



# SEEKCommons

## 2nd Annual Network Convening REPORT

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UC Berkeley MaCSS  
2121 Allston Way, 2nd Floor  
Berkeley, CA



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## Summary

The 2nd Socio-Environmental Knowledge Commons (SEEKCommons) Research Network Convening was organized as a discussion forum to address common challenges at the intersections between Social and Environmental research, Open Science, and Science and Technology Studies (STS). Building on our experiences as SEEKCommons Network members, we identified key issues to be resolved in 2025 with respect to the sustainability of our social, technical, and environmental projects. With the help of an organizing committee formed by SEEKCommons and Berkeley Data Science and Environment (DSE) members and fellows, we dedicated two days of our meeting to identify priorities and workshop solutions for 2025.

Key activities we planned and conducted for the event included: presentations from former Fellows, Network members, and guest speakers from influential open science and socio-environmental projects; demonstration of software prototypes for data curation; and breakout sessions for elaborating solutions for pressing challenges in data management and stewardship, but also for Open Science sustainability more broadly. Central topics of discussion included: ethical resource sharing and protection, distrust in OS, digital sovereignty, and horizontality in interdisciplinary collaborations within and beyond academia. Our participants emphasized the importance of framing emergent OS policy with ethical concern for sociocultural and historical differences, power imbalances and injustices, but also as a question of reciprocity and trust under the rubric of the "common" beyond the defense of cost-benefits of “open technologies” as accelerators of scientific production.

As an outcome of our annual gathering, we reaffirmed the urgent need for reframing OS as a matter of collective governance through the concept of the “common” (thus responding to and redressing systematic and recurrent issues of resource exploitation and abuse that have marked historically the interaction of scientists with “over-studied” communities worldwide). For 2025, our Research Network will prioritize the organization of workshops to respond to the challenges we identified, but also to continue fostering common projects and open spaces for the encounter between groups of practitioners that would otherwise never meet (across Open Science, for example, and socio-environmental research in STS).

Our plan is to allocate resources for: (1) addressing the question of ethical licensing for under-represented groups working with open technologies; (2) continuing to support collaborative work to improve and document common infrastructure projects; and (3) preparing a edited volume that highlights the work we have done as members of the SEEKCommons Network.

We thank all the participants for their contribution and look forward to realizing the social, technical, and environmental potential of our projects in the SEEKCommons Network and well beyond. We also thank the National Science Foundation for sponsoring the event and for its continued support for our research networking efforts (grant # 2226425).

### – Organizing Committee

*Erin Robinson, Ciera Martinez, Annie Snyder, Jessica Reyes, Lane Rasberry, LF Murillo*

## Introduction

The 2024 Socio-Environmental Knowledge Commons (SEEKCommons) Network Convening was held as a forum for researchers, technologists, and community-based practitioners to discuss socio-environmental challenges with common technologies for collaborative research. Building on the network's foundational work of the previous two years, our gathering was framed around the "common" as a principle for building community around open technologies for socio-environmental research. Our goal was to strengthen Network connections, develop practical recommendations, and create sustainability strategies for common projects under the umbrella of the SEEKCommons project.

Established in 2022, SEEKCommons was born out of the urgency to respond to climate crises and their compounded socio-technical, environmental, and collective governance issues. As a research network, we have been pursuing answers to these questions: How can Open Science (OS) contribute to the present and future of socio-environmental research? And, conversely, how can community-based socio-environmental projects contribute to addressing serious blindspots in Open Science concerning the ethics of technoscientific work?

As Open Science projects become more popular and better funded, they encounter common issues in the space of Free and Open Source project governance regarding their sustainability and "openness." Issues such as exploitation of open resources (for commercial machine learning applications), overworked volunteers, and demographic skewing underline some of the complexities of realizing a more sustainable digital commons. Governance structures that fail to properly allocate resources and responsibilities often lead to difficulties in renewing the body of project maintainers, leading to burnout and mistrust of potential contributions.

To address the issue of sustainability of Open Science projects in the space of socio-environmental research, this report presents key "patterns" (i.e., solutions to common problems) and "anti-patterns" (i.e., frequent but ineffective approaches to recurrent problems) we identified during our meeting. As a way to respond to the problems we identified, the SEEKCommons project will fund and support Fellows' projects and Network activities that involve advancing collaborative projects for open infrastructure support and resource curation. The Network will continue to support FAIR, CARE, and Open Science principles, but will also address the blindspots that have been identified during the meeting across these domains of socio-technical work and ethical concern. In what follows, we will provide the detailed description of our meeting sessions and their outcomes.

## Overview of Meeting Activities

The 2024 SEEKCommons Network meeting included a series of activities to create a space of open and honest exchange about the difficult problems we have encountered across OS, socio-environmental, and STS projects. The activities we organized included: presentations from former Fellows, Network members, and guest speakers; demonstrations of software prototypes and activities of open data curation; and breakout sessions for elaborating solutions for pressing challenges in the space of FAIR-CARE integration, but also OS sustainability. Central topics of discussion included ethical resource sharing and protection in face of AI and

other data harvesting attempts, digital sovereignty and the question of general distrust / mistrust in OS, and horizontal relations in interdisciplinary collaborations within and beyond academia.

## Introductory Session: State of the SEEKCommons Project

We started with a **presentation from Principal Investigator LF Murillo on the state of the SEEKCommons project**. This presentation had two primary goals: first, to update the Network about the accomplishments of the project thus far; and, second, to highlight the challenges we faced and collect feedback on the Network priorities for 2025. This presentation also included an overview of all the areas of the project and how Network members could get more involved. Special attention was dedicated to the Fellowship curriculum, but also the challenges of producing outputs that, albeit important for the communities represented in the Fellows' projects, did not have the recognition of academia (i.e. forms of knowledge that do not count as "scholarship," such as the work of data curation, artistic intervention, and collaborative research to train vulnerable communities how to use common technologies for the purposes of environmental justice).

Another important aspect that was highlighted was the lingering division within STS between OS skeptics and OS practitioners. This divide has created the impossibility of advancing collaborative work for the development of common, sustainable data infrastructures. This has been one of the most difficult challenges of the SEEKCommons project.

## Session 1: SEEKCommons Fellowship: Lessons Learned

**This session showcased Fellowship projects from the 2024 cohort.** The emphasis here was on the discussion of the challenges that every grantee encountered to advance their projects with FAIR and CARE in Open Science. The Fellows' projects generated a lot of enthusiasm for the Network members in the room and were constantly referred to by the conference participants through the meeting. Examples of project highlights included:

- **Tiffany Tang's** project on creating FAIR-compliant data infrastructures to manage private well data, addressing unregulated water testing and demographic gaps. Her iterative, community-driven approach, tackled challenges in data wrangling and emphasized the need for flexible data governance approaches;
- **Erin Robinson** explored FAIR and CARE metadata practices for biological specimens. Her work at environmental field stations emphasized the importance of ethical data-sharing practices, highlighting the need to integrate CARE principles into FAIR frameworks to align with indigenous rights and community priorities;
- **Valerie Berseth** addressed the critical role of trust in open science, using salmon conservation efforts as a case study. She illustrated how transparent collaboration and community engagement are essential to overcoming mistrust in institutional science (which, in certain contexts, is rampant);
- **Sebastian Zarate** focused on agrobiodiversity knowledge infrastructures for Andean potatoes, balancing indigenous stewardship with conservation and commercialization goals. His work emphasized reciprocity, cultural sensitivity, and the importance of fostering relationships for ethical data governance.

The SEEKCommons Fellows presentations emphasized reciprocity, trust, ethical principles, and collaboration in questioning current OS practices. Existing data-sharing efforts, for example, were perceived as misguided for not prioritizing mutual benefits, or for not emphasizing enough the practical needs that local communities have when engaging a digital project. Trust was

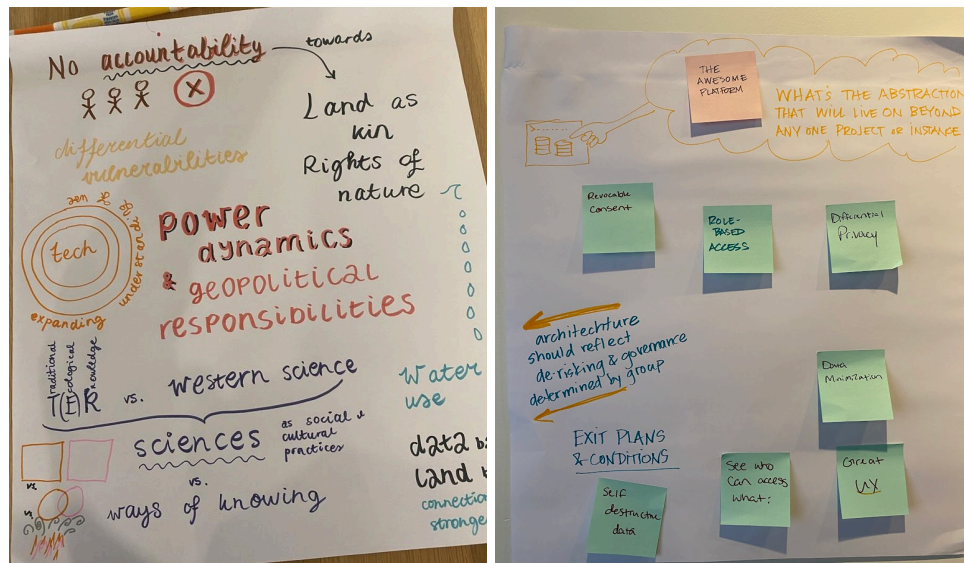
presented across projects as a critical foundation, requiring genuine engagement, accountability, and alignment of research goals with community priorities. Iterative and co-creative processes were also discussed as crucial for enabling data efforts that remain flexible enough and adaptable for community needs—that is, that are not set in perpetuity by university contracts that cannot be changed. Other Fellows' projects that were also funded in 2024, but did not participate in the convening due to the impossibility of the grantees to join our event, included:

- **Katie Ulrich's** work on the curation of a data set of biofuels and bioplastics for STS research. Katie's project led to the creation of a catalog that they called "sugar library." This library inventoried forms of sugar(cane) Katie encountered in their field research in Brazil. It now has over 500 curated entries that are FAIR compliant. The project aimed to translate this library into a publicly accessible tool to mediate both broader public interaction with the research project and further horizontal, collaborative concept-sharing with fellow scientist interlocutors;
- **Vincenzo Tozzi's** project involved supporting the Digital Research and Development Group (NPDD) of Mocambos Network that connects more than 200 Afro-Brazilian (quilombos) and Indigenous communities. Tozzi's work focused on the development of the new version of Baobáxia, a Free Software to create local and eventually connected federated networks, providing digital archive, blog and map services. Baobáxia is a grassroots technology for self-government and digital sovereignty;
- **Madhuri Karak's** project countered carbon-centered forest data infrastructures with experiments in visualization spanning ecoacoustic, text, and oral formats. In a visual essay for *It's Freezing in L.A.* an art and politics magazine dedicated to climate writing, Karak foregrounded community-owned knowledge from Indonesia's West Kalimantan province against the dominant architecture of remote sensing data, and what is lost in valuations of landscapes viewed from above;
- **Jose Becerra's** project used ethnographic mixed methods to examine how stakeholders in the Inland Empire region of California use research instruments and data for environmental decisions, while identifying ways to democratize science for socio-environmental research and action. As a final deliverable, Jose wrote a manuscript undergoing the peer-review process, presented his SEEKCommons research at Harvard's JPB Environmental Health fellows workshop and Oakland's Sudoroom, recorded a podcast with fellow anthropologists on Anthropod, and will be writing and presenting the study materials at conferences including the Society for Social Studies of Science;
- **Nkwi Flores** worked on a Biokulture Design Framework for Indigenous research and development governance, collaborating across ontologies, agnotologies, and epistemologies transboundary work. The framework is a fractal example of the ongoing Indigenous Complexity Systems Praxes and Theory, as well as the semi-permeable border work between Indigenous and settler systems. As a final deliverable, Nkwi (a) wrote a manuscript undergoing review to present in the SAIL 2025 conference as part of the language technology for the rematriation of data. He continues to refine the Biokulture Design Framework manuscript to build rights to data and stewardship of open data with FAIR, CARE, and TRUST principles.

## **Session 2: Digital Sovereignty with Data Vulnerable Communities: Implementation Strategies and Challenges**

**This session explored actionable approaches to data sovereignty for communities that have critical data gaps and/or sensitive data that can be used to cause harm. With a focus**

on questions of data trust, data mis/use, and capacity and institution-building, participants identified key challenges and proposed solutions to ensure data sovereignty that is led by community members by themselves and for themselves.



**Figure 1.** Notes from the Digital Sovereignty session.

This session was organized around groups of self-selected participants to discuss pressing issues of digital sovereignty. The **Trust group**, for example, discussed the importance of fostering trust through transparency and long-term engagement. They emphasized the need for clear documentation, reproducibility checklists, and community involvement in research processes in more organic, meaningful ways. Challenges such as misalignment of priorities and distrust in artificial intelligence (AI) due to its black-boxing effects were discussed at length. Solutions included implementing Valeri Berseth's "Trust and Distrust Mapping" proposed in her Fellowship presentation to address community-specific needs, ensuring participation and accountability in governance and clear communication about data processing needs (at small and big scales).

In the **Capacity Building group** participants focused on community-driven approaches to address systemic inequities and advance alignment with locally situated values. This group brought up the critique of the administrative burden that is generated by science funders. This burden detracts from meaningful community work, for example, since the temporality of well-grounded community work extrapolates project life-cycles. Another hurdle here is the difficulty of measurement of concrete outcomes (since much progress happens through building trusting relationships in informal spaces, which cannot be quantified—which has quite often intangible results and unanticipated effects). Instead, this group advocated for user-centered design that "meet communities where they are," emphasizing capacity as an opportunity rather than a deficit. Iterative strategies were recommended to support community-based research while addressing immediate community needs with a view toward long-term sustainability of community-based research collaborations.



**Figure 2.** Collaborative mapping of priority topics for group discussion.

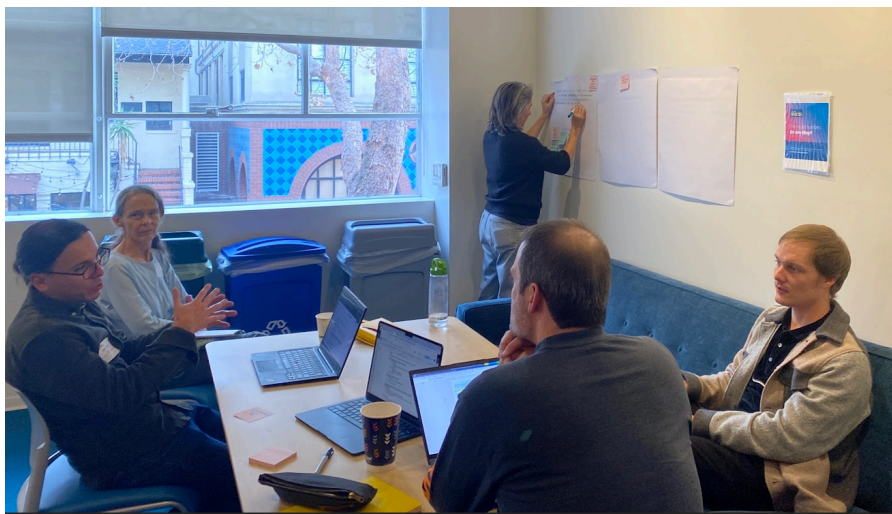
The **Accountability group** explored systemic inequities in research and governance, particularly with respect to the interplay between Traditional Ecological Knowledge (TEK) and Western science. This group described the interconnectedness of land sovereignty and data sovereignty for indigenous groups, critiquing the lack of accountability of career scientists and the environmental harm caused by data infrastructures—such as the substantial impact on water and electricity requirements for large-scale data analytics). Proposed solutions included: embedding TEK into open governance structures, viewing data sovereignty as a component of land sovereignty, and developing community-led research frameworks that prioritize the sustainability of common (built with long-term, trusting relationships).

In the **Institutional Building group**, discussions centered on collective governance (using the commons framework elaborated by Elinor Ostrom and her colleagues), data expertise training, and data agreements. This group also highlighted challenges such as power imbalances, inadequate governance structures, and dependence on national systems for hosting sensitive data (which are often threatened by change in political orientation of federal governments). Decentralization techniques were suggested, such as: creating community-based entities for data hosting, establishing federated platforms (that can be collectively controlled, but also used across communities to lessen the burden of running one’s own instance).

The **Data Misuse group** presented the risks of unethical data appropriation and provided a list of dangers that were presented back to the workshop participants. One of the core challenges on this topic concerns the lack of mechanisms for revising / revoking consent as situations change (concerning the sensitivity of the data at stake). Participants presented partial (and existing) solutions involving data encryption, sharing encryption keys, and implementing “differential privacy” measures. The group also identified a mix of technical and political solutions, ranging from query-based access systems that encrypt data-at-rest and implement a strong data access policy. Regulatory measures were also discussed concerning data access, circulation, disposition, and use. Most importantly, the group highlighted the need for communities to maintain granular control over their data and advocated for legal frameworks to



protect data agreements, licenses, and, often overlooked, community rights and cultural sensibilities (not be encoded in agreements that were drafted elsewhere by university lawyers).



**Figure 3.** “Data misuse” group in session.

Participants in all groups formed rough consensus around the importance of balancing immediate needs with a view toward capacity building for long-lasting partnerships. The following recommendations were drafted as an outcome of this session:

- *Putting trust first as a foundation for collective governance of common resources;*
- *Investing in secure platforms for sensitive data instead of assuming “openness” as a default for areas in which community data has the potential for becoming sensitive;*
- *Drafting collaborative agreements that include legal protections with data security provisions. Contemporary data sovereignty debates provide the contours of these agreements—as they present important technological alternatives with a view toward community self-determination on and offline.*

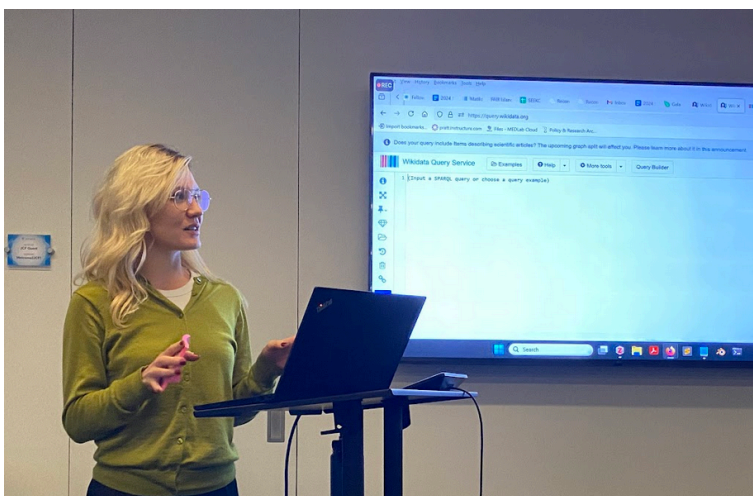
### **Session 3: SEEKCommons Hub UI-UX workshop**

In previous virtual and in-person convenings, the **SEEKCommons Network discussed the parameters of the repository we wanted to build**. The repository was meant to address a problem that we identified through empirical research on the “state of Open Science in socio-environmental research.” We started this research with STS projects that were sponsored by NSF and identified a serious gap in terms of findability and accessibility of funded research outputs. Based on this issue, we started to work on the SEEKCommons “Resource Hub.”

One of the research goals in our original research proposal for NSF was to design a website to host the Resource Hub. We had made the commitment to invest time and effort into existing community efforts, so we decided to stick with FAIR-enabled long-term repositories and common infrastructures, such as Zenodo and Wikidata. For Wikidata in particular, we realized that Network members had a hard time understanding the technical terms around semantic data technologies, so we decided to help with this by creating a web interface to make exploring and contributing to the SEEKCommons knowledge graph easier. This is where Gala, the web

platform for sustainability case studies came to the picture. We identified that Gala had the potential to be a good host for a module we could build to integrate Wikidata.

We decided to bring the Wikidata module and run a UI/UX workshop with Network members. The session started with an explanation of the overall goals of the SEEKCommons Resource Hub by Co-PI Gerd Heber. His presentation was followed by a demo by Rebecca Hardin (from Gala) and Nate Papes (from Atomic Object) of the Wikidata module on Gala and a collection of suggestions from Network members on how to improve the work. The demo emphasized the need for a 2-way communication between Gala and Wikidata (for the purposes of not only reading relational data on Gala, but also contributing back improvements to Wikidata).



**Figure 4.** Dorothy Howard presents the work of data curation on Wikidata.

The demo was followed by a more technical debate about the work of data curation on Wikidata by Lane Rasberry and Dorothy Howard with details from the work that they have contributed to the project in fostering the creation of our knowledge graph. They emphasized the importance of attending to persistent identifiers (such as ORCID) to facilitate the work of identifying public research outputs from our Network members and their collaborators. Discussions were held on the prioritization of user-friendly interfacing, creating robust meta-data exports, and supporting existing tools like Gala and Scholia for visualizing relational data. Participants were encouraged to 1) review their ORCID profiles; 2) test the Gala-Wikidata integration; and 3) contribute use cases.

For the conclusion, the group discussed their vision for the future of the SEEKCommons Hub to include data protection/security provisions and to attend to the needs of indigenous communities to honor indigenous rights in data agreements. Beyond CARE and FAIR, the importance of "care-work" for non-indigenous, under-represented group data was also acknowledged.

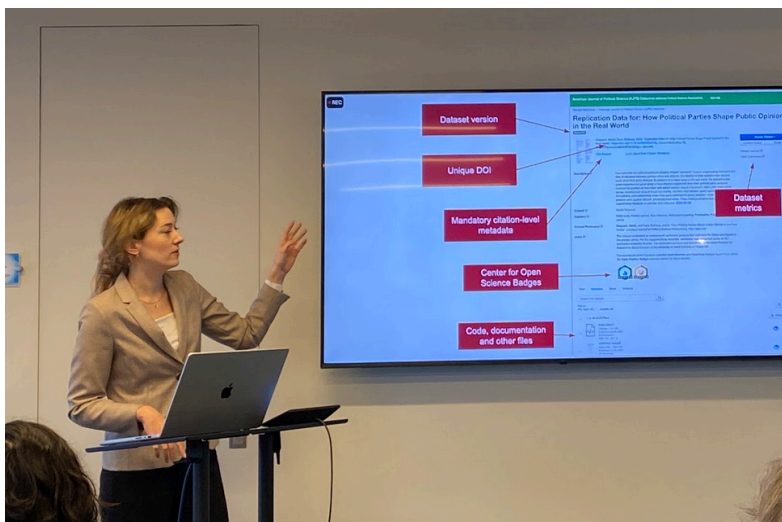
#### **Session 4: Challenges and promises of FAIR+CARE+Commons integration through real-world examples**

This session served to **evaluate the state of the integration between FAIR, CARE, and Common frameworks**, but also to discuss the challenges we encountered as practitioners. By

collectively exploring these challenges, we sought to uncover opportunities for advancing common solutions. The session had the intervention of three practitioners who shared difficult problems for group discussion.

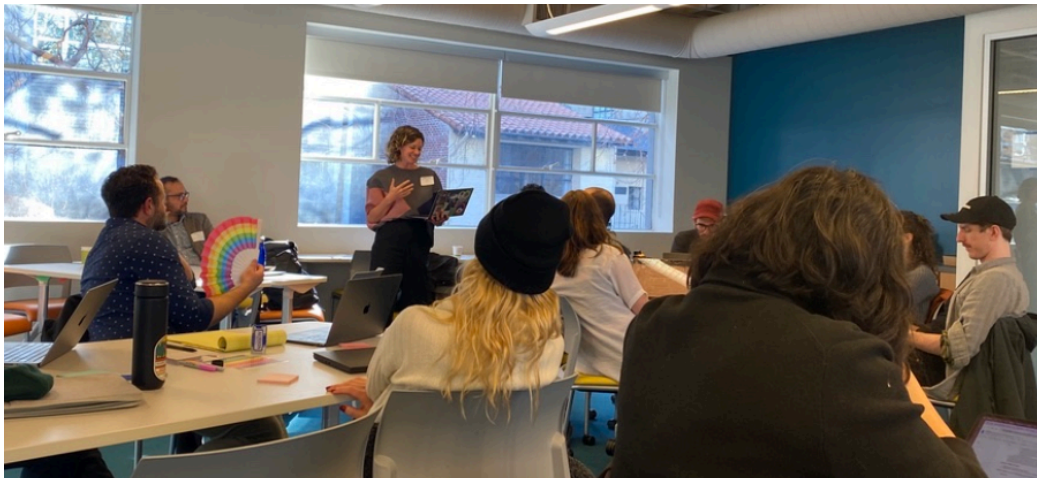
Jeff Ward's talk focused on data sovereignty with indigenous technology. He emphasized the integration of cultural principles into technological frameworks, highlighting the balance between FAIR (Findable, Accessible, Interoperable, Reusable) and CARE (Collective Benefit, Authority to Control, Responsibility, Ethics) principles with the specific needs of Indigenous communities. Persistent problems included the risks of "digital colonization" by large tech companies, challenges in adapting software, hardware, data licensing models to align with Indigenous values, and ensuring ethical data stewardship rooted in long-term responsibility. Additional challenges presented were related to balancing open source principles (underlying several aspects of Open Science) with Indigenous data sovereignty, addressing historical and ongoing exploitation of Indigenous knowledge, and navigating the tension between generalization and community-specific solutions. Ward stressed the importance of decolonizing governance structures through collective decision-making and exploring community-driven business models to ensure sustainability.

Ana Trisovic addressed challenges in environmental and climate data reproducibility. In her talk, she argued for increased adherence to FAIR principles. Persistent problems that still exist in our data practices include inadequate metadata, usability issues with hierarchical / nested datasets, and inconsistent documentation that hinder data reuse and replication in the environmental and climate sciences. Other barriers that she discussed involve insufficient support for reuse, limited commitment to high-quality data sharing, and the general absence of user-friendly interfaces for public repositories. She highlighted the vulnerabilities in environmental data related to Native American and Alaska Native communities, and noted the lack of integration between demographic and environmental data to advance socio-environmental research. Trisovic called for systemic cultural change to prioritize data stewardship and advocated for community-driven projects to improve data curation across disciplines.



**Figure 5.** Ana Trisovic presents the challenges of UI/UX in open data repositories.

The final talk for this session was offered by Network member Lisa Blackmore on the intersections between art and community engagement for water quality restoration. Her talk discussed the urban waterways of Latin America concerning the disconnect between government regulation and ecological action. One of the persistent challenges identified in this context was the limited resources of community science, insufficient legislative follow-through, and lack of public awareness of large-scale ecological problems with watersheds. Despite these difficulties, participatory approaches in community science have proven to be fruitful in mobilizing local communities and driving legislative change. One of the ways through which this mobilization took place was through art interventions in the context of the project “Water Commons” led by Lisa Blackmore and Alejandro Ponce de Leon.



**Figure 6.** Lisa Blackmore discusses the “Water Commons” project.

This session concluded with the discussion of the importance of combining efforts (platform building, data expertise, and community engagement) for improving FAIR+CARE+Commons integration. We identified, for example, that a triangulation was possible with the three talks: Jeff’s values-driven platform work seemed to be needed for Lisa’s grassroots environmental action case. By the same token, Ana’s data science expertise appeared to be very important in supporting data curation for community needs on platforms that properly accommodate FAIR and CARE data. By combining efforts of community-driven platform design with data curation work, we can bridge fundamental gaps where common projects can be helpful beyond their immediate contexts of application.

## **Session 5: Sustainability of Open Technologies for Open Research Projects**

One of the **key blindspots in the discussion of Free and Open Source sustainability has to do with the interplay of social, technical and environmental aspects.** For this session we decided to concentrate on the issue of support for key Open Science projects (composed of various sub-communities and areas, such as Free and Open Source Software, Open Data, Open Access, and Open Hardware). To facilitate this debate, we requested for a long-term maintainer of the Scientific Python community, Jarrod Milmann, to present his experience with project maintenance.

Jarrold Millman's talk presented the challenges and opportunities of raising awareness about open-source tools in academic institutions like UC Berkeley. Not only companies and governments, but universities are also known for extracting significant value from open-source projects, such as Jupyter and Python, but they often fail to provide adequate support, funding, and recognition, relying instead on outdated software contracts and limited funding mechanisms. Efforts to leverage the Open Source Program Office (OSPO) at UC Berkeley and similar initiatives across the UC system were discussed as potential pathways for raising awareness and consolidating support. Challenges include resistance from faculty reliant on proprietary legacy software, institutional funding limitations, and the precarious positions of faculty and developers advancing Free and Open Source projects.

The group discussion led to the identification of important strategies to address the problem of sustainability: 1) promoting a cultural shift within faculty committees through a compelling advocacy campaign; 2) improving our capacity to promote our projects through more compelling story-telling; and 3) investing more time and effort on "branding" to humanize FOSS efforts that tend to appear too technical and unreachable to most people (even in the academic context). Broader engagement through student fellowships, mentorships, and learning from international examples and government policies was recommended to institutionalize support. The SEEKCommons Fellowship was also identified as one of the mechanisms for creating a culture of common scientific technology building and sharing.

We concluded our session with the discussion of the urgent need for coordinated efforts to address academic precarity (for technologists, early career scientists, and community partners), institutionalization of funding for community projects, and the reaffirmation of the indispensable *sine qua non* role that open technologies play in *infrastructuring* research, teaching, and education.

## **Session 6: Priority Topics for Network Workshops in 2025**

Our final session was dedicated to the discussion of our plans for organizing research activities for the Network in 2025. The most urgent priorities we identified include:

- Promoting FAIR+CARE+Commons training to address unethical practices of data extraction and misuse in AI-based research;
- Fostering interdisciplinary research with stronger emphasis on the intersection between the arts and sciences to improve storytelling and community engagement with our work;
- Developing "community toolkits" to facilitate access to Open Science technologies;
- Creating more accessible channels for community participation in our Network through more frequent community events, workshops, and regular "office hours" with Network members who can advise on FAIR, CARE, and Open Science;
- Offer workshops on areas that need more attention, such as:
  - Grant writing for OS sustainability
  - Inventory of the state of the art on Open Science software, hardware, data
  - Data trusts and community agreements
  - Preparation of papers / articles on Socio+Environmental integration
  - Limits and opportunities for "openness" in AI research and development
  - Communication strategies for Open Science projects (for public outreach)
- Draft an edited volume for the Network by the Network to highlight our common projects (while presenting our inventory of patterns and anti-patterns in collaborative research).

Despite concerns about funding uncertainties and maintaining collaborative ties within the Network, there was a collective commitment from our members to overcome obstacles through continued engagement. The next steps we agreed upon include:

- Finalizing our 2025 workshop plans with full details about contents and formats;
- Working on a project newsletter for the Network to increase members' visibility;
- Working on the first draft of our edited volume with chapters on the projects that were conducted under the umbrella of SEEKCommons

We left this final session with a concrete set of recommendations to guide our research network coordination efforts for 2025.

## Conclusion

Our 2nd Annual Convening successfully identified the priorities of the Network by bringing together technologists, researchers, and community organizers to discuss the challenges and potentialities of the work we are all doing on FAIR, CARE, and Open Science. From technical discussions of data management to difficult conversations about the historical issues of discrimination and power imbalance in science and technology, our group managed to create a respectful space of exchange to address the most important problems of sustainability of common technologies and infrastructures for socio-environmental research. Here are the key topics we have identified for future development in the context of our research network:

- **Strengthening Governance and Trust of Common Technology Projects:** Future efforts will focus on developing adaptive governance models that align with community values and priorities. Building on insights from our convening, SEEKCommons members will prioritize trust-building efforts, including transparent processes for increasing participation in decision-making of common science and technology projects;
- **Enhancing Social, Technical and Ecological Sustainability of Common Tools and Infrastructures:** Recognizing the critical role of open technologies, the network will explore new funding models, partnerships, and institutional advocacy to sustain common tools and platforms that we all rely upon. We work to increase our support for open source contributors and foster institutional recognition of their work, while advancing empirical research and development of more sustainable technologies;
- **Expanding Capacity and Inclusivity Within and Beyond Academia:** To support community organizations and community members from minority backgrounds and underrepresented groups, SEEKCommons will put more emphasis on user-centered design and capacity-building activities. Developing toolkits with good documentation, training workshops, and open educational resources tailored to community-defined priorities will remain a priority for the Network;
- **Integrating Art and Science to Promote Community-based Socio-Environmental Research:** Interdisciplinary collaborations that incorporate art and environmental justice advocacy into socio-environmental research will be prioritized. Our goal is to increase public engagement, foster creative problem-solving, and connect diverse knowledge systems through our common projects;

- **Advancing FAIR+CARE+Commons Integrations:** Implementation of FAIR and CARE principles will continue through the development of actionable guidelines, open repositories and tools. These efforts will prioritize ethical data governance and cultural sensitivity to align research outputs with local needs, while attending to the importance of the "commons" as a means for building collective governance structures around common projects;
- **Long-Term Sustainability Planning:** Our Network will focus on supporting existing community projects, instead of investing in new projects that replicate efforts. We will work to create sustainable pathways for Open Science projects to persist beyond the lifecycle of the SEEKCommons project. Our plans for 2025 include preparing community-led publications, hosting regular events for the broader public, and extending well-established information-and-sharing platforms (such as Wikidata and Gala).

By pursuing these shared plans, the SEEKCommons Network will build on the momentum of our convening to better support common socio-environmental projects responding to the social, technical, and environmental challenges of the present. We look forward to seeing our colleagues and learning from their projects at the next convening!

## List of Participants

Luis Felipe R. Murillo (University of Notre Dame), Erin Robinson (Metadata Game Changers), Ciera Martinez (UC Berkeley), Gerd Heber (HDF Group), Rebecca Hardin (University of Michigan), Matias Milia (University of Notre Dame), Lane Rasberry (University of Virginia), Annie Snyder (UC Berkeley), M.V. Eitzel (UC Davis), Eric Kansa (Open Context), Kate Wing (Intertidal), Sebastian Zarate (North Carolina State University), Valerie Berseth (University of Oregon), Tiffany Tang (Northwestern University), Nwki Flores (University of Arizona), Keren Reichler (Rice University), Kyle Harp-Rushing (Chapman University), Magali deBruyn (UC Berkeley), Jeff Ward (Animikii), Liz Henry (GOAT), Ana Trisovic (MIT), Felipe Montealegre-Mora (UC Berkeley), Diego E. Soto (UC Berkeley), Jarrod Millman (Scientific Python), Benjamin Goering (Independent), Lisa Blackmore (University of Essex), Eli Draizen (UC San Francisco), Alejandro Ponce de Leon (UC Berkeley), Anne Fitzpatrick (Atomic Object), Nate Papes (Atomic Object), Ann Russel (Iowa State University), Shreya Shankar (UC Berkeley), Dorothy Howard (UC San Diego).

# Appendix

## Patterns and Anti-Patterns: Preliminary Inventory

### Patterns Identified

#### Collective Governance and Trust

1. **Transparent Governance:** Successful collective governance relies on transparency, long-term engagement, and the inclusion of diverse voices in decision-making processes.
  2. **Community Empowerment:** Governance structures that prioritize community involvement foster trust and accountability.
  3. **Common Governance:** Shifting away from top-down governance models to frameworks rooted in equity, cultural sensitivity, and collective input is critical.
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#### FAIR and CARE Principles

4. **Alignment of FAIR and CARE:** Integrating FAIR (Findable, Accessible, Interoperable, Reusable) principles with CARE (Collective Benefit, Authority to Control, Responsibility, Ethics) ethics ensures that openness respects cultural and ethical values, but also, and more importantly, honor indigenous rights and community protocols for data collection, storage, and use.
  5. **Ethical Data Practices:** FAIR alone is insufficient; ethical considerations must be embedded in data sharing and governance frameworks to address the needs of diverse communities.
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#### Sustainability of Open Technologies

6. **Institutional Advocacy:** Open tools thrive with institutional support, highlighting the need for university and organizational advocacy.
  7. **Funding Models:** Exploring diverse funding mechanisms, such as reinvesting cost savings and partnerships, sustains critical open technology projects.
  8. **Collaboration and Maintenance:** Sustaining open technologies requires ongoing collaboration, robust maintenance, and acknowledgment of contributors.
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#### Interdisciplinary Collaboration

9. **Bridging Disciplines:** Collaboration across fields—combining environmental science, technology, and community organizing—strengthens solutions to socio-environmental challenges.
  10. **Shared Understanding:** Establishing a common framework or "boundary object" helps diverse groups align their efforts while maintaining flexibility.
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## Data Sharing and Community Engagement

11. **Reciprocity in Data Sharing:** Successful data-sharing practices ensure mutual benefit for researchers and communities, avoiding extractive models.
  12. **Community-led Solutions:** Centering community needs in data governance and Open Science projects builds trust and leads to more meaningful outcomes.
  13. **Iterative Processes:** Collaborative, iterative methods allow for continual refinement of data-sharing frameworks and community solutions.
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## Sustainability, Equity, and Inclusion

14. **Focus on Under-represented Voices:** Prioritizing marginalized communities, including Indigenous groups and grassroots organizations, creates conditions for advancing equitable access to Open Science.
  15. **Capacity Building:** Building skills and resources alongside under-represented communities, where they are considered partners not objects of knowledge
  16. **Accessibility of Tools:** Open technologies must be user-friendly, multilingual, and adaptable to diverse cultural, ecological, and technical contexts.
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## Common Knowledge Integrations

17. **Balancing Traditional and Modern Knowledge:** Integrating traditional knowledge systems with scientific methods helps support better knowledge systems in socio-environmental research.
  18. **Storytelling and Data:** Using creative approaches like storytelling helps communicate the importance of various types of data to broader audiences (experts and non-experts alike).
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## Sustainability of Common Efforts

19. **Long-Term Vision:** Ensuring sustainability requires ongoing support for common tools, frameworks, and relationships that can endure beyond individual projects.
20. **Trust as a Foundation:** Building and maintaining trust with climate-impacted communities is fundamental for advancing open socio-environmental research.

## Anti-patterns Identified

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### Governance and Trust

1. **Top-Down Governance:** Centralized decision-making that excludes community input undermines trust and fails to address local needs.

2. **Over-Reliance on Individuals with Strong Personalities:** Dependence on a few key contributors for governance or decision-making leads to burnout and risks project sustainability.
  3. **Broken Promises:** Institutions failing to fulfill commitments erode trust with communities that often have a history of exploitation in their dealings with scientists and government officials.
  4. **Opaque Governance:** Lack of transparent and understandable processes for decision-making and accountability discourages community engagement and increases skepticism and apathy.
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### **FAIR and CARE Practices**

5. **FAIR Without CARE and "care:"** Applying FAIR principles without ethical considerations ignores the cultural and social implications of data sharing. Care practices (beyond CARE) are also needed for marginalized non-indigenous communities.
  6. **One-Size-Fits-All "Openness:"** Implementing Open Science policies without considering historical, disciplinary, and sociocultural contexts results in impractical, inappropriate, or harmful applications.
  7. **Hype Without Substance:** Projects that use "Open Source" as a label without adequate tools, resources, or practices undermine credibility and trust of Open Science projects.
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### **Sustainability of Open Technologies**

8. **Exploitation of Open Source:** Corporations exploiting Free and Open Source projects without giving back deplete human and computational resources, negatively impacting common projects and endangering their future.
  9. **Precarity Among Developers:** Lack of stable funding and support for Open Science tool and platform developers leads to burnout and reduces the sustainability of critical tools.
  10. **Neglect of Maintenance:** Prioritizing new projects over the maintenance of existing tools and platforms weakens our capacity as a community to respond to bigger and more urgent social, technical, and ecological problems.
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### **Community Engagement**

11. **Extractive Data Practices:** Data-sharing initiatives that fail to offer tangible benefits to communities are perceived as exploitative and erode trust.
  12. **Tokenism:** Including marginalized groups for appearances rather than meaningful participation further advances exclusion and creates disputes within communities.
  13. **Imposed Solutions:** Introducing externally developed solutions without involving local communities results in misalignment with their needs, priorities, and forms of knowing.
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## Sustainability, Equity, and Inclusion

14. **Normative Conformity:** Capacity-building efforts that force marginalized groups to conform to dominant norms (e.g., university-centric administrative processes) undermine genuine inclusion.
  15. **Lack of Accessibility:** Tools and platforms that are not user-friendly, flexible, and adaptable to diverse contexts create barriers for underrepresented communities.
  16. **Disregard for appropriate technology:** Ignoring infrastructural and energy requirements of certain tools and platforms further marginalizes communities without the same level of access the corporate and university researchers in well-resourced centers have.
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## Knowledge Sharing and Collaboration

16. **Flattening Knowledge Systems:** Ignoring the complexity of traditional or socio-cultural knowledge production leads to oversimplified solutions.
  17. **Disconnected Efforts:** Failure to integrate local knowledge and involve communities in research design reduces the relevance and effectiveness of projects.
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## Sustainability of Common Efforts

18. **Short-Term Focus:** Projects with limited funding or vision fail to sustain long-term relationships with communities that would benefit the most from interdisciplinary collaborations.
  19. **Over-Promising Governance:** Claiming openness or inclusivity without the capacity to deliver damages credibility and trust.
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## Trust and Accountability

20. **Absence of Verification Mechanisms:** Lack of tools to verify compliance with governance or data-sharing agreements undermines accountability.
  21. **Neglecting Long-Term Relationships:** Treating community engagement as a one-time effort rather than an ongoing process discourages trust and collaboration.
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## Technology Design and Use

22. **Over-Reliance on Digital Tools:** Assuming technological tools alone can solve socio-cultural challenges leads to incomplete, ineffective, or harmful "solutions."