

'ENVIRONMENT RESEARCH INFRASTRUCTURES INNOVATION ROADMAP'



HORIZON-INFRA-2023-DEV-01

ENVRINNOV | GRANT No. 101131426

D5.1 Long-term measures for engagement of key stakeholders

30.9.2026



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Deliverable Number	Deliverable Title	Lead Beneficiary	Type	Dissemination Level	Due Date (in months)
D5.1	Long-term Measures for Engagement of Key	1 – ICOS	Document-report	Public	33

Version	Date	Changed page(s)	Cause of change	Partner
V1	10/7/2026	Initial version		ICOS ERIC

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Executive summary

Environmental Research Infrastructures (ENVRIs) play a critical role in generating observations, data, services, and expertise needed to address climate change, biodiversity loss, and other environmental challenges. However, achieving scientific excellence alone is not sufficient to maximise societal, policy, and economic impact. Long-term innovation requires sustained collaboration among research infrastructures, industry, policymakers, scientific communities, and other stakeholders. Effective stakeholder engagement creates the conditions for trust-building, knowledge exchange, co-creation, innovation uptake, and long-term impact.

This deliverable presents the outcomes of stakeholder engagement activities carried out within ENVRINNOV between January 2025 and September 2026. Activities included stakeholder mapping workshops, internal coordination workshops, analyses of stakeholder engagement mechanisms, pilot outreach events, webinars, conference activities, and two extensive interview campaigns involving policymakers, industry representatives, Environmental Research Infrastructures (ENVRIs), scientific organisations, and innovation ecosystem actors. Together, these activities generated evidence on stakeholder needs, barriers to innovation, preferred engagement mechanisms, and opportunities for strengthening collaboration across the ENVRI ecosystem. The findings consistently highlighted the need for stronger collaboration between research infrastructures and industry, improved science-policy translation, greater visibility of ENVRI services and capabilities, more effective matchmaking and brokerage functions, increased access to testing and validation environments, and long-term mechanisms supporting co-creation and stakeholder participation.

The feedback collected throughout the project strongly validates the strategic direction of the ENVRI Innovation Roadmap. Stakeholders emphasised the importance of moving beyond project-based interactions towards permanent structures that support continuous dialogue, knowledge exchange, and innovation development. Support was expressed for the establishment of an ENVRI Innovation Hub acting as a coordination mechanism for stakeholder engagement, innovation services, capacity building, mobility, matchmaking, and communities of practice. Stakeholders also highlighted the need for dedicated innovation and industry engagement functions within Research Infrastructures, improved communication through policy-oriented products and user-friendly services, and stronger links between scientific outputs, market opportunities, and policy needs.

Based on the evidence collected, this deliverable proposes nine recommendations: establishing permanent multi-stakeholder innovation forums; developing an integrated engagement design and facilitation framework; creating thematic working groups; introducing structured stakeholder consultation processes; establishing dedicated industry engagement and innovation roles; promoting cross-sector learning activities; supporting mobility, exchange, and transnational access; implementing a robust monitoring, evaluation, and continuous improvement framework based on stable KPIs and impact pathways and Monitoring, Evaluation and Continuous Improvement. Together, these measures provide a practical roadmap for strengthening stakeholder engagement and innovation across the ENVRI ecosystem, supporting the transition from knowledge generation to societal, environmental, and economic impact.

Introduction

Background

Engaging stakeholders in innovation processes is widely recognized as essential because innovation rarely occurs in isolation; instead, it is a collaborative, interactive process shaped by multiple actors. Scholars such as Henry Chesbrough emphasize this through the concept of *open innovation*, arguing that firms must purposively use inflows and outflows of knowledge to accelerate innovation and expand markets (Chesbrough, 2003). By involving customers, partners, suppliers, funders and even competitors, organizations can access diverse knowledge bases, reduce uncertainty, and identify opportunities that would otherwise remain hidden. Similarly, Eric von Hippel highlights the role of “lead users” in innovation, demonstrating that users themselves often develop novel solutions that organisations can adopt and scale (von Hippel, 2005). Engaging stakeholders therefore enhance creativity, improve problem–solution fit, and increases the likelihood that innovations will meet real-world needs.

Moreover, stakeholder engagement also contributes to legitimacy, adoption, and long-term success of innovations. Everett Rogers’ *Diffusion of Innovations* theory shows that the uptake of new ideas depends heavily on communication and social systems, meaning that early involvement of stakeholders facilitates acceptance and diffusion (Rogers, 2003). In addition, Freeman’s stakeholder theory highlights that organizations must create value for a broad range of stakeholders, not just shareholders, suggesting that inclusive innovation processes improve both ethical outcomes and business performance (Freeman, 1984). Engaging stakeholders help build trust, align expectations, and reduce resistance to change, which is particularly important in complex or systemic innovations such as the ones that could be supported for the ENVRI (Environmental Research Infrastructures) community. Ultimately, integrating stakeholder perspectives not only strengthens the innovation itself but also ensures smoother implementation and broader societal impact.

Although this deliverable focuses on stakeholder engagement, findings from stakeholder consultations also informed the development and refinement of the ENVRI Innovation Roadmap. Consequently, the deliverable includes recommendations related to innovation governance, knowledge exchange, and innovation support structures.

Scope and groups of key stakeholders

Our starting point for identifying stakeholders was the ENVRINNOV Grant Agreement, which outlines the key target groups essential to achieving the project’s objectives. These stakeholders include the ENVRI community (Environmental Research Infrastructures), ESFRI (the European Strategy Forum on Research Infrastructures), the broader scientific and research community, private sector organizations, and policymakers. Together, these groups play a critical role in advancing the project’s goals, ensuring the uptake of its outcomes, and maximizing its scientific, societal, and policy impact.

The ENVRI community consists of all current and future research infrastructures (RIs), as well as related projects and networks in the field of environmental sciences. This community represents the core ecosystem of actors generating and managing environmental knowledge and services. The ESFRI (European Strategy Forum on Research Infrastructures) and wider scientific community includes the ESFRI Forum—such as its

Chair, Executive Board, members, delegates, and Secretariat—as well as RIs, projects, and networks across the pan-European research infrastructure landscape that are actively engaged in innovation, including other projects funded under the same call.

The private sector encompasses two main groups. First, businesses operating in the environmental domain—ranging from SMEs to large corporations—that develop technologies or make use of new technologies and services emerging from ENVRI activities. Second, networks and representative organisations that support and promote the uptake of project results. These include organisations such as the European Institute of Innovation and Technology (Climate-KIC), European and international industry associations (for example, the European Association of Remote Sensing Companies – EARSC), national industry bodies, and collaborative initiatives such as EOSC-DIH (European Digital Innovation Hub Network).

Finally, policymaking and funding bodies include public authorities and organisations that shape or influence research and innovation policies. These actors play a key role in ensuring that project results are taken up at policy level and supported over the long term. This group includes the European Commission, the EU Research Executive Agency, the European Innovation Council (EIC), national and regional funding agencies, as well as international organisations such as the IPCC (International Panel on Climate Change), IPBES (Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services) and UNFCCC (United Nations Framework Convention on Climate Change). It also includes national authorities responsible for designing, implementing, or monitoring environmental policies, and global environmental monitoring organisations such as the World Meteorological Organization (WMO).

Key activities for the Outreach of stakeholders

Activities Led or Coordinated by ICOS

The following key stakeholder engagement activities are reported in this deliverable. In each of these activities, ICOS played a leading role in their organisation and coordination:

- Workshop on Stakeholder Mapping, Annual Meeting, 28-30 January 2025, Rome, Italy.
- First annual event: Panel Session at Intergeo, 7-9 October 2025, Frankfurt, Germany.
- Webinar on Innovation in Hydrosphere Measurement Techniques, 22 October 2025, online.
- ICOS & Partners Workshops on Methods for Stakeholder Outreach, December 2025, Finland.
- Internal Workshop on Stakeholder Engagement with Project Partners, 5 February 2026, online, co-designed with the Cyprus Institute
- Interviews with Key Stakeholders to Gather Feedback on the Roadmap, May-August 2026.
- Second Annual Event: Presentation and Interactive Activity. During the ICOS Science Conference in Lund. Hyltemossa Excursion, 18th September 2026, Sweden

Activities Supported by ICOS

The following activities also contributed to stakeholder engagement. While ICOS participated in and supported these events, it was not responsible for their primary organisation:

- Workshop on Innovation in Atmospheric Measurement Techniques, 12 June 2025, online.
- EU Research & Innovation Days, 16-18 September 2025, Brussels, Belgium. ICOS representatives participated and reported on the event.

Identification of representatives of key stakeholders' groups

Workshop on Stakeholder Mapping

To better map the key stakeholder groups for consultation and feedback, we organized a dedicated workshop in Rome on 29 January 2025, held as part of the project's Annual Meeting. Participants were divided into small groups based on their involvement in different work packages. Each group was tasked with identifying the main stakeholder groups relevant to their specific work package.

Details on the workshop

Stakeholders were categorized into two broad clusters: Policy makers, subdivided into: International, EU, National, and Local policy makers. Other stakeholders, including Civil Society, European Research Infrastructures, Private sector, Technical/specialist networks, Global organizations, Knowledge Intermediaries, and Funding bodies.

Each stakeholder category was clearly defined and made available through a digital whiteboard tool (Trello) used during the workshop. The work packages and participants were distributed in three groups. The session was supported by three facilitators to guide discussions and ensure consistency across groups. The following two screenshots provide visual documentation of the workshop's outcomes.

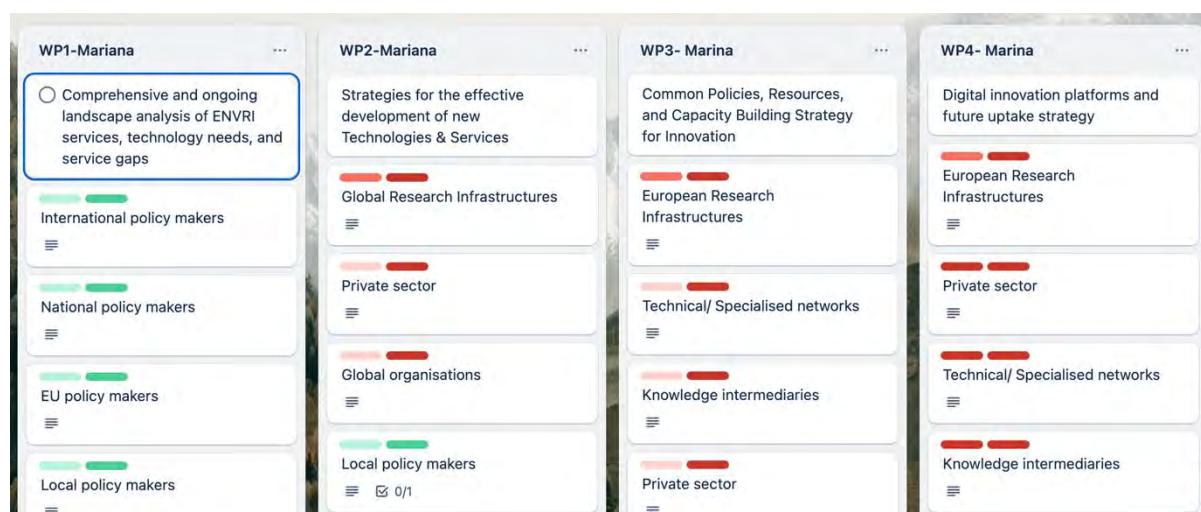


Image 1. Results from the prioritisation of stakeholders corresponding to each WP.

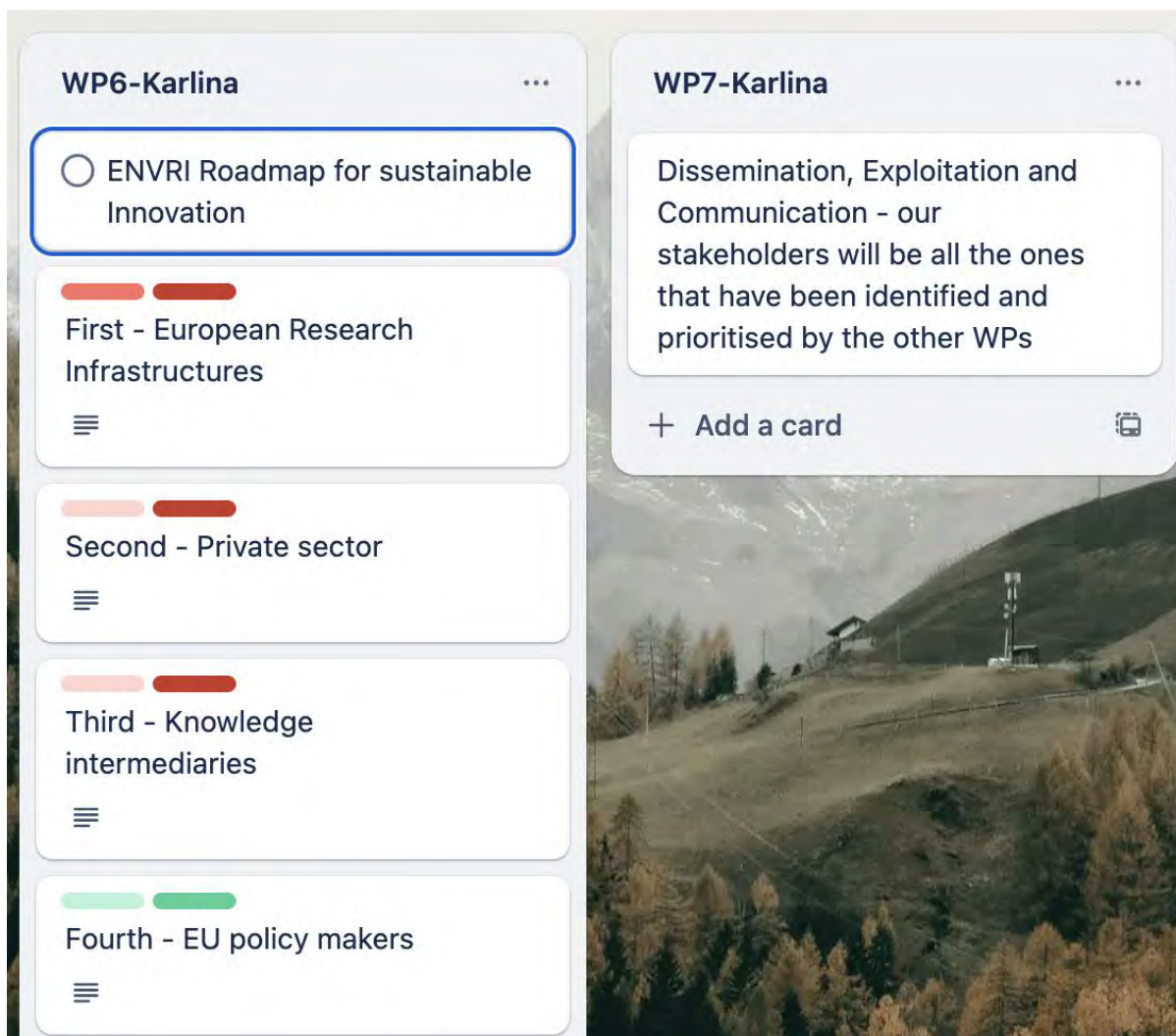


Image 2. Results from the prioritisation of stakeholders corresponding to WP6-7.

The Trello board used for this workshop is available through this link: <https://trello.com/b/E6D3iBTL/envrinnov-wp5-stakeholders>

Conclusions from this workshop

Overall, a clear pattern emerged from the workshop discussions: most participants identified European Research Infrastructures, the private sector, and policy makers as the most relevant stakeholder groups for their respective work packages. These were consistently prioritized across different groups, highlighting their central role in the future engagement strategy of the project.

A final discussion was held on the strategic direction of stakeholder engagement, specifically on whether to organize an event targeting policy makers or focus initially on the broader private sector. While no definitive conclusion was reached, there was general agreement that engaging the private sector in the early phase of the project could be more effective. This would allow the consortium to refine and align its messaging before directly addressing policy makers at a later stage—once concrete results and recommendations are available.

Additionally, partners were consulted on their interest in participating in a potential event that ICOS could organize during the Meteorological Technology World Expo 2025 in Vienna. While the concept of presenting the innovation results of ENVRINNOV jointly was seen as valuable in principle, the overall level of interest was limited. The proposal was not rejected, but it became evident that more clarity and alignment would be needed for such an initiative to move forward meaningfully.

The workshop also highlighted the complementary roles of the three priority stakeholder groups. Research Infrastructures contribute scientific expertise, facilities, and data that support both upstream and downstream innovation. The private sector plays an important role in transforming scientific knowledge and services into applications, products, and commercial solutions, while policymakers contribute by creating the regulatory, funding, and strategic conditions that enable innovation uptake. Together, these groups form the core stakeholder ecosystem that the ENVRI Innovation Roadmap seeks to engage in.

Internal Workshop on Stakeholder Engagement with Project Partners

On 5 February 2026, we organised an internal workshop with project partners to map and assess stakeholder engagement activities across the work packages. The workshop aimed to provide an overview of how each work package is engaging stakeholders, identify stakeholder needs, and explore potential support actions to strengthen engagement throughout the project.

Eight partner organisations participated in the workshop. Together, they identified the key stakeholders relevant to each work package at that stage of the project, discussed the rationale for prioritising these groups, and outlined strategies for involving them throughout the project's lifetime. The workshop also helped to align stakeholder engagement efforts across the consortium and ensure that activities are targeted, coordinated, and responsive to stakeholder needs.

Following this exercise, participants developed a roadmap for future stakeholder engagement. This helped us identify potential overlaps and ensure coordination, while also confirming that teams engaging with stakeholders receive the necessary support from our work package. Feedback collected in the file indicates that the workshop was generally perceived as useful for generating new opportunities and structuring engagement, although identifying certain stakeholder groups was sometimes challenging.

Details of the workshop

The workshop focused on structuring stakeholder engagement across several work packages (WP3, WP4, WP6, and WP7) by identifying, prioritising, and contextualising key stakeholder groups. Participants mapped a broad range of actors, including European Research Infrastructures, technical specialised networks, knowledge intermediaries, the private sector, policy makers, funding organisations, and global organisations. For each work package, partners specified concrete stakeholders (such as the ENVRI community, ESFRI, ERIC Forum, PERIIA (Pan European Research Infrastructure ILO Association), and private companies connected to specific research infrastructures), assessed whether contact already existed, and clarified the reasons for their selection. These reasons consistently relate to ensuring uptake of project results, obtaining feedback to refine deliverables, aligning with existing initiatives, and supporting the long-term sustainability of project outcomes.

Stakeholders in WP3

1. European Research Infrastructures	2. Technical specialised networks	3. Knowledge Intermediaries	4. Private sector	5.
Who are the key stakeholders you plan to engage with for this project?	Who are the key stakeholders you plan to engage with for this project?	Who are the key stakeholders you plan to engage with for this project?	Who are the key stakeholders you plan to engage with for this project?	Who are the key stakeholders you plan to engage with for this project?
Are you currently in contact with these stakeholders regarding the project? (Y/N)	Are you currently in contact with these stakeholders regarding the project? (Y/N)	Are you currently in contact with these stakeholders regarding the project? (Y/N)	Are you currently in contact with these stakeholders regarding the project? (Y/N)	Are you currently in contact with these stakeholders regarding the project? (Y/N)
Why have you chosen these specific stakeholders? (How will their involvement contribute to the project goals?)	Why have you chosen these specific stakeholders? (How will their involvement contribute to the project goals?)	Why have you chosen these specific stakeholders? (How will their involvement contribute to the project goals?)	Why have you chosen these specific stakeholders? (How will their involvement contribute to the project goals?)	Why have you chosen these specific stakeholders? (How will their involvement contribute to the project goals?)
How do you plan to engage these stakeholders? (What activities or/and communication channels will you use?)	How do you plan to engage these stakeholders? (What activities or/and communication channels will you use?)	How do you plan to engage these stakeholders? (What activities or/and communication channels will you use?)	How do you plan to engage these stakeholders? (What activities or/and communication channels will you use?)	How do you plan to engage these stakeholders? (What activities or/and communication channels will you use?)
If you have done stakeholder mapping	If you have done stakeholder mapping	If you have done stakeholder mapping	If you have done stakeholder mapping	If you have done stakeholder mapping

Image 3. Example of the mapping for stakeholder engagement done for each WP

In addition, the workshop produced initial engagement plans and a forward-looking roadmap. Partners outlined practical engagement methods, including bilateral meetings, participation in conferences and exhibitions, training sessions, surveys, webinars, and collaboration through existing networks and forums. The roadmap also captures upcoming opportunities such as scientific conferences, training sessions, and meetings with initiatives like ENVRI-Hub next, illustrating how engagement is expected to evolve over time.

Roadmap

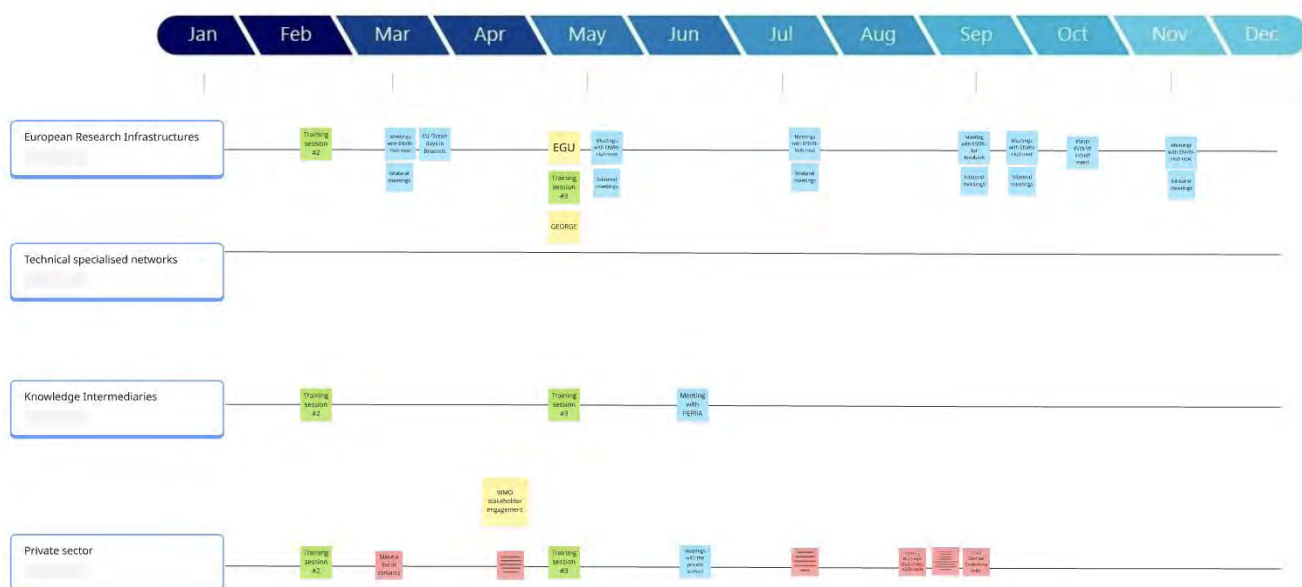


Image 4. Roadmap built during the workshop.

Conclusion on this workshop

A first key conclusion is that there is strong alignment across work packages in terms of the types of stakeholders considered essential, particularly the central role of the ENVRI community, European-level bodies, and the private sector. This suggests good coherence in the project's overall engagement approach but also highlights the importance of coordination mechanisms to manage overlaps, especially where multiple

work packages target similar stakeholders through comparable activities. Partners highlighted the usefulness of this workshop and the need for better coordination across projects and tasks within projects to avoid duplication of engagement activities and to share stakeholder intelligence.

A second conclusion is that stakeholder engagement is already partially established but uneven across groups, with some partners reporting active contacts while others still need to build connections. The planned mix of engagement formats—ranging from formal events to direct interactions—indicates a comprehensive approach, yet the roadmap made during this workshop also reveals the need to further specify priorities and ensure that less clearly defined stakeholder groups are more systematically addressed.

Mapping of existing mechanisms and best practices for the engagement of key stakeholders

In this deliverable, we report results of mapping of existing engagement mechanisms and the analysis of best practices among them.

Internal ICOS & Partners Workshops on Methods for Stakeholder Outreach

Mapping of existing mechanisms was conducted in two workshops with 7 and 32 participants. The first session aimed to test the methodology as well as collect experience from ICOS ERIC Head office. The participants populated this board and compared formats. In ICOS Head Office the Operations Unit the session was organised in January 2026. Colleagues of this unit are experts in creating and organising events to outreach stakeholders. 7 persons participated. The second, larger session was organized in association with ENVRINNOV 2nd Annual meeting, and 32 persons took part in this meeting.

The results from the two sessions were analysed jointly, as all contributions were collected in the same (Trello) repository. This approach allowed participants in the workshop held during the 2nd Annual Meeting to review, build upon, and expand the materials previously gathered from participants at the ICOS Head Office workshop.

Details on the workshops

The tool used in these sessions was Trello platform board, as many of the participants were familiar with its user interface. The Trello board help us to consolidate a collaborative effort to map, compare, and evaluate a broad range of engagement formats used by Research Infrastructures, scientific networks, EU projects, and related communities. Across contributions, a clear ambition emerges to create a shared typology and evidence-based guidance on how to select, design, and execute engagement activities that match stakeholder needs, project goals, and resource constraints.

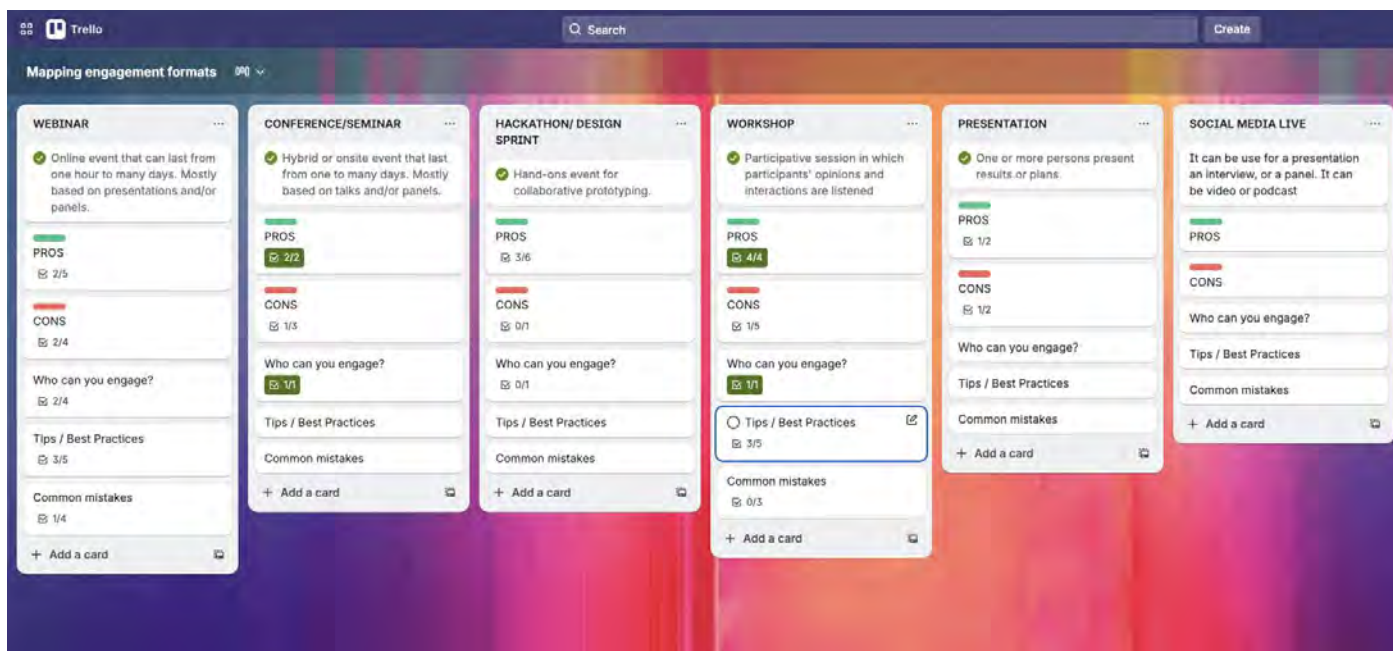


Image 5. Screenshot on the results of the workshops conducted to collect information on methods.

The formats examined include:

- Webinars
- Conferences & Seminars
- Workshops
- Hackathons / Design Sprints
- Presentations
- Social media Live formats
- Meetings / Focus Groups
- Field Visits / Demo Days
- Campaigns
- Public consultation / commenting on drafts

Each format has been assessed across consistent analytical dimensions: pros, cons, best practices, common mistakes, target stakeholders, and (sometimes) technical or logistical considerations. This makes the dataset rich and easy to analyse longitudinally.

Conclusions on these workshops

The two workshops demonstrated that stakeholder engagement should be understood as a continuum rather than a collection of isolated methods. No single engagement format is suitable for all situations; the effectiveness of a format depends on the objectives of the activity, stakeholder maturity, available resources, and the desired level of participation.

The formats examined include webinars, conferences & seminars, workshops, hackathons / design sprints, presentations, social media, live formats, meetings / focus groups, field visits / demo days, campaigns and public consultation / commenting on drafts.

Each format has been assessed across consistent analytical dimensions: pros, cons, best practices, common mistakes, target stakeholders, and (sometimes) technical or logistical considerations. This makes the dataset rich and easy to analyse longitudinally.

A central tension runs through almost all analysis:

High-interaction formats (workshops, focus groups, hackathons) offer deep engagement and rich qualitative insights, but are resource-intensive, require skilled facilitation, and yield small participant numbers.

Broadcast formats (webinars, presentations, social media live, campaigns) scale easily, reach international audiences, and are cheap to run, but typically face low engagement, multitasking, and minimal feedback loops.

This suggests that both teams consulted are aware that no single format is optimal; instead, designing engagement pathways—moving participants from light-touch to deep participation—is likely the most effective approach.

Format	Interactivity	Scalability	Best for	Key Weakness
Webinar	Low	High	Awareness, dissemination	Low engagement
Conference/Seminar	Medium	Medium	Networking, visibility	Resource-intensive
Workshop	High	Low	Co-creation, qualitative input	Needs skilled facilitation
Hackathon/Design Sprint	High	Low	Innovation, prototyping	Resource-heavy
Presentation	Low	Medium	Sharing results	One-way communication
Social Media Live	Low	High	Mass outreach	No feedback
Meeting/Focus Group	High	Low	Consultation	Small scale only
Field Visit/Demo Day	Medium	Low	Trust-building	Logistical work
Campaigns	Low	High	Public awareness	Generic messaging

Table 1: Summary of results regarding the formats for engaging stakeholders

A common misconception in stakeholder engagement is that certain engagement formats are inherently suited to a particular stakeholder group, for example, that webinars are best for policymakers, workshops for researchers, or hackathons for industry. In practice, there is little evidence to support such rigid distinctions. Most engagement formats—including webinars, seminars, workshops, hackathons, presentations, social media live sessions, bilateral meetings, focus groups, field visits, and communication campaigns—can be effectively used with any stakeholder group. The suitability of a format depends less on *who* the stakeholder is and more on *where the collaboration stands*, what objectives the engagement seeks to achieve, and what level of commitment participants are able and willing to provide. The International Association for Public Participation (IAP2), for example, emphasizes that different engagement approaches are appropriate depending on the goals, resources, timelines, and desired level of participation, rather than the stakeholder category itself. (IAP2, 2025)

Consequently, selecting an engagement format should be viewed as a strategic decision within a broader collaboration journey. At the early stages of a relationship, stakeholders may have limited familiarity with

the project, uncertain expectations, or competing priorities. Under these circumstances, requesting intensive participation in a multi-day workshop or hackathon may be unrealistic. Similarly, a senior policymaker may be unable to attend an in-person event due to scheduling constraints, while still being willing to contribute to an online discussion or provide strategic input through a short meeting. Effective engagement therefore requires a realistic assessment of both the project's capacities and the stakeholders' availability, interests, incentives, and decision-making authority. The Organisation for Economic Cooperation and Development (OECD) guidance on stakeholder participation similarly highlights that meaningful engagement should be accessible, timely, and responsive to stakeholders' circumstances. (OECD, 2026).

Building commitment gradually is often more effective than immediately requesting substantial investments of time and effort. A useful starting point may be a webinar, panel discussion, or keynote presentation. Inviting a stakeholder to speak at an event not only provides visibility and recognition but can also create an initial sense of ownership and connection with the project. Such low-threshold forms of participation allow stakeholders to become familiar with the initiative before being asked to engage more deeply. As trust and mutual understanding develop, stakeholders can then be invited to participate in more demanding activities, such as co-creation workshops, working groups, pilot projects, hackathons, advisory boards, or steering committees. Research on co-creation and multi-stakeholder collaboration consistently shows that engagement is most successful when participation evolves progressively and stakeholders perceive value in increasing their level of involvement. (van der Zouwen et al, 2025)

An important principle is that the intensity of the engagement format should be proportional to the level of commitment that can reasonably be expected from a stakeholder. Asking for a one-hour contribution to a webinar requires a different relationship than requesting participation in a two-day workshop or a six-month co-design process. When organizations fail to recognize this distinction, they risk stakeholder fatigue, declining participation rates, and weakened relationships. Conversely, aligning engagement methods with stakeholders' motivation and availability increases the likelihood of sustained collaboration and meaningful contributions. The IAP2 participation framework explicitly recognizes that different levels of engagement demand different levels of involvement and influence, and that these expectations should be transparently communicated from the outset. (IAP2, 2025)

Beyond the design of formal engagement activities, successful collaboration also depends on the quality of interpersonal relationships. Much of the trust, understanding, and alignment necessary for long-term cooperation is developed outside structured sessions. Informal interactions during conference dinners, networking receptions, site visits, or coffee breaks often create opportunities for candid discussions that may not emerge in public forums. These settings can help participants explore sensitive issues, clarify concerns, identify shared interests, and build the personal connections that underpin successful partnerships. For this reason, engagement planning should include not only the formal agenda but also the informal spaces where relationships can develop naturally. Meaningful stakeholder engagement is ultimately as much about fostering trust and mutual understanding as it is about selecting the appropriate engagement method.

Ultimately, stakeholder engagement and participation should not be regarded as a simple communication activity or as a set of isolated methods applied at different stages of a project. Rather, effective

engagement requires careful design, continuous attention to detail, and a deep understanding of the motivations, constraints, and expectations of different stakeholder groups. Research on participation and co-creation has consistently shown that successful collaboration depends not only on the choice of engagement methods but also on the quality of facilitation, relationship-building, trust, and the creation of meaningful opportunities for stakeholders to contribute. For this reason, ICOS has chosen to dedicate specific expertise and resources to stakeholder engagement by assigning a service designer to lead these efforts. This reflects the recognition that stakeholder participation and engagement cannot be approached superficially or treated as an administrative task. Service designers bring specialist knowledge in participatory and co-design methodologies, as well as the professional attitudes, sensitivities, and facilitation skills required to create inclusive and productive collaborative processes. Their expertise extends beyond the application of methods and tools; it encompasses empathy, active listening, stakeholder journey design, management of power dynamics, and the ability to foster trust and long-term commitment among diverse actors. Such capabilities are increasingly recognized as critical success factors in complex multi-stakeholder initiatives and co-creation processes.

Strengths and good practises

Broadly applicable best practices include:

- Define a clear goal or question for the interaction
- Use interactive tools (polls, Mentimeter, Mural, Miro, sticky notes)
- Collect registrations and attendance for reporting needs
- Provide food and comfortable environments for onsite events
- Prepare backup questions for to invigorate discussions
- Use visuals (infographics, videos) to boost engagement
- Leave time and space for discussion, not just presentations
- Tailor messaging to specific audiences
- Offer hybrid options where possible
- Summarise and ask for participants' comments on the summary

These insights are practical, clear, and actionable for the ENVRI Innovation Hub (EIH).

The mapping exercise reveals a mature and nuanced understanding of engagement across this communities. Participants recognize that engagement is multidimensional, and that the choice of format is never neutral—it shapes who participates, what kinds of knowledge emerge, and how trust is built. This dataset provides a robust foundation for creating: an ENVRI Engagement Handbook, internal training modules, or a decision-support tool for choosing engagement formats.

Across all the formats examined, a clear picture emerges of engagement as a continuum rather than a set of isolated techniques, where each format carries its own balance of depth, reach, and resource demands, reflecting different philosophies of how knowledge is shared and relationships are built within scientific

communities. Webinars and campaigns, for instance, offer scalability and visibility but tend to flatten interaction into one-way flows, revealing a persistent tension between efficiency and true participant involvement, while more immersive formats like workshops, hackathons, and focus groups show their value in fostering reflection, co-creation, and trust even as they expose vulnerabilities—such as dependence on facilitation skills or the fragility of online attention—that can compromise their outcomes when not carefully planned.

Conferences and field visits sit somewhere in between, acting as social glue that strengthens networks and shared identity but often struggling to move beyond traditional presentation-driven structures or logistical constraints, suggesting that their potential for anchoring community-building may be underused when interactivity is not intentionally designed in (which is the case in most conferences organised by Research infrastructures). What becomes evident is that no single format can satisfy all engagement aspirations: the most effective strategies are those that weave formats together to gradually deepen participation, honour the diversity of stakeholders, and acknowledge the emotional and cognitive labour required to keep people present and invested. Ultimately, the reflections across formats demonstrate a collective awareness that meaningful engagement is neither accidental nor automatic is an ongoing craft that blends design, facilitation, and commitment, and depends on choosing formats not just for convenience but for the kinds of outcomes one hopes to cultivate.

Pilot cases for the outreach of key stakeholders

In this chapter, three activities are highlighted and documented because they were organised as part of the actions of this work package. It is important to notice that key partners in the project were involved and consulted on the decision on what could be a relevant event to organise face-to-face.

First Annual Event: Panel Session at Intergeo

During the Intergeo 2025 panel *“Connecting Environmental Data & Geospatial Solutions: From Research to Action”*, we brought together experts from European environmental research infrastructures to discuss how long-term environmental data can be better integrated into geospatial applications, supporting science-based decision-making and sustainable development. This ENVRINNOV-led session had also an interactive session to actively involve the audience and move beyond a traditional panel format. This was done using Mentimeter, a digital tool for real time public consultation. The session, hosted by Mariana Salgado (ICOS ERIC), included talks by three experts from leading Environmental Research Infrastructures (ENVRIs):

- Jaana Bäck (eLTER RI) – ‘Long-term ecosystem data for geospatial applications’
- Tuukka Petäjä (ACTRIS ERIC) – ‘Atmospheric data and remote sensing synergies’
- Leo Rivier (ICOS ERIC) – ‘Carbon flux data validation’

Details on the session

The ENVRINNOV panel at Intergeo 2025 highlighted the role of Environmental Research Infrastructures (ENVRIs) in advancing open science and innovation within the geospatial sector. Through presentations from different infrastructures, participants learned about the wide range of open environmental data and services available, including atmospheric, ecosystem, and carbon observation data. The session also explored how these resources can be used beyond academia, creating opportunities for innovation in areas

such as environmental management, urban planning, and commercial applications. The panel was held at Intergeo because of its ability to reach a large and highly relevant audience of geospatial professionals, researchers, policymakers, and industry representatives, with approximately 18,500 participants attending the event.

To encourage active participation, the panel included an interactive brainstorming exercise designed to help participants imagine future uses of ENVRI data. Following a creativity warm-up activity, attendees generated ideas ranging from scientific applications, such as machine learning and satellite data validation, to educational initiatives, precision agriculture, environmental awareness, and decision-support tools. The exercise revealed strong interest in applying ENVRI data to real-world challenges and demonstrated the audience's willingness to explore innovative and cross-sectoral uses of environmental data.

One of the most important outcomes of the session was the identification of a common misconception regarding data accessibility. Several participants suggested making ENVRI data freely available, revealing that they were unaware that most ENVRI data is already open and publicly accessible. This provided an opportunity for panelists to explain the existing open-data services offered by ENVRI and to shift the discussion toward improving awareness, usability, interoperability, and data reuse. Through this dialogue, the session enhanced the visibility of ENVRI, strengthened understanding of their innovation capacity, and contributed directly to raising awareness of the value and accessibility of environmental research infrastructure data within the geospatial community.

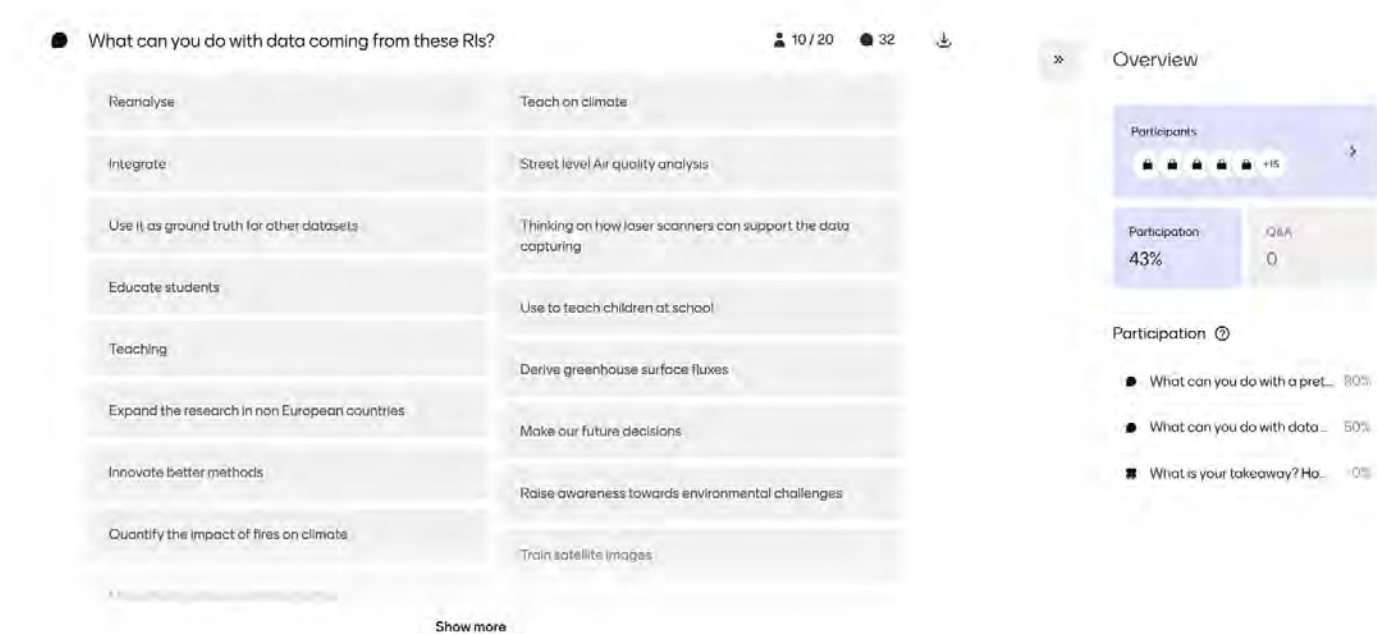


Image 6. Screenshot of the interactive board (Mentimeter) used in Intergeo

Conclusions from this event

This interactive exercise generated several important insights that would likely not have emerged through a conventional discussion format. By inviting open brainstorming, the activity revealed underlying assumptions and misconceptions, demonstrating how free ideation can surface implicit understandings that

often remain invisible in standard Q&A sessions. At the same time, participants consistently linked the data to practical outcomes such as decision-making, education, innovation, and broader societal value, indicating a strong appetite for applied use. However, the exercise also showed that awareness remains a key challenge: even within a technically informed audience, the openness and accessibility of research-infrastructure data cannot be assumed. Overall, the interactive format proved to be a powerful tool for knowledge exchange, functioning not only as an engagement mechanism but also as a real-time learning opportunity for both the audience and the speakers.

What started as a creative brainstorming exercise ultimately became a valuable moment of mutual learning. The session succeeded in opening imaginative thinking about future uses of ENVRI data, while also highlighting the need for clearer communication about the open and free nature of research infrastructure data.

This experience confirms that interactive approaches—when designed intentionally—can simultaneously: Encourage creativity, Surface misconceptions, enable clarification, and strengthen the bridge between research infrastructures and geospatial communities.

We see strong value in continuing to use such formats to co-explore the future of environmental data from research to action.

This session was jointly organised by ICOS, eLTER, and ACTRIS under the umbrella of the ENVRINNOV project. By demonstrating the potential of shared data and tools, the ENVRINNOV session at INTERGEO 2025 showcased how greater cooperation between the environmental and geospatial sectors can lead to new insights and better-informed decisions for a sustainable future.

Webinar on Innovation in Hydrosphere Measurement Techniques

On 22 October 2025, a webinar was held featuring a morning of presentations and a panel discussion focused on recent innovations in marine and freshwater measurement techniques. The event gathered 30 participants, who explored how collaboration between scientists and industry can support the development of new technologies, products, services, and instrumentation.

The webinar brought together a diverse audience including research organisations operating European Research Infrastructures or using their data and services, private companies providing scientific instrumentation and measurement services, industrial end users seeking new technologies, and public and private organisations involved in hydrosphere observations. This mix of participants enabled a multidisciplinary discussion on both technological development and practical application.



Webinar: Innovation in Hydrosphere Measurement Techniques

22 Oct 2025

Join us on 22 October 2025 9:00-11:30 CEST for a morning of presentations and panel discussion on the latest innovations in marine and freshwater measurement techniques. Participants can expect to find out about how co-operation between scientists and industries can enhance development of new technologies, products, services, and instrumentation.

[Click here to register to the webinar.](#)

Who is it for

This webinar is aimed at all industry professionals, researchers, and post graduate students interested in innovation in hydrosphere measurement techniques, including:

- Research Organisations operating European Research Infrastructure (RI) or interested in RI data and services
- Private Companies offering scientific instrumentation or services in the field of marine and freshwater measurements
- Industrial End-Users looking for new technologies/services
- Public and private sector organisations involved in hydrosphere observations

Programme

The speakers, who include instrument developers and scientists with recent related publications, will briefly present their areas of expertise, followed by a panel discussion, with a focus on technology readiness levels and how science can help instrument developers to advance.

Confirmed speakers so far include:

- Janne-Markus Rintala, GEORGE project
- Tobias Steinhoff, GEOMAR Helmholtz Centre for Ocean Research Kiel
- Alizée Roobaert, Flanders Marine Institute (VLIZ)
- Didier Clech, RBR
- Matthew Mowlem, ClearWater Sensors

Image 7. Screenshot on the website advertising the webinar.

Details on the webinar

The programme consisted of short presentations delivered by invited speakers, followed by a panel discussion. The speakers included both instrument developers and researchers with recent publications in the field, ensuring a balanced perspective between technological innovation and scientific needs. Contributions were provided by Janne-Markus Rintala from the GEORGE project, Tobias Steinhoff from the GEOMAR Helmholtz Centre for Ocean Research Kiel, Alizée Roobaert from the Flanders Marine Institute (VLIZ), Didier Clech from RBR, and Matthew Mowlem from ClearWater Sensors. The discussion placed particular emphasis on technology readiness levels and on how scientific collaboration can support the advancement and validation of new instruments.

A central theme throughout the webinar was the need to improve ocean data to better understand climate change, particularly the role of the ocean in the global carbon cycle. The keynote presentation highlighted the GEORGE project, which focuses on the development of new sensors, observation platforms, and training activities aimed at enhancing autonomous ocean monitoring and improving data integration across European research infrastructures.

The presentations covered both technological and scientific perspectives. From the industry side, speakers introduced advances in high-precision sensors, including pressure, chemical, and microfluidic technologies, as well as innovations such as smart cables and real-time monitoring systems. Scientific contributions focused on the use of artificial intelligence and machine learning to reconstruct ocean carbon data and address gaps in observational datasets. These presentations also highlighted the limitations of existing large-scale databases, such as uneven spatial coverage and data sparsity in certain regions. In addition, the webinar addressed validation efforts, including a large intercomparison exercise of measurement instruments, which demonstrated the importance of calibration, accuracy, and standardisation in ensuring reliable observations.

The webinar was organised by ICOS ERIC and EMSO ERIC within the framework of the ENVRINNOV and GEORGE projects.

Conclusions on the webinar

The discussions pointed to several key insights. Collaboration between research infrastructures, industry, and policymakers was identified as essential for progress. Persistent data gaps, particularly in under-sampled ocean regions, continue to limit understanding and require coordinated efforts to address. Advances in sensor technologies and observation systems are necessary to improve spatial and temporal coverage, while approaches based on artificial intelligence can enhance the use of existing data but remain dependent on high-quality observational inputs. The importance of standardisation and validation processes was emphasised, as was the need for training and capacity building to support the uptake of new technologies. Participants also highlighted broader challenges such as data sharing, infrastructure security, and the long-term sustainability of observation systems.

Overall, the webinar underlined that advancing ocean observation requires a systemic approach that combines technological innovation, high-quality data, skilled communities, and sustained collaboration. These elements are necessary to improve scientific understanding and to support evidence-based decision-making in the context of climate change.

Feedback and recommendation on the initial version of innovation roadmap

Second Annual Event: Presentation and Interactive Activity

During the ICOS conference 2026 in the city of Lund, Sweden in September we organised an event to outreach stakeholders. This event was part of the excursion to the Hyltemossa station. The objective was to get feedback on the Innovation Road Map. 40 participants took part in this activity.

Details on the event

This interactive session was designed for industry partners, researchers, and policymakers attending the ICOS Conference who were interested in shaping the future of innovation within environmental research infrastructures. Participants engaged in a forward-looking discussion on how innovation can be strengthened through collaboration across the environmental research infrastructure landscape.

The session began with a presentation by Mariana Salgado, who introduced the ENVRINNOV project through a short video and provided an overview of the Innovation Toolbox currently under development, as well as the innovation-related services available through the project website. Participants were also invited to provide feedback on the Innovation Roadmap being developed within ENVRINNOV.

The session offered an opportunity to exchange experiences, identify emerging needs, influence future priorities, and collectively explore how environmental research infrastructures can enhance their support for innovation in the coming years. The discussion was guided by the following questions:

- What actions are you currently taking to foster innovation?
- What types of support, services, or tools would be most valuable for accelerating innovation?
- Which formats and approaches are most effective for building innovation capacity?
- Where should environmental research infrastructures be in five years regarding innovation and impact?

To accommodate participant demand, the session was delivered twice, as the presentation room at the Hyltemossa Research Station could host a maximum of 20 participants at a time. Both sessions were facilitated using Mentimeter, enabling participants to contribute ideas and reflections in an interactive format.

The results from the two sessions have been consolidated and analysed together. The following section presents the main findings and key conclusions that emerged from these discussions.

Image 8. Screenshot on the event as part of the ICOS Science Conference.

Excursion 1: ICOS Hyltemossa atmosphere and ecosystem station

Date: Friday 18 September (full day)

Cost: 350 SEK

Capacity: 44 people

Departure: 8:30 (to be confirmed)

This one-day excursion will take you to the Hyltemossa Research station, located within a commercially used spruce forest in northern Scania, about 1.5 hours drive north of Lund. Hyltemossa is one of the major nodes of the climate-related research infrastructure in Sweden and combines an ICOS Class 1 Atmosphere and Class 2 Ecosystem station, an ACTRIS station and measurements for the SITES spectral program. You will get the opportunity to learn about the measurements at Hyltemossa, to tour the facilities, and to hear about the ongoing research including the [ENVRINNOV project](#) . Bus transfer, lunch and Swedish fika with coffee and tea are included in the price.

Preliminary programme:

8.30 Departure by bus from Lund (exact location to be confirmed)

10:00 - 14:30 Visit to Hyltemossa

14:30 Depart to Lund

16:00 Arrive back in Lund



A view from the Hyltemossa tower. Photo: Tobias Biermann



Image 9: Presenting ENVRINNOV in Hyltemossa

Conclusions on the event

The Hyltemossa outreach event brought together a diverse group of participants representing universities, research infrastructures, governmental organisations, companies, and other organisations, with universities being the largest stakeholder group. Participants reported that they are currently fostering innovation through the development of new measurement methods, sensors, sampling devices, environmental monitoring techniques, data products, interdisciplinary collaboration, stakeholder engagement, open-source tools, data sharing, and cooperation with industry partners. Across both sessions, the strongest message was the need for greater support through dedicated funding, complemented by training opportunities and matchmaking mechanisms that facilitate collaboration between researchers, infrastructures, industry, and other societal actors. These findings strongly support roadmap actions focused on innovation services, networking, capacity building, and stronger stakeholder engagement.

Participants consistently identified peer networks as the most effective approach for building innovation capacity, followed by training and mentoring activities, highlighting the importance of community-based learning and knowledge exchange. Looking ahead at five years, respondents envisioned ENVRIs delivering greater impact through enhanced environmental monitoring technologies, more accessible and interoperable data, stronger collaboration across research infrastructures, closer engagement with

policymakers and industry, and more effective communication of scientific results to society. To achieve this, participants repeatedly emphasised the need for communication, collaboration, integration across ENVRI, stronger links with non-academic stakeholders, improved data infrastructure, sustained funding, and continued opportunities for dialogue and knowledge exchange. These priorities align well with the roadmap's ambitions to strengthen the ENVRI Innovation Hub as a platform for collaboration, innovation uptake, policy impact, and long-term societal value.

Interviews with Key Stakeholders to Gather Feedback on the Roadmap

Between May and August 2026, two stakeholder interview campaigns were carried out. The first targeted policymakers and was conducted under the leadership of Dr. Mariana Salgado, with the support of Charlotta Henry, Policy Officer at ICOS ERIC. The interviews aimed to collect feedback on the project roadmap and identify policy-relevant opportunities and challenges.

The second campaign focused on innovation and engaged a broader and more diverse group of stakeholders. All project partners were invited to provide contacts of stakeholders they had engaged with during the project. Two partners submitted stakeholder contacts, and all stakeholders identified through this process were subsequently interviewed. Led and conducted by Mariana Salgado, these interviews explored perceptions of innovation, potential collaboration opportunities, and pathways for increasing the societal and economic impact of Environmental Research Infrastructures.

In addition, representatives of WMO Technical Commissions and Research Boards, European Business and Innovation Centre Network, DG Defi (Defence Industry and Space), DG R&I (Directorate-General Research and Innovation), SBSTA (Subsidiary Body for Scientific and Technological Advice), ESFRI (European Strategy Forum on Research Infrastructures), Ministry of Transport Finland, were contacted, but an interview was not possible to arrange in given time frame.

Details on the first set of interviews:

The interview set was intentionally focused on policy, research, and science-policy interface stakeholders rather than industry or research infrastructures. In total, five interviewees represented policy makers and public authorities, including the European Commission (DG CLIMA), the Ministry of Agriculture and Forestry of Finland, the Finnish Ministry of the Environment, EPA (Environmental Protection Agency) Ireland, and HELCOM (Baltic Marine Environment Protection Commission). In addition, three interviewees represented policy-support and intergovernmental organisations, namely the European Environment Agency (EEA), represented by two experts, and JPI Oceans. Three interviewees came from research organisations and academia, including the Natural Resources Institute Finland (Luke), the University of Helsinki, and individual scientific experts and researchers. The total number of interviews was eleven. No representatives from industry or Environmental Research Infrastructures (ENVRI) were included in this interview set. Overall, the interviews represented five policy and public authorities, six organisations from the broader research, intergovernmental, and policy-support ecosystem, zero ENVRI, and zero industry representatives, providing a focused perspective on how Research infrastructures and ENVRI services can better support policy processes, environmental monitoring, scientific assessment, and evidence-based decision-making.

Conclusions on the first set of interviews

The feedback gathered strongly supports the roadmap's priorities around stakeholder engagement, science-policy translation, user-oriented services, interoperability, and integration into existing policy and operational systems. Across interviews with policymakers, environmental agencies, researchers, and science-policy intermediaries, there is a consistent message that Research infrastructure data is highly valued but is rarely used directly by decision-makers. Instead, data is typically translated through national inventories, modelling frameworks, expert groups, assessment bodies, and organisations such as the EEA (European Environmental Agency), WMO (World Meteorological Organisation), and HELCOM. This validates the roadmap's focus on intermediary users, knowledge hubs, innovation services, and tailored engagement strategies rather than direct delivery of raw data to policymakers.

A second recurring theme is the need to transform scientific outputs into actionable, accessible products. Almost all interviewees highlighted the importance of concise policy briefs, visual dashboards, integrated indicators, summaries, and decision-support tools rather than raw datasets or lengthy scientific reports. Interviewees from DG CLIMA, EEA, HELCOM, national ministries, and environmental agencies stressed that policymakers need clear messages, trusted interpretations, standardised data, and outputs tailored to policy cycles and implementation needs. Several interviewees also identified opportunities for Research infrastructures to provide near real-time monitoring, support greenhouse gas inventories, improve model calibration, and contribute to future European knowledge hubs and monitoring frameworks. These findings strongly reinforce roadmap actions related to communication, user-oriented service design, interoperability, and policy relevance.

The interviews also provide important guidance for refining the roadmap. Stakeholders highlighted gaps in visibility, geographical coverage, integration with modelling communities, and links between observational data and policy frameworks. There was strong support for deeper collaboration with organisations such as the EEA, Copernicus, national inventory agencies, research institutes, and expert networks. Several interviewees emphasised the need for continuous engagement rather than one-off dissemination activities, suggesting that Research Infrastructures should become more embedded in ongoing policy, monitoring, and assessment processes. The roadmap's ambitions around ecosystem integration, interoperability, foresight, and the development of a European Innovation Hub are therefore strongly validated.

Overall, the interviews portray Research infrastructures not as a direct policy actor but as a trusted enabling infrastructure that supports monitoring, modelling, validation, and evidence generation. The clearest roadmap recommendations emerging from the interviews are to strengthen science-policy translation, improve communication and visualisation tools, develop policy-oriented products, build partnerships with intermediary organisations, support integrated European monitoring systems, and enhance collaboration with modelling, inventory, and operational data communities.

Details on the second set of interviews:

This interview process was conducted between June and August 2026 and included representatives from a diverse range of organisations across the environmental innovation ecosystem. Of the 16 interviewees, seven represented industries, including Astralintu (Ecuador), S4 Mobile Laboratories, Codevintec, Nanometrics, an atmospheric LiDAR technology company, RBR Europe, and ENVEA. Three interviewees represented Environmental Research Infrastructures (ENVRIs), namely ICOS, ACTRIS, and eLTER being two of them members of ENVRI board. One member of EGU Scientific division. Three interviewees came

from policy and policy-support organisations, namely the European Innovation Council (EIC), the World Meteorological Organization (WMO), and the Flanders Research Policy Division/ESFRI Environmental Strategy Group. In addition, two interviewees represented other key innovation ecosystem actors: Climate-KIC, which acts as a climate innovation intermediary, and the European Centre for Medium-Range Weather Forecasts (ECMWF) through the Copernicus Atmosphere Monitoring Service. This distribution ensured that feedback was gathered from industry (7), ENVRI (3), EGU (European Geoscience Union) (1), policy organisations (3), and other ecosystem actors (2), providing a balanced perspective on innovation, collaboration, data use, and stakeholder engagement across the environmental research and innovation landscape. The set of questions for these interviews is on the Appendix 1.

Conclusions on the second set of interviews

Across the interviews, there is strong validation of the roadmap direction, particularly its focus on matchmaking, industry engagement, innovation brokerage, capacity building, and cross-ENVRI collaboration. Industry actors consistently asked for easier access to researchers, facilities, testbeds, validation environments, and collaborative projects. Companies such as S4 Mobile Laboratories, Codevintec, Nanometrics, ENVEA, RBR Europe, and the LiDAR company stressed that ENVRI can create the most value by acting as trusted brokers, validation partners, and connectors rather than simply data providers. Matchmaking, access to facilities, technology testing, and structured industry-science dialogue were among the most frequently requested services.

ENVRI representatives generally reinforced the roadmap's emphasis on shared innovation structures, networking, and coordination. Emmanuel Salmon (ICOS), Eija Juurola (ACTRIS), and Beñat Olascoaga(eLTER) highlighted the need for permanent cross-ENVRI collaboration mechanisms, innovation liaison functions, communities of practice, better communication, and a common innovation language. They broadly supported the proposed ENVRI Innovation Hub concept, while stressing that innovation support must be practical, easy to access, and supported by dedicated staff rather than added onto existing scientific workloads.

Policy and ecosystem actors largely confirmed the roadmap's focus on user needs, adoption, and impact. Stefka Domuzova (Climate-KIC), Manimaaran Sivasegaram (EIC), Jarin Tasneem Oyshi (WMO), and Gert Verreet (ESFRI and Belgian representative in several Research Infrastructures (RIs) argued that innovation should start from validated user needs, support policy implementation, and demonstrate real-world value through case studies and success stories. They highlighted gaps in visibility, industry-facing support, innovation capacity, policy engagement, and understanding of how ENVRI data can be transformed into services, markets, and societal impact. Several interviewees recommended dedicated innovation liaison roles, ambassador networks, and stronger engagement with accelerators, incubators, policymakers, and standard-setting bodies.

The main refinements suggested for the roadmap are establish a visible ENVRI Innovation Hub and liaison network; prioritise matchmaking and co-creation over generic training; provide access to testbeds, validation, and demonstration environments; invest in innovation literacy and capacity building; strengthen science-policy and science-industry translation; and create governance mechanisms that enable continuous collaboration rather than project-based interactions. Funding, visibility, dedicated innovation personnel, and long-term coordination were identified as the main success factors and barriers.

From Stakeholder Engagement to Impact

The following table shows how the different activities carried out in this Work package have informed the set of recommendations and the feedback on the Innovation Roadmap.

Stakeholder Group	Engagement Activity	Feedback received	Implications for the Innovation Roadmap	Related Recommendation
Environmental Research Infrastructures (Partners in ENVRINNOV Project)	Stakeholder mapping workshop, Rome Annual Meeting, 29 Jan 2025	Strong consensus that Research Infrastructures, private sector actors and policy makers should be prioritised as key stakeholder groups.	Confirmed stakeholder prioritisation strategy and the need for targeted engagement approaches for each group	Permanent Multi-Stakeholder Innovation Forums; Structured Stakeholder Consultation Processes
Partners in ENVRINNOV project	Follow-up stakeholder engagement workshop, 5 Feb 2026	Need for better coordination across projects and tasks within projects to avoid duplication of engagement activities and to share stakeholder intelligence.	Inclusion of coordination mechanisms and shared stakeholder engagement planning within the roadmap.	Thematic Working Groups; Communities of Practice
Research Infrastructure representatives	Mapping exercise on engagement formats, Jan-Mar 2026	No single engagement format is suitable for all situations. Successful engagement depends on stakeholder maturity, objectives, and available resources.	Roadmap should promote engagement pathways rather than isolated activities.	Integrated Engagement Design and Facilitation Framework
Research Infrastructure representatives (Partners in ENVRINNOV)	Mapping exercise on stakeholder engagement mechanisms	Facilitation quality strongly influences engagement outcomes. Lack of facilitation expertise can reduce value of workshops and consultations.	Capacity building for engagement and facilitation should be included in future innovation support structures.	Integrated Engagement Design and Facilitation Framework
Geospatial industry professionals, GIS specialists, service fi, researchers	First Outreach event: Intergeo 2025 panel and interaction with the audience	Participants identified many practical applications for ENVRI data, including urban	Demonstrated demand for broader exploitation and downstream innovation based	Industry Engagement and Innovation Roles

		planning, agriculture, decision-support and machine learning.	on ENVRI services and data.	
		Several participants assumed ENVRI data was not freely accessible, indicating low awareness of existing services and open-data policies.	Need for improved communication, visibility and user-oriented dissemination of innovation outputs and services.	Cross-sector Learning Activities; Structured Consultation Processes
Marine and freshwater observation community, industry representatives, sensor developers	Webinar on Innovation in Hydrosphere Measurement Techniques, 22 Oct 2025	Strong interest in collaboration between research infrastructures and instrument developers. Continued concern regarding interoperability, validation, standardisation and long-term sustainability of observing systems.	Innovation Roadmap should strengthen RI-industry collaboration mechanisms and technology transfer pathways. Need for long-term collaborative structures supporting technology development and knowledge exchange.	Industry Engagement and Innovation Roles Thematic Working Groups
Internal project stakeholders	Multiple workshops and annual meetings	Stakeholders favoured practical engagement opportunities over one-way dissemination activities.	Co-design and co-creation approaches should become a standard element of engagement activities.	Multi-Stakeholder Innovation Forums; Structured Consultation Processes
Stakeholders across engagement activities	Workshops, webinars, conference participation and consultations	Long-term value depends on continuity beyond project funding and on maintaining stakeholder networks.	Roadmap should support sustainable engagement structures and long-term monitoring through KPIs.	Monitoring, Evaluation and Continuous Improvement Framework
Industry representatives, ENVRI, policy organisations, and innovation ecosystem actors	Semi-structured interviews conducted between June-August 2026 (16 interviews) 2 nd set of interviews	Strong support for matchmaking, innovation liaison functions, industry engagement, access to testing and validation facilities, capacity	Confirmed the relevance of the roadmap's proposed innovation support mechanisms and highlighted the need for dedicated	ENVRI Innovation Hub; Innovation Liaison Network; Industry Engagement and Innovation Roles; Multi-Stakeholder Innovation

		building, cross-ENVRI collaboration, and a dedicated ENVRI Innovation Hub. Stakeholders also highlighted the need for greater visibility, structured stakeholder engagement, science-policy translation, and long-term coordination.	innovation capacity, brokerage services, co-creation activities, training pathways, and sustainable structures connecting research infrastructures, industry, and policymakers.	Forums; Matchmaking and Brokerage Services; Communities of Practice
Policy makers, environmental agencies, science-policy intermediaries, and research organisations	Semi-structured interviews conducted between May and June 2026 by Dr. Mariana Salgado and ICOS Policy Officer Charlotta Henry	Stakeholders consistently highlighted the need for policy-ready information rather than raw data, stronger integration of RI data into existing monitoring and reporting systems, better science-policy translation, concise policy briefs, visual dashboards, and collaboration with trusted intermediary organisations such as the EEA, national inventory agencies, and expert groups. There was also strong support for interoperability, standardisation, and continuous engagement rather than one-off communication activities.	Confirmed the roadmap's focus on user-oriented services, science-policy translation, interoperability, stakeholder engagement, and ecosystem integration. The interviews reinforced the need to position RI as a trusted enabling infrastructure supporting modelling, inventories, assessments, and policy implementation through targeted communication and collaboration mechanisms.	Science-Policy Translation and Policy Engagement; Policy-Oriented Data Products and Communication; Structured Stakeholder Consultation Processes; European Innovation Hub; Interoperability and Integration Services; Science-Policy Engagement Activities .
Participants represented a diverse mix of universities, research infrastructures, governmental	Second Outreach event: Presentation and Interactive activity.	Participants reported fostering innovation through the development of new methods,	The roadmap should prioritise sustainable funding mechanisms,	Strengthen the ENVRI Innovation Hub's role as a facilitator of collaboration and

organisations, companies, and other organisations, with universities forming the largest group.		sensors, measurement techniques, experiments, data products, data sharing, collaboration, outreach, and industry engagement. Funding was identified as the most important support need, followed by training and matchmaking opportunities. Peer networks, training, and mentoring were considered the most effective formats for building innovation capacity. Participants envisioned stronger collaboration, better data access, enhanced monitoring technologies, greater policy engagement, and increased societal impact within five years.	stakeholder matchmaking, innovation training, peer-learning networks, and stronger links between research infrastructures, industry, policymakers, and society. The feedback also highlights the importance of data sharing, communication, interoperability, and pathways from research outputs to societal and policy impact.	innovation uptake by investing in networking and peer-learning activities, training programmes, innovation support services, industry and policy engagement, and long-term support for data-driven environmental solutions and monitoring technologies
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Table 2. Stakeholder feedback collected during Task 5.1 and its contribution to the ENVRI Innovation Roadmap

Stakeholder feedback collected throughout Task 5.1 consistently highlighted the importance of structured and continuous engagement, stronger collaboration between Research Infrastructures and industry, improved communication of ENVRI innovation capacities, and the need for mechanisms that support co-creation and long-term participation. These findings directly informed the recommendations presented in the following section of this deliverable. The recommendations therefore do not represent theoretical proposals alone, but are grounded in evidence gathered through stakeholder workshops, consultation

exercises, pilot events, webinars, and project-wide engagement activities carried out between Months 12 and 33.

Stakeholder engagement should not be viewed as an objective, but as an enabling mechanism that supports innovation uptake and societal impact. Long-term engagement creates the conditions necessary for collaboration, trust-building, and co-creation, which in turn increase the relevance, adoption, and sustainability of innovation outcomes. The relationship can be understood as a progressive pathway:



Image 9. Stakeholder Engagement → Trust Building → Co-Design

Each stage reinforces the next. Regular interaction enables stakeholders to develop trust and mutual understanding. Trust facilitates more meaningful collaboration and co-creation activities. Co-designed solutions are more likely to address real needs and therefore have a greater chance of being adopted and implemented. Increased uptake ultimately strengthens the scientific, societal, and economic impacts generated by Research Infrastructures and their innovation activities.

The recommendations presented in the following sections aim to strengthen different parts of this pathway by creating the structures, competencies, and processes needed to support long-term stakeholder engagement and innovation within the ENVRI ecosystem.

The Role of the ENVRI Innovation Hub

The ENVRI Innovation Hub has the potential to become a central coordination mechanism for innovation, stakeholder engagement, knowledge exchange, and capacity development across the ENVRI ecosystem. Beyond serving as a platform for showcasing innovation opportunities, the Hub could support the organisation of stakeholder engagement activities, dissemination of learning resources, mobility and exchange programmes, monitoring of innovation outcomes, and the development of communities of practice. By providing a common framework and shared services, the Innovation Hub can help reduce fragmentation,

increase collaboration between Research Infrastructures, and support the long-term sustainability of innovation activities.

Guiding principles for future collaboration

Inclusiveness

Inclusiveness is essential in ENVRI innovation because it ensures that a wide range of stakeholders—Research Infrastructures, scientists, industry actors, and policy makers—are actively involved in the innovation process. Environmental challenges are complex and require diverse perspectives, expertise, and experience. By fostering inclusiveness, ENVRI can better capture different needs, encourage broader participation, and avoid leaving out valuable knowledge or smaller actors such as SMEs (Small and medium-sized enterprises). This increases the relevance, quality, and societal impact of innovation outcomes. Inclusiveness is achieved not only using a diverse range of engagement mechanisms, but also by ensuring that all relevant stakeholder groups are meaningfully represented and actively involved in the process.

Transparency and Trust

Transparency is key to building trust among the many actors involved in ENVRI. Open communication about goals, processes, and decision-making helps stakeholders understand how and why actions are taken. This is particularly important in collaborative environments where multiple organisations and countries are involved. Trust enables smoother collaboration, reduces conflicts, and encourages stakeholders to share knowledge and data more openly, which is critical for advancing environmental research and innovation.

Co-Creation and Shared Ownership

Co-creation ensures that innovation is not developed in isolation but jointly designed with those who will use or be affected by it. In the ENVRI context, this means involving Research Infrastructures, industry, and policy stakeholders in shaping solutions from the early stages. Shared ownership increases commitment to the outcomes and improves the likelihood that innovations will be adopted and sustained over time. It also helps ensure that solutions are fit-for-purpose and aligned with real-world needs.

Flexibility and Adaptability

Flexibility and adaptability are essential because stakeholder needs, technological developments, and policy priorities evolve over time. Engagement mechanisms and collaboration models should therefore be periodically reviewed and adapted to remain relevant and effective.

In line with this principle, partners in this Work Package decided to organise the final stakeholder outreach event as part of the ICOS Science Conference in September 2026. This conference provides an ideal setting, as it brings together both industry actors and the scientific community in one place. Rather than creating separate or parallel events, this approach reflects a flexible and strategic use of existing platforms where key stakeholders are already engaged. By embedding project activities within established venues, ENVRI maximises outreach, strengthens connections, and ensures more effective engagement with relevant audiences.

Sustainability and Long-Term Commitment

Sustainability is crucial for ensuring that the benefits of ENVRI innovation extend beyond the project's lifetime. This involves not only environmental sustainability but also the long-term maintenance of collaborations, infrastructures, and innovation outputs. A long-term commitment from stakeholders helps secure continued investment, supports the implementation of project results, and ensures that innovation pathways are fully developed.

This principle is key to creating lasting impact and supporting the transition from short-term project results to durable solutions in environmental science and policy.

Recommendations on measures and/or mechanisms to support collaboration and closer engagement

The work carried out in this Work Package has informed the development of the roadmap. The stakeholders identified, as well as the proposed engagement methods, are based on preliminary recommendations developed by the partners involved in this Work Package. Further co-development of the roadmap will engage stakeholders.

As part of the recommendations for long-term measurements to support collaboration and closer stakeholder engagement, we propose the use of the impact pathway concept, originally developed by ICOS within the NUBICOS EU project.

An impact pathway, in this case, refers to the simplified chain of causal events linking activities carried out by multiple Research Infrastructures (RIs) across EU projects to observable effects on the economy and society. It provides a useful framework for identifying the sequence of events and the range of factors contributing to the generation of societal impact. Impact pathways can also be understood as the contexts in which specific impacts emerge (Muhonen et al., 2020), helping to clarify how impacts develop and accumulate over time.

This pathway can be visualised as a “pipeline pathway”, consisting of scientific development, productive interactions, and knowledge transfer that ultimately led to tangible societal benefits. For example, results derived from measuring Key Performance Indicators (KPIs) can provide evidence of RI activities and serve as a starting point for identifying potential pathways to impact.

Emerging pathways can be identified by examining the types of knowledge produced, the modes of interaction, and the beneficiaries associated with research activities. The pathway typically includes the following components:

Dissemination: the transfer of information to scientific communities and society (e.g. scientific publications)

Co-creation: the facilitation and exchange of knowledge through collaboration (e.g. partnerships with industry)

Responding to Societal Change: the transfer of knowledge to support societal needs (e.g. contributing data or expertise to global initiatives)

Driving Societal Change: enabling or influencing concrete societal actions (e.g. implementation of mitigation measures resulting from RI activities)

In the context of ENVRINNOV, this framework can be operationalised as follows:

Dissemination: Indicators may include website visits, social media impressions and engagement (e.g. likes and shares), as well as the distribution and uptake of policy briefs and project case studies.

Co-creation: This can be reflected in the number and quality of interactions with stakeholders, including collaborative activities such as jointly organised events, workshops, and partnerships.

Responding to Societal Change: Contributions of data, knowledge, and expertise through platforms such as the ENVRI Hub demonstrate how the project supports emerging societal needs.

Driving Societal Change: Longer-term outcomes, such as the development of shared outputs (e.g. policy briefs) and their influence on decision-making processes, illustrate the project's role in enabling societal change.

Impact pathways define how KPIs relate to each other and form a coherent narrative of actions. However, it is essential to establish a clear and stable set of KPIs to enable comparable monitoring of projects performance over time. KPIs are not the only component of this monitoring, but they are a key tool for understanding how projects evolve in their main strategic focus areas. A stable KPI framework is therefore a cornerstone of evidence-based evaluation.

KPIs are directly linked to the assessment of the scientific and societal impact of ENVRINNOV, while also being applicable to future projects. Data collected through relevant KPIs makes it possible to identify and construct impact pathways that demonstrate the project's scientific and societal relevance over time. It is important to note that KPIs are not intended to capture every aspect of project activities. Instead, they should focus on a limited number of key outcomes that best reflect overall performance and contribute to understanding societal impact development.

As KPIs provide essential information on key operational areas, they are also closely linked to overall project risk management (referring here to broader operational risks rather than risks at the level of individual partners or host organisations). KPI data can provide insights into the likelihood of operational risks materialising.

A fixed set of KPIs helps projects identify priority outcomes, align activities with strategic objectives, and allocate resources effectively. Clear and stable KPIs also provide consistent guidance on priorities. If KPIs change frequently, they lose their steering function, strategic priorities may become unclear, and the ability to demonstrate societal impact through evidence-based data is weakened.

KPIs only become meaningful when tracked consistently over multiple years and across projects using the same criteria. If KPIs change annually, trends cannot be analysed, improvements or declines cannot be demonstrated, and strategy implementation cannot be properly evaluated. Moreover, frequent changes come with costs, including additional workload, redefinition of calculation methods and targets, and the need for internal communication and alignment.

A robust and stable set of KPIs is therefore a crucial component of effective management in EU projects involving RIs. As outlined above, KPIs are closely linked to stakeholder outreach and engagement. Long-term measurement of stakeholder engagement should be aligned with KPIs and interpreted through the lens of impact pathways. Stakeholder engagement should not be measured in isolation, but rather in relation to activities and outcomes associated with dissemination, co-creation, responding to societal change, and driving societal change.

In Deliverable 7.1 (D7.1), Key Performance Indicators (KPIs) were defined for ENVRINNOV, along with specific targets to be achieved during the project's implementation period. As this deliverable focuses on

long-term measurement, it is recommended to continue using the same KPIs, while adapting them to future joint actions agreed upon by the consortium.

The ENVRI community is currently applying for a range of new funding opportunities, where the definition and monitoring of KPIs remain essential. Maintaining continuity in KPIs will therefore support consistency, comparability, and alignment across initiatives.

KPIs for Dissemination

The dissemination KPIs include:

- Publications in scientific and specialist media
- Research Data Management (RDM) and Open Access outputs
- Organization of workshops on innovation in environmental technologies and services, hosted by the ENVRI community
- Organization of annual stakeholder events targeting policy, industry, and ESFRI communities
- Participation in conferences and other specialist events
- Training activities and resources for capacity-building
- Collaboration with innovation-performing academic and private sector stakeholders
- Creation and dissemination of materials targeting policy stakeholders

KPIs for Exploitation

The exploitation KPIs include:

- Policy feedback and contribution to policy development
- Enhancement of visibility of ENVRI's innovation capacities and accessibility
- Development of common strategies for new technologies and services

KPIs for Communication

The communication KPIs include monitoring performance across the following channels and tools:

- Website
- Social media
- Other digital channels
- Innovation mailing lists
- Newsletters
- Promotional materials
- Events
- Media coverage

- Alignment, Impact Pathways, and Stakeholder Engagement

In addition to these KPI categories, the ENVRI community is developing multiple service catalogues and Innovation Hubs (sometimes under different names), which function as digital environments to support and accelerate innovation.

To ensure coherence and comparability across these developments, it is recommended to apply a shared impact pathway framework. This would provide consistency in how KPIs are selected, measured, and interpreted across initiatives.

Stakeholder engagement is inherently linked to KPI achievement. Avoiding duplication in development efforts will also help prevent overlap in stakeholder engagement activities. However, the most critical factor is the early and continuous involvement of stakeholders through co-creation and co-design processes.

Engaging stakeholders from the outset significantly increases the likelihood of achieving KPI targets related to uptake, relevance, and impact. It also ensures that developed services, tools, and innovations are better aligned with real needs, thereby strengthening both implementation and long-term sustainability.

Recommendations: Strengthening Stakeholder Engagement Mechanisms

This Deliverable has developed these recommendations.

Recommendation 1: Establish Permanent Multi-Stakeholder Innovation Forums

Purpose

To establish an ongoing dialogue that fosters critical thinking and continuous engagement with key stakeholders. The innovation forum should serve as a space where participants can openly exchange ideas, challenge assumptions, and reflect on emerging trends and needs. By maintaining regular interaction, the forum helps build stronger relationships, encourages mutual learning, and ensures that innovation activities remain aligned with stakeholder expectations and real-world challenges.

Structure

The innovation forum can take the form of a regular face-to-face gathering, held either annually or semi-annually, where a diverse group of stakeholders come together. Participants should collaboratively identify and prioritise the themes and topics to be addressed in each meeting, ensuring relevance and shared ownership of the agenda. Rather than focusing on one-way communication or presentation-heavy formats, the forum should prioritize interactive and participatory methods—such as workshops, roundtable discussions, and co-creation sessions. This approach promotes an open and inclusive atmosphere, encouraging active contributions, dialogue, and knowledge exchange among participants. The ENVRI Innovation Hub could coordinate the forum, support agenda development, facilitate stakeholder participation, and ensure that outcomes are translated into actions that inform the iterative update of the Innovation Roadmap.

Expected benefits

The forum offers the opportunity to gather continuous and structured feedback on ongoing innovation activities and development projects. This regular input helps refine approaches, identify potential challenges early, and improve the overall quality and relevance of outcomes. In addition, it supports stronger alignment between stakeholders, enhances collaboration opportunities, and fosters a shared understanding of priorities and goals. Over time, the forum can also contribute to building a community of practice, strengthening networks, and increasing the likelihood of successful uptake and long-term impact of innovation results.

The KPIs outlined in all these recommendations are preliminary proposals intended to illustrate potential performance measures. The final selection and definition of KPIs should be reviewed and agreed upon with the relevant stakeholders. At this stage, the proposed KPIs have neither been discussed nor formally endorsed.

KPIs

- Number of participants per forum
- Diversity of stakeholder groups represented (% RI, industry, policy, academia, civil society)
- Number of collaboration opportunities identified
- Stakeholder satisfaction rate (% positive feedback)
- Percentage of participants returning to subsequent forums

Recommendation 2: Develop an Integrated Engagement Design and Facilitation Framework

Purpose

The purpose of this recommendation is to strengthen the strategic design and effectiveness of stakeholder engagement by ensuring that engagement formats are carefully aligned with clearly defined objectives. By introducing a structured “format selection matrix,” engagement activities can be better matched to goals such as awareness raising, consultation, co-creation, training, and community building. This approach aims to move beyond ad hoc selection of formats by promoting a more intentional, goal-oriented design of engagement processes. At the same time, it seeks to enhance the overall quality and impact of engagement by combining formats into coherent pathways that gradually deepen stakeholder involvement and by improving communication through clear and compelling visual materials.

Structure

This recommendation is built on three interconnected components. First, the development of a format selection matrix that evaluates and scores engagement formats based on their suitability for different objectives. Second, the design of “engagement journeys,” where multiple formats are combined sequentially—for example, moving from webinars to surveys, then to workshops and field visits—to balance

reach and depth. Third, the strengthening of internal facilitation capacity through mapping existing skills, providing training, and creating shared resources such as templates, scripts, and a cross-team facilitation community. Supporting all components is a stronger focus on visual communication, including the use of infographics, video and podcast content, and shared platform for training and outreach materials. The ENVRI Innovation Hub could develop, maintain within its Innovation Toolbox repository, and disseminate the matrix, ensuring consistency and reuse across RIs.

Expected benefits

Implementing this recommendation will lead to more coherent, efficient, and impactful stakeholder engagement. Activities will be better aligned with their intended purpose, improving both participation and outcomes. The use of engagement journeys will enhance stakeholder experience by creating smoother transitions from initial awareness to deeper collaboration and trust-building. Strengthening facilitation capacity will improve the quality of interactions, enabling more inclusive participation and better capture of insights. In addition, improved visual communication will increase the accessibility and reach of project outputs. Overall, these measures will contribute to more effective knowledge exchange, stronger stakeholder relationships, and higher-quality innovation outcomes.

KPIs

- Number of RIs adopting the common engagement tools
- Number of staff trained in facilitation
- Number of engagement activities completed using the framework
- Stakeholder satisfaction rate (% positive feedback)

Recommendation 3: Create Thematic Working Groups

Purpose

Thematic working groups should be established to strengthen collaboration and innovation among stakeholders by providing dedicated forums for addressing specific sectors and shared challenges relevant to Research Infrastructures. These groups would bring together Research Infrastructures, industry representatives, policymakers, and other stakeholders to exchange knowledge, identify opportunities for innovation, and co-develop solutions that respond to environmental and societal needs. By combining sector-specific expertise with challenge-oriented collaboration, thematic working groups can help ensure that innovation activities are targeted, relevant, and aligned with strategic priorities.

Structure

Thematic working groups should be organised through two complementary dimensions:

Sector-specific working groups should focus on distinct domains such as climate monitoring, biodiversity, data services, or other priority areas. This structure enables stakeholders with shared expertise and interests to engage in deeper discussions, explore emerging opportunities, and strengthen connections between scientific research and practical applications. Bringing together actors from research, industry, and policy communities within the same thematic area can facilitate knowledge transfer and support the development of innovative services and solutions.

Challenge-driven working groups should be centered on clearly defined problems that require coordinated action and cross-sector collaboration. Rather than focusing solely on a specific domain, these groups would address challenges such as data interoperability, service integration, climate adaptation, or other strategic topics. This approach encourages stakeholders to move beyond discussion towards collaborative problem-solving and the co-design of practical solutions.

The challenges addressed by these groups should be selected by the ENVRI Board based on transparent criteria, including societal relevance, stakeholder demand, feasibility, potential impact, and alignment with EU policy priorities.

Expected Benefits

The creation of thematic working groups is expected to deliver significant benefits for the ENVRI community and its stakeholders. By bringing together participants with shared interests and expertise, these groups can facilitate more focused knowledge exchange and deeper discussions on sector-specific topics and common challenges. They can also strengthen collaboration and networking among research infrastructures, industry partners, policymakers, and end users, fostering stronger connections across the innovation ecosystem. Through the identification of sector-specific opportunities and the co-creation of solutions, thematic working groups can enhance innovation capacity and support the development of new ideas, services, and applications. In addition, they can improve the coordination of efforts around shared challenges, reducing duplication of work while creating synergies across initiatives. By aligning activities with societal needs, stakeholder demands, and EU policy priorities, these groups can help ensure that innovation efforts remain relevant and impactful. Ultimately, thematic working groups can generate tangible and scalable outcomes, such as new services, tools, standards, and practices, while increasing the overall impact of Research Infrastructures by strengthening the link between scientific knowledge, operational services, and real-world applications.

KPIs

- Number of active thematic WGs
- Number of organised meetings annually
- Number of participating organisations
- Number of joint initiatives, services, tools, standards generated
- Number of recommendations integrated into ENVRI strategic planning

Recommendation 4: Introduce Structured Stakeholder Consultation Processes

Purpose

The purpose of introducing structured stakeholder consultation processes is to ensure that stakeholder engagement becomes a consistent, transparent, and integral component of decision-making and innovation activities within ENVRI. Rather than relying on occasional or informal interactions, a structured approach enables stakeholders to contribute their perspectives throughout the development, implementation, and evaluation of initiatives. This helps build trust, strengthen relationships, and ensure that decisions are

informed by the needs, expectations, and expertise of a diverse range of actors, while improving the responsiveness and relevance of ENVRI's activities.

Structure

Structured stakeholder consultation processes should be based on two complementary elements: regular engagement cycles and effective feedback mechanisms. Regular engagement cycles should establish opportunities for interaction through recurring meetings, workshops, stakeholder forums, and project-specific consultations. These engagement activities should be scheduled at defined intervals, such as quarterly or annually, to provide stakeholders with ongoing opportunities to contribute input, review progress, and discuss emerging priorities. Alongside these interactions, dedicated feedback mechanisms should be implemented to capture stakeholder perspectives in a systematic and accessible manner. These may include surveys, digital consultation platforms, suggestion systems, and formal consultation procedures that gather both qualitative and quantitative feedback. The information collected should be regularly analysed and integrated into decision-making processes to ensure that stakeholder contributions are effectively considered and acted upon.

Expected Benefits

The introduction of structured stakeholder consultation processes is expected to enhance the quality, inclusiveness, and effectiveness of decision-making across the ENVRI community. Regular engagement opportunities can strengthen trust, transparency, and long-term relationships with stakeholders, while creating a shared understanding of priorities, progress, and challenges. Systematic feedback mechanisms can ensure that stakeholder views are consistently captured and incorporated into planning and implementation activities, increasing accountability and demonstrating the value of stakeholder contributions. In addition, structured consultation can help identify emerging needs, opportunities, and risks at an early stage, enabling more adaptive and informed responses. Ultimately, these processes can improve stakeholder satisfaction, support more relevant and demand-driven innovation, and contribute to stronger alignment between ENVRI activities, user needs, and broader societal and policy objectives.

KPIs

- Number of consultations conducted
- Number of stakeholders consulted
- Response rate
- % of stakeholder feedback incorporated into decisions
- Number of strategic decisions informed by consultations
- Stakeholder satisfaction with the consultation process

Recommendation 5: Establish Industry Engagement and Innovation Roles within Research Infrastructures

Purpose

To strengthen downstream innovation and increase the uptake of research outputs by the private sector. Dedicated staff should be responsible for building relationships with industry, identifying opportunities for collaboration, and supporting the transition from co-design activities towards implementation, adoption, and

impact. Stakeholder engagement with the private sector should become a strategic and continuous activity rather than a project-specific task.

Structure

Depending on available resources, innovation support functions may be established within individual Research Infrastructures or provided through a shared ENVRI-level mechanism coordinated by the ENVRI Innovation Hub.

This person could operate at the interface between research, industry, and innovation ecosystems. Key responsibilities would include facilitating collaboration with companies, organising co-creation and engagement activities, identifying innovation opportunities, supporting pilot projects, and connecting research outputs with potential users and markets. Competencies in facilitation, stakeholder engagement, service design, and innovation management are particularly important for this role.

To support knowledge exchange and continuous professional development, Research Infrastructures should foster Communities of Practice focused on innovation, industry engagement, stakeholder collaboration, and service development. These communities would bring together staff responsible for innovation and stakeholder engagement across different Research Infrastructures, creating opportunities to share experiences, methods, tools, success stories, and lessons learned. Regular exchanges through workshops, peer-learning sessions, and online collaboration platforms would help build common approaches, reduce duplication of effort, and strengthen innovation capacity across the ENVRI ecosystem. The ENVRI Innovation Hub could provide a platform for coordinating and supporting these communities.

Expected Benefits

A dedicated innovation and industry engagement function would strengthen the ability of Research Infrastructures to transform scientific knowledge, services, and data sets into practical applications. It would support more systematic collaboration with the private sector, improve the implementation of co-created solutions, and increase the societal and economic impact of Research Infrastructures activities. In the long term, it would contribute to a stronger innovation culture and create clearer pathways from research to adoption and use.

KPIs

- Number of industry engagement activities
- Number of companies engaged
- Number of industry collaborations established
- Number of co-creation activities completed
- Number of technologies/services validated with external users
- Number of innovation support cases provided through the EIH

Recommendations: Enhancing Knowledge Sharing and Learning

Recommendation 6: Cross-sector learning activities

Purpose

Promoting cross-sector learning activities enables the exchange of knowledge, experiences, and best practices across different domains such as public, private, academic, and civil society sectors. This can be achieved through joint workshops, collaborative pilot projects, peer-learning networks, and thematic forums that bring diverse stakeholders together. Such interactions foster innovation by exposing participants to alternative approaches, encourage mutual understanding of sector-specific challenges, and support the co-creation of more holistic and effective solutions.

Structure

The ENVRI Innovation Hub should serve as the central platform for coordinating, promoting, and disseminating learning opportunities across the ENVRI ecosystem. It could host training catalogues, learning resources, recordings, best practices, and information on upcoming capacity-building activities, thereby improving visibility, accessibility, and coherence across Research Infrastructures.

Expected benefits

A centralised cross-sector learning platform could serve as a hub for bringing together the learning offerings provided by the ENVRI, enabling a more coordinated and consistent approach to capacity development. Collaboration with the academic sector could lend additional legitimacy and help ensure the quality and recognition of the training programmes.

KPIs

- Number of training and learning activities delivered
- Number of participants trained
- % of participants reporting increased knowledge
- Number of good practices transferred between sectors
- Number of collaborations initiated following training activities
- User satisfaction with the training program

Recommendation 7: Support mobility, exchange, TNA

Purpose

Mobility, exchange activities, and Transnational Access (TNA) strengthen skills, knowledge, and organizational capacity by providing researchers, technical staff, and industry representatives with opportunities to gain experience in different environments. These mechanisms support knowledge transfer, foster cross-sector collaboration, help address identified skills gaps, and promote continuous learning aligned with emerging scientific and technological needs. Existing instruments such as COST Actions can further support these objectives by funding networking and mobility opportunities.

Structure

The ENVRI Innovation Hub should serve as a central coordination point for mobility, exchange, and TNA opportunities across the ENVRI community. It should collect and disseminate information on staff exchanges, secondments, study visits, funding opportunities, and available TNA programmes, while actively promoting these opportunities to both research and industry stakeholders to facilitate collaboration and access to expertise, facilities, and services.

Expected benefits

A coordinated approach to mobility, exchange, and TNA will enhance professional development, improve knowledge sharing across Research Infrastructures and sectors, increase the uptake of available access opportunities, and strengthen collaboration between research and industry. Ultimately, it will contribute to a more skilled, connected, and innovative ENVRI community that is better equipped to respond to future challenges.

KPIs

- Number of mobility opportunities promoted
- Number of participants completing exchange
- Number of new collaborations resulting from the exchange
- % of participants applying acquired skills in their home organisation

Recommendations: Strengthening Science-Policy Engagement

Recommendation 8: Strengthen Science-Policy Translation and Policy Engagement

Purpose

The purpose of this recommendation is to improve the capacity of Environmental Research Infrastructures (ENVRI) to translate scientific knowledge, data, and services into forms that are relevant, understandable, and actionable for policy audiences. Research Infrastructures produce valuable observations and evidence, but policymakers rarely use raw data directly. Instead, they rely on trusted intermediaries, expert assessments, inventories, indicators, models, and policy-oriented products. Strengthening science-policy translation will help increase the visibility, uptake, and policy impact of ENVRI data, services, and expertise while ensuring that scientific knowledge contributes more effectively to evidence-based decision-making.

Structure

This recommendation should be implemented through a combination of complementary actions:

Development of policy-oriented communication products, including policy briefs, executive summaries, dashboards, visualisations, factsheets, and thematic reports.

Creation of regular dialogue mechanisms between Research Infrastructures and policy-support organisations, such as environmental agencies, inventory compilers, expert groups, and relevant European institutions.

Identification and support of science-policy liaison functions capable of translating scientific findings into policy-relevant insights and communicating policy needs back to Research Infrastructures.

Increased participation in policy consultations, expert groups, knowledge hubs, and European monitoring and reporting initiatives.

Development of common guidance and training materials on science-policy communication for ENVRI staff.

Expected Benefits

Strengthening science-policy translation will improve the accessibility and usability of ENVRI outputs for policymakers and policy-support organisations. It will increase the visibility of ENVRI services and data within policy processes, strengthen collaboration with key intermediary organisations, and support the integration of Research Infrastructure data into monitoring, assessment, modelling, and reporting frameworks. In the long term, it will contribute to greater societal impact by ensuring that scientific evidence generated by Research Infrastructures is more effectively translated into environmental policy, regulation, and implementation.

KPIs

- Number of policy brief produced
- Number of ENVRI representatives participating in policy consultations
- Number of policy organisations reached
- Number of policy processes informed by ENVRI output

Recommendations: Monitoring, Evaluation and Continuous Improvement

Recommendation 9. Monitoring, Evaluation and Continuous Improvement

Purpose

The purpose of establishing a robust monitoring, evaluation, and continuous improvement framework is to enable evidence-based decision-making, demonstrate scientific and societal impact, and support effective management of research and innovation activities within the ENVRI community. At the core of this framework is a stable and well-defined set of Key Performance Indicators (KPIs) that collectively reflect the project's strategic objectives and operational priorities. Rather than serving as isolated metrics, KPIs should form an interconnected system that links project activities, outputs, outcomes, and impacts over time. This approach allows projects to assess progress, understand the effectiveness of interventions, identify emerging risks, and support continuous learning and improvement. Furthermore, a common KPI framework can provide continuity and comparability across projects, strengthening strategic coherence within the broader environmental research infrastructure ecosystem.

Structure

The monitoring and evaluation framework should be built around a fixed and consistent set of KPIs that capture a limited number of critical outcomes reflecting project performance in key strategic areas. These KPIs should be monitored regularly and integrated into a broader evaluation system that includes impact assessment, stakeholder engagement monitoring, and risk management processes. KPI data should be used

to develop and analyse impact pathways, illustrating how project activities contribute to longer-term scientific and societal outcomes. In addition, the framework should support the identification of operational risks by tracking trends and deviations in performance indicators related to implementation, outreach, uptake, and stakeholder engagement. Building on the work already undertaken in ENVRINNOV Deliverable 7.1 (D7.1), it is recommended that the KPIs defined for the project be maintained as the basis for long-term monitoring, with only limited adaptations introduced when required by future joint actions or strategic priorities. This balance between stability and flexibility will preserve the integrity of longitudinal analyses while allowing the framework to remain responsive to evolving needs.

Expected Benefits

A stable monitoring and evaluation framework is expected to improve strategic management, accountability, and impact assessment across ENVRI initiatives. Consistent use of KPIs over time enables the collection of comparable data, facilitating the identification of trends, the measurement of progress, and the assessment of whether strategic objectives are being achieved. By clearly defining priority outcomes, the framework can support more effective planning, resource allocation, and decision-making, while reducing the administrative burden associated with frequently changing indicators and methodologies. The integration of KPI monitoring with stakeholder engagement and impact pathway analysis will also provide a more comprehensive understanding of how project activities contribute to scientific excellence, societal responsiveness, and long-term impact. Moreover, maintaining continuity in KPIs across successive projects will strengthen comparability, alignment, and knowledge sharing throughout the ENVRI community, supporting future funding opportunities and reinforcing a common approach to evaluating the value and contribution of Research Infrastructures.

KPI Categories

The proposed KPI framework should not be considered separately from the stakeholder engagement recommendations presented in this deliverable. Rather, KPIs provides a practical mechanism for monitoring the implementation and effectiveness of these recommendations over time. For example, multi-stakeholder innovation forums can be assessed through indicators such as participation levels, stakeholder diversity, and satisfaction rates. Thematic working groups can be monitored through the number of meetings organised, collaborative outputs produced, and advanced innovations. Industry engagement and innovation roles can be evaluated through the number of industry collaborations, co-creation activities, pilot projects, and technology validation initiatives supported. Similarly, cross-sector learning activities, mobility schemes, and training programmes can be monitored through participation rates, stakeholder feedback, and evidence of knowledge transfer. By linking stakeholder engagement activities to measurable indicators, the KPI framework transforms the recommendations from strategic aspirations into operational actions that can be monitored, evaluated, and continuously improved over time.

KPIs for Dissemination focus on production, sharing, and uptake of knowledge. These include scientific and specialist publications, research data management and open access outputs, organisation of workshops and stakeholder events, participation in conferences, delivery of training activities, collaboration with academic and private sector actors, and the development of targeted materials for policy audiences.

KPIs for Exploitation relates to the use and uptake of project results. These include contributions to policy development, increased visibility and accessibility of ENVRI's innovation capacities, and the development of common strategies for new technologies and services.

KPIs for Communication measure the reach and effectiveness of communication activities across multiple channels, including websites, social media, digital platforms, mailing lists, newsletters, promotional materials, events, and media coverage.

In parallel, the ENVRI community is developing service catalogues and Innovation Hubs—digital environments designed to support and accelerate innovation. To ensure coherence and comparability across these initiatives, it is recommended to adopt a shared impact pathway framework. This would provide a consistent basis for selecting, measuring, and interpreting KPIs across projects and platforms.

Finally, stakeholder engagement is intrinsically linked to KPI achievement. Early and continuous involvement of stakeholders through co-creation and co-design processes significantly increases the likelihood of reaching targets related to relevance, uptake, and impact. It also reduces duplication of effort and ensures that services, tools, and innovations are closely aligned with real-world needs, thereby strengthening both implementation and long-term sustainability.

Stakeholder assessments

Conducting stakeholder satisfaction assessments provides a systematic way to evaluate how well engagement activities and outcomes meet stakeholder expectations. This involves collecting structured feedback through surveys, interviews, or evaluation tools that measure perceptions of inclusiveness, transparency, responsiveness, and overall effectiveness. By regularly analysing satisfaction levels, organizations can identify strengths, detect areas requiring improvement, and ensure that stakeholder relationships remain constructive and mutually beneficial over time.

Periodic Review Mechanisms

Establishing periodic review mechanisms ensures that monitoring and evaluation processes are not static but continuously revisited and refined. This includes scheduled internal reviews, external evaluations, or performance audits that assess progress against predefined objectives, indicators, and benchmarks. Such mechanisms enable organizations to verify whether strategies remain relevant, effective, and aligned with evolving goals, while also supporting accountability and evidence-based decision-making.

Learning and Adaptation Processes

Embedding learning and adaptation processes allows organizations to translate insights gained from monitoring and evaluation into practical improvements. This involves systematically capturing lessons learned, facilitating knowledge-sharing among teams, and integrating findings into policy adjustments, program redesign, or operational changes. By fostering a culture of continuous improvement, organizations can remain agile, respond effectively to emerging challenges, and enhance long-term impact through iterative refinement of their approaches.

Roadmap for Implementation

Short-Term Actions (0–12 months)

In the initial phase, priority should be given to setting up the foundational structures and processes. This includes establishing at least one pilot multi-stakeholder innovation forum with clearly defined objectives, participant groups, and facilitation methods. In parallel, initial thematic working groups should be launched in selected priority areas to test both sector-specific and challenge-driven collaboration formats. Structured stakeholder consultation processes should be introduced, including defined engagement cycles (e.g., quarterly touchpoints) and basic feedback mechanisms such as surveys and consultation tools. At the same

time, existing KPIs should be reviewed, validated, and aligned with current project activities, ensuring continuity. Early stakeholder satisfaction assessments can be conducted to create a baseline, while initial cross-sector learning activities and mobility opportunities (e.g., pilot exchanges or workshops) should be mapped and integrated into the ENVRI Innovation Hub. Develop templates and guidance for policy briefs, policy-oriented dashboards, and science-policy communication.

Medium-Term Actions (1–3 years)

The medium-term phase should focus on scaling, consolidation, and integration. Multi-stakeholder innovation forums should become regular and institutionalized, with increasing participation and clearer links to project decision-making and strategy development. Thematic working groups should expand in both number and scope, producing concrete outputs such as prototypes, policy inputs, or service innovations. Stakeholder consultation processes should be refined based on feedback, with more advanced and digitalized mechanisms introduced to support continuous input collection and analysis. Cross-sector learning activities should be systematically organized and embedded within the ENVRI Innovation Hub, alongside structured mobility and exchange programmes supported by transnational access (TNA). At this stage, KPIs should be consistently tracked and analysed across activities, with impact pathways becoming more clearly defined. Periodic reviews and evaluations should be formally implemented, ensuring that lessons learned are captured and translated into improvements. Initiate the design of science-policy translation activities, including policy brief templates, policy-oriented communication guidelines, and the identification of relevant policy stakeholders and intermediary organisations. Establish regular science-policy dialogue mechanisms with policy-support organisations, environmental agencies, and relevant policy networks.

Long-Term Actions (3–5 years)

In the long term, the focus should be on sustainability, strategic alignment, and impact demonstration. Multi-stakeholder innovation forums and thematic working groups should evolve into stable, self-sustaining collaboration platforms embedded within the ENVRI ecosystem. Stakeholder engagement should be fully integrated into all stages of project design and implementation through established co-creation practices. Knowledge sharing, mobility, and learning activities should be mature and tightly linked to strategic priorities, with the ENVRI Innovation Hub serving as a central coordination platform. KPI frameworks should be fully operational across projects, enabling longitudinal analysis and robust impact pathway development that demonstrates both scientific and societal impact. Monitoring, evaluation, and learning processes should be embedded as standard practice, supporting continuous adaptation and long-term improvement. At this stage, alignment across multiple projects and funding streams should be achieved, ensuring coherence at the ecosystem level. Establish regular science-policy dialogue mechanisms and collaboration with policy-support organisations, environmental agencies, inventory compilers, and European expert networks. Develop a portfolio of policy-oriented products and services. Integrate science-policy translation services into the ENVRI Innovation Hub and establish permanent policy engagement mechanisms.

Resource Requirements

Successful implementation of this roadmap requires a combination of human, financial, and technical resources. Dedicated coordination staff are needed to manage stakeholder engagement activities, facilitate forums and working groups, and oversee monitoring and evaluation processes. Financial resources should

support events, digital platforms, mobility programmes, and training activities. Technical infrastructure is essential, particularly for the ENVRI Innovation Hub, digital consultation tools, and KPI tracking systems. Additionally, expertise in facilitation, evaluation, and data analysis is required to ensure high-quality implementation and meaningful interpretation of results. Long-term sustainability will depend on integrating these resource needs into broader project and funding frameworks.

Integrate science-policy translation activities into the ENVRI Innovation Hub and establish permanent mechanisms for engagement with policy communities, ensuring that ENVRI data, services, and expertise contribute effectively to policy implementation and assessment frameworks.

Science-policy communication and stakeholder engagement expertise should also be considered, particularly in relation to policy-oriented products, science-policy translation, and engagement with policy-support organisations.

Attention should be given to securing dedicated human resources for industry engagement and innovation management. Research Infrastructures seeking to strengthen downstream innovation should consider establishing specialist roles focused on stakeholder engagement, service design, innovation facilitation, and industry collaboration. These competencies are increasingly important for translating research outputs into societal and economic impact.

Risk Mitigation Measures

Several risks may affect implementation, including low stakeholder engagement, fragmentation of efforts, inconsistent KPI application, and limited uptake of outputs. To mitigate these risks, early and continuous stakeholder involvement through co-design should be prioritized to ensure relevance and commitment. Clear governance structures and coordination mechanisms should be established to avoid duplication and fragmentation across initiatives. Maintaining a stable and limited set of KPIs will reduce complexity and ensure comparability over time. Regular monitoring, stakeholder satisfaction assessments, and periodic reviews should be used to identify emerging issues early and enable timely corrective actions. Finally, aligning activities with stakeholder needs and demonstrating clear value will be essential to sustain engagement and ensure long-term impact.

At the time of writing this deliverable, it is not possible to link each identified risk to a specific mitigation action and responsible actor. Risk management should be understood as an ongoing process that requires continuous monitoring, assessment, and adaptation. The definition of mitigation measures and responsibilities will therefore need to be undertaken by the relevant experts and governance bodies as the project progresses. Providing detailed mitigation plans at this stage could be counterproductive, as it may create the impression of certainty where further analysis and stakeholder input are still required.

Conclusion

Summary of key recommendations

This deliverable highlights the need to strengthen stakeholder engagement, innovation uptake, science-policy collaboration, knowledge exchange, and monitoring practices through a set of mutually reinforcing actions. Key recommendations include the establishment of permanent multi-stakeholder innovation forums to ensure continuous dialogue, the creation of thematic working groups to enable focused and challenge-driven

collaboration, and the introduction of structured stakeholder consultation processes with regular engagement cycles and robust feedback mechanisms. The report also recommends strengthening science-policy translation and policy engagement through the development of policy-oriented communication products, regular dialogue with policy-support organisations, and mechanisms that facilitate the translation of scientific knowledge into actionable information for decisionmakers. In addition, the report recommends establishing dedicated industry engagement and innovation roles within Research Infrastructures to build stronger partnerships with the private sector, support downstream innovation, and create clearer pathways from research outputs to practical applications and societal impact. Enhancing cross-sector learning activities and supporting mobility and exchange programmes, including transnational access opportunities, are also identified as critical measures for building long-term capacity and fostering innovation. Finally, the development and consistent application of a stable KPI framework, complemented by stakeholder satisfaction assessments, periodic reviews, and learning and adaptation processes, provides the foundation for effective monitoring, evaluation, and continuous improvement.

Ultimately, innovation in Environmental Research Infrastructures is not only a matter of scientific excellence or technological capability. It depends equally on the ability to build lasting relationships between researchers, industry, policymakers, and society, as well as on the capacity to translate scientific knowledge into forms that support evidence-based decision-making. The recommendations presented in this report aim to move stakeholder engagement and science-policy interaction from project-based activities towards strategic and permanent capabilities within the ENVRI ecosystem, creating stronger pathways from knowledge generation to societal, environmental, and economic impact.

Expected impact on innovation outcomes

The proposed measures are expected to significantly enhance the quality, relevance, uptake, and long-term impact of innovation within the ENVRI ecosystem. Stronger and more structured stakeholder engagement will ensure that innovation activities are closely aligned with user needs, policy priorities, and societal challenges, thereby increasing the likelihood of adoption and sustainability. Permanent innovation forums, thematic working groups, and structured consultation processes will create continuous channels for dialogue, co-design and feedback, enabling innovation efforts to remain responsive to emerging needs and opportunities.

The introduction of dedicated industry engagement and innovation roles within Research Infrastructures is expected to strengthen downstream innovation by creating more systematic and sustained collaboration with the private sector. These roles will help bridge the gap between research and development, identify opportunities for commercialisation and service development, facilitate pilot projects, and support the translation of scientific knowledge, data, and technologies into practical solutions. Over time, this will contribute to stronger innovation ecosystems, increased societal and economic impact, and clearer pathways from research outputs to market uptake and real-world implementation.

Enhanced cross-sector learning activities, mobility programmes, and knowledge exchange mechanisms will further stimulate creativity, capacity building, and mutual understanding among research, industry, and policy communities. These interactions will facilitate the transfer of knowledge and best practices across sectors, support the co-development of innovative solutions, and strengthen long-term collaborative networks. A coordinated learning ecosystem, supported through the ENVRI Innovation Hub, will help create a more integrated and innovation-oriented community.

Finally, the implementation of a robust monitoring, evaluation, and learning framework based on stable KPIs, stakeholder satisfaction assessments, periodic reviews, and adaptation processes will provide the evidence base needed to demonstrate progress and impact over time. This will enable the ENVRI community to better understand how innovation outcomes are generated, identify successful practices, and continuously improve collaboration and innovation processes. Collectively, these measures will strengthen coordination, reduce fragmentation, increase innovation capacity, and enhance the scientific, societal, and economic value generated by Environmental Research Infrastructures.

Call for collective action

Achieving these ambitions requires a coordinated and sustained effort across the ENVRI community and its stakeholders. Research infrastructures, policymakers, industry actors, and the scientific community must work collaboratively to implement these recommendations, ensuring shared ownership and alignment of objectives. Early and continuous stakeholder involvement, coupled with a commitment to transparency, learning, and adaptation, will be essential to success. By collectively investing in structured engagement, capacity building, and evidence-based monitoring, the ENVRI community can strengthen its role as a driver of innovation and deliver meaningful, long-term societal impact.

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Appendix

Appendix 1: Questions for the interviews to stakeholders.

What is your role in relation to ENVRIs / research infrastructures / innovation?

How do you currently engage (if at all) with innovation activities in your organisation?

How would you describe the current role of ENVRIs in innovation?

What works well today in terms of innovation support or collaboration?

Where do you see the biggest gaps or challenges?

What kinds of support or services would be most valuable for advancing innovation?

If there were a shared “innovation support structure” for ENVRIs, what should it offer?

Which services would be most useful (e.g. training, matchmaking, tools, funding support)?

What would make you actually use such services ?

What would make collaboration with industry or policymakers easier?

What are the biggest barriers today?

What types of partnerships would you like to see more of?

How important is building innovation skills across ENVRIs?

What formats work best (training, mentoring, peer networks, champions, etc.)?

Looking 3–5 years ahead, what should ENVRIs ideally achieve in innovation?

What should be the top priorities to get there?

What would success look like?

What could prevent these kinds of initiatives from succeeding?

What would be critical to make them sustainable long-term?

Is there anything we haven't covered that you think is important for ENVRIs and innovation?