‘ENVIRONMENT RESEARCH INFRASTRUCTURES INNOVATION ROADMAP’

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Glossary

Acronyms	Full name
ACTRIS	Aerosols Clouds and Trace Gases Research Infrastructure
ENVRI	Environmental Research Infrastructures
ENVRI-HUB	User-friendly platform for seamless access to data from environmental Research Infrastructures
ERIC	European Research Infrastructure Consortium
ICOS	Integrated Carbon Observation System
RI	Research Infrastructure
WP	Work Package

Table of Contents

1. Introduction

1.1. Deliverable Scope & Structure

This Deliverable outlines the activities and results achieved as part of Task 3.1 Common Policies and Resources on Innovation during M6 – M18. This task fits within the overall scope of WP3 Common Policies, Resources, and Capacity Building Strategy for Innovation, which aims at the completion of the preparatory works required to create the necessary content and structure to feed the digital platforms for innovation uptake to be developed in Task 4.1 and inform the Innovation Roadmap (Task 6.1). More specifically, the key objective of Task 3.1 is the creation of a comprehensive Innovation Resources Toolbox, that will be digitalized on the ENVRI-HUB (through Task 4.1), and act as the go-to online guide to innovation management, valorisation and collaboration for the ENVRI community.

As such, in section 2, this deliverable reports on the activities undertaken by the consortium for the construction of the ENVRI Innovation Resources Toolbox, including mapping and consolidating input on innovation policies and frameworks already developed through past projects or advanced ENVRIs, compiling best practice resources for innovation management and implementation, as well as the results on methodologies and collaboration frameworks developed through WP1 and WP2 of the ENVRINNOV project respectively. Further, section 3, outlines the actions taken to gather input and feedback from the wider ENVRI community, to ensure the Toolbox is both useful and usable by the ENVRIs, and how this has informed the shaping of the latest iteration of the Toolbox. Finally, section 4 outlines the current content and structure of the toolbox, following the construction, feedback and review methodologies outlined in sections 2 & 3, and maps out the next steps for the finalization of the digitalization of the Toolbox on the ENVRI-HUB, which is taking place within the framework of Task 4.1.

Lastly, it should be noted that this deliverable and the work carried out in Task 3.1, also utilises results reported in the following Milestones and Deliverables:

- Milestone MS4 Innovation strategy pilot cases successfully achieved (published as news item 31.03.2025): ENVRINNOV MS2.2
- Milestone MS5 ENVRI Innovation Toolbox (First Version) (published as news item 27.09.24): ENVRINNOV MS3.1
- MS6 Innovation Policies and Resources Discussed at BEERI (now ENVRI Board)
- Milestone MS7 Capacity Building Needs & Gaps and available resources (published as news item 31.12.24): ENVRINNOV MS3.3
- Deliverable D1.2. Ongoing analysis of technology/service needs and gaps
- Deliverable D1.1. ENVRI catalogue of services construction & ongoing update
- Deliverable D2.1 Technology Infrastructure Implementation Strategy
- Deliverable D2.2 Tech-Boost pipeline Implementation Strategy
- Deliverable D2.3 Scientific Services Implementation Strategy
- Deliverable D2.4 Intra-RI Tech Development Implementation Strategy

2. Construction of the ENVRI Innovation Resources Toolbox

2.1. Methodology

In order to construct the toolbox, there were several steps that were taken first to determine what should comprise its content and structure, based on the specific needs of the ENVRI community.

First, extensive desk research was undertaken to map, compile and synthesize input on innovation policies and frameworks already developed through past projects or advanced ENVRIs. Further, a detailed mapping was done to identify additional resources that can foster the implementation of innovation activities, including online guides, methodologies, templates, and best practices available

through respected sources, such as the European Commission IP Helpdesk, and the World Intellectual Property Organization (WIPO). This is described in detail in sections 2.2 & 2.3 below.

Further, and as relevant results from ENVRINNOV WP1 and WP2 begun to emerge, these were also integrated within the Toolbox. On the former, this related to methodologies regarding the ongoing analysis of technology/service needs and gaps, and how such insights should inform how ENVRIs assess and shape their innovation portfolio, and the latter utilized learnings to inform the resources on how ENVRIs can best collaborate between them, and with external stakeholders, particularly in industry, for the purposes of innovation development and valorisation. This is described in sections 2.4

To ensure the usefulness and usability of its results, the construction of the toolbox, included several rounds of feedback through different means, which were then iterated into the final format and content. This process is described in section 3 of this document.

2.2. Compilation and synthesis of other policies already defined/implemented

Firstly, a compilation of results from previous projects took place. Building on knowledge and capabilities developed by several ENVRIs through consistent engagement with aspects of innovation within the scope of past projects. Specifically, a preparedness roadmap and shared approaches to RI-industry collaboration (ENVRI-Plus), a strategic action plan for enhancing uptake of ENVRI data by the private sector (ENVRI-FAIR), proposed governance models and capacity-building for industry liaison (ENRIITC), and insights on stakeholder engagement, policy alignment and cross-RI coordination regarding innovation (ERIC Forum). These results were compared, assessed and combined to form the basis of the common approaches and proposed policies that have been included in the Toolbox, as these are outlined in section 4 of this deliverable.

In addition, a survey was conducted of innovation related policies defined and implemented by ENVRIs. This pertained primarily to those that have reached higher maturity level (e.g. ERIC status). Based on our findings, there are several EVRIs that consistently engage with aspects of innovation. For example, ACTRIS-ERIC works towards the development of an innovation platform to stimulate a more open technology transfer approach within ACTRIS, and has dedicated pages within its website that outline the RIs capabilities and value-adds in regards to innovation (https://www.actris.eu/supporting-innovation), as does ICOS-ERIC (https://www.icos-cp.eu/science-and-impact/society-impact/technology-innovation).

Through our research, we determined that innovation management within ENVRIs, whilst developing, has not yet been operationalized, as that relates to formal innovation management and technology transfer frameworks, governance and decision-making structures, and dedicated policies on innovation matters (e.g. a comprehensive IP Policy considering all aspects identification, evaluation, and commercialization of IP, or innovation services management and pricing structures). This is a need that also emerged through the analysis conducted as part of Task 3.2. and mentioned in section 3 of this deliverable. Hence, this has largely informed the contents of the Toolbox, which now includes dedicated sections on guidelines and best practices regarding internal frameworks, policies and agreement templates for innovation (see section 4).

Finally, research was done to map best practice examples on innovation within the wider ESFRI ecosystem, but outside the ENVRI community. For example, looking to take inspiration from the approaches of RIs that have long utilized access as an enabler of innovation, such as the European Synchrotron Radiation Facility (ESRF), or ERICs that have more recently developed a comprehensive framework on Open Innovation and Industry Collaboration, such as the Central European Research Infrastructure Consortium (CERIC-ERIC).

2.3. Additional resources fostering the implementation of innovation activities

In addition to compiling policy frameworks and practices from within the ENVRI community and related projects, further work was carried out to identify high-quality resources from established European and international organisations that could support the implementation of innovation activities across the ENVRI community. These materials were selected with a view to complement and strengthen the ENVRI-specific content by offering practical guidance, tools, and training resources applicable across a range of innovation-related challenges. These resources were integrated into the Toolbox under thematic headings such as IP management, technology transfer, and collaboration frameworks (see section 4).

Specifically, this process included a detailed review of relevant innovation and IP support services developed by European Commission bodies, EU-funded platforms, and international institutions. Resources from the European IP Helpdesk were particularly useful in providing hands-on tools for managing intellectual property and collaboration agreements, including guides on licensing, confidentiality, and negotiation practices. These were included under the dedicated section on “Collaboration” and “Technology Transfer” within the Toolbox, with agreement templates, and best practice examples curated to support their practical use by RIs.

Further, the Smart Specialisation Platform (S3) was identified as a useful reference point for understanding how regional innovation ecosystems can be leveraged to support research infrastructure activities. Guidance from the European Innovation Council (EIC), the European Institute of Technology & Innovation (EIT) (particularly relevant thematic KICs such EIT Climate-KIC), and the European Patent Office (EPO) were also reviewed and selectively included where relevant for example, in relation to Technology Transfer pathways and the critical role of proper IPR management in bringing research from lab to market.

At the international level, materials from the World Intellectual Property Organization (WIPO) were included, particularly regarding licensing practices and IP valuation frameworks that are applicable to multi-stakeholder collaborations. These were placed within the Toolbox as part of a broader effort to equip ENVRIs with models and reference materials aligned with international standards.

In compiling these resources, the emphasis was placed on curating materials that are from reputable sources, openly accessible, practical, and can be used as complementary to the internal frameworks being developed by the ENVRIs themselves. This ensures that the Toolbox is aligned with the specific needs of the ENVRI community but also in line with broader guidance and expertise that can be readily adopted or adapted by RIs as needed.

2.4. Methodologies developed in WP1, and strategies tested/refined in WP2

Alongside the desk research and mapping exercises described above, relevant outcomes from WP1 and WP2 of ENVRINNOV were also integrated into the Toolbox. These inputs primarily reflect methodologies developed through the project to support the identification of innovation potential within RIs (WP1), as well as practical strategies for fostering collaboration with external stakeholders (including industry) and valorisation of results (WP2).

Results from Deliverables D1.1 and D1.2 under WP1 have informed sections of the Toolbox that refer to the use of needs and gaps analysis to assess the potential of an innovation project, as well as to scope out areas of opportunity to invest in, regarding innovation. This includes methodologies for identifying and evaluating technological and service-related gaps, both within the RI and in relation to external user needs. As outlined in “D1.2 Ongoing analysis of technology/service needs and gaps”, this approach combines qualitative and quantitative tools to assess the potential for innovation based on existing capabilities, societal demand, and environmental challenges. These methods have been integrated in the Toolbox to help RIs assess their own innovation potential and prioritise efforts accordingly (“Technology Development” and “Technology Transfer” sections as per the structure outlined in section 4 of this document). They also link directly to the ongoing identification of key exploitable results, which can then be further supported through the IP management and collaboration tools provided in other sections.

From WP2, the strategies tested and refined through the innovation pilot cases (as summarised in MS4 and detailed in Deliverables D2.1, D2.2, D2.3, and D2.4) have been translated into practical resources to support effective collaboration between RIs and external stakeholders, particularly industry. These include models for structuring innovation partnerships, templates for various types of collaboration agreements, and guidance on managing expectations and risks within co-development activities. These outputs have informed the Collaboration Models and Template Agreements sections of the Toolbox (see section 4).

In particular, the pilot cases provided valuable insights into how different types of collaboration (e.g., joint development, service provision, access-based innovation) need to be supported and formalised through appropriate legal and operational frameworks. These have been compiled in the Toolbox as a Collaboration Canvas tool and accompanying checklist, which provide step-by-step guidance RIs can use to structure their own innovation collaborations, from stakeholder identification to legal agreement and follow-up evaluation.

3. Drafting, Review, and Endorsement

3.1. Drafting the Toolbox

The work described in section 2, culminated in the first offline version of the Innovation Resources Toolbox, in line with Milestone MS5 ENVRI Innovation Toolbox (First Version). It brought together early content and structure drawn from project tasks, existing tools, and examples of good practice across the RI landscape, as described in section 2.

This was then summarized in the form of a news item published on the ENVRI community website (link here) presenting the aims, structure and content areas of the Toolbox to build awareness and invite feedback. Accordingly, it was promoted through ENVRI community channels (including the ENVRI newsletter and social media accounts, helping to initiate a wider conversation with the community.

Consequently, a range of different activities were then carried out to review and validate the Toolbox with users and inform its further development. This process, outlined in detail in the subsections below, was essential to ensure the Toolbox was aligned with ENVRI needs, informed by relevant expertise, and endorsed by the wider community. It included targeted interviews, a community survey, a user mapping exercise, iterative review with project partners, and presentations to key stakeholders, including the ENVRI Board. Details on each of these activities, below.

Stakeholder Interviews

Individual interviews were conducted with stakeholders in the ENVRI and wider RI community. This was focused on key people actively working in developing aspects of innovation, services development or industrial collaboration in an RI. It included contacts working in developing innovation within RIs in the Environment domain, as well as mature RIs in other ESFRI domains, that have already developed a substantial innovation service offering and/or the operational structure to support innovation management. The interviews offered practical insights on the types of tools and guidance that would be most relevant in shaping RI innovation strategy as well as day-to-day operations. For purposes of data protection, the exact list of contacts interviewed is not disclosed in this public deliverable, but the insights extracted from this discussion, were weaved into the structure and content of the Toolbox.

Community Survey on Capacity Building Needs & Gaps (within the framework of Task 3.2)

As part of Task 3.2, a community-wide survey was launched to better understand capacity-building needs and current gaps in innovation-related support. The results, published in a dedicated news article on the ENVRI community website, pointed to a need for better access to training and internal guidance on technology transfer, collaboration agreements, and stakeholder engagement. These findings directly

informed several sections of the Toolbox, including those on Innovation Policies and Collaboration Models (see section 4).

Toolbox user mapping

Based on the above feedback, it became obvious that different segments of the Community had different needs and hence would need to interact with the Toolbox in different ways. To ensure the structure and guidance materials included were aligned to these varied needs, a short user mapping exercise was carried out. This aimed to identify the main categories of potential Toolbox users within the ENVRI community and align the resource types most relevant to each.

The results of this exercise highlighted two broad user groups within the ENVRI community. The first includes those working in RI Head Offices, such as administrative and management staff e.g. operations managers, communications officers, and liaison roles. These users are typically involved in shaping strategy, coordinating external engagement, and overseeing cross-RI functions. For this group, the most relevant resources include materials related to collaboration models, stakeholder engagement, innovation policies, contractual tools, and technology transfer and IPR management.

The second group includes researchers and specialists, such as scientific and technical staff based at central facilities or distributed RI nodes, as well as facility managers and affiliated research-performing organisations. Their focus is more operational and hands-on, and their needs are primarily linked to supporting or participating in collaborative projects and developing new services or technologies. For this group, the Toolbox resources related to collaboration and technology development are the most relevant.

Based on the results of this mapping exercise, the content, structure and language of the Toolbox was revised to better meet user group needs. We expect that this approach will continue to guide further refinement of the online version, as this is further developed and tested by beta users within the framework of Task 4.1.

3.2. Review & Endorsement

From the ENVRINNOV Consortium:

Feedback on the developing Toolbox from consortium partners was collected on an ongoing basis and played a key role in shaping both the structure and content of the resource. The Toolbox was reviewed and developed incrementally, in batches, with each section reviewed, revised, and validated in close collaboration with partners across the project.

The content was organised around five core sections: Strategy, Collaboration, Technology Development, Technology Transfer, and Additional Resources, which includes information on networking opportunities, funding opportunities, and innovation success stories. These categories were chosen to reflect the different dimensions of innovation capacity-building relevant to the ENVRI community, and as highlighted based on the research and feedback mechanisms described above, to ensure that both strategic and operational perspectives were adequately covered.

Accordingly, each section underwent several iterations, with ENVRINNOV partners invited to provide detailed feedback through shared documents, meetings, and bilateral discussions. The feedback was used to clarify language, adjust structure, and ensure that links to relevant frameworks, tools and existing good practices were appropriately incorporated. This collaborative process also helped ensure alignment with the practical realities and institutional priorities of the different RIs represented in the project, which span different environmental domains and different stages of maturity

From the wider community, including the ENVRI Board:

In parallel to consortium feedback, the initial version of the Toolbox was also tested with the wider ENVRI community through various activities and events.

One of the first opportunities for external feedback was organized during ACTRIS Week 2024, where the Toolbox was presented during the opening session of the meeting on 5 November 2024. Specifically, a 15-minute live Slido survey and Q&A were held with attendees, focusing on the relevance of the Toolbox contents, its usefulness for their roles, and what additional materials or formats would make it more helpful. The session provided early validation of the structure and scope of the resource and gave valuable insights into how different stakeholders in distributed RIs might use the Toolbox in practice.

In line with Milestone MS6 Innovation Policies and Resources Discussed at BEERI (now the ENVRI Board), further review and endorsement came through dedicated interactions with the ENVRI Board, the strategic decision-making and coordination body that brings together the leadership of the different ENVRIs (the evolution of the BEERi - Board of European Environmental Research Infrastructures). ENVRINNOV results, including the Toolbox, were formally presented to the Chair and Co-Chair of the ENVRI Board, during an ENVRI Projects Coordination Meeting, which was held in Brussels on 1-2 April 2025. This presentation included an overview of the proposed approach to common innovation policies, processes and support resources integrated in the Toolbox.

Further, as a follow-up to this meeting, the Toolbox was again presented during an ENVRI Board online meeting held on 23 June 2025, where a presentation of the ENVRINNOV project was included as a dedicated agenda item. The purpose of this second presentation was to provide a more detailed walkthrough and to discuss next steps. Feedback was very supportive, and it was agreed that a dedicated session would be hosted at the next in-person ENVRI Board meeting in autumn 2025, where ENVRINNOV results will be discussed in more depth.

In addition, the Toolbox was featured during dedicated ENVRINNOV sessions at EGU 2025, which took place on 27 April – 2 May 2025 in Vienna, and gathered a big part of the ENVRI community. Specifically, during the week, a demo version of the ENVRI Innovation Resources Toolbox (on the ENVRI-Hub) was showcased during a lunchtime talk at the ENVRI booth. The Toolbox was also featured in the opening section of the ENVRINNOV training session hosted during the conference. This session introduced the rationale and potential of the Toolbox as a support instrument for fostering RI-industry collaboration and innovation capacity building. More information is available in the event summary here.

Through this iterative feedback process, it became increasingly clear that a digital version demo would make it easier for users to provide meaningful input on the usability and added value of the Toolbox. As a result, work began on building a demo version of the Toolbox on the ENVRI-Hub platform. This version will continue to be refined and finalised as planned under Task 4.1, with more information outlined in Section 4 of this document.

4. Completed Structure, Content & Next Steps for Digitalization

4.1. Toolbox structure and content

As a result of the activities, outlined in sections 2 and 3 above, the ENVRI Innovation Resources Toolbox content has been completed, and is now being structured in the form of an online demonstrator on the ENVRI-Hub (not public access yet). The digital version aims to bring together the content developed in WP3 and present it in a format that is accessible, modular, and designed to evolve over time.

As per the structure and content set out in the offline version, the structure of the Toolbox is organised around five main sections, reflecting the typical stages and areas of work involved in building innovation capacity within ENVRIs:

1. **Innovation Strategy**: This section sets the overall framing for the Toolbox. It combines resources that can support RIs to shape their own internal approach to innovation. It includes examples and

starting points for drafting innovation strategies, and guidance on how to link innovation to the RI's mission. The aim is to help individual RIs reflect on what innovation means in their setting and how to approach it in a structured way.

2. **Collaboration Resources**: This section includes practical tools to support collaboration with external partners, particularly industry, public authorities, and other research organisations. It is broken down into three subsections:
   - Innovation Collaboration Models, with information on models ENVRIs can pursue for joint research & development, contract research, and commercialization activities.
   - Collaboration Tools, such as planning resources, canvases and checklists for co-design or joint development activities most useful during the scoping stage of collaboration planning.
   - Collaboration Agreement Guides & Templates, including editable agreement templates, and how to implement them at each step of the collaboration process.

   Many of the above were drawn from the strategies piloted under WP2, and are designed to support clear, structured, and goal-oriented innovation partnerships.
3. **Technology Development**: Here, the focus is on helping RIs identify, assess an advance early-stage ideas and prototypes. Accordingly, the section includes frameworks for ideation and discovery, including on how to use insights on market needs and gaps, to generate new ideas and assess their potential (as per WP1 outputs). It also contains information on established frameworks for innovation management and product development (from Discover to Validation), as well as tools for assessing the maturity of technologies (based on the TRL scale).
4. **Technology Transfer**: This part of the Toolbox covers the steps involved in turning an internal development into something that can be adopted or used externally, whether by industry, the public sector or other research partners. It more specifically examines three pathways to technology transfer: through services, licensing, or spin-off. Accordingly, it also includes extensive information on managing intellectual property and identifying and scoping appropriate transfer pathways.
5. **Additional Resources**: This section is meant to be used as a space to signpost opportunities that can be utilized by RIs, e.g. for funding calls that could be suitable for innovation, and networking opportunities through which to uncover possible collaboration partners. Finally, it will also feature success stories, and it will include access to the multimedia materials developed in WP2 (as per Task 4.1).

Screenshots displaying the Toolbox's structure, as well as content from the evolving digital version in the ENVRI-HUB, are included in the Annex.

4.2. Next steps for digitalisation

The next stage of development will take place through Task 4.1 (M18-M24), with the aim of testing and refining the digital version of the Toolbox. This will start with a beta version, shared with a small group of testers drawn from across the ENVRI community. The focus will be on gathering feedback on usability, structure, and how well the content meets real needs.

This phase will also begin to integrate multimedia resources developed under WP2, as well as link the Toolbox to relevant parts of the ENVRINNOV training programme under Task 3.2. The aim is to create a platform that users can interact with and contribute to over time.

The ambition is that the Toolbox will remain a useful, living resource for the ENVRI community after the end of the project.

5. Annex

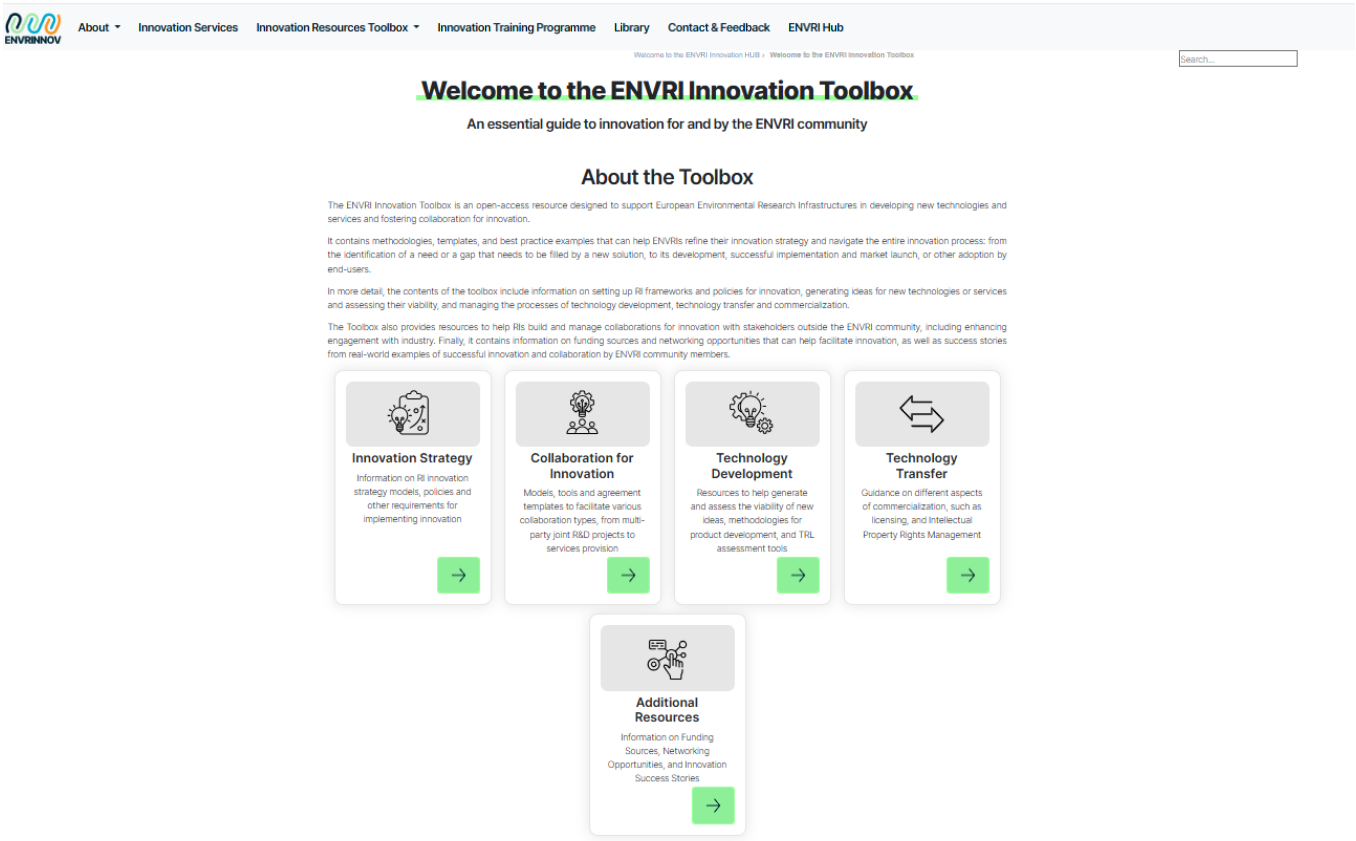

Fig.1: Innovation Resources Toolbox Content Summary

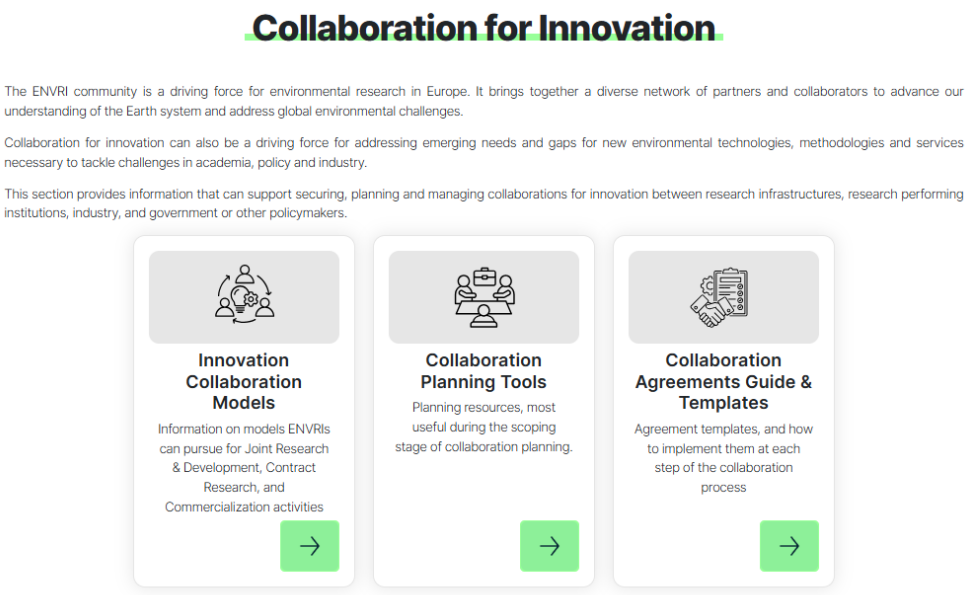

Fig.2: Toolbox's Collaboration for Innovation Section Summary

Collaboration Agreements Guide & Templates

This section aims to assist with managing agreements throughout the collaboration cycle, from initiation to completion. Navigate through to discover the "when, what and why" of each agreement and use the best practices and available example agreement template to tailor your contract according to your needs.

Note that this guide is for informational purposes only and is not legal advice. Please consult a legal professional before finalising agreements.

Acknowledgements

This Collaboration Agreements Guide content been developed with reference to publicly available resources from several esteemed organizations, including the World Intellectual Property Organization (WIPO), the Intellectual Property Office (IPO) UK, and the NCP.IP Austria. More specifically the below resources used and referenced:

WIPO model contracts for academic institutions: In order to support academic institutions in the development and negotiation of technology transfer contracts, WIPO provides model agreements between academic institutions and industry partners. Link here: WIPO model contracts for academic institutions

NCP.IP Austria- The Intellectual Property Agreement Guide: About IPAG

IPO UK-Lambert Toolkit: The Lambert Toolkit is a resource designed to facilitate research collaborations between universities and industry in the United Kingdom. Developed by the UK Intellectual Property Office (IPO), it provides model agreements and guidance for managing intellectual property (IP) in collaborative research: **IPO UK-Lambert Toolkit**

Contracts during a collaboration

A major challenge in research collaboration projects is their multidisciplinary nature, which requires partners with different goals, methods, and cultures to work together. Each partner may have unique interests, such as advancing research or commercializing products. For example, universities and research organizations aim to publish their findings, while businesses focus on gaining a competitive edge and growing. Publishing too early without protection can harm commercial interests and intellectual property, which is important for business partners.

Sharing and obtaining knowledge openly is key to driving innovation and collaboration. This openness is crucial because no one has a monopoly on invention. However, the emphasis on Open Innovation and Open Science in EU-funded projects brings challenges. Managing knowledge and protecting intellectual property becomes more complex in these multi-partner environments. Balancing individual and shared business strategies is essential for creating impactful and mutually beneficial innovation.

To ensure successful partnerships in research collaborations, a well-planned strategy using contracts and agreements can align and protect the interests of all partners. Here's a suggested approach that stages agreements at critical points to guide partnerships toward their goals:

Collaboration Phase?	When?	What Agreements?	Why?
Initiation	Start of collaboration discussions	• Non-Disclosure Agreement (NDA) • Memorandum of Understanding (MoU)	• NDA protects confidential information shared early. • MoU defines initial objectives and intentions for the partnership

Fig.3: Content snapshot of the Collaboration Agreement Guide & Templates sub-section