project high-tech equipment that is currently being developed at the University of Lodz and will be donated to schools. Using these sets, the project participants will collect data on cosmic ray particles constantly bombarding the Earth's surface. In the era of globalization, these data will be transferred to the central servers of the CREDO project and from there will be available to all participants of the project, it is also planned to fully open the databases to everyone. It will be an element of the global CREDO project, which conducts basic research related to the broad subject of modern physics, physics of elementary particles and astroparticles. These topics are generally not covered in curricula, or even if they are, it is rather superficially. Information on the web or television about major discoveries at CERN or ISS appears constantly, and there is a constant demand for deeper knowledge in these areas. Involving eager young people in solving important scientific problems and involving them in the work of scientists from Physics Institutes and University Science Departments is an original motivation for including young people in the proposed extracurricular activities. Another, but still important goal of the current pilot project is to show that a new way of conducting extracurricular education can increase the effectiveness and efficiency of educational activities in subjects commonly considered difficult, too difficult for the average participant in the standard school education process.

The pilot project has received funding for 10 schools from the vicinity of the physics department at the Łódź University (in general from the city of Łódź) and will conclude at the end of 2022. At the moment, we have many applications for participation, which we intend to handle. In the past, we proposed similar projects to institutions in several European countries and it also met with great interest, but we did not manage to finance it. Currently, there is a possibility that after the success in Poland we will come back to this subject on a European scale.

How can we test plastic pollution perceptions and behavior? A feasibility study on Danish students participating in "the Mass Experiment"

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Research suggests that behavior change programs can be fast and cost-effective solutions to plastic pollution alongside traditional environmental policy-making. Furthermore, encouraging change in perception and behavior can be a tool to change consumption and waste handling towards increased circularity, which is of high concern in the EU. Beyond knowledge, predictors of pro-environmental behavior include concern, social norms, nature-connectedness, identity and self-efficacy. Citizen Science (CS) as a way to raise awareness and potentially change behavior show promise within plastic litter monitoring. We tested the feasibility of evaluating a nation-wide citizen science intervention, 'the Mass Experiment' (ME), with school students (age 7-16) in Denmark. With more than 57,000 students signed up for ME, this is to our knowledge one of the largest CS activity on plastic debris targeting young people. As an addition to the core CS activity we developed a voluntary and anonymous questionnaire to study the perceptions and behaviors of the students. We hypothesized that the intervention would increase risk perception, self-efficacy and empowerment as well as self-reported actions. Through 931 pre-surveys and 838 post-surveys aggregated at the team level (n = 48), we found that the intervention had no significant overall effect on team, risk-perception, pro-environmental behaviors, nor self-efficacy or empowerment. However, unexpected patterns emerged for age effects, potentially advising some caution over the design of such CS activities particularly for younger children. We discuss methodological limitations, the high baseline for nearly all variables, the Danish context and the intervention itself and make recommendations for studying future CS interventions.

Will high school students be scientific literate when participating a Citizen Science Project?

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Mette Fentz Haastrup (high school coordinator) University Library of Southern Denmark
Connie Svabo (professor) the University of Southern Denmark
Katrine Bergkvist Borch (scientific assistant) the University of Southern Denmark
Maiken Westen Holm Svendsen (scientific student) the University of Southern Denmark

Introduction and aim
Citizen Science projects may enhance participants scientific literacy. The University Library of Southern Denmark (ULSD) is partner, in co-creation with the Region of Southern Denmark, five region hospitals and two media houses, in the Citizen Science project "A Healthier Southern Denmark". [1] The project involves the citizens suggesting themes for health projects and voting for the allocation for funding. In connection ULSD has for 2022 established a high school panel, in collaboration with six high schools and consists of ap. 300 students (age 16-19).
The aims are:

1. To engage high school students to participate in Citizen Science health projects, and contribute as "young fellow researchers".
2. To investigate if the project has enhanced and empowered the student's scientific literacy level.

Methods
To meet aim no. 1, the students will be presented to the theory on the health sector in Denmark and research designs for user-involved studies. They have introductions on Citizen Science including participatory democracy, as well as media, and source criticism. Documents and videos on an USLD Libguide [2] will, in co-creation with the high school teachers, be part of their curriculum. Eventually the students will interview the researchers from the main project "A healthier Southern Denmark" and will produce a conference poster, based on the methods they have learned.

To meet aim no. 2, an online survey on scientific literacy inspired by TOSLS [3] is conducted on all the enrolled students and follow-up interviews (semi-structured questions) are held with a selected number of students.

2019 pilot project
In 2019 a high school panel connected to "A healthier Southern Denmark" was established as a pilot project. Two high schools and 86 students participated. A questionnaire was conducted, and it showed that the students found interest in social and health policy issues and found citizen science an instructive way to involve citizens. On a scale from 1 to 5 (1 low and 5 very high) the students rated "citizen science strengthens the health research" 4,1, and "citizen science is a beneficial bridge between scientists and citizens" 4,5.
The pilot project is revised and expanded in 2022, and a survey on scientific literacy is developed.

Results and Discussion
As it is an ongoing project during the time of the conference, partly results will be available in mid-april 2022.

USLD sees projects like the high school panel as a future core task: to make students acquainted with topics within Citizen Science and being scientific literate, and furthermore be encouraged to collect data, and being critical to all sources. The project indicates that a university library can manage to network with several partners while also focusing on high schools' students learning outcome. ULSD sees a potential for expanding the high school project.

Vores historie - samskabelse af ny viden med gymnasieelever

Mette Fentz Haastrup, Gymnasiekoordinator, Syddansk Universitetsbibliotek
Cecilie Bjerre (post.doc., Institut for historie, Syddansk Universitet)
Klaus Petersen (professor, Institut for historie og Institut for Statskundskab, Syddansk Universitet)

Introduktion og formål
"Vores historie" er et Citizen Science-projekt ved Syddansk Universitet (SDU), der har til formål at give nye perspektiver på den såkaldte 'familierevolution', der fandt sted i perioden 1960-1980 ved at belyse historien fra det enkelte menneskes perspektiv. Det er der kun få kilder til, hvorfor der er et behov for at indsamle danskernes fortællinger.
Projektets mål er at:
1. engagere gymnasieelever som borgerforskere i et historiefagligt forskningsprojekt
2. undersøge gymnasieelevernes perspektiver på at være borgerforskere
3. afprøve om forskningsdesignet giver det ønskede output (anvendelige interviews) og afdække perspektiverne for at samskabe humanistisk forskning med gymnasieelever

Metode
Mål 1) Elevernes opgave som borgerforskere er at indsamle interviews. For at hverve gymnasieelever, har projektgruppen opbygget et fællesskab med interesserede gymnasier og samarbejdet med de deltagende gymnasier på to plan: 1) en styregruppe med en repræsentant fra hver af gymnasierne og 2) gymnasielærerne fra de deltagende klasser.
For at engagere lærerne (og deres elever), er de blevet inddraget i udarbejdelsen af undervisningsforløbet og -materialet, bl.a. lektionsplanen og undervisningsplatformen. Forløbet indgår som en del af historieundervisningen i klasserne, og det er frit for lærerne, i hvor høj grad de følger lektionsplanen.
For at klæde eleverne fagligt på, bliver de undervist i relevante samfundsforandringer i perioden, f.eks. kvindernes indtog på arbejdsmarkedet, familiepolitik, kønsrolle- og ligestillingsdebatten, samt interviewteknik, metadata og GDPR.
Eleverne skal i grupper interviewe en informant, som de selv har fundet. Forskerne har udarbejdet en interviewguide. Men lærere og elever har mulighed for at betone udvalgte temaer og supplere med øvrige temaer, hvilket interviewene vil afspejle. Eleverne uploader interviewene til Skyfish, hvor de vil være "åbne data" efter FAIR-principperne.
Eleverne afslutter forløbet med en analyse af indsamlede interviews på baggrund af en selvvalgt problemformulering. De præsenterer deres resultater til en posterkonkurrence ved en fælles afslutning. Her præmierer forskerne de tre bedste postere og holder en afslutningsforelæsning, hvor gymnasieeleverne vil få et indblik i de foreløbige forskningsresultater, samt projektets videre perspektiver.
Mål 2) Der der udarbejdet en evaluering, hvor eleverne evaluerer deres oplevelse og vurdering af at deltage i pilotprojektet. Ligeledes evaluerer og vurderer lærerne deres oplevelse som lærer, samt elevernes udbytte.
Mål 3) Forskerne vil evaluere interviewenes kvalitet og hele projektforløbet, samt inddrage elev- og lærerevalueringerne.

Pilotprojektet 2021
Pilotprojektet gennemføres i 2021 med 14 klasser fra fire gymnasier. Udviklingen af undervisningsforløbet og opbygning af de to platforme blev påbegyndt i februar 2021. Undervisningsforløbet, herunder indsamling af interviews, gennemføres i efteråret 2021 og afsluttes med posterkonkurrencen i december 2021.

Resultater
Pilotprojektet er ikke afsluttet, men til konferencen "Engaging Citizen Science" vil det være muligt at præsentere erfaringer fra projektet og foreløbige resultater, hvad angår:
- kvaliteten af de indsamlede interviews
- elevernes og forskernes perspektiver for borgerinddragelse og samskabelse

Topic: Citizen Health Science

Who Shall Decide What to Research? Health Research Priority Setting as the New Future?

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Traditionally, researchers, research institutions or funding organizations decide on the questions that research should answer. The corporate world, however, has demonstrated very early on that involving stakeholders in defining research and development (R&D) activities can be very beneficial. Many of the best ideas for new products and services (e.g., LEGO sets, Local Motors' cars, or telecommunication applications for Orange) have originated from stakeholders having a say in setting the R&D agenda. A gradual turn of tide can also be observed in science. Influential bodies, like the European Commission (EC), the Organisation for Economic Co-Operation and Development (OECD), and the World Health Organization (WHO), or UK's National Institute for Health Research (NIHR) are strongly advising researchers to actively involve non-research stakeholders in setting the scientific research agenda. And indeed, increasing efforts are made to identify stakeholders' research needs by involving them in "research priority setting".

Research priority setting encompasses any activities that involve non-research stakeholders in identifying, prioritizing, and reaching consensus on those areas, topics, or questions that research needs to address. Particularly in the first stage of the research process, when deciding what to research, input by non-research stakeholders can be very beneficial. It has been shown to promote the uptake and implementation of research evidence, secure optimal return on investment, reduce "research waste", and foster the relevance and legitimacy of research overall.

We will present why health research can benefit from priority setting and how to design "good" priority setting. In addition, we will reflect how inclusiveness and empowerment of patients and the public can be ensured in priority setting, and how the involvement of non-research stakeholders in health research can have sustainable impact for research but also for society. In line with the European Commission's call for mission-oriented research that responds to the grand social, environmental, and economic challenges of our time, we will lastly look at how research priority setting may be a recipe to identify these grand challenges that research needs to address.

Ketotic hypoglycemia in Down syndrome

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The story behind the publication:
The Facebook support group for members of Ketotic Hypoglycemia International became the platform where a mom of a child with Down Syndrome identified families with stories similar to her own. This resulted in a citizens-initiated and citizens-driven project, where scientific experts from the organization's Scientific Advisory Board were later invited in to participate. The first peer-reviewed scientific paper on the topic has been published, an animation video of the findings has been produced, and the first pilot project is about to start, investigating the prevalence of ketotic hypoglycemia in a cohort of 70 children with Down Syndrome in Denmark. These projects are examples of parent-organization driven research, where novel observations may arise, not firstly caught by the health care system. Acknowledgment of such observations by a presentation and subsequent further research is a good example of level 4: extreme citizen science in medicine.

Background
Ketotic hypoglycemia (KH) without an identifiable underlying metabolic or hormonal disease is historically named idiopathic KH. The prevalence is unknown, but idiopathic KH is considered the most frequent cause of hypoglycemia beyond the neonatal period. KH in Down syndrome (DS) has not been reported.

Methods
We conducted a web-based survey on KH in DS through the non-profit patient organization Ketotic Hypoglycemia International. The responses were evaluated for consistency with KH by two authors. Two DS patient histories with documented KH were shared in more detail.

Results
Survey data on 139 DS patients were obtained. After validation, 10 patients (7.2%) had reported episodes of documented hypoglycemia, ketosis, and/or symptoms compatible with KH beyond the neonatal period. Glucose concentrations ranged 1.2-2.9 mmol/L; beta-hydroxybutyrate was up to 5.5 mmol/L during hypoglycemia. One girl had trisomy 21 with no response to i.m. Glucagon also had a heterozygous Xp22.23 deletion including GYG2, which protein, glycogenin 2, is a substrate for glycogen synthase. Treatment with extended release cornstarch was effective.

Conclusion
This is the first demonstration of a possible high prevalence of KH in DS. Even though this finding needs to be confirmed in other research settings, identification of KH in DS could have a dramatic impact, as simple treatments with cornstarch, protein, and frequent meals may prevent KH attacks and, analogous to other conditions with KH, improve growth, stamina and prevent overeating and obesity. GYG2 deletion may contribute to KH in DS, resembling glycogen storage disease type 0.

"The support needs to be part of the system" – Designing Inclusive eHealth Applications for Older Adults with Low eHealth Literacy

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The project Got-IT* aims to develop an online toolkit to assist the design of inclusive eHealth solutions targeting the promotion of healthy lifestyles among older adults (65+) with low eHealth literacy.

The project consortium has used participatory citizen science as an approach to actively engage with the relevant stakeholders, including older adults with low eHealth literacy, eHealth developers, and secondary end users like eHealth professionals. We applied three different research designs all centered on the active engagement of the different stakeholders, using the design of an eHealth app to ground the investigations.

Four co-creation sessions were conducted with older adults with limited eHealth literacy (Four co-creation and two testing sessions in the Netherlands and three workshops in Austria). We used various co-creation techniques to facilitate the citizens' contributions in the design of app visualizations that meet their needs and preferences. Their contributions addressed amongst others the amount of information on the screen, colors and symbols used, letter font size and privacy issues.

We also investigated the experiences of eHealth developers designing eHealth applications for people with low eHealth literacy through an online survey (n=42). It was concluded that in general eHealth literacy does not play a large role in their development processes yet, but there is a large interest in co-design with end-users with low eHealth literacy. EHealth developers were subsequently involved in the creation of the toolkit during focus groups at a European eHealth conference.

Older adults with low eHealth literacy often rely on the support of secondary end-users (e.g. care professionals or their extended family). Three focus-group discussions were also conducted (n=9) with professionals working directly or indirectly in the field of health-care (e.g. medical doctors, nurses, physiotherapists, psychologists). The experts stressed that simplicity, inclusivity and motivation are key factors for a successful implementation of an eHealth application.

Our empirical approach to creating the toolkit focused on integrating all stakeholders as experts in their field. We achieved this by involving older adults with low eHealth literacy in the design-process of an eHealth application-mockup and collecting the experiences and the lack thereof of developers in designing eHealth applications. Another important aspect was to gather experiences of those who provide older people with a direct (social-)support system (e.g. health professionals), when new eHealth-applications are being introduced.

The outcomes of the Got-IT project align not only with the first objective of the AAL Programme (better quality of life for older adults and their networks, by empowering the citizens to take care of their own health), but are also central components of citizen science as a whole, by actively engaging the different target groups at various levels of our research process.

Cognitive Abilities in the Wild: Population-scale Game-Based Cognitive Assessment

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Psychology and the social sciences are undergoing a revolution: It has become increasingly clear that traditional lab-based experiments are challenged in capturing the full range of individual differences in cognitive abilities and behaviors across the general population. Some progress has been made toward devising measures that can be applied at scale across individuals and populations. What has been missing is a broad battery of validated tasks that can be easily deployed.

Here, we present Skill Lab - a collection of 6 mini-games which enables efficient assessment of a suite of cognitive abilities from. Skill Lab has applied a citizen science approach in order to validate the cognitive assessment outside the lab with a crowdsourced broad and diverse sample. The recruitment was performed in collaboration with the Danish Broadcast Company (Danmarks Radio, DR), and we managed to engage 16,000 players representing a large cross-sectional sample of the Danish population in terms of gender and age.

Based on the data provided the players we have developed game-based measures that are five times faster to complete than the equivalent traditional measures. We have already used our measures to replicate previous findings on the decline of cognitive abilities with age. Furthermore, by combining the game data with an in-game survey, we demonstrate that this unique approach can give insights into key questions in social science by challenging the Jack-of-all-Trades theory of entrepreneurship and provide evidence for risk preference being independent of executive functioning. We are furthermore, using our data set to investigate the behavioural differences between a more traditional Mturk population and our crowdsourced population and the implications on the results of the study.

Citizen science in environmental epidemiology: experiences from CitieS-Health Ljubljana pilot

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In this contribution, lessons learned from conducting citizen science activities within the CitieS-Health H2020 project in Ljubljana, Slovenia, are summarised. The Ljubljana pilot was designed to gain insight into relationship between people's immediate surroundings and the effect of environmental stressors (with a focus on noise) on their (mental) well-being. To this end, 50 participants from Ljubljana collected information on noise levels, characteristics of their living environment, cognitive performance, mood and sleep using mobile phone applications and physical activity trackers. In addition to active involvement of citizens in data collection, an emphasis on how to engage citizens in all four phases of the project's methodological framework (identification, design, deployment and action) is given. In order for the participants to be able to analyse the data they have collected, we have developed a special on-line application that visually displays the data on maps and interactive multi-dimensional charts, and where some of the information is interpreted by researchers and some is there for the participants to inspect and interpret on their own. In addition to the main study, the project was aligned with the elementary school curriculum as well, so pupils were able to engage in various project-related activities. A general overview of the aforementioned activities is presented, focusing on the various community-level outcomes and on experiences gained by both researchers and citizen scientists.

Participants Inclusiveness and Empowerment: Results from an Environmental Epidemiological Citizens Science Study in Kaunas City

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Background and Aim
Public engagement in the research of environmental epidemiological problems is becoming an important measure to empower citizens to identify local environmental and health problems and to pressure on politicians to improve the living environment to reduce health problems. This HORIZON2020 CitieS-Health Kaunas Pilot study evaluate the results of the participants inclusiveness and empowerment of the environmental epidemiological research on the acquisition of new skills and knowledge as well as on behaviour.

Methods
This participatory action research was conducted from 2019 to 2021 and involved 1062 18–75-year-old permanent residents of Kaunas city, Lithuania. The methods of invitation in the study included mass media, advertisements at community events, open scientific-practical conferences Human and Nature Safety. The participants formulated research question: why citizens in my district suffer from hypertension more often than in other ones, outlined environmental concerns and major health problems and evaluated the neighbourhood environmental quality by using formalized questionnaires developed together with the researchers. About 35% participants agreed to take part in the data gathering by a portable Fitbit Alta sensor. We measured citizens' engagement in the research on the acquisition of new skills and knowledge to recognize environmental health problems and the relationship with health using a Likert rating scale.

Results
Most of the participants who agree to be engaged in the data gathering by personal sensors were 18–44-year-old (51.9%), had a significantly higher mean diastolic blood pressure ($p = 0.030$), and worse rated of the built neighbourhood quality and social well-being.

About 42.7% of all participants acknowledged that participation in the research study improved them data collection and interpretation skills, 58.8% of them stated that the participation improved their knowledge on the links between environmental quality and health, and 45.5% of the participants thinking that their voice was heard by politicians. The participation in the environmental epidemiological research enhanced the understanding of the environmental issues that affect citizens' health and well-being and had a beneficial effect on health behaviour. The impact of the gained knowledge was significant ($p = 0.003$), albeit moderate on physical activity. Even though 60.6% of the study participants agreed that greater physical activity and walks in the green areas might improve their health, only 17.7% of high-impact participants and 10.9% of those with a low impact on knowledge reached the recommended level of physical activity.

Conclusions
The participatory research approach empowers citizens to identify environmental health problems through acquired knowledge. The defining environmental education targets through participatory action research increase interest in science and nature and are helpful in gaining a better comprehension of the relationship between the quality of the neighbourhood and the magnitude of the health-related problems.

Crowdsourcing the 1918 pandemic

Søren K. Poder, ma, ph.d.-fellow, Pandemix Center, Department of Science and Environment, University of Roskilde
Lone Simonsen, Professor, Department of Science and Environment, University of Roskilde

The overall purpose of the poster is to present how crowdsourcing has been applied to a historical-epidemiolocal research project about the 1918 pandemic. Moreover, how we by automatic segmentation of historical records generated sets of micro-tasks that by means of a digital platform was distributed to individuals based on individual domain specific knowledge. And consequently, generated more accurate data significant faster.
Based on assessments of time and accuracy of ~14.000 completed micro-tasks, we propose a workflow where tasks are distributed according to individual skill sets and solved in a loop with dynamic Machine Learning models.
Consequently, we suggest a workflow that over time will accelerate the transcription of historical handwritten records exponentially. And hence a) can be applied to similar historical, epidemical, and economic research projects, and b) provide a first step into a collective Intelligence scheme.

Research Background
Using vast amount of digitalized historical population level data epidemiologist has since the turn of the 21st century gained extensive knowledge on the rise, fall and diffusion e.g., the 1918 pandemic. Knowledge that, as it turned out, was crucial for our understanding of and respond to the current pandemic. However, while lots are already known about e.g., the 1918 pandemic's global diffusion, knowledge about how local socio-economic, demographical, and public health interventions affected the course of the disease locally and ultimately also the global diffusion, is limited. To examine these crucial mechanisms, we conducted a micro-epidemiological investigation into the city of Aarhus' experience with the 1918 pandemic by using highly detailed record level data from the period.

Historical health data
Danish archives hold unparalleled detailed records on nearly every aspect of Danish citizens since the last part of the 19th century. For instance, annual tax assessment protocols, hospitalization records, death certificates etc. So, while the international research to a large extent is unable to see what happened on the micro-epidemiological level Danish researcher has the unique opportunity to examine epidemics on an individual level, and hence reconstruct pandemic's social and spatial distribution bottom up.

Crowdsourcing.
However, to use these stunning amount of information tens of thousands of records must be transcribed, and the extracted data points structured consistently so that the individual records can be linked. Transcription of historical records are typically being done by volunteers that solves sequences of tasks (e.g., transcription, correction) that each produce one data point. Such manual transcription is highly labor-intensive, expensive, time consuming, and constraining in terms of adding additional datasets concurrently with iterative research process'.

Solution
Ideally, trivial problems like transcription of numbers, dates and common words should be handled automatically by machines whilst, as our preliminary results indicates, difficult or special cases should be transcribed by human specialists. For instance, topic specific terms like diagnosis, cause of death etc. Based on previous experiences, we hypothesize that the best way to construct a transcription process of historical records that is timely, motivating for the volunteers, and produces highly accurate data is to merge traditional crowdsourcing-based transcription, active learning-based task distribution with dynamic Machine Learning element.

Demo Sessions – Monday, 25 April, 15:30 - 17:30

Topic: Platforms to Support Citizen Science

MICS: a platform to measure the impact of citizen science

Luigi Ceccaroni, Earthwatch Europe

The MICS Project is developing an online platform and toolbox that citizen-science project coordinators can use to assess the impact of projects, making technology work for citizen science.

MICS considers impact across five domains (environment, society, economy, governance, and science and technology), and the platform consists of approximately 200 indicators – implemented in the form of questions - designed to find out as much as is possible about a project's intended or achieved impact across these domains. These 200 indicators have been generated and refined through a combination of literature reviews, workshops and iterative interviews to capture as much information about impact as possible.

The MICS platform has an intentional "gamified" feel to it, designed to keep users (citizen-science project coordinators) engaged as they answer as many of the 200 questions as they want to. In return, while they use the platform, coordinators are provided with an impact report, including an overall impact score for the project, breakdowns by domain, and suggestions on improving the project to achieve a more positive impact in the future.

Type of hands-on engagement: At this demonstration, participants will be invited to test the MICS platform. They will be able to create a project page – similar to a social media profile page – and answer some questions relating to the project's impact. They will be presented with an output detailing where they are making a practical positive impact and where there is room for improvement.

Technology/methodology showcased: The MICS platform uses the algorithm "Alquimics" to calculate a numerical score for impact from the answers given in response to impact indicators. It has been created partly through handcrafting (a labour-intensive technique for programming that involves writing explicit rules and templates) partly through machine learning (a type of AI that learns to perform a task by analysing patterns in data).

Ongoing related citizen science projects: MICS [https://mics.tools/] is an ongoing citizen science project funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 824711.

Location: Mogens Zieler Room

Meta-level Citizen Science: Analysing Citizen Science projects as a Citizen Science activity

Cleo Schulten, M.Sc., RIAS Institute
H. Ulrich Hoppe, Professor, RIAS Institute

The EU project CS Track (2019-22, "Science with and for Society") aims to investigate Citizen Science activities and practices to improve the understanding of such projects, taking into account also subjective factors such as motivation of participants and potential impact on science. One part in the project's activities is the collection of information on CS projects, in a structured database, the aggregation of metadata information and further analyses using analytics techniques combined with empirical studies.

To bring together analytics tools and to make these tools and the resulting data interactively accessible for users, we developed the "Analytics Workbench". The workbench utilizes text mining and other tools to generate results related to individual projects primarily based on project descriptions. Additionally, we utilize network analysis tools to contextualize the collected data, show relations between networks and give project recommendations based on user interest. To assign Research Areas and SDGs (Sustainable Development Goals) to the projects based on their descriptions we use Explicit Semantic Analysis (ESA). ESA is used to calculate text similarity between project descriptions and comparative texts for the SDGs and Research Areas for which we use articles from the Wikipedia corpus. Assignments are then based on these calculated similarities. Additionally, named entities (such as names of persons, institutions locations etc.) are extracted from descriptions using Named Entity Recognition using the spaCy library. The data collected over all analysed projects can then be viewed in a dashboard that includes descriptive statistics (diagrams) as well as interactive network visualizations that allow for investigating connections between projects and with organizations and research areas.

Based on the Analytics Workbench, the analysis of CS projects can itself be conducted as a CS activity in which volunteers would help in extending and improving the database. Users without a high degree of specific expertise and training can analyse proposed projects gathered in a source database with their project name, URL and description. They can also add other projects to the database and analyse those. During the project analysis, users can modify already existing project descriptions and they can check and correct analysis results.

In the suggested demo activity, we would invite the participants to use the workbench "hands on" to analyse proposed projects possibly guided by a short instructional video and accompanied by a questionnaire. The envisioned demo scenario would also allow for remote access. For a hands-on participation in the demo, participants need to bring their own laptops.

Topic: Platforms to Support Citizen Science
Location: Mogens Zieler Room

Wiki Labs demo - Learn how to use Wikipedia to build a strong knowledge-sharing community

Finn Årup Nielsen, chairman of Wikimedia Denmark / Associate Professor at Technical University of Denmark
Kim Bach, volunteer Wikipedian / IT specialist at the Danish Defense
Peter Leth, volunteer Wikipedian / chairman of OpenDenmark and Creative Commons Denmark
Merete Sanderhoff, community lead of Wiki Labs Culture / curator at Statens Museum for Kunst

Join this demo to be introduced to the basics of contributing to the world's largest user-generated knowledge resource, the open encyclopedia Wikipedia. Learn from a group of seasoned editors how you can share your knowledge and become part of one of the most successful and enduring citizen science platforms that embodies democratic citizenship in the 21st century.

Since 2015, Wiki Labs Culture - a community of volunteer Wikipedians and people working in Danish cultural heritage institutions - have met on a regular basis to enrich Wikipedia with trusted quality information, images and data about art and cultural history. Each partner has something the other one needs: Wikipedia reaches far more and more diverse user groups than any museum or archival website. Cultural heritage institutions have validated data and content which, when openly licensed, enhances Wikipedia's credibility. Through an approach of building mutual value and trust for volunteers as well as institutions, the community has grown strong and extremely dedicated, counting today +300 members in Denmark and beyond.

Running Wiki Labs Culture has gained us ample experience in

- teaching and sharing Wikipedia skills
- using open licensing correctly and to our benefits
- increasing quality materials and search results on our subjects of interest
- building and sustaining a thriving community.

In this demo, we will share hands-on experiences in

- the potentials and barriers in Wikipedia for your area of interest
- how to learn / teach basic skills of contributing to Wikipedia, Wikimedia Commons and Wikidata
- how to read and use Creative Commons licenses in Wikipedia
- how to navigate Wikipedia's help pages and discussion fora
- how to build a friendly, well-functioning and sustainable Wikipedia community

Activities

- introduction to the basic rules of Wikipedia editing
- exploring potentials - from minor edits to mass uploads
- differentiating between Creative Commons licenses, how to apply and read them
- pro tips on how to build and sustain your Wiki community

Outcomes

- basic skills of using Wikipedia actively
- a heightened understanding of the possibilities and pitfalls of using Wikipedia as knowledge-sharing platform
- basic understanding of Creative Commons licensing as a toolset
- tips to start and grow a solid community around a subject of interest

Target group
Anyone with an interest in learning to contribute to Wikipedia and its related projects. You don't need to be technically skilled - Wikipedia is open for all.

Topic: Platforms to Support Citizen Science
Location: Mogens Zieler Room

Using Wikis to co-create knowledge resources

Bastian Greshake Tzovaras, Center for Research & Interdisciplinarity, Inserm U1284, Université de Paris
Katharina Kloppenborg, Center for Research & Interdisciplinarity, Inserm U1284, Université de Paris
Omer Benjakob, Center for Research & Interdisciplinarity, Inserm U1284, Université de Paris

Wikis as a tool for online group collaboration can enable the collective creation and maintenance of a shared knowledge base by communities. As such they can be an interesting digital tool to support knowledge creation processes both for science in general and citizen science in particular. Wikis have already been applied in domains such as genetics, synthetic biology and environmental monitoring. In our demo we present how we utilize to support the creation of a shared body of knowledge in a particular citizen science community, that of *personal science* practitioners.

Personal science describes the practice of using empirical methods to explore personal questions and is practiced by individuals who strive to improve their health or well-being, or are driven by curiosity or enjoyment of self-tracking activities. A big barrier that personal scientists encounter is the need to "reinvent the wheel" when developing their own research projects as there is no common resource of knowledge. We co-developed a prototype of a semantic wiki to provide an interconnected knowledge resource for and with this community.

In this demo we highlight both the outcome of our co-design in terms of semantic structuring of knowledge as well as how the wiki features enable it to be useful for other citizen science projects to organize and prioritise the creation of knowledge.

Topic: Platforms to Support Citizen Science
Location: Mogens Zieler Room

Topic: New Technology for Citizen Science:
From Maker Spaces to Online Citizen Science

Participatory Research at Hackuarium in the time of the pandemic

Rachel Aronoff, Dr (PhD in Microbiology), Hackuarium
Dr Guy Aidelberg (CRI, Paris)
Kathrin Hadasch (Ianus Peacelab, Germany)
Tatiana Eliseeva (Hackuarium)

Our pandemic experiences have shown that the world needs to learn more about valuing science and dropping anti-intellectual attitudes. Poor messaging and similarly poor responses have made our current global pandemic much worse for us all. The crises around toxic substances and clean water are also affected by the challenge of good science communication. Participatory research by community laboratories, like Hackuarium, where we aim to democratise research, while learning more and having fun, is one way to get more of the general public aware of such issues. We think every city should have a community laboratory!

After founding the public association, AGiR!, more than 8 years ago, and then getting pulled into open research and Hackuarium, which just celebrated its 7th anniversary, I propose to present some examples of Hackuarium projects and collaborations. From our international collaborations for 'Corona Detective' to the 'cheek cell chip' -which was put to the side when initiating the Corona Detective R&D- and with publication of a lake water quality study in some sense dependent upon a 'silver lining' from the pandemic, Hackuarium projects clearly inspire and make people think.

To demonstrate the recent Corona Detective method, and perhaps also the classic micronucleus test and microbial analyses for water quality tests at the Engaging Citizen Science Conference could be a great way to get more people aware of how many ways they could consider trying some participatory research, too.

We already hope to inspire more public engagement, including our continued collaboration with Colombian colleagues about mercury in the river Atrato, with whom we are planning micronuclei tests. We also have initiated a new push on 'coding for everyone,' and continue to be hopeful, in spite of the evidence... =) Viva open science!

Location: Preben Hornung Room

Demonstration of the use of mini drones in community monitoring of reforestation in Uganda

Le Huong Johnsen, Verification expert, PhD, Nordeco and TROFACO
Steffen Johnsen, CEO and PhD, Tropical Farmer Connect (TROFACO) ApS

With the possibility of recording images and video with GPS and timestamps by mobile phones and increasingly easy-to-use and smaller drones, communities can obtain visual data of any activity that leaves physical changes in the landscape.

This potentially puts in their hands easy-to-understand (and communicate) and hard-to-reject evidence.

The evidence may be used by community in their management of the resources and/or in interactions with authorities.

TROFACO uses the drone tool to verify spatial extent of reforestation by communities in Uganda, on their community land, and show to sponsors of the reforestation how the trees are thriving (see: trees.trofaco.org)

The technology is immediately applicable to other forest management, wetlands, ecotourism etc. The hobby-type drones are easily flown by anybody with a bit of training (or experience from videogaming). With inexpensive software, most drones will be able to fly fixed paths (along 'waypoints') which render true replication (such as a timeline) of the observations, be they photos or video.

The presentation will show video recorded using waypoints, and demonstrate the flying of a mini drone and photos taken by it.

Topic: New Technology for Citizen Science: From Maker Spaces to Online Citizen Science
Location: Preben Hornung Room

Zeit.shift: Digital in yesterday's future A citizen humanities case study on historical Tyrolean newspapers

Greta Franzini, Dr., Eurac Research
Verena Lyding, Eurac Research; Egon W. Stemle, Eurac Research; Andrea Abel, Dr., Eurac Research

Zeit.shift is an ongoing digital and citizen humanities project between Eurac Research (Bolzano, Italy), the Dr. Friedrich Teßmann Library (Bolzano, Italy) and the Universitäts- und Landesbibliothek Tirol (Innsbruck, Austria), which seeks to contribute to the preservation of the memory and cultural heritage of the historical region of Tyrol. The project focuses on historical newspapers written in German and mostly blackletter script, which are currently scattered across North, East and South Tyrol and are only partially digitised. The objective of the project is twofold: increase access to these historical collections by digitising some 500,000 pages of Tyrolean newspapers published between 1850 and 1950; and investigate the potential of citizen engagement as a means of enhancing and making these cultural assets more widely known.

As a "distributed intelligence" citizen humanities project, *Zeit.shift* does not include input from citizens at each step of the research but relies on their cognitive and observation abilities to enhance data, granting them the possibility of influencing changes in methodology, objectives, development, results and dissemination. Unlike most citizen humanities projects working with digitised historical newspapers, *Zeit.shift* endeavours to combine common citizen science tasks of georeferencing and data annotation, with the aim of leading participants on a trail of serendipitous discovery of the past.

The ongoing contributory initiative that most closely resembles *Zeit.shift* is *Altes-Leipzig*, a reconstruction of historical Leipzig made possible thanks to digitised archival documents and genealogical information provided by citizens.

The demo will consist of two hands-on activities. The first activity, already underway, makes use of the existing platform *Historypin* and invites citizens to geolocate and semantically tag newspaper advertisements to help recreate the economic landscape of Tyrol from roughly 100 years ago. The project seeks to leverage the captivating sense of nostalgia evoked by reminders of products, traditions, people or businesses from the past to crowdsource citizen knowledge for the purposes of both cultural dissemination and research. The second activity, currently under development, is a custom typing game designed to improve the OCR of unrecognised words. In the game, these blackletter words are attached to arrows that fly in the direction of Ötzi the Iceman. The goal is to type the words as fast as possible before they reach and kill Ötzi. When Ötzi dies, players are shown the scores for their contribution as well as the original newspaper page from which the killing word was taken, allowing them to explore its context.

Demo presentations will be in English. However, the activities, while primarily targeted at German-speakers, are open to all who have some knowledge of the German language. Demos are possible without supervision as they were designed for remote participation. The activities can be run on the participants' personal laptops without account registration, are both web-based and only need an active internet connection and a web browser (preferably Firefox or Chrome).

Topic: New Technology for Citizen Science: From Maker Spaces to Online Citizen Science
Location: Preben Hornung Room

A tour of ScienceAtHome; an online citizen science platform

Janet Rafner, Director of learning, Center for Hybrid Intelligence, Dep. of Management, Aarhus University
Jacob Sherson, Prof MSO, Director of Center for Hybrid Intelligence, Dep. of Management, Aarhus University
sherson@mgmt.au.dk

In the ScienceAtHome project, both human and algorithmic problem solving is investigated through the lens of machine optimization, psychology, cognitive science and behavioral economics. Apart from natural and social science games, we also investigating large-scale game-based assessment of both basic cognitive skills and 21st century skills like creativity. In our Games4Good division we use games as public participation and engagement tools. In the Corona Minister Game the general public is invited in to explore and develop Corona containment policies evaluated on a mixture of criteria like health, economics and privacy invasions. Similarly, we have recently launched crea.visions first in collaboration with the UN organization AI4Good and in the next phase with the Danish Public Climate Summit, as an AI-enhanced creativity support tool for reflection and discussion on potential future scenarios for Mankind in light of the global SDGs.

Our intention with games is threefold;

i) to give the general public insight into the complex value-based decision tradeoffs that have to be made by our governments in times of crisis with the hope that this understanding can be a pathway to higher compliance with regulations and recommendations
ii) to investigate how we can use games to crowd-source public opinions on value-based political matters to increase participation in deliberate democracy, and
iii) to use the public-crisis game setting to set a personally safe space to engage students and members of the general public in their own personal perspective, hopes and fears for the present and the future.

In this demo, we will give a tour of the ScienceAtHome portfolio of games with a particular emphasis on illustrating how the general public can currently help research and participate in participatory futures discussions by playing our games.

Topic: New Technology for Citizen Science: From Maker Spaces to Online Citizen Science
Location: Preben Hornung Room

Topic: Spatial Citizen Science

Giving citizens a voice in mobility planning: an innovative mapping tool to enable spatial co-creation

Anke Bracke, Co-Founder & Business Developer, Maplix
Casper Van Gheluwe (Maplix & Ghent University) and Cedric Versluys (Maplix)

There is no way around it anymore: enabling citizens to participate in decision-making processes is a must. Especially in the field of mobility planning, where a co-creative approach has been gaining a lot of attention. This evolution has had an impact on the way both policy makers and researchers approach the concept of mobility planning. In recent years, its focus has shifted considerably towards a more demand-oriented model that takes into account sustainability and traffic safety. A new and increasing need has arisen to lay the foundations for a better, more liveable and above all safer traffic situation, fostering a modal shift to more active mobility and moving away from the dominance of motorized transport.

To maintain a demand-driven focus, while at the same time engaging citizens to consider their own mobility behaviour, these citizens need a voice in the process. This voice can contribute to the process in various ways: from understanding citizens' travel behaviour as a baseline measurement, to identifying bottlenecks or to assess the quality of the public domain and designing future solutions. In addition, 'liveability' is playing an increasingly important role in this process. Consulting local residents to rethink and co-create the design of squares, city parks and streets has become indispensable.

To facilitate this transition, new ways of data collection, public participation methodologies and community engagement tools have become necessary. And what better way to tackle challenges in public space than by using a map? Maps allow people to understand and manage complex situations in a simple and clear way. The concept of participatory mapping was born, and is here to stay.

Innovative aspects Maplix (www.maplix.com) is a spatial research tool that connects citizens with planners and therefore facilitating a bottom-up approach in mobility and spatial design. By providing a simple way to collect high quality geospatial data on a map, Maplix adds a new dimension to the process of mobility planning. Using map-based surveys is not only extremely efficient to achieve the desired results, but also allows citizens to connect with each other and build a local community of changemakers.

To enable spatial co-creation in mobility planning, Maplix offers many interesting features, which will be showcased during the demo. By linking geometries drawn on the map to a series of questions about experience and perception, the process also acquires an important subjective dimension. Linking objective and subjective data does not only hold great value for the design of a supported and efficient mobility policy, but also allows policy makers to guide their citizens towards a sustainable way of travelling, taking into account a series of spatial parameters.

To make analysis easier and save time, Maplix offers automatic and real-time data processing, which can be tracked via interactive web reports and maps. This way, the results can easily be shared with stakeholders or fed back to the citizens. Finally, Maplix is known for its particular focus on inclusive design through an attractive and simple user interface. Those who need help can count on a step-by-step tutorial throughout the map. Participating in a spatial co-creation process via Maplix should be easy and above all: a fun experience for all. End goal? Reaching a community where every layer of the population is represented.

Demo presentation During a live demo of Maplix, we aim to present the tool with all its functionalities by showcasing a fictive case study in Aarhus, accompanied with a relevant local objective and approach. Participants of this demo session will have the opportunity to put themselves in the shoes of local citizens and contribute to a local mobility project in Aarhus via their smartphones. The results gathered during the sessions are shown live and in real-time on an interactive map projected on a screen.
Location: Richard Mortensen Room

Telraam citizens' platform

Sanne Vanderstraeten, Project officer citizen participation, Mobiel 21
Elke Franchois - Projectleader citizen science at Mobiel 21
Kris Vanherle - CEO of Telraam
Dave Driesmans - Developer at Telraam

Telraam (www.telraam.net) is a Citizen Science tool, initiated in 2018 by Transport and Mobility Leuven, Mobiel 21 and Waanz.in, that collects, analyses and uses mobility data together with citizens. Mobility in a street, neighbourhood or city largely determines the use of space and the quality of life in the residential area.

We are developing a Citizens' platform that will continue to work with Telraam, its data and analyses. The citizens platform offers to citizens the means to understand the complex data that is mobility data, in the personal and wider spatial context.
Tools are provided to:

- Understand the data;
- To imagine more liveable, more pleasant and enjoyable streets and neighbourhoods;
- To stimulate a dialogue with nearby neighbours and municipal authorities in order to make behavioural change possible to live and move more sustainably.
- To stimulate small local actions like car sharing, bike pools, bike parking,... that contribute to a shared vision for their neighbourhood.

The Telraam citizens' platform can count on more than 1500 active citizens (which we call 'counters') in Europe to help shape, use and disseminate it.

Since the start of Telraam there has been an ongoing conversation with the counters through technical workshops, the helpdesk, online Q&As, social media... This way we learned that there are needs among the counters to make them stronger in this citizen science project: stronger in understanding the mobility context, stronger in analysing the data, stronger in talking about the data with the neighbours and the municipality/city, stronger in setting up action based on the data, stronger in formulating recommendations based on the data etc,... For this reason, we have set up several co-creative labs with the Telraam counters. In these co-creative labs the need for a citizens' platform arose and grew. Eventually together we shaped the building blocks for this platform. Based on this we came up with 5 personas, as the intended users of the platform. This citizens' platform is designed to meet the needs of these 5 personas. We have included two examples in this abstract, as well as a picture of the building blocks.

Format session
We choose a guided demo to present the Citizen' platform on the conference. During this demo, we will introduce Telraam, the 5 personas, the building blocks and various available tools orally supported by posters to illustrate the presentation, if necessary. We ask the participants to identify themselves with one of the 5 personas. Once they have chosen a persona they are invited to explore the platform and look for ways to fulfill the needs of their persona. This way, we evaluate whether the citizens' platform does indeed offer help and inspiration. Furthermore we test whether the platform is being used in the way we intended and if it's intuitive enough. The feedback will help us to further adapt and develop the citizens' platform to potentially serve citizens from all over Europe. We expect the participants to bring their own phone, tablet or laptop to participate in this demo.

Topic: Spatial Citizen Science
Location: Richard Mortensen Room

Towards a Sociological Understanding of Citizen Science by Participation (Ethnography)

Andrew Wood, Project Co-ordinator Network for Clean Air (UK)

Network for Clean Air (NCA) is a grassroots NGO based in Oxford, UK. We work with people and communities [in the UK] for better air quality and less air pollution. We use citizen science as a capacity building tool for increased advocacy of clean air. We've assisted with about sixty citizen science projects from 2013-2018. Communities – as part of their wider campaigns and citizen science projects with us – have stopped polluting developments, and prompted further air pollution monitoring by local authorities including extending Air Quality Management Zones.

We work with groups and individuals in civil society to measure air quality using gas diffusion tubes – an analogue technology - which are sensitive to Nitrogen Dioxide (NO2) air pollution. The devices are low cost, easy to use, and may be deployed in multiple locations simultaneously. They are manufacture to common standards by accredited laboratories and also used by local authorities, Government and regulatory bodies. We provide participants with diffusion tubes, training and assistance for these projects; we follow a participatory project methodology.

This methodology involves a group using their local knowledge to decide where to site the diffusion tubes. A large map and sticky dots are provided for creating a plan and there's a discussion about criteria for choosing sites including: achieving a geographical spread; achieving a range of readings based on estimates of pollution from traffic and other sources; the symbolic value of sites – a socio-political criteria; the frequency of visitation to a site. The group also needs to organised the logistics of putting the tubes out and their retrieval.

Topic: Spatial Citizen Science
Location: Richard Mortensen Room

Topic: Environmental Citizen Science

Lake suitcases as a citizen science tool

Sara Egemose, Associate Professor, Department of Biology, University of Southern Denmark
Laura Amy Mohaupt, Master student, Department of Biology, University of Southern Denmark
Christina Greve, project employee, Department of Biology, University of Southern Denmark
Anna Okholm, Research assistant, Department of Biology, University of Southern Denmark
Thomas Kaarsted, Deputy Director, Citizen Science Knowledge Center, University of Southern Denmark
Gitte Kragh, Post doc, Centre for Science Studies, Aarhus University

Now children, young people and their families can learn more about the water quality and plant and animal life in our approx. 200,000 Danish lakes and ponds though the project "Lakes in spare time – lake ecology and citizen science" (www.sdu.dk/søerifritiden). At the same time, researchers are being helped to obtain even more knowledge about the lakes. This is done through the development of several activities in collaboration with nature schools, libraries, after-school care facilities, voluntary associations, citizens, and researchers. Through the project activities, children and young people can become junior freshwater biologists and contribute with new data and new knowledge about our lakes. The target groups are school children, young people, and their families.

One of the project activities is 'lake suitcases', where citizens, associations, etc. can borrow a box of equipment including guides, manuals, etc. and explore the local lake. Afterwards they are encouraged to report back the species, water quality data or other observations on the project homepage. The suitcases can be borrowed, e.g., at local libraries. There are suitcases with 3 different themes: Animals and plants, water quality, and lake games. From spring 2022 it is planned to have 20 suitcases of each theme available. In 2021 the prototypes were developed and tested and feedback from relevant target groups where gathered and a thorough evaluation was performed. Lists with materials, manuals, etc. is also available online on the project website so that anybody interested in making their own suitcase can either get expired or use the materials for free. At the demo, we will demonstrate the suitcases, present the first lessons learned and encourage the participants to engage in further development of the activity.

The project runs from 1 April 2021 to 31 March 2025 and is funded by the Villum Foundation.

Location: M1

Arter – fællesskabsrum, fællesskabs-datavalideringer og alt biodiversitetsdata samlet et sted

Anders P. Tøttrup, Associate Professor, Statens Naturhistoriske Museum
Projektleder Josefine Møller og journalist Jon Skovgaard Mathorne, Statens Naturhistoriske Museum

Med Arter, Danmarks nye artsportal og fællesskab for og om biodiversitet, er der adgang til flere end 42 millioner artsfund fra Danmark. Samtidig er det en portal, som er rettet mod at gøre det så enkelt som muligt at indberette fund af arter i Danmark. Dermed er Arter en potentiel guldgrube for citizen science-projekter, som har let adgang til at oprette målrettede indsamlinger ved hjælp af Arter med hurtig filtrering og Excel-import af de gjorte fund.

En vigtig hjørnesten på Arter er ligeledes borgerrettet, nemlig forankringen af Arter hos det naturhistoriske miljø i Danmark. De naturhistoriske foreninger bidrager med uvurderlig hjælp i form af ekspertbistand, både i forhold til valideringen af de fund, Arter-brugerne indberetter, og den indsigt, det kræver at drive en artsportal, som skaber værdi for såvel amatøren med stor faglig viden som hos den almindelige borger i Danmark.

Et af de seneste nye tiltag på Arter sigter netop efter at skabe værdi hos landets naturhistoriske foreninger, nemlig muligheden for at indgå fællesskaber via hjemmesiden arter.dk. Her kan foreninger oprette egen sider målrettet deres eksisterende og potentielle nye medlemmer. Samtidig kan foreningen, såvel som alle andre, oprette aktiviteter, hvor der sættes en ramme om indsamlingen af artsfund. Det kan eksempelvis være rammer i form af tidsrum, geografi og specifikke Arter. Et par eksempler kunne være en aktivitet, der har til formål at registrere ræve på Læsø i juli 2022, eller sommerfugle på Lolland en dag i september. Rammerne kan nemt og fleksibelt sættes sammen efter behov.

Så se, hvad Arter kan byde på i forhold til citizen science, og hør mere om de naturhistoriske foreningers vigtige rolle på Arter.

English
Arter.dk is Denmark's newly released, national registration platform for biodiversity. 42 million registrations, from different scientific projects, museum collections and registrations done by citizens are already on the platform and more a constantly added. The site uses a unique validation system, that lets citizens create trustworthy data readily usable in scientific research, by easy export in excel formats. And Partnerships with hobby enthusiasts, and different natural history societies supply a backbone of knowledge of high quality to the platform. Come to our booth and learn about Arter.dk and its advantages, and be inspired on how to run an organize a citizen science platform.

This demo will run in English, but please note that the platform discussed is only available in Danish. Discussions in Danish are also welcome.

Topic: Environmental Citizen Science
Location: M1

udvikling af active Living Lab - eksperimenterende, inspirerende og fysisk aktive læringsaktiviteter om naturfag

Lars Breum Christiansen, lektor Active Living, Idræt og biomekanik SDU.
Rasmus Vestergaard Andersen, Videnskablig assistent, Idræt og biomekanik SDU.
Søren Lekbo, Videnskablig assistent, Idræt og biomekanik SDU.
Laura Milsø Stephensen, Idræt og biomekanik SDU.
Louise Briand Thomsen, Idræt og biomekanik SDU.

Workshop med Active Living Lab
På Syddansk Universitet drømmer vi om, at vores store grønne udenomsareal bliver et *bevægelseslaboratorie,* hvor børn og unge indgår i eksperimenterende, inspirerende og fysisk aktive læringsaktiviteter om naturfag (STEM). Læringsaktiviteterne danner og anvender data, der opsamles til brug for forskning omkring børn og unges læring, trivsel og sundhed. Vi kalder konceptet Active Living Lab (ALL). Idéen er at konceptet skal tage udgangspunkt i aktiviteter som adventure race, escape room og geocaching, hvor man i hold transporterer sig gennem landskabet og undervejs finder, møder og løser opgaver og eksperimenterer. Indhold og format af konceptet bliver udviklet i løbet af foråret 2022.

Dette udviklingsprojekt anvender Citizen Science (SC) i udviklingen af ALL. Ved at gå på tværs af forskningsområder og sektorer kombinerer vi viden og erfaringer fra SDU, UCL, UC Syd, SDSI, Campus Odense og ikke mindst, grundskoleeleverne og lærerne selv. Gennem ekspert- og borger-inddragende workshops opsamles og kombineres viden, erfaringer og refleksioner med formålet at generere nye vinkler til udvikling af ALL. Udover at have et niveau af deltagelse fra lokalsamfundet, er målet samtidig at projektet kan engagere og uddanne børn og unge samtidig med at der genereres data til forskning. Herved udgør ALLs temaer i relation til CS:

- CS på tværs af forskningsområder og sektorer til formål for ny viden, ideer og perspektiver, samt som springbræt til fremadrettet tværfagligt samarbejde.
- CS som generator for dataproduktion til forskning.

ALL vil til konferencen præsentere, udforske og udfordre det hidtil udviklede konceptet gennem demonstrationsformatet ved brug af deltagerinddragende aktiviteter. Målet er at deltagere kan prøve en udgave af konceptet og efterfølgende indgå i korte diskussioner. Demonstrationen vil foregå på dansk og er tilrettelagt ud fra ovenstående temaer og følgende forskningsspørgsmål:

Hvordan udvikles aktiviteter, der bevæger, danner og uddanner børn og unge og samtidig producerer og indsamler data, der er anvendelig i forskning om samme målgruppe?

Topic: Environmental Citizen Science
Location: M1

Empowering Community Cleanups through Clean Swell: How volunteers anywhere can contribute to tackling plastic pollution

Sarah Kollar, Outreach Manager, International Coastal Cleanup, Ocean Conservancy

Cancelled

Plastic pollution and marine litter are major threats to our ocean, plaguing waterways and impacting marine life, economies and communities worldwide. Ocean Conservancy has proudly hosted the annual International Coastal Cleanup (ICC) for 35 years, the world's largest volunteer effort for ocean health. The ICC has expanded to over 155 countries and has mobilized over 16 million volunteers to remove approximately 156 million kilograms of trash from beaches and waterways around the globe, all the while logging each item and building the world's largest database on marine litter. With volunteer science at the heart of the ICC, Ocean Conservancy has worked to build a suite of data collection tools that focus on ease of use, efficiency for community cleanup leaders and promote an exciting, educational cleanup experience for all. Our data collection app, Clean Swell, launched in 2016 and has successfully propelled volunteer-driven data collection around the world both during the annual ICC and via year-round. Through this demo, we will share how Clean Swell works, from download to completed cleanup to the online open-access database where cleanup results are stored and accessed by conservationists, students, researchers, and anyone working on mitigation strategies. We are thrilled to share this tool with water and ocean lovers around the world who wish to actively contribute to tackling plastic pollution and marine litter, one piece at a time.

Topic: Environmental Citizen Science
Location: M1

Topic: Citizen Science App Course

Engaging apps that users love

Simon Leed Krøs, Senior Project Manager, The Danish Society for Nature Conservation
Jonathan Bornemann, CEO & Partner, House of Code

Cancelled

Technology, and specifically mobile apps, are key drivers in many Danish and international citizen science projects, since they enable users anywhere to engage directly with your project, easily collect data and on devices that people know and use on a daily basis. Many CS projects have, however, learned the hard way that app design (UX) and user engagement is harder than it looks and difficult to get right.

The Danish Society for Nature Conservation project leader of one of Denmark's largest app-driven citizen science projects to date (Biodiversity Now), and Danish app developer House of Code will showcase practical experiences and best practice related to engaging app-design, UX, in-app and general engagement and retention. On this demo we dive into the world of apps and the many aspects related to making truly engaging apps that people love to use.

Location: M2

If you would like to attend this course, please sign up at the registration desk as places are limited.

Topic: Global Biodiversity Information Facility (GBIF) Course

Sharing, Accessing, and Working with Open Citizen Science Data on the Global Biodiversity Information Facility

Caitlin Mandeville, PhD candidate, Norwegian University of Science and Technology Centre for Biodiversity Dynamics
Wouter Koch, Senior Advisor, Norwegian Biodiversity Information Centre
Jorge Sicacha Parada, PhD candidate, Norwegian University of Science and Technology Department of Mathematical Sciences
Philip Mostert, PhD candidate, Norwegian University of Science and Technology Department of Mathematical Sciences
Kwaku Peprah Adjei, PhD candidate, Norwegian University of Science and Technology Department of Mathematical Sciences, will provide assistance with hands-on activities but will not be one of the speakers.

This demo aims to demystify the open sharing of citizen science biodiversity data for both managers of citizen science data and also potential data end users. Demo participants will be introduced to a range of ways that their work can intersect with the Global Biodiversity Information Facility (GBIF), the world's largest open biodiversity data infrastructure.

We will introduce participants to best practices for openly sharing their own citizen science data as well as for accessing and working with open data. The demo will address common questions and challenges related to sharing and working with open citizen science data, covering approaches ranging from research question formulation to data management to statistical solutions for dealing with bias and uncertainty in the data.

Demo speakers will present briefly on the following topics:

- Case studies demonstrating different approaches to sharing citizen science biodiversity data on GBIF
- Hands-on demonstration of how to find and access relevant data on GBIF
- A discussion of common questions and challenges in working with data from GBIF
- Brief Introduction to statistical approaches for overcoming challenges in working with unstructured biodiversity data

The demo is open to participants with any prior level of experience with open data sharing, and activities will be responsive to the specific interests and experience of the participants. Participants will learn from both the presenters and from each other, as there will be time for participants to discuss and share experiences with one another. Discussion can address the themes raised in the workshop, other related questions from participants, or brief hands-on exploration of the workshop concepts. Participants who wish to explore some of the open data concepts introduced during the workshop should bring a computer; however, it is still possible for participants to take part in the workshop's discussions if they do not wish to bring a computer.

Participants will have the opportunity to share their experiences and perspectives on open data sharing with the demo organizers. These responses will be compiled in the form of a physical or digital resource that can be rapidly shared with other conference attendees, with the goal of sparking ongoing conversations that extend beyond the demo.

Location: M2.3
If you would like to attend this course, please sign up at the registration desk as places are limited.

Start Making Sense

Max Odsbjerg Pedersen, ma., information specialist, Royal Library.
Jonas Heide Smith, Head of Digital, National Gallery
Søren K. Poder, ma. Ph.D.-fellow, Pandemix Center, University of Denmark, assistant professor/ crowdsourcing adviser, University College
Jacob Sherson, Prof. MSO dep.s of Management, Physics and Cognitive Science, Aarhus University

The purpose of this workshop is to actively engage members and researchers from different domains (cultural heritage, data sociology etc.) in a discussion on how engaging the crowd in "human in the loop" computation schemes might be able to connect and enrich the huge variation of different digital cultural heritage collections. For instance, images, audio-visual, texts, art paintings etc.

After setting the stage for the workshop (Merete Sanderhoff, SMK) and the four brief presentations (5 min.), participants will be divided into teams of four to five members. Based on a compendium containing a variety of digitized historical texts, paintings, historical photos and images of art objects, each team will be asked to consider four coherent challenges, including questions on combinations of the proposed methodologies, in relation to:

1. Utilizing the cultural and scientific value of our individual collections as well as across collections.
2. A development of coherent and qualified ML-based object recognition scheme based on a crowdsourcing process of factual descriptions.
3. How to replace traditional object recognition schemes with a collective intelligence approach to capturing and utilizing human intelligence, reasoning and intuition in the service of a description and contextualization of digital resources across different domains: texts, image, paintings, sculptures etc.

Throughout the workshop the hosts will be joining the teams for the purpose of answering questions and keep the focus on challenges and common proposed solutions to capture the crowd's collective memory and skill sets through combinations of artificial intelligence, collective intelligence and crowdsourcing.

Takeaways
Participating in the workshop will provide the participants with basic knowledge about new ways of engaging the public in projects where trivial tasks have been replaced by a process where the public, by contributing with common sense, personal knowledge and memories, together with machines adds a contextual and collective intelligence based analytic frame.

Location: Mogens Zieler Room (max. 70 participants)

Co-designing citizen science for impact

Ms. Uta Wehn, Adlerbert Visiting Professor of Marine Citizen Science for Sustainable Development; Associate Professor of Water Innovation Studies, IHE Delft Institute for Water Education
Mr. Luigi Ceccaroni, Earthwatch
Ms. Sasha Woods, Earthwatch
Mr. Balazc Kozak, Geonardo

Citizen science is increasingly recognised as a multi-stakeholder phenomenon. This nuanced understanding often goes hand in hand with questions regarding the control over and participation in the process of setting up and running citizen science initiatives. Involving and managing diverse stakeholders from the start and over time can be challenging; as a result, achieving impact with citizen science can be elusive.

Based on the best practice generated by the Ground Truth 2.0 project for co-designing full-scale citizen observatories, the MICS project adapted this approach for co-designing citizen science activities in the context of nature-based solutions. The resulting Ground Truth 2.0 methodology light focuses on generating citizen science activities that are based on a sound understanding of the social context and set up to address jointly agreed societal challenges. Based on guiding principles, this approach provides a coherent process for the joint development of the purpose, scope and implementation of citizen activities with citizen scientists and other key stakeholders.

This workshop will use this co-design approach and lessons learned from its use in three case studies in Europe, to discuss and share experiences with co-designing citizen science.

Location: Preben Hornung Room (max. 70 participants)

Empowering youth through youth citizen (social) science - possibilities and challenges

Michael Søgaard Jørgensen, Associate Professor, Aalborg University
Claire Murray, project officer, ECSA secretariat
Eglė Butkevičienė, professor, Kaunas University of Technology
Cathrine M S Winther, PhD student, Aalborg University

An essential part of empowerment is the sharing of power. For youth citizen science and youth citizen social science, this starts with addressing, working with and dismantling the traditional power structures that define most of the youth's relationships with adults and their community. However, as practitioners in citizen science, this requires us to reflect on how we construct our project, which societal fields and communities we are approaching and how we try building equitable collaborations with youth. This workshop brings together European citizen science projects and other youth researchers working with youth to share experiences and to build synergies.

The SEEDS project and the YouCount project are both transnational projects and directly centred around the expertise and the empowerment of youth. Both projects aim to co-create innovations and policies through hands-on citizen science activities.

YouCount is using co-creative youth citizen social science to produce new knowledge about positive drivers for social inclusion of youth (14-30 years old) at risk of exclusion, specifically focussing on social belonging, social participation and civic engagement as important drivers of social inclusion in nine local case studies.

SEEDS is a science project by teenagers for teenagers. It aims to empower them to live healthy lifestyles and to help them explore how important and exciting science is. The project uses citizen science to create new experiments for healthy lifestyles.

In this workshop we will explore the power balances in our projects and discuss empowerment of youth through youth citizen science. We will share experiences on how we are engaging youth in co-designing the project activities, while paying attention to hidden power structures in society, e.g.in public institutions, which might make it difficult to develop inclusive and equal project relations. The workshop will thereby focus on the challenges and possibilities that can arise in youth citizen science projects, and how these can move towards youth empowerment.

This workshop is targeted at persons either working with youth in citizen science projects or people who would like to work more actively with youth and their perspectives in citizen science projects.

Location: Richard Mortensen Room (max. 50 participants)

Creating community – how can citizen science projects enhance existing communities and create new ones?

Dr Laura Fogg-Rogers, Science Communication Unit, University of the West of England, Bristol
Dr Ana Margarida Sardo, Science Communication Unit, University of the West of England, Bristol
Sophie Laggan, Science Communication Unit, University of the West of England, Bristol
Elke Franchois, Mobiel 21, Belgium

This workshop will explore two aspects of community in citizen science projects. Firstly, we will explore methods to include and empower existing communities in citizen science projects and technology for sustainability. Secondly, we will also explore opportunities and barriers to creating and enhancing a sense of community amongst participants and inter-disciplinary researchers within international citizen science projects.

The workshop will draw on learnings from the WeCount citizen science project, which ran from 2019-2021. The Horizon 2020 project aimed at quantifying local road transport, producing scientific knowledge in the field of mobility and environmental pollution, and co-designing informed solutions for several road transport challenges. The project aimed to empower citizens to take a leading role in the production of data, evidence, and knowledge around mobility in their neighbourhoods.

Hundreds of citizens (n=548) in five European case studies (Leuven in Belgium; Madrid/Barcelona in Spain, Ljubljana in Slovenia, Dublin in Ireland and Cardiff in the UK) were involved, with a ratio of 51% male and 49% female participants. Each participant operated a low-cost, automated, traffic-counting sensor (called a Telraam) to count the number and speed of cars, large vehicles, cyclists and pedestrians. Citizens analysed data from the sensor and used findings to influence local decision-making.

The project team conducted an in-depth mixed methods evaluation of the WeCount project, from evaluating events, citizen scientists' experience and involvement, to the WeCount research team's journey. Participants were largely well-educated, with 82% holding a degree, although 25% of participants lived in areas of lower socio-economic status (determined by postcode data). Citizens took part in quantitative surveys about their experience, as well as a sub-set participating in qualitative semi-structured interviews. Interviews were also conducted with WeCount research team members, which were triangulated with ACTION Impact scores to determine project impacts.

WeCount was able to reach and sustain engagement with broad demographics in society, with the Telraam data acting as a talking point for families, another tool in the toolbox for activists, and an opportunity to feel as though citizens were contributing to something bigger than themselves. The COVID-19 pandemic meant that recruitment, engagement, and training for citizens and staff were conducted online. While the project still fulfilled its metrics, interview data indicated that the lack of face-to-face engagement hindered the relationship buidling with some citizens, especially those with a low-socioeconomic status, or intermediary organisations. Other impacts included slower deployment of sensors and reduced capacity for research teams to build their own sense of community.

This workshop will therefore build on these learnings to enable conference participants to develop engagement plans for online and face-to-face citizen science projects. Participants will conduct their own audience segmentation and community mapping to consider diverse community needs for recruitment and engagement. Finally, participants will also discuss how to generate community amongst existing participants and research staff members. Sharing and exchanging knowledge is essential for co development of participatory research. Enabling inter-disciplinary and intersectional conversations is therefore a critical element of citizen science, where conference delegates will develop best practice outcomes.

Location: M1 (max. 70 participants)

How to get citizen science data accepted by the scientific community? Developing research questions and data quality mechanisms

Dr. Tim Kiessling, Leibniz Institute for Science and Mathematics Education
M.Sc. Sinja Dittmann, Leibniz Institute for Science and Mathematics Education

Citizen science projects can generate novel scientific insights based on data of high quality. However, the acceptance of citizen science data by the scientific community is at times complicated by the absence of people with a formal scientific education at all stages of the research process. Therefore obtaining data of high quality requires careful previous planning, finding an adequate research question (potentially together with the citizen scientists), instruction of the participants regarding data collection, and/or further data quality control mechanisms (e.g. photos to corroborate data).

In the project "Plastic Pirates" we made the experience that having clear research questions as well as transparently detailing which conditions need to be fulfilled to be able to include a citizen science dataset in the analysis of plastic pollution of riversides in Germany was crucial for acceptance of our study in peer-reviewed literature. More specifically, this was done by verifying collected citizen science data with photos, an evaluation of the sampling by the participants themselves, and developing a decision making-flowchart showing when a dataset was accepted within the study as well as listing the reasons why datasets were excluded.

During this workshop, participants will get an insight into (i) identifying a relevant research question (narrow enough to be able to be answerable, but broad enough to engage citizen scientists besides merely collecting data), (ii) developing data verification mechanisms (robust enough to evaluate whether data were collected as planned, but simple enough to not burden the citizen scientists), and (iii) obtaining a sincere evaluation about the data collected (walking the narrow path of accepting some degree of error while still maintaining enough data for analysis).

The workshop will consist of an approximately 30 minute overview of the Plastic Pirates project and its data quality management, including solutions found and open questions. It will be followed by a round of questions and an introduction of the workshop participants, the citizen science project they are involved in, and their role within these projects. In a subsequent working phase, the participants are tasked with identifying and developing specific research questions in accordance with the planned goal of their project (e.g. producing valuable scientific data, improving the life quality of citizen science participants or their communities) as well as accompanying an adequate data quality mechanisms, so that in turn robust data of high quality can be obtained from the citizen science project. Based on this work, common pitfalls are identified and experiences are shared towards the end of the workshop, with the goal to obtain a document with potential solutions for the topic of data quality in citizen science projects.

Location: M2.2 (max. 15 participants)

Power and limits of Citizen Science when the very notion of citizenship is being eroded

Laure Fallou, Research officer, EMSC
Alice Corbet, National Center for Scientific Research (CNRS), Les Afriques dans le Monde (LAM), Pessac, France
Laennec Hurbon, Faculty of Human Sciences, State University of Haiti, Port-au-Prince, Haiti Nixon Calixte, National Center for Scientific Research (CNRS), State University of Haiti, Port-au-Prince, Haiti
Jean-Marie Theodat, Université Paris 1 Panthéon-Sorbonne, Paris, France
Eric Calais, Department of Geosciences, École Normale Supérieure, CNRS UMR 8538, PSL Université, Paris, France

In August 2021 a citizen-seismological network in Haiti was able to monitor the aftershock sequence that followed a deadly M7.2 earthquake so that the population and emergency responders could be informed in real-time. This was made possible thanks to low-cost, low-maintenance sensors installed in a dozen of citizens' houses. This citizen seismological network palliates for a deficiency of the State in Haiti that doesn't have the resources to maintain a "professional grade" seismic network. When interviewed about their participation in the project, these hosts expressed how they felt empowered to be part of this citizen-seismological network. They also underlined their pride to contribute to their country's potential future development through science and risk reduction. In this case, involving citizens in the creation of the network allowed it to be more effective, more accountable, more committed and, in short, more citizen. In a context where the very notion of citizenship is being eroded as the capacities of the Haitian State, particularly the regalian ones, are disintegrating, this is a crucial issue.

Citizen Science initiatives often claim that they may empower citizens and have an impact on policy. But how can this be achieved depending on the various types of political regimes, the different levels of commitment, financial resources, and power of the States? What role are the different cultures of citizenship and the trust of citizens in their authorities (and vice versa) playing? In the end, what we wish to question here is what is at stake behind the word "citizen" of "citizen science". And while the Covid crisis has highlighted that, on the one hand, science can have a strong impact on society and democratic life, and that on the other hand citizens can take an interest in it, this question becomes all the more essential.

The roundtable will start with a brief presentation of the Haitian case. It will serve as an example to introduce this topic. Participants will then be invited to share their own experience and theoretical thoughts from different citizen science fields and different forms of State and governance. We will discuss together the definitions of citizen and citizenship and their concrete realities in different cultural contexts and countries. We will also question to what extent citizen science can enhance citizenship, or on the contrary, may be limited by the failure of the State to perform its regalian functions, which are necessary for the full exercise of citizenship. Finally, we encourage participants to share their experience and knowledge about Citizen Science projects that have been developed in authoritarian countries, where a strong regalian environment can be stronger than the citizen participation, or in 'failed states', where the question of interference and respect of sovereignty can be questioned.

Topic: Ethics and Evaluation
Location: Mogens Zieler Room

"First use no humans" - The Ethical Implications of Hybrid Intelligence in Citizen Science

Pietro Michelucci, Executive DIrector, Human Computation Institute
Libuše Vepřek, Cultural Anthropology Intern, Human Computation Institute

Ethics in citizen science has become a topic of growing interest and activity within our community. With citizen science volunteers increasingly donating their cognitive labor to distributed information processing systems there is increased recognition about the need for establishing a set of related ethics to ensure the fair treatment and wellbeing of these contributors and the conscientious use of the capabilities they enable. In parallel, there has been an international call for the ethical governance of artificial intelligence (AI), with questions about bias and the role of impacted stakeholders. At the intersection of these two hot topics lies a largely unexplored space of ethical consideration: what ethical issues arise as AI becomes increasingly integrated with citizen science? For example, citizen science is sometimes viewed as a platform for acquiring high volumes of data for teaching machine learning models, which are hoped to eventually obviate the need for crowdsourcing by fully automating the data analysis. Are the participant communities aware of the fact that their efforts are in service of planned obsolescence, such that if they do their job well enough and long enough they will no longer be needed? Once a citizen science project can be replaced by a machine, should the project be dismantled or continued for the sake of community, education, and a shared sense of purpose? Or consider mutual learning, where AI systems actively learn from highly skilled citizen science participants, and then use that knowledge to teach unskilled volunteers - are there ways this can go wrong? Can known issues of learned bias in AI give rise to new problems in this context, for example, where bias is perpetuated from human to AI to human again? The purpose of this roundtable is to boldly explore the ethical implications of increased and multifarious integration of AI in citizen science projects. To stimulate discussion, we will employ a gamified activity, in which use cases contributed by participants are used to elicit a set of collective ethics via pairwise transactions in a manner analogous to the game Telestrations. The list of ethics arising from different roundtable sessions will ultimately be collated and compared, and the output of the game will be made available online.

Topic: Ethics and Evaluation
Location: Mogens Zieler Room

As open as possible, as closed as necessary: how to find the right balance in sharing citizen science data for health?

Dr. Ria Wolkorte, Health Technology and Services Research Department, TOPFIT Citizenlab, University of Twente, Enschede, The Netherlands
Dr. Michelle M.A. Kip, Health Technology and Services Research Department, TOPFIT Citizenlab, University of Twente, Enschede, The Netherlands
Dr. Lieke Heesink, Biomedical Signals and Systems Group, TOPFIT Citizenlab, University of Twente, Enschede, The Netherlands

Citizen science inherently requires openness and transparency with regard to data. This is also one of the 10 principles for citizen science projects as set out by the European Citizen Science Association. More specifically, it is argued that since data is collected in the public domain, these data and the results should also be shared publicly. Results can be shared through open access formats and through freely accessible summaries and reports.

A frequently used method for data sharing is through repositories. Repositories facilitate the reuse of data for other research, and allows reproducing and confirming the findings of the original study. In order to promote the sharing of data, citizen science projects should, where possible, adhere to the principles of FAIR (making data Findable, Accessible, Interoperable and Reusable). The basic notion of FAIR is 'as open as possible, as closed as necessary', implying that the data does not necessarily have to be fully open to comply to the principles of FAIR. To accommodate this, repositories offer different levels of openness ranging from completely open, to placing data under embargo with access only upon reasonable request, to only publishing the metadata. This 'metadata only' option implies that only the dataset is described but the data itself are not shared.

In the domain of health and wellbeing the principles of openness and transparency sometimes collide with the principles of privacy. These issues particularly occur with qualitative data. For these situations, there is no one-size-fits-all approach in balancing openness against privacy. Within the Citizenlab project at the University of Twente we conducted a citizen science project in collaboration with people with rheumatoid arthritis. The project entailed interviews, surveys with open- and closed ended questions, focus groups, and the collection of data on a digital platform. The collected data concerned among others personal and health-related data and is a mix of quantitative and qualitative data.

To inform the data management strategy of our project, it was important to understand the views of different stakeholders with regard to the use of repositories to share the data collected during this project. Therefore, we held a focus group discussion with participants, and another multidisciplinary focus group discussion including not only participants but also ethicists, data stewards and citizen science researchers. In these focus groups we discussed motivations and prerequisites for sharing data.

In the roundtable discussions we will share in 3-5 minutes:

- our experience with the process to come to a shared decision on data management;
- the knowledge that we have gained about the perspectives of the different stakeholders with regard to data sharing;
- how to decide upon the degree of openness of the data, which requires a delicate trade-off between participants' willingness to share their data and adhering to the principles of publishing data in line with the principles of FAIR and citizen science as much as possible.

We will then open the dialogue for the attendants to share their perspectives and experiences regarding how different types of data and/or projects inform choices regarding the balance of open data and privacy.

Topic: Ethics and Evaluation
Location: Mogens Zieler Room

A Collaborative Endeavour to Develop Criteria for Citizen Science Platforms

Daniel Dörler, Dr., University of Natural Resources and Life Sciences, Vienna
Gitte Kragh, Dr., Aarhus University
Cristina Luís, Dr., University of Lisbon
Sonja Grossberndt, Dr., Norwegian Institute for Air Research
Fredrik Brounéus, MSc, Vetenskap & Allmänhet

Citizen science (CS) is currently on the rise in many countries. In 2018, Denmark was one of the first European countries to launch a national CS portal. CS platforms or portals are websites that display CS projects to an interested public, connecting CS actors and promoting CS in both science and society. They are not only multipliers for national and international CS projects and initiatives, but also for big transnational organizations such as the European Citizen Science Association (ECSA). In their work CS platforms often target scientists, citizens and policy makers, and interact with these diverse stakeholder groups to foster responsible CS (e.g., scientific integrity, inclusiveness, ethics) and to promote engagement in and recognition of CS. The coordinators of such platforms facilitate and moderate new developments and enhance connections between national CS actors and the international community.

As CS platforms (regional, national and international) are working at the interface between diverse scientific, societal and political institutions and stakeholder groups, they have to act in transparent, comprehensible and inclusive ways. A current challenge for platform coordinators in many countries is to determine which projects to include on their online portals, as this decision is crucial for the perception and practice of CS. This requires a transparent evaluation process which promotes responsible, sustainable CS; ensuring the credibility of the platforms as well as the trust in CS in general. At the same time, the selection process should not be restrictive towards new and alternative CS movements, nor should it require substantial efforts from project or platform managers. Currently, most platforms lack clear and transparent criteria to support platform managers in their decision process; or to help CS project managers understand why their projects are rejected and what they need to do to become listed.

In an attempt to tackle this challenge, the ECSA working group "Citizen Science Networks" is developing such criteria for CS platforms in an open consultation process. In the proposed dialogue roundtable the working group members invite interested project managers, researchers and other CS stakeholders at the Engaging Citizen Science Conference to discuss the current stage of the criteria and share their needs, concerns, ideas and questions on the subject of inclusive criteria for CS portals. The discussions and outcomes will directly feed into the development process, before the final set of criteria will be presented at the ECSA conference in autumn 2022.

Topic: Ethics and Evaluation
Location: Mogens Zieler Room

Topic: Environment and Empowerment

How can low-cost sensor technologies and citizen science make air pollution visible and shape policies towards healthier cities.

Nuria Castell, Dr., NILU - Norwegian Institute for Air Research
Sonja Grossberndt, NILU

In Europe, 90% of city dwellers are exposed to pollutants at concentrations higher than the air quality levels deemed harmful to health. In the Nordic countries, air pollution causes around 4 000 premature deaths in each Denmark and Sweden and around 2000 premature deaths in each Finland and Norway every year. Still, there is a divided opinion among citizens and policy makers about the quality of outdoor air in the Nordic countries.

At this roundtable, we will present the activities and results from the NordicPATH Urban Living Lab in Kristiansand, Norway (http://nordicpath.nilu.no), where citizens are engaged in air quality monitoring by using low-cost sensors mounted in their households and on their bikes. We will discuss about the following question: "How can we increase trust in the data collected by citizensso it can serve as input for actions and policies towards improving the urban environment?".

In the example of Kristiansand, the citizens monitored high levels of fine particulate matter that exceeded the WHO recommendations for health, as well as the air quality thresholds from the European Air Quality Directive. When that happens, the authorities need to put measures in place to lower air pollution. However, those high levels where not reflected in the official data that policy makers use to create policies: the air quality reference stations and the air quality model.

To increase trust in the "unofficial" citizen collected data, NILU installed a reference instrument at one of the participant houses. The results showed a good agreement between citizen collected and reference data. Together with the municipality, citizens and private sector, we are now co-creating solutions that can lower air pollution levels.

The results of the roundtable will advance knowledge on increasing trust and uptake among researchers, authorities and policy makers, of air pollution data collected in citizen science projects.

Topic: Environment and Empowerment
Location: Preben Hornung Room

Citizen science for monitoring odour pollution: connecting citizens and policymakers

Rosa Arias, CEO & Founder, Science for Change
Carla Perucca Iantelli, Policy Strategic Oficer, Science for Change

OdourCollect is a free app for reporting odour observations, giving citizens a tool for generating valuable data to inform environmental authorities, councils and industries about the situation in real time. Through its innovative approach, OdourCollect provides new sets of data and creates valuable information complementary to traditional odour measurement techniques. OdourCollect methodology has been developed and tested in the past 3 and a half years, in the framework of H2020 project D-NOSES, in 10 pilot case studies, in 9 countries around the world. This project reversed the way in which odour pollution is commonly tackled, through a co-creative citizen science approach, demonstrating that the inclusion of citizens in odour regulation and management processes is beneficial for all stakeholders, as it promotes scientific education, improves relationships and increases confidence in public authorities. Taking OdourCollect and D-NOSES projects as examples, in this roundtable, the challenges of connecting citizen science (CS) projects, environmental agencies and policy-makers will be discussed. Institutions have their own paths and methods to track Sustainable Development Goals and monitor environmental indicators that typically follow a top-down approach. The roundtable will be started by a brief introduction of the D-NOSES project actions carried out to inform policies. This first roundtable will be discussing the connections of CS with policy-makers. Some of the questions that will be included in the first roundtable discussions are the following: a) The D-NOSES project developed a multi-level governance model to approach the different governance levels. We noticed the importance of adapting the approach depending on the context. Which is the most effective approach at local, national or European level in different scenarios and projects? What are the challenges at each level? b) We identified a need for a cost-effective technique to assess the perceived nuisance directly within the community. Citizens own the most precise and cost-effective sensor to measure odours - their own noses - and have a clear motivation for engagement: recovering their quality of life. Which are the gaps that other CS projects can fill? Can you give some examples? How to recognise citizens as producers of valid knowledge?

After a short break, the second roundtable will focus on the policymaking process, and the possible actions that can be taken towards new regulations that consider and value citizen generated data. As a result of D-NOSES we developed the “European Green Paper on Odour Pollution” and organized an event at the European Parliament. We will focus on how we can translate citizen science generated data into real actions? Moreover, odour observations have been proved as helpful data for industries and public institutions. Which aspects of CS can be valuable for environmental agencies and how can we approach them? What are the current challenges preventing the sustained CS uptake by public authorities? Which aspects of data quality are particularly important to consider when seeking alignment with environmental regulatory standards and monitoring requirements?

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Topic: Environment and Empowerment
Location: Preben Hornung Room

Empowering the citizen in citizen science

Elke Franchois, Project officer Citizen Science, Mobiel 21
Andreas Bernhart, Data & Projectmanagement, Bike Citizens Mobile Solutions GmbH

Empowering the citizen in citizen science with PING if you care!

Cycling is quick, cheap and healthy. There is always room for improvement. The PING if you care! campaign (www.pingifyoucare.eu), developed by Bike Citizens and Mobiel 21, enables people to point out problems. It gives cyclists the opportunity to communicate and engage directly with the city government to make cycling more comfortable and safer. Research has shown that safety is the main reason not to cycle.

Cyclists receive a Bluetooth button (PING button) and the Bike Citizens app. Within the app, users are asked to give some background information about themselves such as gender, age, cycling experience in the city. Users track their rides by using the app and push the PING button whenever there is something to share: flaws in the cycling infrastructure, unclear signage, a conflict with another road user, the fear of dooring... At the end of a ride, cyclist are asked to categorize their PING locations, by using a standard PING category set.

The Brussels region (2017), the city of Amsterdam (2019) and the city of Munich (2019) have set up a PING if you care! campaign as a crowdsourcing citizens engagement campaign to make their city more cycle friendly.

What if cyclists are eager to share their experience to make cycling more safe, but the city does not want to invest in co-creating a better cycling policy? How to motivate cyclists to invest in a tool as PING if you care? How to strengthen them to analyse the gathered data and formulate recommendations? How to make them motivated scientists in this citizen science tool? To have an answer on these questions, we would like to set up a dialogue roundtable.

During a roundtable discussion, we will present all tools related to a PING If you care! campaign: (1) the PING Bluetooth button (2) the Bike Citizens App (including the in-app survey on demographic info), (3) the list of PING categories to categorize a specific PING location and (4) the Analytic tool. For the first 3 tools we will show what kind of data comes out of these tools and how they can be analysed in for example the analytic tool, based on the 3 PING if you care cases. We will do so, orally supported by posters to illustrate the presentation. We expect the participants to bring their own smartphone and a tablet or a laptop to participate in this roundtable discussion.

After presenting all the tools and all the types of data that come out of these tools and how we can analyse data, we would like to discuss our questions during the roundtable discussion. These questions are mainly about how to engage and empower the cyclists in co-creating a safe cycling policy in their city, based on the citizen science project PING If you care!. We are interested in how we can encourage, motivate and support citizens to set up their own PING if you care! campaign, in order to make their own town's cycling policy safer and more pleasant. What do citizens need? What is currently missing in a PING if you care! campaign? What should be done differently? In other words, how to make the citizens in this citizen science project stronger?

Topic: Environment and Empowerment
Location: Preben Hornung Room

How to involve underserved schoolchildren in citizen science?

Jasmin Colakoglu, M.Ed., Leibniz Institute for Science and Mathematics Education Kiel

Citizen science projects can deeply engage participants and, besides collecting scientific data, present a chance to transmit various benefits to the people involved: citizen science can contribute to an increase in scientific literacy and environmental awareness as well as transmit expert knowledge about the studied subject, and help participants to become critically-thinking and engaged individuals.

Most participants in citizen science projects are well educated and have a higher socioeconomic status compared to the general public. Therefore, transferring these benefits to people with lower education, with a lower income, with less access to resources, or to people with a language barrier (this heterogeneous group will be referred to as "underserved people" henceforth) is a challenge that needs to be addressed. One potential way to reach underserved people is by implementing citizen science projects in comprehensive schools: these school environments oftentimes include schoolchildren from multiple socioeconomic backgrounds and citizen science allows schoolchildren to experience learning and actual research in a different context.

In our project, the "Plastic Pirates", we experienced that to reach underserved schoolchildren it is crucial to engage the intermediary person between the coordination team and the audience (in this case the teachers). In-depth interviews with school teachers from comprehensive schools as well as interviews with underserved schoolchildren participating in the Plastic Pirates showed that this can be done, for example, by (i) offering a project flexible in time and location, (ii) ensuring that the project addresses school curricula to relieve the pressure of teachers to find a connection between teaching requisites and the citizen science project, and (iii) offering project material that eases participation, for example by being free of cost, being available in easy language or simply containing master sheets to copy.

In this dialogue roundtable we will briefly share these experiences from the Plastic Pirates and provide a platform to exchange ideas and experiences regarding the involvement and engagement of underserved people in citizen science, with a focus on adolescents and schoolchildren. The discussion aims to identify barriers and potential solutions for participation and involvement and create a network of people working on this specific topic. A key question of the roundtable discussion will be "How to involve underserved people in research and how to convey the multiple benefits of citizen science to this heterogeneous group of people?"

Topic: Environment and Empowerment
Location: Preben Hornung Room

Topic: Citizen Science in Institutions

Open Innovation in Science Impact Labs: Co-creating sustainable futures

Dr. Dorothea BORN, Open Innovation in Science Center, Ludwig Boltzmann Gesellschaft
Mag. Patrick LEHNER, Open Innovation in Science Center, Ludwig Boltzmann Gesellschaft
Laura SOYER, MA, Open Innovation in Science Center, Ludwig Boltzmann Gesellschaft
Mag. Patricia STARK, Open Innovation in Science Center, Ludwig Boltzmann Gesellschaft

Co-creation is not rocket-science, yet it gives us the chance to addresssocietal challenges and exploring research questions from diverse perspectives and experimenting with novel and creative approaches that enable a learning environment in which different social actors interact and possibly create social innovations and scenarios for sustainable futures in different disciplinary fields.

Through our Open Innovation in Science (OIS) Impact Labs, recently implemented at three Austrian universities, we aim to support research institutions to create infrastructures and resources to involve societal actors in research and promote the use of open innovation in science. On different levels we connect the dots between civil society, art, science and technology by providing competence training as well as funding and support for transdisciplinary and cross-institutional projects. Our aim is to promote the involvement of civil society actors across different research paths and to establish an institutional research culture that encourages and trains researchers to use open innovation approaches in their respective projects.

The three OIS Impact Labs are implemented in three different research fields: sustainability and arts, technology and society, health and nursing care and are therefore confronted with different challenges regarding the involvement of different stakeholders, citizens and patients in research processes. These OIS Impact Labs support and fund key projects in these research areas, working on practical solutions with high societal relevance. Citizens, patients and practice experts play an active part in shaping the projects, often combining scientific, technological and artistic strategies.

At the Diaologue Roundtable we will share our approach and our learnings from these OIS Impact Labs and the experiences of building institutional competencies in the Austrian research landscape. After providing a very short input regarding our learnings and experiences from the OIS Impact Labs, we will offer space to engage with each other and exchange on open practices and involvement approaches across different research fields and processes.

Topic: Citizen Science in Institutions
Location: Richard Mortensen Room

Building spaces for reactive citizen science: from legal clinics, to a union, to innovative communication

Anna Berti Suman, Postdoc, MSCA Fellow, The SensJus Project, The European Commission Joint Research Centre

As principal investigator of the Marie Skłodowska-Curie Action-funded Sensing for Justice (SensJus) project, I research the potential of grassroots-driven environmental monitoring, i.e. reactive citizen science, as a source of evidence in environmental justice litigation, and as a tool for environmental mediation in extra-judicial setting. Our research addresses an urgent need for multi- and interdisciplinary research to understand emerging possibilities of the practice and to provide scientific evidence for decision-making in the EU, taking inspiration from the US where the field is more developed especially in terms of case law and legislation.

Within the project, we realized that there are grey zones of citizen science were its recognition and valorisation is more difficult than for established, larger-scale, EU-funded citizen science initiatives. We focus especially on very local, spontaneous, small-scale and low-budget initiatives that are not supported by a public agency nor linked with an academic institution, and that deploy in contexts dominated by high social distrust and conflict. We explored through fieldwork specific instances of this type of citizen science, for example in Basilicata where lay people are monitoring the impact of oil pollution on their land https://sensingforjustice.webnode.it/l/on-the-footprints-of-the-civic-sentinels/, exposing themselves to legal risks and to risks for their own health.

In the roundtable, we will pinpoint this challenge, namely the lack of recognition and of protection for these actors, and stimulate a public reflection along the following lines:

1) The need to establish spaces, which can be legal clinics at universities, museums or libraries where peer citizens, experts and students that can advise less structured and more spontaneous citizen science initiatives and assure them support in order to comply with applicable laws and regulations while carrying out their monitoring. These clinics could also provide support to avoid liabilities and health risks for participants stemming from citizen science. Lastly, they could provide support in terms of data management in the short and long term. We will take as inspiration the US CSA experience: https://citizenscience.org/get-involved/working-groups/law-policy/ask-a-legal-question/.

2) The recognition at legal or at least political level of more 'reactive' forms of citizen science such as the AnalyzeBasilicata campaign in Italy (https://covacontro.org/) that are struggling to get funding and visibility, introducing a discussion on how to support these civic sentinels through creative forms (for example a 'union' similar to labour unions for the citizen scientists).

3) The reflection on new forms of communication that bring a wider audience closer to civic monitoring, for example through drawings and story-telling, as we did under the SensJus project with this free graphic novel recounting the story of a civic sentinel facing oil contamination (available in three languages): https://sensingforjustice.webnode.it/l/fumetto/. This method of communication could facilitate a dialogue also with low literacy citizen science participants such as those encountered in Basilicata which were mainly farmers and peasants.

We will conclude with sketching through discussion a 'manifesto' to ensure that reactive environmental citizen science, which we consider a critical and disruptive response to environmental problems caused by private actors and enabled by institutional inertia, can flourish and increase its impact.

Topic: Citizen Science in Institutions
Location: Richard Mortensen Room

Citizen Science strategy: immediately caught in a paradox

Rhoda Schuling, Dr., Hanze University
Nikki Jepkema MA, Hanze University

The Hanze University for Applied Sciences (Groningen, the Netherlands) has been cautiously adopting Citizen Science as research and innovation orientation since 2019. Currently, top management of the University aims to adopt the approach more fully, as it aligns with the University's practice-oriented research framework that aims for strong (regional) impact. Especially the schools that are linked to the university's Centre of Expertise Healthy Ageing are eager to start working with Citizen Science in health innovations, as they expect this approach will be much better suited to deal with the complexity of societal health challenges today. However, having Citizen Science as a new orientation as ordered top-down is an un-citizen science way of implementing the approach in all 18 associated schools of the University, and developing understanding of and capacity for it in our own professionals. To this end, a small taskforce of which we represent two of the three members, was implemented to create a Citizen Science Support Lab.

Our focus has ranged from raising awareness (formulating a positioning statement) to agenda setting and is currently creating educational formats for capacity building. We are part of both a national and an international consortium (ECSA) for Citizen Science, and ultimately aim to function as a knowledge and expertise hub for all interested parties, both internal and external.

In this roundtable we will summarize our experiences with reorienting a practice-oriented applied science community to adapting CS in all levels from management to students. We will briefly highlight steps in this adaptation process but hope to discuss navigating pitfalls, resistance, overwhelming bureaucracy and misunderstanding of the concept.

We are curious to hear where representatives of other institutions recognize our experiences and where they do not. We aim to conclude, if possible, with better insight into rich practices for developing citizen science support systems within universities.

Topic: Citizen Science in Institutions
Location: Richard Mortensen Room

Citizen participation for Biomedicine innovation

Dusan Misevic, Director of Research Affairs, Center for Research and Interdisciplinarity (CRI), INSERM U1284, Université de Paris
Katharina Kloppenborg, Center for Research and Interdisciplinarity (CRI), INSERM U1284, Université de Paris
Bastian Greshake Tzovaras, Center for Research and Interdisciplinarity (CRI), INSERM U1284, Université de Paris

Biomedicine today is organized from the top down, which comes at a cost: openness and responsiveness. Patients' needs can go unheard within institutions whose very mission is to hear them. During the Coronavirus Disease 2019 (COVID-19) pandemic, we saw many examples of grassroots responsiveness which overcame such issues. However, many barriers still prevent bottom-up innovation adoption on a larger scale—successful examples remain the exception to the rule. The main barrier faced by community-led movements is access - specifically, access to funding, materials, mentoring ethical and biosafety oversight. In a recent opinion piece we identified several pathways to overcome these barriers, namely:

1. Offer official status: A formal legal status of citizen researcher should be created to unlock legal protections and workplace insurance. Community mentorship should be rewarded when evaluating research impacts, adding further incentives for researchers.
2. Develop microgrants targeted to grassroots groups: Funders should create specific funding routes for community projects. Importantly, the grants—which do not need to be large—should account for the fact that these projects are typically not yet organized in a fixed legal entity.
3. Explore alternative mechanisms of ethical and biosafety oversight: Open up ethical review procedures to bottom-up innovators and explore alternative models should be explored, including participant-led ethics committees and crowdsourced review in the model of open software.

During the dialogue roundtable we wish to engage the participants in discussing possible solutions and sharing their relevant experiences. The conversation will be driven by questions such as:

- Do you have experience of hosting citizen-researchers in your lab? Have you been a citizen researcher, hosted in an academic environment yourself?
- What do you see as the biggest barrier for welcoming a citizen researcher in your lab? What would help you resolve it?
- What was the most successful strategy your institution, your colleagues, or yourself used to break down barriers to citizen research?

Citizens are already reimagining biomedicine by taking an active role in urgently needed research, lifting these barriers will strengthen the impact. At our institution we will be running a Call for Citizen Researchers to join our lab and work on their projects during 2022. This roundtable will help refine the vision of how to best enable and support grassroots invitation in biomedicine, share this message and help get other communities and institutions onboard.

Topic: Citizen Science in Institutions
Location: Richard Mortensen Room

Topic: Citizen Health Science

The Dynamics of Citizen Science for Health

Gaston Remmers, Foundation My Data Our Health (Amsterdam) & University of Twente, The Netherlands
Alexandra Albert – ExCiteS, University College London
Bastian Greshake Tzovaras – Centre de Recherche Interdisiciplinaire, Paris, France
Sabine Wildevuur, Design Lab, University Twente, The Netherlands
Mic Starbuck, Chest Heart and Stroke foundation Scotland
Jef Van Laer, Citizen Science Vlaanderen, Belgium
Lea den Broeder, RIVM, The Netherlands
Martijn de Groot, RadboudREshape, The Netherlands

Health is still a relatively underrepresented domain in the field of Citizen Science. Its manifestations, however, are diverse. To identify the differences between Citizen Science for Health in relation to other domains, a workshop was hosted on the topic in September 2020 at the online ECSA conference, which lead to the establishment in December 2020 of the international Working Group on Citizen Science for Health, under the umbrella of ECSA. This Working Group is gathering in a bi-monthly rhythm. As one of its key-activities, the Group has developed a multilingual survey on opportunities and barriers of Citizen Science for Health. The survey is currently being disseminated in Europe and beyond.

The proposed Dialogue Roundtable *Dynamics of Citizen Science for Health* will start with a short generic presentation of the preliminary findings of the survey. Then, an interactive discussion with the participants will take place on the 2 or 3 most remarkable findings, to elicit comments, feedback and contextualization, and that will help to strengthen the analysis of the survey data. The choice of the discussion topics will be done in concordance with other dialogue roundtables on CS and health taking place at the same time. The ultimate aim of the dialogue is to share and generate more profound insights in the dynamics of citizen science for health, and to consolidate the network of practitioners.

Topic: Citizen Health Science
Location: M1

A framework to evaluate citizen science for health: what makes health different from other fields?

Dr. Sabine Wildevuur, Director DesignLab, Health Technology and Services Research Department, TOPFIT Citizenlab, University of Twente, Enschede (NL)
Dr. Ria Wolkorte

Evaluation is an important aspect of scientific projects. Evaluation supports reflection on the process, to formulate recommendations for improvement in future projects. Evaluation also aids in describing the outcomes and impact of a project. Structured evaluation of a project is essential to create an accurate overview of both the process and outcomes.

A framework can be used as a tool to support evaluation of projects. Several frameworks have been created for citizen science projects. To name a few, Kieslinger et al. created a framework for socio-ecological projects. This framework incorporates the evaluation of both the process and the outcomes and impact, and distinguishes between the areas of science, participants, and socio-ecology and economy. Co-Act is a project that created a framework to evaluate the impact of citizen social science projects on involved actors and their socio-cultural contexts.2 The MICS project is developing metrics and instruments to evaluate citizen science impacts on the environment and society.

An upcoming field of research in citizen science is health. Health and wellbeing are topics that affect everyone. Since people naturally gather knowledge on their own disease or wellbeing, and through experience understand well what may or may not work in their personal context, citizen science works well. However, projects in the domain of health differ from projects in other research areas. One major difference is that citizen science for health projects often include the collection of health-related data from the participants. As a result, different issues need to be taken into account in the evaluation process. For instance, in citizen science for health the object of study (the patient and his experiences) is often also the subject of study. Since health affects people personally, the immediate stakes can be quite distinct from environmental projects. Further, data safety and privacy is more important when it concerns personal (health related) data. Additionally, ethical issues are often prominent in health, where these may be different in other research areas. The type of outcome will most likely be different as well; impact is not on the environment but on your health and/or personal context. Therefore, health-related citizen science projects require an area-specific evaluation framework. However, it is not necessary to create such a framework from scratch as frameworks for other research fields may inform the creation of a framework for the evaluation of health-related citizen science projects.

In this workshop, we use the evaluation framework of Kieslinger et al. as a basis, to discuss with the audience overlaps and differences between socio-ecological citizen science projects and health-related projects. These discussions will inform the creation of a health-specific evaluation framework.

The workshop will consist of (1) an introduction of the evaluation framework for socio-ecological citizen science projects, (2) an introduction of citizen science for health and its specific elements, (3) a discussion with the audience on possible adaptations and/or additions to the socio-ecological framework to create a health-related framework for the evaluation of citizen science. The discussion can be structured using methodologies that are used in design thinking.

Topic: Citizen Health Science
Location: M1

Giving persons with dementia a voice in research about everyday life in a nursing home

Aase Marie Ottesen, Researcher, PH.D., Department of Communication and Psychology, Aalborg University

I will present results from an action research project entitled: "Meeting through song and music as an integral part of the culture and everyday life for persons with dementia in a nursing home". I have carried out the action research project in collaboration with a nursing home, whose vision was that song and music should become an integral part of the culture and everyday life at the nursing home. Against this background, the idea of the action research project was to involve residents, relatives, employees and the nursing home manager as co-researchers in dialogue-based and co-creative processes, with the following purposes:

- Investigate how song and music can become an integral part of the culture and everyday life in the nursing home
- Coming up with recommendations and ideas for the development of a culture and everyday life, where song and music are included.

The presentation will focus on how persons with dementia are giving a voice in the action research process, through use of person-attuned methods, such as songwriting, idea cafes and workshops. The action research process is unfolded and put into perspective with a focus on: "What co-creation can be, how it can take place and what it can contribute to".

With the aim of involving the participants in the dialogue roundtables as best as possible, I will set up a dialogue on the following challenges in relation to involving persons with dementia in research:

- Ethical considerations and precautions
- Involvement in a respectful and dignified manner
- Choice of person-attuned methods and consequences in relation to the research results
- Strategies and tools that can facilitate meaningful involvement of persons with dementia
- Collaboration with professionals on recruiting participants

Topic: Citizen Health Science
Location: M1

From smartphone supported Citizen Health Science to Cooperative Citizen Test Lab

Trine Rolighed Thomsen, Ålborg University
Ulrik Bak Kirk, Aarhus University
Frederik Mølgaard Thaysen, Danish Life Science Cluster
Carsten Obel, Aarhus University

The wide dissemination of smartphones provides new opportunities for Citizen Health Science, based on citizen value creation of P4 Health (Participatory, Preventive, Predictive and Personalized). In the best case this may lead to better prediction and prevention of diseases and personalised support and treatment of citizen and patient to great clinical benefit and cost reduction. However, there is at the same time a risk of 'O4 medicine' (overtesting, overdiagnosis, overtreatment, overcharging). In this workshop we contribute with our experiences from three projects that aim to bridge personal health and population health by combining 24/7 data from smartphones with other kinds of health data:

HealthD360 - Health data that creates value for the citizen
In HealthD360 we investigate the possibilities for creating better health for the citizens by gathering data from the public healthcare system and linking them with data from the citizens' smartphones and wearables. The ambition is to promote more personal, secure, and coherent treatment in collaboration with patients and healthcare professionals.
We will share experiences with developing solutions to monitor diabetic foot ulcers and to support mental health in schoolchildren.

FEMaLe – Finding Endometriosis using Machine Learning
The EU-funded FEMaLe project is working on a machine-learning multi-omics platform that can analyse omics data sets and feed the information into a personalised predictive model. The focus of the project is to improve intervention for individuals with endometriosis, a condition where tissue normally lining the uterus grows outside the uterus. A combination of tools, such as a mobile application and augmented reality surgery software, will be co-created, facilitating improved disease management and the delivery of precision medicine.
We will share experiences with co-creating a consensus study survey as well as the Lucy Application, which is your personal gynecological virtual assistant, helping to take care of your female health.

CoronaLytics: A 360 degree mobile/wearable data household approach to guide shared precision health and decision-making during the COVID-19 epidemic
In the research project CoronaLytics citizen could contribute to with personal data gathered on a smartphone. Both automatic data collection of activity and heartrate data and data bases on questionnaires was used. The project worked with the citizen perspective and focused on daily impact on everyday life during the pandemic. We will share our gained experiences in how to engage patients and citizens in the design, development, and implementation processes.

Workshop focus
Based on these experiences and those of the workshop participants, we will discuss how governance, design and analytic methods can support the development of the citizen health science concept to secure citizen value creation of P4 Health. We will discuss the idea of a cooperative governance model to secure data solidarity. And how Citizen Health Science in combination with Denmark's unique potential can secure a democratic health model, where the partnership between citizens and researchers forms a population test lab. This may be the framework for the next generation of population-based research, including development and testing of personal health solutions based on motivated consent and participation from Danish citizens.

Topic: Citizen Health Science
Location: M1

Stimulating deep co-creation in responsible crowdsourcing: the case of JoinUs4Health

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Andrea Camila Diaz Perez, Institute for Community Medicine, University Medicine Greifswald, Greifswald, Germany
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Crowdsourcing involves online, distributed problem-solving to leverage collective intelligence to address normative or societal issues. Crowdsourcing has been applied in many research contexts as a way to gather ideas and possible solutions to specific issues, mobilize mass engagement with research topics, as well as increase data collection and data analysis potential. In the JoinUs4Health project, we aim to develop a methodology for responsible crowdsourcing in the context of long-term cohort research, where crowdsourcing is used to include different perspectives in the research process as well as ensure that the research conducted is aligned with societal expectations and concerns. One key feature of responsible research is co-creation of knowledge between academic and non-academic actors, where stakeholders work together to address the proposed challenge. While Web 2.0 technologies have enabled collaboration between a large number of people, they have also highlighted the limitations of co-creative methodologies when applied to crowds. Deliberation is a key pillar of co-creation and even though crowds can be engaged very effectively in a consultative manner, fostering deliberation and therefore meaningful co-creation in such context can be challenging. Therefore, in this roundtable we aim to discuss how to foster meaningful co-creation through crowdsourcing. Specifically, we would like to explore how we can integrate lower-intensity participation, where citizen scientists are consulted and provide input through voting for example, with higher-intensity participation, where citizen scientists engage in deliberation and provide extended contributions to be used by the crowdsourcing community. We will briefly present our preliminary findings from the JoinUs4Health project and outline the challenges we have faced when developing our crowdsourcing methodology. Finally, we will invite the attendees to share their experiences with co-creation on a larger scale and the strategies they have employed to overcome the issues that they have faced using similar methodologies.

Topic: Citizen Health Science
Location: M1

Topic: Citizen Science in Cultural Heritage

Citizen Science in archaeology – uncovering the past with a cross disciplinary approach

Marie Rathcke Lillemark, Biologist, project manager, museum educator, Natural History Museum of Denmark
Luise Ørsted Brandt. Arkæolog og lektor på Globe Instituttet, Københavns Universitet. Forsker i forhistoriske proteiner fra blandt andet skind og tekstil. Ansvarlig for Next generation lab.
Sidsel Bjerregaard Kirk. Undervisnings- og udviklingsansvarlig ved skoletjenesten på Københavns Museum og på Arkæologisk værksted.
Mia Toftdal. Arkæolog og museumsinspektør på Københavns Museum. Ansvarlig for Arkæologisk værksted.
Peter Jensen. Daily manager of the Unit of Archaeological IT and DIME. Has an academic background in Prehistoric Archaeology and Informatics from Aarhus University.
Andres Dobat. Archaeologist and associate professor, Aarhus University. Works with the DIME initiative.

Faget arkæologi befinder på humaniora, men bevæger sig i et spændfelt med naturvidenskab, og benytter sig af en række fag som antropologi, historie, sociologi, geologi, biologi, fysik og kemi. Samtidig har vi i Danmark tradition for en stærk lokal involvering af frivillige i det arkæologiske arbejde både i udgravninger og på museerne.

Det arkæologiske område er derfor oplagt til nye projekter, der søger at formidle en tværfaglig, anvendelsesorienteret tilgang til vidensskabelse, og samtidig vil udnytte det enorme potentiale i de mange arkæologiske fund, der hvert år afdækkes landet over.

Gennem præsentation af tre nyere projekter, der på hver deres måde involverer frivillige med en ambitiøs videnskabelig og formidlingsmæssig dagsorden, foreslår vi at sætte fokus på citizen science i arkæologi. Alle tre projekter arbejder med en tværfaglig tilgang og vægter sparring med deltagere højt i deres udviklingsproces.

Vi ønsker at lægge op til en debat blandt deltagerne om muligheder og svagheder i brede, tværfaglige projekter. Vi håber således at kunne diskutere forskellige videnskabelige traditioners tilgang til citizen science og perspektivet for fremtidige citizen science-projekter i arkæologi og i øvrige tværfaglige sammenhænge.

Topic: Citizen Science in Cultural Heritage
Location: M1.1

Frivilligdigitalisering på Rigsarkivet: Samskabelse er værdiskabende

Katrine Tovgaard-Olsen, Teamleader, Rigsarkivet
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De sidste 30 år har frivillige fotografer, indtastere og korrekturlæsere doneret tid, kræfter og fingerspidser til digitaliseringen af Rigsarkivets samlinger. Den indsats har affødt millioner af online-tilgængelige billeder af arkivalier, og oparbejdning af store strukturerede datasæt, såsom Dansk Demografisk Databases kirkebøger og folketællinger, og Indtastningsportalens cs-projekter, fx dødsattester og fængselsstambøger.

Fællesnævneren for de cs-projekter, der har størst – om mest vedvarende – tilslutning i Rigsarkivet, er at de tilrettelægges, koordineres og søsættes i tæt samarbejde med - eller på opfordring af - projektets slutbrugere. Forskellige borgergrupper motiveres af forskellige endemål: Slægtsforskeren, der ønsker at kortlægge sine aner, finder ofte en anden mening i indtastningen af folketællinger, end forskeren, der ønsker strukturerede data til sine undersøgelser. De indtastningsprocedurer og datasæt, som Rigsarkivet designer, skal – så vidt muligt - kunne omfavne begge brugsscenarier, og CS-teamets rolle (Rigsarkivets rolle) bliver hér, at agere bindeled mellem to brugergrupper, der ikke altid er enige. Vi skal derfor kende originalmaterialets indhold, anvendelsesmuligheder og sværhedsgrad, og vi skal give os tid til faglig sparring med de frivillige, der skal skabe og bruge data, såvel som de forskere, der kunne tænkes at bruge det "færdige datasæt". Men CS-teamets facilitator-rolle stopper ikke ved projektlancering, for frivillig arbejdskraft er ikke gratis arbejdskraft. Tværtom kræver det etableringen af et "medskaber-fællesskab", konstant dialog, hyppige netværksmøder, og – til en vis grad – et personligt forhold til interessenterne, at drive et velfungerende cs-projekt.

Når denne tilgang til citizen science prioriteres, er det fordi projekternes samskabende natur tillægges en værdi i sig selv. Ambitionen er således ikke eksklusivt, at generere enorme mængder rådata (her findes andre oplagte alternativer), men også undervejs at invitere brugerne til "hands on" fordybelse i de digitale magasiner, og til at dele deres erfaringer, oplevelser og viden med andre ligesindede. I dette henseende, argumenterer vi, er samskabelse afgjort værdiskabende.

Rundbordsdialogen vil tage udgangspunkt i temaerne:

- Tilgange til samskabelse inden for citizen science
- Opbygning af fællesskab inden for citizen science-projekter

Hovedfokus vil være på Rigsarkivets arbejde med at engagere og motivere frivillige gennem "radikal brugerinddragelse", og denne tilgangs styrker og udfordringer. Crowdsourcingenhedens rolle som bindeled mellem forskellige borgergrupper og interessenter vil blive udfoldet, og vi håber på en diskussion af "værdien" af cs-projekter.

Topic: Citizen Science in Cultural Heritage
Location: M1.1

Topic: Citizen Food Science

– WHAT'S NEXT FOR FOOD CITIZEN SCIENCE –

Minna Kaljonen, Finnish Environment Institute, Environmental Policy Centre
Taru Peltola, Finnish Environment Institute, Environmental Policy Centre
Christian Reynolds, City University London
Bálint Balázs, Environmental Social Science Research Group

(Marc Barzman, INRAE, will conduct this Dialogue Roundtable)

This English-language interactive workshop provides discussion space on food citizen science. Key learnings, inspirational examples and proper methodologies are briefly presented with a view of enabling participants to engage in new collaborative projects. In the longer term, the discussions aim to establish a core group of citizen science practitioners, enthusiasts, and researchers, potentially a new working group under the auspices of ECSA.

Our everyday food practices as consumers or citizens range from food provisioning, sharing or forging, gleaning, through fermenting, brewing, or pickling to bartering, sharing, exchanging edible food. Participation in our food systems requires an everyday scientific literacy or amateur food science, which is already gaining acknowledgement in food systems transformation literature. But whereas research that engages consumers has long traditions, food studies are becoming only a recently emerging and promising thematic domain of citizen science. Academic and policy literature confirmed that citizen engagement in food system transitions is indispensable for food systems-level transformation, namely to lock out our locked-in food systems (IPES-Food 2015). Still, citizen science and public participation in scientific research are rarely used in food innovations and governance (Ryan SF et al. 2018). There has been very little focus on how citizen science could contribute to democratic, socially and economically just, and ecologically desirable food systems.

This 90-minute workshop will include interactions with participants in discussion rounds around the following questions: what topics should be covered, what are the expectations, and who would be the beneficiaries. We will map the everyday activities, key players, research themes and opportunities of food citizen science most favoured by participants, then deliberate on the possible objectives of a food citizen science working group. These could be: Identifying new research horizons (by exploring how non-scientists can play meaningful peer-reviewed roles in project development, data collection, or discovery around food system transformation); Establishing a peer learning group (by creating a community of practice promoting Food Citizen Science, develop the methods, frameworks and agendas); and Gaining more visibility for citizens in food systems research (by engaging citizens in food knowledge production or food innovation).

Location: M2

Topic: Citizen Science for Energy Transition

Citizen Science to address Energy Transition in Europe

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The Energy sector accounts for almost three quarters of global greenhouse gas emissions, with domestic emissions at around 15%. Hence the key role of citizens as 'prosumers' in the required transition toward more sustainable energy systems. From reducing energy demands by households to more sustainable transportation, the challenge for systemic change lies in individual behaviour change. Such an energy transition will require collective action through local hubs such as local and decentralised, bottom-up energy communities. They have the capacity to empower civil society and democratize the energy system. As citizen science activities, they are also part of the open science movement and thus foster a democratization of knowledge. This rationale is driving a recently launched international Innovation Action as part of the EU Green Deal programme of the European Commission: The "AURORA" project aims to explore the benefits of empowering large social communities by upgrading them to local energy communities and enabling them to act as Citizen Science hubs.

As one of five demonstration-sites across Europe, the University of Aarhus aims at encouraging more than 1,500 people to become 'Near-Zero Emission' Citizens and Energy Transition Ambassadors. The project will leverage established social structures such as university campuses, to foster actions led by citizens enabling collective and individual behavioral change. The citizens will provide data to carry out studies on how people's behavior can affect to energy transition models. Collaboratively developed roadmaps will help local authorities to make decisions on where to invest and how to foster the installation of home-made smart meters. An innovative monitoring and labelling system will be developed to support the citizens in better understanding the impact of their daily energy decisions, and in effect also measure the potential behavioral change individually and empirically.

In the interest of time (with merely 20 minutes for this session in total), the project proposes to limit linear presentations to a minimum for introducing the project approach and outlining the challenges and opportunities for citizens in Aarhus in just a few minutes. Most of the session will be facilitated as a Fish-bowl Discussion, an innovative dialogue format that is explicitly designed to give local or lay participants a voice. Participants can either come to the front individually to contribute a statement and join the discussion until the next participants wants to take their place, or (if there is some 'ice' to be broken), the moderating can start the conversation by approaching participants with a mobile microphone in order for them to make short statements.

Together with people from around Aarhus (its university community and beyond), project representatives and our local project partners would explore how Citizen Science can foster the Energy Transition. The conference session would thereby be the starting point for a three-year engagement process with Aarhus citizens and academics to collectively transform the region into a more sustainable energy landscape.

Location: M2.2

Keeping participants engaged in citizen science projects: the role of science communication strategies

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Citizen science projects can involve from just a few participants to millions of people collaborating around a common goal. Typically, participant involvement focuses on data collection, analysis, or reporting, but other types of collaboration are also possible, such as defining the research question or communicating results. However, participant retention is a constant challenge for citizen science projects.

Retaining participation offers several benefits to both projects and participants: it reduces the amount of time project managers must spend recruiting and training new participants; the level of experience achieved by participants over the long term can lead to higher quality data; long-term participation in programs that involve geographically-based observations produces longer observation records, valuable for documenting changes over time at a single site; long-term participation in a program can also lead to greater participant satisfaction. Since retention of participation is central to the success of projects, a better understanding of the specific actions that increase such retention could benefit the citizen science community.

Within the NEWSERA project (https://newsera2020.eu/) we are analysing how to improve engagement of each stakeholder from the quadruple-helix model, as well as science and data journalists, in citizen science through the implementation of co-created innovative science communication strategies. Although here we will specifically focus on citizens as the stakeholder target group. As such, we propose with this dialogue roundtable to discuss with citizen science project managers, citizen science participants, and other citizen science stakeholders, the challenges faced in maintaining long-term participant engagement. What are the main difficulties in keeping participants engaged? Which strategies can be applied to motivate project participants? Which techniques might be most effective in increasing or maintaining higher levels of engagement? How can well-defined science communication strategies play a determining role in this process?

The discussions and results of this session will contribute to the debate around the best strategies to engage and keep participants in citizen science projects and provide some clues for citizen science project managers to improve their engagement strategies.

Topic: Engagement and Communication Citizen Science
Location: Stakladen

Identifying CS stakeholder profiles and developing multi-level and sustainable engagement strategies

Dorottya Varga, Researcher, Vrije Universiteit Brussel
Diego Casado Mansilla (Universidad de Deusto)
Carolina Doran (European Citizen Science Association)

Air pollution accounts for an estimated 4.2. million deaths per year, mostly due to cardiovascular and respiratory diseases, and lung cancer. In the WHO European Region 1 alone, exposure to airborne particulate matter decreases the life expectancy of every person by an average of almost 1 year.

Socio-Bee is a Horizon 2020-funded project that aims to reduce air pollution in urban areas 3 through citizen science (CS). As a consortium of 18 partners from 6 countries, the project started in October 2021 and will run until October 2024. Through an example from nature, Socio-Bee builds on the metaphor of bee colonies to develop effective behavioural and engagement strategies with a wide range of stakeholders (i.e., queen bees, drone bees, working bees, and bears) and to co-create in hives long-lasting solutions against urban air pollution supported by emerging new technologies such as drones or wearables.

While prior literature and past CS projects offer numerous insights on how to engage citizens to participate , they often fail to provide a fine-grained analysis of the barriers and 4 motivations of different citizen groups and other stakeholders, and how they should be effectively supported throughout the project life-cycle and beyond. In Socio-Bee, we aim to contribute to current knowledge on CS engagement strategies in several ways. First, by identifying all relevant stakeholders through profiling and segmentation approaches and by understanding their barriers and motivations to participate, we will create data-driven personas considering their varying roles and involvement in the project. Second, we will develop tailor-made strategies on how to recruit, engage and support stakeholders in different project stages and for different purposes. Third, our approach will focus on the inclusion of vulnerable social groups such as minors and older adults. Finally, we will create a publically available engagement toolkit supported by digital technologies, that will be scalable and replicable in future CS projects. The SocioBee co-creation approach will be tested in three pilot projects: in Zaragoza (Spain), Ancona (Italy), and Maroussi (Greece). We are currently conducting a systematic review of past European CS projects and scientific CS literature, and developing stakeholder maps in collaboration with pilot project partners. Furthermore, we are collecting expert knowledge within the consortium to underpin the bees and bears concept and the main traits behind each of them. The next stages will include surveying citizens, conducting external expert interviews, and carrying out lab and field experiments.

With this roundtable, we aim to co-create a vision for multi-stakeholder engagement in environmental CS projects with a focus on air quality. After a brief introduction to the project, we will give the participants two questions on: 1) the barriers and motivations of different stakeholders and 2) their potential influence and interest in the project. Participants will be divided into 2 groups and asked to collectively brainstorm on different solutions for their assigned challenge. Groups will then switch questions and will continue to brainstorm based on ideas the previous group has developed. The round table will end with a guided discussion of the ideas presented by the previous exercise.

Topic: Engagement and Communication Citizen Science
Location: Stakladen

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