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Meeting needs & requirements: developing a Code of Conduct for an interdisciplinary consortium engaging with collaborative research practices in the Arctic

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ABSTRACT

Research funding frameworks and programmes, such as Horizon Europe, increasingly encourage and reward large-scale, interdisciplinary, and international projects. These initiatives place growing requirements on applicants to address complex global problems through a shared understanding and a transparent commitment to ethics, equity, gender, knowledge co-production, and citizen science. In this research note, we introduce and evaluate several participatory methods employed by an interdisciplinary research team in the development of a project specific Code of Conduct during the start-up phase of a Horizon Europe-funded and Arctic-focused project. This process served as a foundational step to align diverse academic perspectives with community-centred values, preparing the consortium for respectful collaborative research with Indigenous rights holders and local communities at a later stage of the project. By evaluating these early-stage methodologies, we examine how the development of a Code of Conduct by a consortium, early on in a project, can help to establish the shared understanding necessary for interdisciplinary and international research collaboration.

KEYWORDS

Collaboration; Code of Conduct; ethics; gender; knowledge co-production

Introduction

Leading funding programmes, like the European Union's Horizon Europe (HE), increasingly encourage and reward large-scale, interdisciplinary, and international research projects in the Arctic. They also place growing requirements on applicants to solve complex problems in collaboration with Arctic communities.[1] As a result, there is growing awareness on how to design and conduct research that is relevant to both scientists and Arctic communities; especially when it comes to working with Indigenous peoples against

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[1]Plummer et al., "Transdisciplinary Partnerships for Sustainability," 955; Norström et al., "Principles for Knowledge Co-Production," 182–183; Moore and Hauser, "Marine Mammal Ecology and Health"; Latola et al., "White paper," 5; and Baer et al., "Tell Us How to Engage You!," 245.

Europe's current and historical colonial background.[2] The co-production of knowledge is central as it considers more than one way of knowing; including scientific, non-academic, and Indigenous Knowledge systems. This approach lays the groundwork to collaboratively identify culturally appropriate, as well as socio-economically and ecologically sustainable solutions to critical Arctic issues, including climate change and pollution.[3]

In interdisciplinary research, 'researchers work jointly to integrate disciplinary perspectives and to address a common problem while remaining anchored in their home disciplines'.[4] Interdisciplinarity also provides the possibility for individuals to exchange their 'views of the world, their non-academic beliefs, and personal endeavours'.[5] This approach is integral for the ICEBERG project, as the consortium brings together knowledge, methods and perspectives from multiple academic disciplines which, at a later stage in the project, will expand to collaborate with non-academic actors.

This research note focuses on the early phase of the project, when ICEBERG's interdisciplinary team prepared for the collaborative research approaches that have followed. We use 'collaboration' as an umbrella term to describe the diversity of research engagements related to working together with non-academic actors; this includes concepts and approaches like co-creation, co-production, co-design, public engagement, participatory research, and community-led research.[6] We also acknowledge that these concepts overlap and differ in their level and length of collaboration. Our goal is not to streamline them, but rather to acknowledge the complexity of working collaboratively, and making this reality visible when preparing the consortium for their work at a later stage of the project. What these concepts *do* have in common, is the importance of paying attention to relationships with non-academic partners, which is always conditional.[7] Carrying out this work has its complexities and challenges, as 'researchers' are not a monolithic entity, just as there is not one 'community' or non-academic counterpart. Given the vastly diverse cultural backgrounds and areas of expertise among researchers in these large-scale projects, we argue that it is critical to develop a common baseline – a Code of Conduct – that can align and integrate this diversity of perspectives and approaches, as well as function as the corner stone for dialogue between science and society at a later point in a project.

We suggest that projects allocate ample time and resources to examine their research team and research context; including questions related to background (e.g. nationality, discipline, institution, etc.), expectations and/or requirements (e.g. specific to discipline, institution, field site, country), as well as researcher's preferences related to conduct, consensus-building, and self-assessment. Contextually, this entails an in-depth understanding of the history of the field site and its peoples. While there is no 'one-size-fits-all' approach to developing a Code of Conduct, we propose a variety of methods that can simultaneously support a consortium in its efforts to meet standardised requirements of

[2]Yua et al., "Framework for co-production of knowledge," 1; Herrmann et al., *Comprehensive Policy Brief to the EU Commission*; and Doering et al., "Improving the Relationships between Indigenous Rights Holders."
[3]Plummer et al., "Transdisciplinary Partnerships for Sustainability," 955; and Norström et al., 'Principles for Knowledge Co-Production," 182–183.
[4]Norris, "Managing the wicked problem of transdisciplinary team formation," 16.
[5]vanessalevesque, "Inter- and Transdisciplinary Approaches."
[6]Criado and Estalella, *Experimental Collaborations;* and Vorberg et al., A Systematic Review of Co-Creation and Co-Production
[7]Jones and Jenkins, *Rethinking Collaboration.*

funders (regarding ethics, equity, knowledge co-production, and citizen science, for example) while accounting for the unique needs of each consortium.

Ethical considerations are fundamental, and HE projects are required to make ethics relevant in all research stages, building on research integrity standards outlined in the European Code of Conduct for Research Integrity.[8] Recent guidelines on Arctic research further underline ethical justifications for working with Arctic communities, especially Indigenous peoples, by focusing on questions that are salient to them, on their terms and specific rights.[9]

The issue of gender equality is also of growing importance. HE has made the integration of a gender dimension a default requirement for its research program; both as a means of enhancing gender equality and as a way of improving the relevance of research to society. Beyond gender, projects are encouraged to foster an inclusive research environment that ensures equitable participation and addresses biases within research design and project implementation. In its pursuit of a 'Union of Equality', the European Commission has, for instance, committed to addressing intersectional forms of discrimination and inequality across all policies. It also encourages diversity in research teams and stakeholder engagement.

In line with these goals, the direct participation of citizens in scientific processes is encouraged to bridge the gap between science and society, and to promote societal uptake of proposed solutions. The funding programme's commitment to Open Science further aligns with a more inclusive approach by breaking down traditional barriers between researchers and the community, both in terms of demystifying the scientific process and the transparency of research results. Despite a project's best intentions, initial commitments can run into challenges when translating these more inclusive approaches into practice, hence it is crucial for projects to have a dedicated team that can identify methods to address related needs and requirements.

This research note introduces and evaluates methods used to develop a Code of Conduct for the ICEBERG project. This process – focusing on knowledge co-production, ethics, equity, and citizen science – occurred over the first six months of the project and included a virtual internal project workshop. We begin with the project's aims and the need to address these issues, and outline the project's organisational structure and methods used, including surveys, workshops, literature reviews, and mapping exercises. Then, we highlight the results of these methods, providing specific recommendations and examples, and conclude with a discussion of our key findings, challenges, and the Code of Conduct's ongoing application.

Setting the stage: the ICEBERG project

The ICEBERG project has a two-fold aim: to comprehensively assess the sources, types, and impacts of pollution, in combination with chronic climate-induced stressors on ecosystems and communities in three field sites in the European Arctic: western

[8]Nordling, "Europe's Biggest Research Fund Cracks Down"; ALLEA, *European Code of Conduct*.

[9]Holm et al., "Praxis for Ethical Research"; Latola et al., "White Paper"; Herrmann et al., *Comprehensive Policy Brief to the EU Commission*; Doering et al., "Improving the Relationships between Indigenous Rights Holders and Researchers in the Arctic"; Yua et al., "Framework for Co-Production of Knowledge"; and Inuit Circumpolar Council, *Ethical and Equitable Engagement Synthesis Report*.

Svalbard, southern Kalaallit Nunaat/Greenland, and northern Iceland. Together with the latter two communities, this project seeks to develop strategies to enhance community-led resilience and pollution-control governance, taking a One Health[10] approach to improve human, animal, and ecosystem health.

In terms of composition, the project consortium includes 16 diverse partner institutions, including academic institutions, small enterprises, and non-governmental organisations, and integrates a multitude of methods from the human, legal and social sciences, and citizen science together with the natural and life sciences.

The project is structured into six teams, some of which are focused purely on the natural or social sciences, and one that is mixed; notably, some researchers are members of multiple teams. One team takes a natural science approach to study the source, distribution and impacts of two types of pollutants in the European Arctic. Meanwhile, another team – consisting of natural and social scientists – employs quantitative methods, as well as qualitative methods like focus groups, and citizen science to assess pollution- and climate change-induced changes observed by local communities and Indigenous communities. A third team translates the findings of the first two to develop recommendations to improve science-based pollution-control governance within EU Arctic policy, funding institutions, and international bodies like the Arctic Council.

Within this structure, ours is the fourth team – consisting of six researchers from five partner institutions – and has the task of developing an overarching framework that brings together all other groups to harmonise the project's research methodologies, and to reflect on the consortium's composition. The complexity of the project's setup needs to be taken into consideration, and a balance needs to be found between acknowledging the existence of these different approaches while also achieving common ground both within and across disciplines. These objectives require the consortium to broaden its definition and understanding of co-creation, knowledge co-production, ethical research, citizen science, data management, and the integration of a gender lens. The fifth and six team cover overall communication and coordination of the project.

As outlined in the ICEBERG project proposal, one of its goals is to build a cohesive team through reflexivity in an iterative exchange between different researchers and collaborating communities over the course of the project, supporting the consortium in its aim to address emerging changes in the Arctic, while also meeting the requirements of the funding body.

Developing a Code of Conduct: materials & methods

As a common endeavour between different actors, research includes direct and indirect collaborations. To realise the research integrity of this process within ICEBERG, the project developed a living Code of Conduct. Generally, a Code of Conduct is an adopted statement that sets guidelines regarding the norms, rules and responsibilities of a particular organisation or project. Although there are existing global and regional frameworks for scientific collaboration and the inclusion of historically marginalised groups, such as the European Code of Conduct for Research Integrity, it can also be

[10]"One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems." World Health Organization, *One Health*

constructive for consortia to reflect on research integrity within the context of their own project.[11]

Large-scale, international, and interdisciplinary projects, like ICEBERG, include vastly different institutional partners and researchers – in terms of their nationality, disciplines, regional focus, and fieldwork experience – who bring their diverse areas of expertise, as well as varied perspectives and expectations on how research and collaboration should occur. In such cases, it is critical to develop a common baseline for research conduct. It is also a unique opportunity to proactively contribute to a more inclusive polar research community that is enriched by a diversity of individuals, ideas, and approaches while addressing overlapping and interconnected barriers to equality.[12] At the same time, the process of developing a code of conduct can be challenging when it comes to reconciling multiple, and sometimes conflicting values.[13] There is often an ambiguity of responsibility due to unclear boundaries between various existing commitments to field-specific, institutional, and national codes.[14]

With this in mind, the ICEBERG Code of Conduct was designed as a living document to serve as a baseline for the consortium to enhance and adapt the quality of its work throughout the project. The first iteration was co-developed within six months following an online internal project workshop held four months into the project. Interactive points of engagement to re-evaluate the Code of Conduct and assess whether the consortium is meeting its aspirations, will take place at the project's annual general assembly meetings.

In the following sections, we introduce and reflect on the methods used as part of this workshop and to develop the Code of Conduct. These methods were selected to better understand team composition and dynamics, improve team readiness and trust,[15] map potential responsibility ambiguity, and gather guidance on how to engage with collaborative research practices in the Arctic. The sections are structured to match the project's work on 'Co-Creation, Ethics, Diversity, Equity, and Inclusion'.

Understanding the research consortium

A tailored code of conduct requires a greater understanding of a consortium's composition and needs. We collected this information for ICEBERG through a voluntary, 10-question survey developed with the project leads. The survey covered participants' nationality, gender, institutional affiliation, education, professional role, research stage, and scientific background. It also asked about measures that ICEBERG could implement to further support the consortium's gender inclusivity, and whether this was the respondent's first Arctic and/or interdisciplinary project. Additionally, it inquired as to whether participants noticed barriers to working in these areas within the project thus far and

[11] ALLEA – All European Academies, *The European Code of Conduct for Research Integrity*. See also, TRUST Consortium, *The TRUST Code*.
[12] Seag et al., "Intersectionality and International Polar Research."
[13] Peels et al., "Value pluralism in research integrity."
[14] Schroeder et al. *Equitable research partnerships: a global code of conduct to counter ethics dumping*, 47.
[15] Morgan et al. "Developing and evaluating a team development intervention to support interdisciplinary teams."

asked them to share challenges that they may have faced in similar projects from which we could learn.

Participants were given one week to complete the 10-minute survey. They were informed that the collected data would be anonymised and disaggregated to protect individual privacy.

Ethics, equity & engagement

During the first five months of the ICEBERG project, our research team developed the first draft of a framework to co-evaluate ethics, and engagement protocols to ensure the consortium's on-going reflection with ethics over the project's duration.[16] The interest lies in how researchers apply ethics and engagement protocols in Arctic research, specifically within large EU-funded projects like ICEBERG. The term 'ethics' is understood as an umbrella term to engage with what the Cambridge dictionary defines as 'a set of beliefs about what is morally right or wrong',[17] or in Willie Ermine's words 'the capacity to know what harms or enhances the well-being of sentient creatures'.[18] The aim of an ongoing ethics evaluation framework is to move away from self-evaluation at the beginning of a project, towards an ongoing discussion and reflection among all project participants, including scientists, as well as Indigenous and local community members.[19] It is crucial to consider each individual's background, history, and responsibilities, especially in the context of Arctic research conducted by European groups, largely composed of organisations from outside the region of study.

Central to the ethics evaluation framework are a variety of 'points of co-evaluation'; spaces of engagement for different actors to come together and reflect on the ethical dimension of their work (Figure 1). Some of these spaces already exist as a part of the project's structure, like its Annual General Assemblies and fieldwork activities; others like shared reading groups or regular check-ins – with researchers who are interested in further exploring ethical aspects of their work – are initiated additionally.[20] Throughout the project, the ethics evaluation framework will be further refined and adapted based on the feedback gathered during these 'points of co-evaluation'.

In the following sections, we highlight two methods employed to elicit insights on how ICEBERG consortium members engage with ethics on a reactive, analytical, and future-oriented level, and to assess which ethical guidelines they are familiar with.

Exploring individual perspectives through postcard-writing

The ICEBERG kick-off meeting served as the first space where consortium members could reflect on the ethical dimension of their work. The chosen form of engagement was an individual writing task on physical postcards (Figure 2), designed for the event. Writing functioned as an elicitation method with the

[16]European Commission, *Horizon Europe Programme Guide*.
[17]Cambridge Dictionary, "Ethics."
[18]Willie Ermine, "The Ethical Space of Engagement."
[19]Holm et al., "Praxis for Ethical Research."
[20]Ervin and Gannon, "Stories Read and Told"; and Grenier et al., "Advancing Book Clubs."

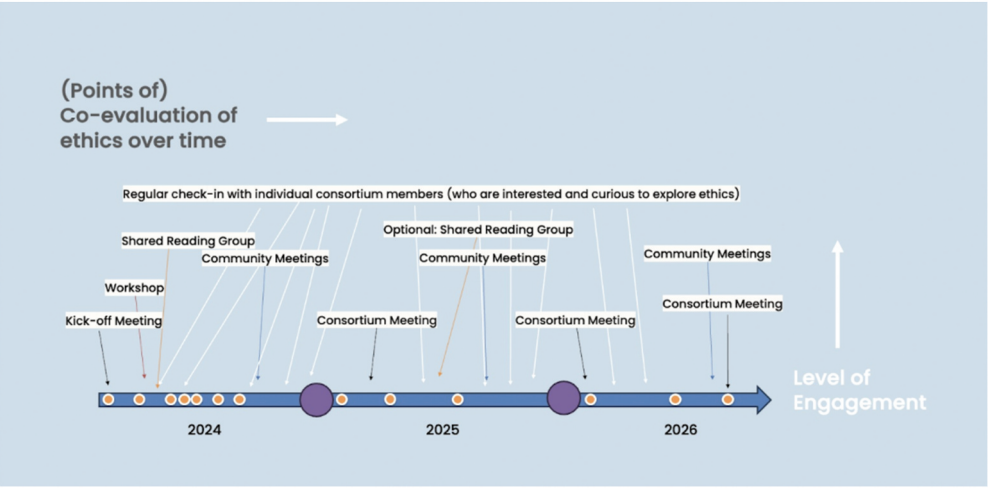

Figure 1. Draft of ethics evaluation Framework shared during internal project workshop.

Figure 2. A5 postcards for exploring individual perspectives on research ethics.

postcard format inviting participants to address an imagined recipient. Unlike a survey, the postcards were chosen as a playful way to ask participants to write from a specific situated place (the kick-off meeting), moment in time (the start of the project), and to both an imagined audience and their future self.[21]

[21] Jensen and Chahine, "It's a Bit like Saying: I Don't See Colour"; Jolly and Stanley, "Letters as/Not a Genre"; and Jolly, "What I Never Wanted to Tell You."

The front of the postcard displayed a dictionary definition of 'ethics' and 'ethical', framed by general project information. The three questions on the back of the postcards were designed to understand participants' reactive views on ethics. The first question explored their immediate, top-of-mind responses to the term.[22] The second asked about the relevance of ethics in their work and their personal experiences in praxis. The third question went beyond existing knowledge to investigate what they would like to learn.[23]

Consortium members were invited to fill out these postcards during the first day of the event with the postcards later exhibited on a wall in the main meeting room of the kick-off meeting for attendees to engage with each other's contributions.

Surveying for methods, existing ethical & equity-related guidelines

Several of us collaborated on and distributed a survey to all ICEBERG partner institutions on their approaches to co-creative methods, ethics, and equity-related issues. The overarching goal was three-fold: (1) to better understand and map the various methods and dense web of documents (e.g. guidelines, protocols) that consortium members work with; (2) for individuals in the project to (re) familiarise themselves with the documents to which they have committed themselves to; and (3) to collate this knowledge and make it accessible to all consortium members in the form of an online repository.

The methods section of the survey mapped the variety of collaborative approaches planned in ICEBERG. Meanwhile, the ethics section invited partners to list all relevant guidelines, principles, codes of conducts, toolkits and policies that tie into the ethical considerations of their work, differentiating between six different levels of application:

(1) within one's own organisation or institution;
(2) the country of the respondent's organisation or institution;
(3) the country of the specific field site where partners will be working;
(4) on a European and international level;
(5) in the specific disciplines that people work in;
(6) in relation to specific (Indigenous or local) groups that partners are working with or whose lands they will be working on.

Similarly, the survey asked partners to list the different document types that they work with in relation to gender, diversity, equity, and inclusion (DEI). This exercise is unique as projects often do not assess their collective approach to these issues, especially before fieldwork.

Identifying methods for collaborative research

Beyond understanding our interdisciplinary consortium, we recognise that assessing Arctic marine pollution requires collaboration with Indigenous and non-Indigenous coastal communities. Calls for a more just and reflective approach to Arctic research have grown in the European research community, especially regarding the rights of

[22]Steneck, "Fostering Integrity in Research"; Desmond and Dierickx, 'Research Integrity Codes of Conduct."
[23]Sultana, "Reflexivity, Positionality, and Participatory Ethics"; and Sehlikoglu, "Ethics without the Ethics."

Indigenous communities.[24] Therefore, our team identified key concepts, literature, and methods through a literature review on collaborative research approaches, in order to provide guidance and recommendations for ICEBERG's interdisciplinary team. Furthermore, we employed two specific methods (below): the Flow of Information Timeline (FIT) and a Stakeholder Mapping. These methods were chosen for their ability to help the consortium share perspectives, raise awareness, and align views.

Literature review on collaborative research approaches

A thorough literature review is necessary to cut through the complexity of various concepts related to collaborative research approaches and support the project's interdisciplinary research team by clarifying different understandings of similar terminologies. In ICEBERG, a variety of concepts (e.g. 'co-creation', 'co-production', and 'co-design') are used interchangeably by different project partners to describe their planned collaborative research engagements.[25] Adjacent concepts with different nuances include 'public engagement', 'participatory', or 'community-led' research.[26] Ellam Yua et al, for instance, define knowledge co-production with Arctic Indigenous peoples as 'a process that brings together Indigenous Peoples' knowledge systems and science to generate new knowledge and understandings of the world that would likely not be achieved through the application of only one knowledge system'.[27] Moreover, equity in co-production means ensuring 'that space is fairly provided for all knowledge systems and knowledge holders'.[28] Depending on prior experiences and current work carried out in ICEBERG, consortium partners might have different understandings of what collaboration means in theory and in praxis. An overview can make these differences visible and create awareness among consortium partners, especially when collaborating across disciplines.

Flow of information timeline (FIT)

FIT is a visual method for interdisciplinary and transdisciplinary research teams to co-produce knowledge. It helps build a shared understanding of the temporal and functional dimensions of diverse project activities, as well as facilitates science communication across different knowledge systems and between representatives of different scientific disciplines and/or professions and knowledge systems. These visuals can illustrate activities that follow an annual, seasonal pattern and as a timeline of continuous, evolving processes.[29]

In ICEBERG, the FIT method was used to bring together different ways of knowing and planning on an interdisciplinary level, and to catalyse collaboration within our newly established consortium that would soon begin the project's collaborative engagement phase with non-academic actors. It was conducted using a virtual whiteboard during the internal project workshop and during additional online workshops with various sub-teams. Specifically, the FIT method used a timeline to visualise the project's three-year

[24]Herrmann et al., *Comprehensive Policy Brief*; Doering et al., "Improving Relationships"; and Latola et al., "White Paper."
[25]Ibid., 310; Chambers et al., "Six Modes of Co-Production for Sustainability," 84.
[26]Nguyen et al., "Trends and Patterns."
[27]Yua et al., "Framework for Co-Production," art. 34.
[28]Ibid.
[29]Mettiäinen et al., "Co-Designing the SnowApp Climate Service," 26–27.

research process. The whiteboard included a separate box for each case study site, each with a three-year, month-by-month timeline. For clarity, each project team was assigned a designated sticky note colour for sharing their planned tasks, while connecting arrows were used to highlight how data from one activity would feed into another. The guiding questions included: What type of data would you like other project teams travelling to the field sites to collect for you? What kind of information will your team share with others to enable their work? How are your fieldwork schedules aligned?

This co-creative method was employed to build awareness of how the teams' work and task timing (e.g. fieldwork) are interconnected and to help avoid community research fatigue.

Stakeholder mapping

A critical step prior to knowledge co-production includes the identification of stakeholders and their level of engagement.[30] The European network EU-PolarNet, for example, defines stakeholders as 'those who are potentially affected by, concerned about, interested in, important to, or end-users of polar research outcomes. Stakeholders include a wide variety of public and private sectors including policy, business, governmental and non-governmental organisations (NGOs) and the wider society, including local and Indigenous peoples (right holders)'.[31] The 'stakeholder mapping' exercise that we employ is primarily meant to help the ICEBERG team identify key actors to: collaborate with in case study sites; better understand relationships between these actors and the potential drivers for, and obstacles to, their engagement; and foster local co-production. The exercise may also help to coordinate stakeholder interactions between research team members, to avoid fatigue, and define effective engagement strategies with communities. Additionally, 'backup' stakeholders can be identified through the mapping should primary stakeholders be unwilling to participate, discontinue their involvement during the project (attrition), or have intermittent availability. The exercise produces a dynamic map where stakeholder engagement can be closely monitored and adjusted throughout the project's lifetime, which is essential to identifying missing actors.

At the beginning of the project, a preliminary map of stakeholders in each of the three project's field sites was developed with consortium members through an interactive online activity, using a digital whiteboard, where partners were asked to identify:

(1) Relevant stakeholders, indicating why they should be involved in the co-production process, including stakeholders that project partners were already in contact with and others who should be involved in the future;
(2) Primary stakeholders, (high expected participation) in knowledge co-production; and
(3) Drivers for, and barriers to, stakeholder engagement.

[30]Latola et al., "White Paper," 6–7.
[31]Ibid., 5; EU-PolarNet, "Integrated European Polar Research Programme," 7. We use 'stakeholder' as an umbrella term for actors outside the scientific community. However, this the term does not fully capture relations with Indigenous peoples, being "rights holders," whose rights must be taken into close consideration. Inuit Circumpolar Council, "Policy Paper."

Drawing on this input, stakeholders were categorised based on their expected participation level in the project. Following the framework for knowledge co-production defined by Bojovic and colleagues,[32] three categories were used: low level or 'engaged' stakeholders, medium level or 'involved' stakeholders and high level or 'empowered' stakeholders. Building on this framework, Baulenas et al. illustrate a map by placing stakeholders in different concentric squares, where key ones, with a higher level of participation in co-production, are placed at the centre (Figure 3).[33] The stakeholder mapping is expected to be a living document that partners will revisit and reflect on during the project's lifetime.

Citizen science

Within the first six months, ICEBERG started developing a citizen science framework and identified a community-based environmental monitoring (CBEM) programme that contributes to strategies to enhance community-led resilience.

Citizen science is defined as the participation of people in scientific processes who are not institutionally linked to that field of science.[34] It is relevant for collaborative research, as it engages communities in jointly generating actionable knowledge and creating a shared understanding of complex environmental and social issues. The social benefits of citizen science range in influence scale, from increasing participant's awareness to contributing to policies and national reports.[35] In terms of its scientific benefits, citizen science can expand observation networks and databases in scope and availability, both in spatial and temporal coverage. Citizen science is often associated with monitoring (e.g. taking and uploading pictures of marine pollution) or data collection (e.g. marine litter audits) and is sometimes referred to as 'crowdsourcing'. However, a spectrum of engagement is possible and participation can range from short-term data collection to the more intensive use of time to research the topic with other scientists or volunteers.[30] Thus, the central idea behind citizen science is citizen participation: the participation of the general public, which can (to varying degrees) involve the proposal, design, collection, management, analysis, and dissemination of research.

ICEBERG aims to create a CBEM platform that is co-developed with citizens. Thus, prior to the internal project workshop, one of the primary tasks was to choose and test a suitable platform for CBEM that goes beyond data collection and monitoring to further involve citizens in other areas of research; including in development, analysis, outputs, and decision-making.[36] For this, ICEBERG selected the open-source and free interactive mapping platform uMap (OpenStreetMap-based; https://umap.openstreetmap.fr/en/). Through this accessible CBEM programme community members can submit geotagged information and media to the platform, which can then visualise and communicate observed changes and impacts due to pollution. As such, the platform is meant to harness collective community insights and create a map that genuinely reflects community

[32]Bojovic et al., "Engagement, Involvement, and Empowerment," 2–4.
[33]Baulenas et al., "User Selection and Engagement," 388.
[34]The Commonwealth, "Case Study: Litter Intelligence Programme," Results, accomplishments and outcomes para. 4.
[35]Haklay, "Citizen Science and Volunteered Geographic Information," 105–106.
[36]Mercer et al., "Towards More Inclusive and Solution-Oriented Community-Based Environmental Monitoring," 9.

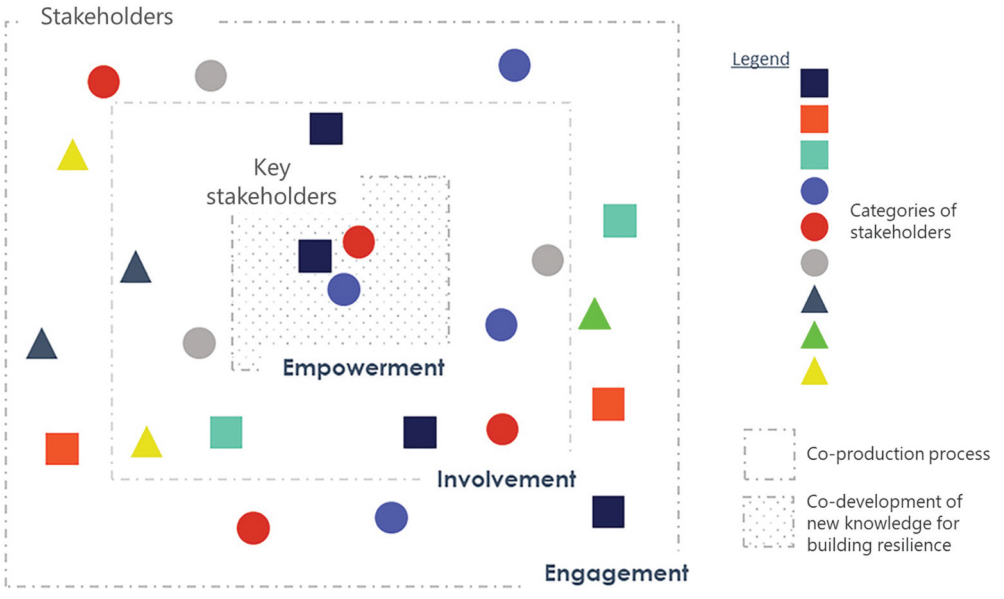

Figure 3. Visual mapping of ICEBERG stakeholders, categorised by level of participation in the co-production process. Shapes and colours represent different stakeholder types (e.g. Indigenous communities, industries, governments, environmental organisations). Adapted from Baulenas et al. 2023.

concerns and needs. Community consultation meetings in case study sites are crucial to gaining community feedback and co-creating the CBEM platform.

Empathy mapping

Empathy mapping is rooted in design thinking, where designers of a product or service must account for the perspective of their potential users.[37] Applying this methodology to community science provides deeper insights into the needs of a community, as opposed to thinking solely from a researcher's point of view. Each empathy map (Figure 4) sets an imaginary context for a persona (negative and positive environmental trends), their fears and hopes navigating this context, and finally how the project (citizen engagement activities) can present opportunities and headaches for them. Through this exercise, researchers put themselves in the mindset of these community members to better understand how it might feel for them if researchers come into the community and initiate citizen science activities.

Internal project workshop

A virtual, consortium-wide internal project workshop was held four months into the project to co-develop the Code of Conduct. Early on, our research team decided that this interactive event would focus on four key issue areas: ethics, equity, knowledge co-production, and citizen science. The structure and content of the workshop were informed by the above-mentioned preliminary research and activities conducted by

[37]Krueger, "Two Methods for Experience Design," 11.

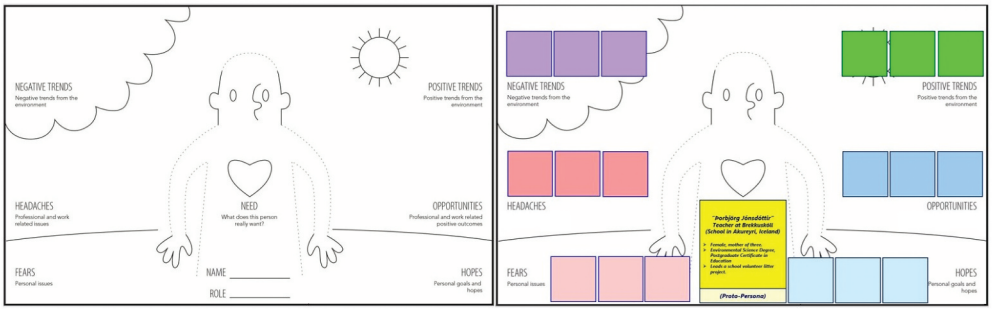

Figure 4. Blank empathy map template and a proto-persona used at internal workshop. Five proto-personas represented potential citizen users across four case study sites.

our team members with different groups during the first four months of the project. The event's aim was to:

(1) Present key concepts and preliminary findings related to ethics, equity, knowledge co-production, and citizen science issues; and
(2) Generate new insights through additional interactive polls, surveys, visual methods, and mapping exercises.

The workshop started with a review of our process for developing ICEBERG's Code of Conduct. Our research team also presented a draft of the ethics evaluation framework, provided an overview of partner's perspectives on the ethical dimension of their research (contributed via the postcard-writing exercise), and shared key results from the consortium-wide ethics, equity, and methods survey. We used the workshop to rank a chosen set of interests shared on the postcards and to survey participants on their use and comfort with the submitted ethical guidelines and protocols. Our research team also employed the virtual FIT and Stakeholder Mapping whiteboards to help project partners collaboratively refine the project's research process.

Lastly, since an iteration of the CBEM platform needed to be completed prior to community consultations, empathy mapping was conducted over the course of the internal project workshop as a co-creation exercise for ICEBERG consortium members to reflect on citizen participation activities. During the workshop, 29 consortium members were divided into break-out groups – selected to include project members from diverse teams, tasks, research backgrounds, genders, etc. — to complete their respective empathy map based on their assigned proto-persona (Figure 4). The workshop also provided an opportunity for team members to gather feedback regarding the CBEM prior to its introduction to communities.

Results

In the following section, we share the results of the above methods.

Understanding the research team: results

The results of the consortium composition survey build on a response rate of 61.5% (42 respondents). Although the participation rate was lower than anticipated, it must be adjusted for members who have chosen not to participate or were travelling (at conferences or for fieldwork); as such, the data is not fully representative of the consortium.

Still, the collected data paints a rich picture of the consortium's diversity. Its 16 partners represent nine nationalities and include a variety of institutions: e.g. universities, research institutes, small enterprises, and non-governmental organisations. Notably, when asked about ways to improve gender inclusivity, participants expressed a desire for the project to aim for a balance between men and women during community consultations.

In response to our inquiry about past experiences and challenges in Arctic or interdisciplinary projects, consortium members shared two notable experiences. One respondent, a woman in the natural sciences, felt unsupported at the beginning of her career but now feels more comfortable and supported due to the ICEBERG project's more balanced gender demographics. Another participant expressed a desire for more guidance on protocols for working with Indigenous communities prior to fieldwork.

Ethics, equity & engagement: results

Exploring individual perspectives through postcard-writing

The postcard exercise elicited a variety of perspectives from consortium members about their understanding of 'ethics' and the connections they draw to the concept. Answers ranged from short replies, like 'respect', 'equity', or 'fairness, mutual benefit', to more lengthy responses, such as 'A guidance to find the (right) way, taking into account possibilities and limitations' or 'Not being harmful to others and our environment'.[38]

Most of the answers touched on how researchers engage with others and their surroundings, with 'ethics' as a helpful indicator to shape and define the fabric of these relationships. Participants' ethical concerns varied widely. Some considered how their work might affect communities, even if their engagement was indirect, such as through policy research. Conversely, others felt ethics were irrelevant to their type of work (e.g. like document analysis) because it lacks a social component.

Based on participants' diverse responses, we identified several themes for further engagement with ethics:

(1) best practice examples from other projects that touch on challenges related to ethics and how people managed to address them;
(2) ethics in the context of natural science research, and how to apply an ethical lens to relations between humans and non-humans/more-than humans in 'not-so-obvious' fields, such as marine management;
(3) the connection between plastic pollution, the ethical dimension of the data that is being generated;
(4) how to make ethics relevant in all phases of research; and
(5) learning more about 'parachute science'.

[38]From transcript of postcard contribution.

The varied responses to the three postcard questions provided a first glimpse into each individual's relationship with, and their experience of, ethics.

Surveying for methods, existing ethical & equity-related guidelines

In response to the survey of ICEBERG partners' approaches to methods, ethics, and equity-related concerns, 66 of the suggested documents related to ethics. These references also fed into the development of 13 recommendations for collaborative research approaches in ICEBERG, broadening the literature review described above. Of the 66 documents, four documents were mentioned by more than three partner organisations: 1) The European Code of Conduct for Research Integrity was mentioned by eight members; 2) the German Code of Conduct: Guidelines for Safeguarding Good Research Practice was mentioned five times; and 3) the EU-PolarNet white paper on stakeholder engagement were mentioned by four partners.

The German Code of Conduct was likely noted due to the high number of German research institutions in the consortium, while the other three guidelines are connected to national, regional, and international principles, as well as local field site requirements. The frequent mention of European frameworks and guidelines makes the consortium's European fabric tangible, as most partner institutions are based in Europe and therefore rely on its transnational governance institutions and bodies for guidance on research integrity.

Meanwhile, project partners shared 61 documents relevant to gender and DEI. The most-cited document – and the only document cited by more than two partners, from different jurisdictions and disciplines – is the EU Gender Equality Strategy 2020–25, which takes a dual approach, focusing on: 1) key actions to achieve gender equality and 2) enhance the integration of a gender perspective in all EU policies and major initiatives. Meanwhile, many of the other listed documents overlapped with those shared in the ethics section. Overall, the documents took 15 different formats: including academic articles, certifications, codes of conduct, national laws, and strategies. While some documents are legally-binding, others are not.

All the sources related to ethics, gender, and DEI, as well as shared collaborative methods, were collated into respective spreadsheets documenting the name, contributing institution, type of document (guideline, policy, etc.), level (international, etc.), publishing body, country of concern, hyperlink, and the number of times the document was mentioned. These documents are accessible to all partners during the project.

Questions at the internal project workshop on the accessibility and usability of these documents elicited complex and varied responses from participants; for instance, many participants easily found ethical guidelines but struggled to adapt them to their everyday work and did not feel very confident in how to translate them into practice. The same is true for equity-related documents.

Identifying methods for collaborative research: results

Literature review on collaborative research approaches

We developed 13 recommendations for collaborative research approaches for ICEBERG's interdisciplinary research team by drawing on existing literature, protocols,

and methodological guidelines for community-based research, including with Indigenous peoples.[39] We also incorporated insights from our work leading up to and during the internal project workshop, addressing questions put forward by consortium members on co-production with our case study communities. These recommendations include the following (outlined in greater detail in Table 1):

(1) Co-define the level of involvement of different groups in the project.[40]
(2) Include Indigenous and practitioners' knowledge equitably.[41]
(3) Ensure mutually beneficial co-production outcomes.[42]
(4) Give all participants the opportunity to review co-production outcomes.[43]
(5) Be aware of potential conflicts and power dynamics when setting up a diverse group of stakeholders. [44]
(6) Establish mechanisms to compensate stakeholders.[45]
(7) Agree on information access, control, and the required degree of confidentiality together with all participants.[46]
(8) Ensure the proper attribution of the ownership of results.[47]
(9) Take into consideration Free, Prior, and Informed Consent (FPIC).[48]
(10) Adhere to ethical guidelines among partners participating in co-production.[49]
(11) Aim for early engagement, trust building, and long-term collaboration with case study communities.[50]
(12) Avoid causing research fatigue through respecting stakeholders' time and schedules.[51]
(13) Provide community members with the chance to participate in their own language.[52]

This set of recommendations guided the development of the Code of Conduct, which was ultimately broken down into four themes: fairness, care, respect, and honesty. In this form, the recommendations became the backbone of the final 15-page document which was then shared with the consortium.

[39]See for example IARPC, *SHARE Principles*; IASSA, *IASSA Principles and Guidelines*; Latola et al., 'White Paper'; Inuit Circumpolar Council, *Ethical and Equitable Engagement*; Yua et al., "Framework for Co-Production'; and Norström et al., "Principles for Knowledge Co-Production."
[40]Baer et al., "Tell Us How to Engage You!" 245, 248.
[41]Yua et al., "Framework for Co-Production."
[42]IASSA, *IASSA Principles and Guidelines*, principle 11.
[43]Yua et al., "Framework for Co-Production."
[44]Norström et al. 5. observed that "Asymmetrical power relations can prevent some actors from engaging in knowledge co-production and will reproduce knowledge hierarchies, in which certain knowledge and expertise are seen as being more legitimate than others."
[45]Latola et al., "White Paper," 7–10; Doering et al., "Improving Relationships," 7; Herrmann et al., *Comprehensive Policy Brief*, 51; and Inuit Circumpolar Council, *Ethical and Equitable Engagement*, 27.
[46]Yua et al., "Framework for Co-Production."
[47]Inuit Circumpolar Council, *Ethical and Equitable Engagement*, 21, 33–34
[48]Ibid., 33.
[49]Yua et al., 'Framework for Co-Production." Yua et al. recommend doing it 'as early as possible, and chronicling them in a living document to minimize misunderstandings, lay out clear intent for all parties, and help with relationship building in the long-term."
[50]Inuit Circumpolar Council, *Ethical and Equitable Engagement*, 28; and Baer et al, "Tell Us How to Engage You!" 247
[51]Inuit Circumpolar Council, *Ethical and Equitable Engagement*, 19, 21, 27.
[52]Ibid., 15, 29; and IASSA, *IASSA Principles and Guidelines*, principle 3.

Table 1. Recommendations for collaborative research identified through desk research and partners' experience.

Recommendation	Description
Co-define the level of involvement of different persons and groups in the project.	The scope of co-production involvement varies from a few key users to a wide range of stakeholders. Not all require the same level of engagement. As a project progresses, researchers must ascertain stakeholders' willingness and capacity to participate to define appropriate involvement levels.
Include Indigenous and practitioners' knowledge equitably.	Indigenous and scientific knowledge and methodologies should be equally considered. There should be a consensus on the methods used for information seeking, analysis, and validation, while respecting Indigenous customary laws and protocols for knowledge sharing.
Ensure mutually beneficial co-production outcomes.	Research involving Indigenous Peoples or their lands should provide tangible benefits and address community-identified questions in addition to scientific ones.
Give all participants the opportunity to review co-production outcomes.	To avoid being extractive, co-production should be a reciprocal process. Share research results with stakeholders in formats that respect oral traditions and Indigenous languages. All participants should be open to diverse discussion formats.
Establish awareness of potential tensions.	Building a diverse stakeholder group requires an awareness of potential conflicts of interest and power dynamics. Identifying drivers and barriers to stakeholder involvement in ICEBERG may evoke conflicting feelings.
Establish mechanisms to compensate stakeholders.	Budget constraints can hinder knowledge co-production. Some scholars suggest compensating stakeholders for meeting participation, as they may forego other income.
Agree on information access, control, and the required degree of confidentiality.	Agreed-upon guidelines for equitable access and control of information must be included in the project's data management plan. Confirm individual stakeholder confidentiality on a case-by-case basis, covering all shared information, views, and photographs. Grant anonymity to all participants unless written consent is provided and protect them from criticism for unfavourable research outcomes.
Ensure the proper attribution of the ownership of results.	Possible actions: co-authorship, memoranda of understanding (goals, principles, IP rights), and stakeholder logos in acknowledgements. Acknowledge Indigenous knowledge in publications; do not report as new scientific findings. Abide by publication restrictions (embargoes or non-publication) negotiated during community engagement.
Free, Prior, and Informed Consent (FPIC).	FPIC is a basic requirement for Indigenous participation in research. Individual consent forms must outline the project's purpose, activities, and potential risks, as well as the right to withdraw or refuse participation at any time without consequence.
Adhere to ethical guidelines.	These can be organisational, specific to Indigenous peoples or different fields of science.
Early engagement, trust building, and long-term collaboration	Ideally, projects are based on long-term connections and trust. This requires early and repeated engagement with communities through local contacts to build trust over time, which requires significant resources and commitment.
Avoid causing research fatigue.	Respect stakeholders' time and schedules. To avoid burdening the same individuals, coordinate project actions, and distribute researchers across several communities. Hiring contact persons or liaisons can save time and effort for both researchers and community members.
Provide community members with the chance to participate in their own language.	To ensure equal participation, researchers must provide translated materials and media in the languages of case study communities. Interpreters are also crucial during data collection, co-production and public events to facilitate understanding and prevent information loss.

Flow of information timeline (FIT)

Based on participant feedback, the FIT exercise catalysed collaboration between disciplines, partners, and teams in ICEBERG by identifying collaboration nodes and questions on co-production within the consortium. At the time of the internal project workshop, the FIT provided insights on anticipated and planned activities, as well as potential collaborations and data needs, for the project's first year. The exercise helped recognise existing interdependencies and synergies that can be utilised throughout the project. For example, to save critical travel resources and minimise research fatigue in case study

communities, social scientists travelling to these communities could be trained to collect soil samples, allowing teams to coordinate sampling efforts across various field sites well in advance. Moreover, this visual exercise facilitated the integration of activities such as ethics evaluation interventions throughout the project. Snapshots of the FIT and the original whiteboard were saved for reference and further use during the project.

Stakeholder mapping

Results from the initial stakeholder mapping conducted for the project's case study sites identified municipal decision-makers and civil servants (particularly experts in waste and pollution management) as key stakeholders (Figure 5). Other stakeholder groups included community groups (schools, women's organisations, fishers, hunters, and foragers) and industry (cruise ships and tourism operators). The most relevant cross-cutting stakeholders included the European Chemicals Agency (ECHA) and several of the Arctic Council's Working Groups, like the Arctic Monitoring and Assessment Programme (AMAP). The revision of stakeholder maps following fieldwork activities will contribute to the transparency and traceability of decisions regarding the involvement of newly identified stakeholder groups or the exclusion of initially identified stakeholders (requiring a consensus across the consortium).

Citizen science: results of the empathy mapping

Based on the empathy maps created by consortium members (Figure 6), some of the extrapolated perceived needs of potential citizens from the project's field sites and citizen

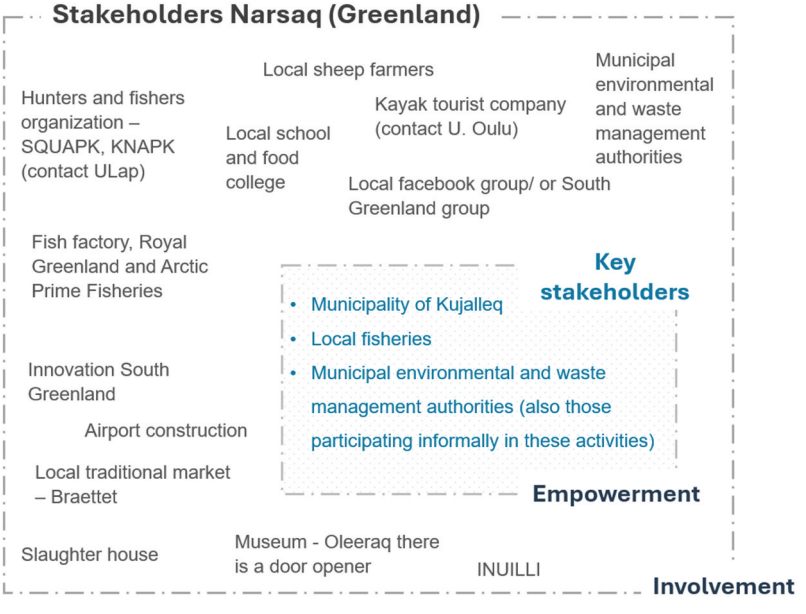

Figure 5. Example of stakeholder map prior to fieldwork for Narsaq (Greenland), showing levels of 'involved' and 'empowered' stakeholders.

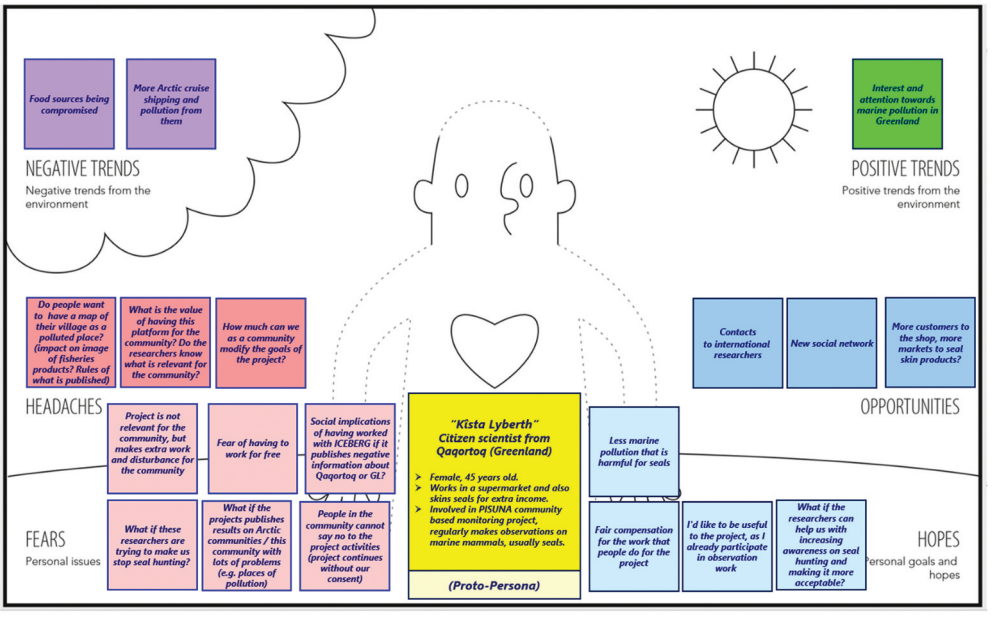

Figure 6. An example of a completed empathy map.

Table 2. Selected examples of empathy mapping results.

Potential needs/challenges (quotes adapted from empathy maps)	Considerations for researchers (based on empathy mapping results)
'I am fed up with researchers' 'This bunch of scientists will go and tell me what to do' 'What if these researchers are trying to make me stop my traditional activities?'	Inform participants, build trust, and be aware of research fatigue and demands for community engagement.
'There is a loss of knowledge of traditional activities' 'I already observe the environment when fishing/hunting. Maybe I can be useful to the project' 'Are Inuit again pictured as the bad people?'	By integrating traditional knowledge, CBEM can raise awareness of local ways of life. This inclusive approach ensures the programme better meets the needs of participants and the community.
'Do the researchers even know what is relevant for the community?' 'Do people want to have a map of their village as a polluted place?' 'What if ICEBERG publishes negative information about my community?' 'People in the community cannot say no to the project activities and the project continues without our consent'	Co-creation empowers communities to define priorities and the CBEM platform's value. By fostering transparency and open dialogue, this approach ensures citizens are consulted and involved in decision-making, leading to respectful, mutually beneficial project outcomes. This also enhances engagement and capacity-building.

science activities are presented in Table 2. These insights generally mirror the recommendations for collaborative research approaches. It is important to note that these results and quotes are essentially 'imagined' by researchers, who themselves have inherent unconscious biases. Nevertheless, they are useful to reflect on research conduct when engaging communities and planning for citizen participation activities, especially in preparation for a fieldwork campaign.

Discussion & conclusion

This research note introduces and evaluates several methods employed to develop a Code of Conduct for the HE-funded ICEBERG project. These methods were designed to address the growing requirements of the funding body, and resulting needs related to collaborative research approaches, including aspects of ethics, gender, equity, knowledge co-production, and citizen science.

The team's commitment to develop a Code of Conduct within the first six months of the project triggered critical discussions on: (1) who we are as a consortium; (2) how we relate to ethics and equity issues; (3) how we co-produce knowledge; (4) and how we engage in citizen science. In addition, the internal project workshop created a space where early findings could be shared with all consortium members and feedback could be gathered.

The results of the preparatory activities and workshop revealed a more nuanced picture of an interdisciplinary consortium. Social scientists were generally more familiar with collaborative research approaches than their natural science colleagues, and for some members this is their first Arctic project. Ethical aspects matter to most project partners, regardless of discipline, experience, or institution. The developed ethics evaluation framework responds to these findings by creating spaces for future engagement, such as a reading group on ethics, pollution, and colonialism where researchers can co-evaluate their work and share experiences. The large volume of diverse documents and resources that partners consult for ethical guidance highlights the relevance of overarching guidelines (e.g. EU level), field-specific regulations, as well as the project's Code of Conduct. These serve as initial data points to understand existing ethical guidelines and engagement. Similar findings emerged for equity, with a clear need for capacity building on how to integrate gender dimensions into research.

The FIT exercise catalysed internal collaboration and provided a snapshot of the project's first six months. Although the multiple case study sites complicated the process, the exercise likely expedited team building, and the whiteboard continues as a living document. The FIT also highlighted areas where consortium members would benefit from recommendations on best practices to avoid potential pitfalls when collaborating with non-academic actors.

The stakeholder mapping exercise was crucial for integrating important values like legitimacy, representation, and agency into the co-production process. It allowed consortium members to define which stakeholders to engage with and at what level. The initial maps were extensive because members found it difficult to differentiate between the 'engaged' and 'empowered' stakeholder categories at that early project stage.

Meanwhile, the empathy map exercise had several successes. It gathered useful feedback to improve the citizen participation platform ahead of fieldwork and facilitated knowledge exchange between experienced and less-experienced researchers. It also provided a dry run engagement with the proto-personas of community members and visualised what those members might think, feel, say, and do. This gave researchers a better appreciation of their operational context and the emotional landscape of the field site. We recommend this exercise for other projects focused on citizen participation, as it demonstrates a commitment to understanding the community on a personal level, which can lead to more effective outreach and engagement.

The internal project workshop equipped us with a clearer understanding of who we are as a consortium, our needs and concerns, as well as a curiosity and willingness to learn more. The data points that we collected prior to and during the workshop shaped the project's 15-page Code of Conduct and various frameworks for engagement.[53] For instance, the team will continue to establish iterative 'points of engagement' to trace ethics-related questions together with individual researchers and the broader consorti um throughout the project, as well as use the living Code as an interactive tool to measure our success and needs for improvement within the project. Ultimately, we hope that this research note contributes a toolbox of methods that can support the growing needs of, and requirements placed on, similar large-scale interdisciplinary, international projects in their endeavour to address complex environmental and social problems, using collaborative research approaches.

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[53] A short 3-page version of the project's Code of Conduct is available on the ICEBERG website at: https://arctic-iceberg.eu/read-the-short-version-of-our-code-of-conduct/.

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