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Note on Participant acronyms: Most of the participating Research Infrastructures (RIs) are not legal entities, and are represented by Participant organization(s). We use convention of having the represented RI as a subscript of the Participant acronym, i.e. ACRONYM_{RI}, or e.g. UHEL_{ICOS}. Some Participants are representing several RIs and this way we can define which role the Participant is having on each task. For Participants not connected to RIs, but providing special expertise, subscript _{EXP} is used. In WP descriptions, due technical constraints, the notation ACRONYM[RI] is used. CNRS third parties are not specified in the task level and the distribution of PMs between different CNRS RI representatives in this level should be only considered as estimates.

1. Excellence

1.1 Objectives

The objective of ENVRI^{PLUS} is to provide common solutions to shared challenges for European Environmental and Earth System Research Infrastructures (RIs) in their efforts to deliver new services for science and society. To reach this overall goal, ENVRI^{PLUS} brings together the current ESFRI roadmap environmental and associate fields RIs, leading I3 projects, key developing RI networks and specific technical specialist partners to build common synergic solutions for pressing issues in RI construction and implementation. ENVRI^{PLUS} will be organized along 6 main objectives, further on called “Themes”:

- 1) Improve the RI’s abilities to observe the Earth System, particularly in developing and testing new sensor technologies, harmonizing observation methodologies and developing methods to overcome common problems associated with distributed remote observation networks;
- 2) Generate common solutions for shared information technology and data related challenges of the environmental RIs in data and service discovery and use, workflow documentation, data citations methodologies, service virtualization, and user characterization and interaction;
- 3) Develop harmonized policies for access (physical and virtual) for the environmental RIs, including access services for the multidisciplinary users;
- 4) Investigate the interactions between RIs and society: Find common approaches and methodologies how to assess the RIs’ ability to answer the economical and societal challenges, develop ethics guidelines for RIs and investigate the possibility to enhance the use Citizen Science approaches in RI products and services;
- 5) Ensure the cross-fertilisation and knowledge transfer of new technologies, best practices, approaches and policies of the RIs by generating training material for RI personnel to use the new observational, technological and computational tools and facilitate inter-RI knowledge transfer via a staff exchange program;
- 6) Create RI communication and cooperation framework to coordinate activities of the environmental RIs towards common strategic development, improved user interaction and interdisciplinary cross-RI products and services.

The produced solutions, services, systems and other project results are made available to all environmental research infrastructure initiatives, thus directly contributing to the realization of the Innovation Union flagship initiative's Commitment n. 5: “to complete or launch the construction of 60% of the ESFRI projects by 2015”.

1.2 Relation to the work programme

The main goals of the work programme as a whole to foster the innovation potential of research infrastructures and specifically of the INFRADEV-4 call are fully met. ENVRI^{PLUS} has its focus on coordination to structure the scientific community and to reduce the fragmentation in the environmental RI landscape. This becomes practical in the 6 Themes. ENVRI^{PLUS} will boost the up-take of the most advanced technological innovations (Theme 1) and data related services (Theme 2). This will promote efficient research and support new scientific breakthroughs. Providing common guidelines for physical and virtual access (Theme 3) will increase the multidisciplinary use of the RIs. It will, furthermore, increase trust and induce the re-use of the data, products and services of the RIs.

New methodological approaches and tools to communicate with users (Theme 3 and 6), new measures to evaluate the socio-economic impacts of the environmental RI (Theme 4), improved training of the RI technicians, managers and users (Theme 5) will foster knowledge transfer and adoption of best practices. By communicating the ENVRI^{PLUS} outcomes within and beyond the environmental RI community (Theme 6) the implementation will be optimized. ENVRI^{PLUS} includes a unique education and training program for awareness, outreach and knowledge transfer that is targeted to a wide variety of users, beyond those usually reached by the single RIs. Significant opportunities for innovation are rooted in the multidisciplinary component of ENVRI^{PLUS} and its multicultural context. The importance of social learning does not directly deal with technological potential but will facilitate collaboration and use of products as a base for future innovation. All these efforts are eventually made to support scientists in providing knowledge related to grand environmental challenges, such as climate change, pollution, loss of biodiversity, weather extremes or seismic-volcano events. Details are provided in the descriptions of the 6 Themes.

1.3 Concept and approach

Research Infrastructures in the Environmental research are crucial pillars for environmental scientists in their quest for understanding and predicting the complex Earth System. Originally, the RI facilities were developed to respond to the needs from specific research communities, following the individual needs and methods of specific disciplines. Disciplinary oriented research communities and RIs collaborated with the neighbouring disciplines normally within the same “sphere” as within the atmosphere, biosphere, hydrosphere and geosphere. These communities are called “the four environmental domains” in the context of this proposal. Internal cooperation created diverse research traditions, specific skills and cultures for the different domains. However, the interlinked nature of the Earth System requires the scientific community to transcend the well-established and familiar boundaries of disciplines and domains, and work towards common holistic understanding of the environment as a one Earth system. ENVRI^{PLUS} gathers all domains of Earth system science to work together capitalize the progress made in various disciplines and strengthen interoperability amongst RIs and domains.

Participation concept

The ENVRI^{PLUS} research infrastructures cover extensively the research fields of the environmental research¹ and together ENVRI^{PLUS} RIs contribute to enhancing of the scientific understanding of the Earth Systems and to providing solution to beat the grand environmental challenges. The ENVRI^{PLUS} research infrastructures listed in Table 1. These RIs present a major investment from the Member States. Even if counting only ENVRI^{PLUS} RIs in the ESFRI 2010 roadmap (see fig 1.3.1), the construction costs are in excess of 1600 million Euros, with annual running cost exceeding 300 million Euros. The ENVRI^{PLUS} collaboration and synergies between these RIs has thus tremendous potential for advantages in the terms of added value, return for investment and support for science, economy and society.

The ENVRI^{PLUS} RIs are diverse in institutional aspects and maturity scales. Some of the RIs have already built their facilities and/or are organized as legal entities (e.g. ERICs or associations), some are still developing their logistical and administrative forms and can only be represented by key partners of preparation projects. This heterogeneity in organization creates further challenges for interoperability and is the key background of ENVRI^{PLUS}: its approach is to integrate as much as possible over this diversity a organise cross-fertilization among RIs. For that reason, ENVRI^{PLUS} comprises in its partnership not only RIs in the ESFRI roadmap but also

¹ As the focus of ENVRI^{PLUS} is on environmental sciences, it is complementing parallel proposals to this call (e.g. the CORBEL proposal on transformative aspects of the health challenges). The RI ELIXIR is contributing to both proposals. However, this is realized with different groups within ELIXIR and was announced to the coordinator in the very early stage of the proposal planning.

research networks such as I³ – research infrastructure projects that have reached sufficient maturity level (see Fig. 1 and consortium description in 3.3).

Table 1: Research infrastructures participating In ENVRI^{PLUS} (in green RIs that are listed in the Biological and Medical Sciences area in the ESFRI roadmap documents). PPP: Preparatory Phase Project, Con: under construction, Ope: operational, STEP2: in the Step 2 of ERIC application.

	RI type	Domain	Current status	On ESFRI roadmap	Legal entity
ACTRIS	distributed	ATM	I3	No	No
AnaEE	distributed	BIO/ECO	PPP	Yes	No
EISCAT_3D	single RI with multiple sites	ATM	PPP	Yes	Yes
ELIXIR	distributed	BIO/ECO	Ope	Yes	Yes
EMBRC	distributed	MARINE, BIO/ECO	Con/Ope	Yes	No
EMSO	distributed	MARINE	Ope	Yes	No, STEP2
EPOS	distributed	SOLID	PPP	Yes	No
ESONET	distributed	MARINE	Con/Ope	No	Yes
EURO-ARGO	distributed	MARINE	Ope	Yes	Yes
EUROFLEETS	distributed	MARINE	I3	No	No
EUROGOOS	distributed	MARINE	Ope	No	Yes
FIXO3	distributed	MARINE	I3	No	No
IAGOS	distributed	ATM	Ope	Yes	Yes
ICOS	distributed	ATM, MARINE BIO/ECO	Con/Ope	Yes	No, STEP2
INTERACT	distributed	BIO/ECO	I3	No	No
IS-ENES	virtual	ATM	I3	No	No
JERICO	distributed	MARINE	I3	No	No
LifeWatch	virtual and distributed	BIO/ECO	Con/Ope	Yes	No
LTER	distributed	BIO/ECO	I3	No	No
SeaDataNet2	virtual	OCEAN	Ope	No	No
SIOS	regional distributed	all domains	PPP	Yes	No

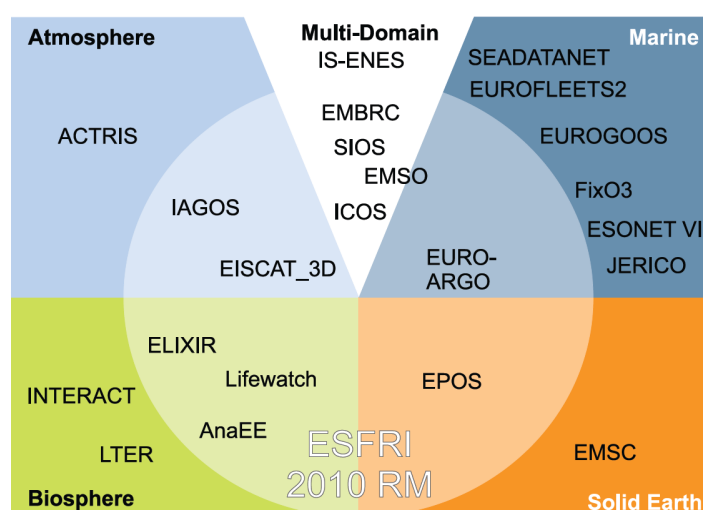


Figure 1: RIs directly participating in ENVRI^{PLUS} proposal. The RIs represent different domains (or “spheres”) of the Earth System, with some of them having multi-domain approach. The inner circle shows RIs in the ESFRI 2010 Roadmap (RM).

The ENVRI^{PLUS} concept is based on joining the efforts of the RIs in the 4 environmental domains to answer shared challenges. Solutions developed within one domain may also be deployed by research infrastructures in other domains. Developing trans-boundary research requires exploring scientific questions at the intersection of different fields, conducting joint research projects and developing concepts, devices, and methods that can be used to integrate knowledge. Establishing a cluster of Environmental infrastructures is a starting point for re-

shaping the strategy to conduct research across disciplines. ENVRI^{PLUS} enlarges the scope of ENVRI (EC FP7 funded RI cluster project) by further developing the trans-boundary conditions required for performing innovative environmental research. The ENVRI^{PLUS} concept is driven by 3 overarching goals: 1) favouring cross-fertilization between infrastructures, 2) implementing innovative concepts and devices across RIs, and 3) facilitating research and innovation in the field of environment to an increasing number of users outside the RIs.

Organisational concept

The 6 Themes identified by ENVRI^{PLUS} will join forces across domains. Single RIs will efficiently benefit in their implementation as well as large user-communities, including academic research and private-sector by using improved RI services. ENVRI^{PLUS} addresses the challenge of working across disciplines by setting practical deliverables that will contribute to building an integrated vision among RI operators. When needed, external expertise is provided, mostly from experts in foundational e-infrastructures, bringing the underlying generic services that can be customized for environmental RI. This organisation ensures that ENVRI^{PLUS} developments are rapidly transferred to RIs and, hence, the RI user communities. For all aspects of its organisation, ENVRI^{PLUS} works on subsidiarity principles, only addressing issues that are more efficiently addressed as a cluster of infrastructures rather than within the single RIs, and avoiding duplication of efforts. Innovations will be implemented across disciplines by several RIs in use-cases to demonstrate feasibility and further develop new tools and services. Subsequent implementation of the new products developed within ENVRI^{PLUS} will then be left to RIs. This approach is used to maximise the chances of successful interoperation between environmental RIs both technically and in human dimensions. The Themes of ENVRI^{PLUS} are broken down to work packages (WP) and tasks. All ENVRI^{PLUS} tasks are led by expert teams from one or more RIs, including e-infrastructures experts whenever needed and always engage participation of several RIs from different domains. Participation of all RIs of the EU Environmental Sciences landscape in ENVRI^{PLUS} ensures that decisions taken within the project will be efficiently implemented.

Methodological approach: the ENVRI^{PLUS} Reference Model

In its methodological approach ENVRI^{PLUS} will be based on the successful FP7 project ENVRI, which has developed a reference model (ENVRI RM) describing the data life cycle in an RI. The ENVRI^{PLUS} RM will extend this approach by including latest conceptual and technological updates from involved RIs. The workflow in all Themes and work packages is organized in a way that information is gathered from RIs about their specific needs or challenges. Solutions will be then developed in cooperation with internal and external experts. The knowledge will finally be disseminated by reports and publications but also improving the ENVRI reference model which in this way will also constitute a knowledge repository. It will be an important tool to transfer experiences from advanced RIs to starting communities (see also Chap. 2: Impact).

Interaction with national or international research and innovation activities

The new organization of the European research infrastructures towards world-class research facilities and data services is being developed with strong support from national stakeholders. A majority of investment and running costs is achieved at national level. ENVRI^{PLUS} will contribute to more efficient and cost-effective management of RIs through transfer of knowledge and best practices amongst infrastructures, thus directly benefiting the science of the Member States.

ENVRI^{PLUS} capitalizes from different initiatives organized at national and international levels and extends their potential applications. ENVRI^{PLUS} facilitates efficient transfer of products developed within a specific RI to other RIs and towards external users, including SMEs. One important example for that is standardisation of measurement techniques and data services. The critical mass of researchers / engineers involved through the different RIs enables ENVRI^{PLUS} to be effectively engaged with both national metrological institutions and private industries in the establishments of new standards. European-based SMEs, associated to ENVRI^{PLUS} through their participation in Environmental RIs will be the first beneficiaries from the harmonization and standardization efforts.

ENVRI^{PLUS} will respond to needs expressed by single infrastructures and stakeholders for improving the European network of observational data as part of the EU's open data initiative. ENVRI^{PLUS} creates the conditions, that would not have existed otherwise, to join forces between e-infrastructure experts and RIs data managers to make data more accessible, interoperable and more useful to end-users. ENVRI^{PLUS} contributes to decision-support and facilitates access to information. ENVRI^{PLUS} will provide the first effective linkage of observing systems across environmental disciplines in Europe but also within specific domains where gaps currently exist. These efforts will be integrated in European data systems in the field of Earth System Science and support EU initiatives, such as the Copernicus *in-situ* Services, but also domain-specific initiatives such as

e.g. EMODnet², the Data Collection Framework for fisheries, the WISE-Marine for environmental data for the marine domain. ENVRI^{PLUS} fully complies with the principles of the Shared Environmental Information System. Harmonization and standardization activities across disciplines together with implementation of joint data management structures within ENVRI^{PLUS} will facilitate the strategic coordination of observation systems required by member states and organized within GEO/GEOSS. The ENVRI^{PLUS} approach aligns with on-going work and trends in the provision of e-Infrastructure especially GRIDs and CLOUDs, data-centric projects such as EUDAT, preservation projects such as SCAPE and APARSEN, the Internet of Things and Future Internet and the developments being proposed (and in some cases implemented) under the umbrella of RDA including management of big data.

The sex and gender analysis have been taken into account in the planning of the project and in defining the proposal concept. The analysis of Gender *balance* in the research teams (within partners) shows the division of the roles and tasks in the project. The table 1.3.1 gives summary of the gender balance in the ENVRI^{PLUS} project.

Table 2: Gender balance of ENVRI^{PLUS} during proposal writing.

Ratio between females to males in the project participants	44 %*
Number of the female theme leaders	3/6
Number of the female task leaders	28/59
Percentage of females members in the executive board (including coordinators)	42 %*

*as far as participants and members in the steering committee have been nominated by the RIs yet

The concept of Gender *dimension* has been also considered when creating the research priorities, concept and approaches. All the gender related interests and priorities are included in the proposal. All the discussions and communication among partners have been supportive, permissive and open for also gender oriented interests. Specific attention will be given to the gender dimension aspect while defining the user requirements, identifying and working with user groups, communicating and disseminating the ENVRI^{PLUS} deliverables, and coordinating internal and external collaborative actions. Special attention will also be paid in the Work Package related to Citizen Science and Participative Science that the traditional norms of genders are not hindering the work.

1.4 Ambition

Environmental risks and opportunities are important drivers of societies and economies. The current environmental RIs have been built to provide important information and services on the processes of the Earth System, observe the state of the environment, and support scientific progress, political decision-making and economic innovation related to environmental challenges and societal needs (Figure 2a). ENVRI^{PLUS} is designed to provide synergic support to the current and future environmental RIs to better fulfil these missions.

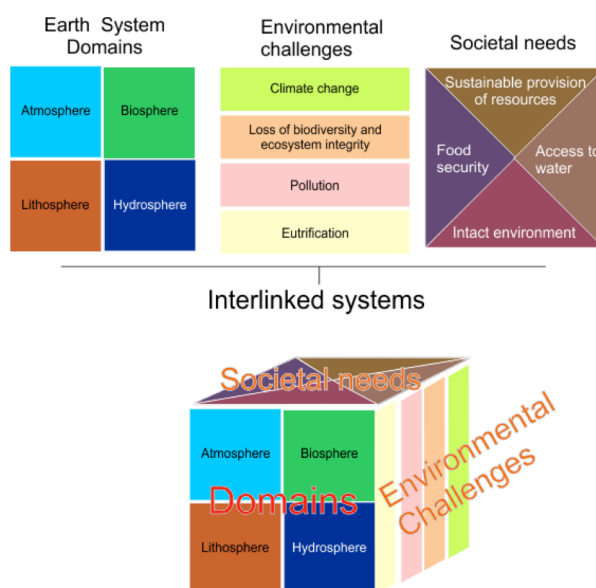
Notwithstanding, the Earth System is a highly interactive system, with different components affecting the behaviour of the system without consideration of human-created scientific disciplines or domains. The current heterogeneous and fragmented structure of the Earth System sciences and RIs as symbolized on the left hand site of Figure 2b makes such multidisciplinary approach challenging as the environmental RIs are now mostly concentrated on providing products for their identified users, generally from the disciplines and environmental domains the RIs are originating from. This is natural result of the process how the RIs have been developed, and although it is an efficient way to provide specialized high quality data and services, the generalization of such products is not straightforward. The current situation is therefore that different RIs are responding to identical societal needs and addressing same Environmental challenges in a quasi-independent manner. Instead, attempts to counteract the largest environmental challenges require holistic understanding of the whole Earth System. We have to think multi-dimensional and relate scientific domains to environmental challenges and human demands (Figure 2b).

The long-term ambition of the scientific community involved in environmental RIs goes beyond providing solutions and tools for their immediate construction and operational needs to generating a common intellectual framework for the environmental RI landscape that improves our ability to estimate the effects of human activities on the Earth System and provide far more reliable tools to answer societal needs. This vision aims to overcome disciplinary segregation and to provide truly discipline agnostic products and services across all domains. Holistic understanding will enable scientists to actually approach the environmental challenges from a problem-directed system analysis approach. This long-term goal facilitates far improved flexibility of the Earth System sciences. Importantly, it will also facilitate implementation of human interactions via societal modelling

² A list of acronyms is provided in the end of the proposal

in the Earth System studies, generating more direct interaction between Earth System and social sciences (including economics)³.

a)



b)

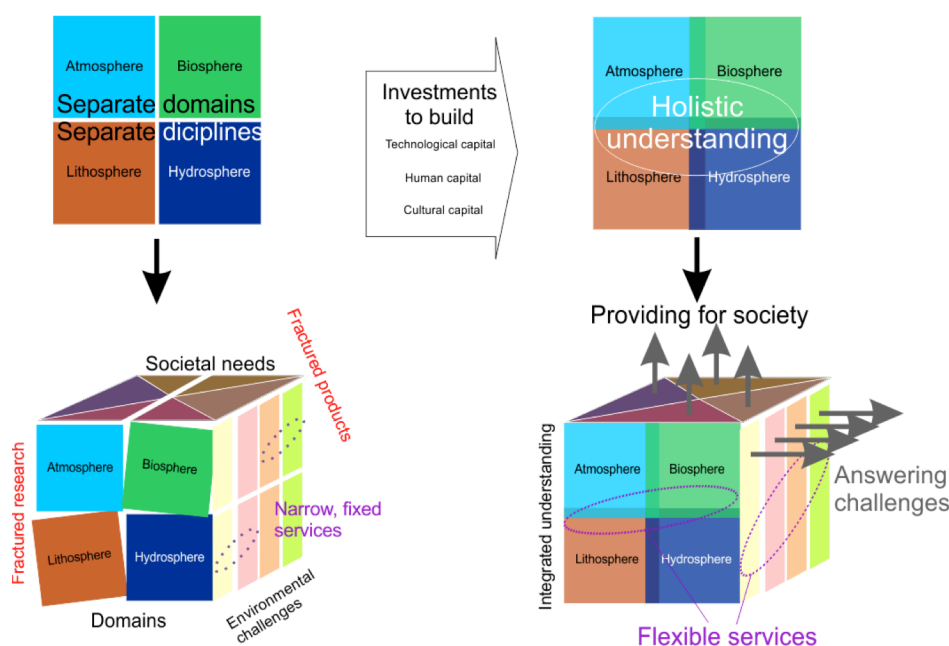


Figure 2: a) The traditional RIs are built according to scientific disciplines and Earth System domains. However, many of the societal and environmental problems are cross-disciplinary and orthogonal to these domains, making the system highly interlinked. b) Still prevalent lack of interoperability makes it difficult to answer to Grand Challenges and generated flexible services. (Figures adapted from the ERI strategy, 2014)

This generalization of environmental RI products does not only serve the RIs and the scientific communities. Homogeneity in data services, workflow documentation and even in the physical makeup of the infrastructures make the RI new innovative services far easier to implement. Emergence of multi-disciplinary research, of which ENVRI^{PLUS} brings a strong contribution, is vital for the work of decision makers, planners and emergency managers considering the complexity of issues related to the changing environment and environmental security.

³ This overall strategic goal is documented in FP6 ENVRI project product “Environmental Research Infrastructure Strategy (ERIS) 2020” by Asmi et al., 2014. Available at ENVRI webpage: <http://www.envri.eu/>

Ambition of ENVRI^{PLUS} is also addressing innovation and end-users in the private sector. A potential large market exists in Europe for improving and developing cost-effective and innovative instrumentation for the eco-industry. Air and water pollution control, environmental monitoring, renewable energy production, nature protection, etc. are examples of sectors with significant economic growth perspectives in the next decade. There, mastering new technologies will enable and drive innovation. Lowered barriers for data and service access make it more affordable for the private enterprises (including small and medium enterprises) to generate new products and innovative cross-disciplinary services, and can directly facilitate citizen interaction with solving the environmental problems. It is clear that the complete presented vision of holistic integration of Earth System sciences led by key environmental RIs, can only be initialized and at best partly fulfilled in a four-year project. It is, therefore, important to provide small initial integration steps with direct measurable immediate short-term benefits. The ambition of ENVRI^{PLUS} to provide common and interdisciplinary solutions to RIs is fusing today's necessities with tomorrow's visions.

2. Impact

2.1 Expected impact

Impact of ENVRI^{PLUS} will address different levels and different targets.

- Impact at single RI level: The European environmental landscape is evolving fast and the advanced and starting communities of the RI networks, such as ACTRIS, IS-ENES, INTERACT, JERICO, LTER, FIX03, EUROFLEETS, ESONET Vi, SEADATANET and EUROGOOS, are now solid elements contributing to the RI network. New RI communities may soon start their operations. ENVRI^{PLUS} will support these RI networks to develop and sustain their structuration and their services for the users by directly adapting and using ENVRI^{PLUS} services, tools and products developed in the different WPs (i.e. data management, training of staff, etc.); Improvements at RI level directly benefits a wide community of users
- Impact on the EU RI structuration: ENVRI^{PLUS} is unique to propose a pan-RI framework for the Environmental science that will provide opportunities - whenever possible - to integrate their actions (esp. governance, access management). These RI networks will fully benefit from the fact that all existing Environmental RIs are represented in the consortium. The main impact by ENVRI^{PLUS} will be broadening, supporting and sustaining the European environmental RI landscape while reducing the costs of the individual RI planning, construction and operations. For example, the take-up of the ENVRI^{PLUS} Reference Model at the individual RI level will help RIs to adopt common approaches to the whole data management lifecycle. This will lead to the better interoperability among the RIs. Moreover, better interoperability will result a better economies of scale and better, user-friendly access with greater use of the data and other RI services.
- Impact of quality, quantity and diversity of services offered by RIs: ENVRI^{PLUS} improves the innovation capacity of the individual RIs and domains by enabling cross-fertilisation of the new knowledge to new solutions and services. An example for that is the implementation of a global data citation system (see Theme 2, WP6) where individual infrastructures are far too small to have any impact but the ENVRI^{PLUS} consortium as a whole may play an important role in cooperation with the successful consortium in call EINFRA-7-2014. Limiting duplicated actions and promoting cost-effective solution for data management, implementing joint implementation of access, training of staff, etc...will improve efficiency of RIs which may revise internally their allocation for services turning them into benefits for users. The innovative level of training in Theme 5 together with special outreach to secondary school students will raise educational levels across the ERA.
- Innovative use of data and data-products: the main barriers for the use (or re-use) of the cross-disciplinary data are not only technology or data issues per se. Several cultural and human related issues may hinder the use of the cross-disciplinary data. An important impact of ENVRI^{PLUS} will be that increased trust and the easy-to-access-and-use user experience on the RI data (theme 4) and services will increase the multiple-purpose use of RI services and the scientific return. Availability of multi-dimensional data and data products from environmental RIs increases environmental information, and bring to innovative use of existing information.
- Building new scientific knowledge: Multi-disciplinary/inter-disciplinary research is key to new scientific breakthroughs. The complex challenges posed by the changing environment will require capacity to address new research concept across different disciplines. ENVRI^{PLUS} is unique to effectively implement opportunities for trans-disciplinary research both through improved interoperability of data and effective opportunities through use-cases in the project.

- Increased capacity for joint management of environmental crisis: single RIs have been essential for providing information during recent environmental crisis (Earthquakes, volcanic eruption ...). Predicting and responding to environmental hazards often requires sets of expertise from different disciplines. ENVRI^{PLUS} not only give the capacity to address environmental crisis at the proper level of complexity but prepares RI managers to respond to demands from stakeholders and civil society (theme 5);
- Addressing the needs for standardization for essential environmental variables: Influencing decision-making for establishing harmonized standards for environmental monitoring and services is therefore essential and can be made much more efficiently at the ENVRI^{PLUS} level than through actions of single RI alone. This is crucial for the development of eco-industry sectors as regulation and standardization are key instruments to sustain growth, by setting more ambitious targets and/or requirements. Establishing quality standards to comply with regulation is essential in this framework. ENVRI^{PLUS} mobilizes sufficient resources and expertise to establish links with environmental metrological projects of the European Metrology Research Programme (EMRP), and facilitate transfer results from single RIs to national metrological institutes (NMIs) on essential variables. ENVRI^{PLUS} will be unique to establish a roadmap for common norms and standards needed by RIs and industry and for which there is an interest from NMIs in EURAMET or standardization organizations.
- Favouring links with the private-sector: while single RIs bring technological innovation and SME partnership, ENVRI^{PLUS} brings the required critical mass to influence decisions-making for regulation and to open markets for increasing transfer readiness level of technologies developed in single RIs. Because ENVRI^{PLUS} represent a much larger market than single RIs, simplifying the market landscape of the environmental research infrastructures will have clear benefits for SME R&D strategies. Work towards simplifying scientific and technical requirements and procurement strategies of the European environmental RIs will clearly benefit SMEs.

2.2 Measures to maximise impact

The impact of the cost efficiency and the greater use of the RI services will be measured in the end of the projects by evaluating Key Performance Indicators of the individual RI's before and after the take-up of the common ENVRI^{PLUS} solutions. Furthermore, ENVRI^{PLUS} will develop measures to evaluate the dissemination of its products, data and knowledge and to maximize the impact of its communication strategy.

a) Dissemination and exploitation of results

Shaping the research communities

ENVRI^{PLUS} clusters 22 RIs. Each of them offers high quality, open RI services for the scientific users in all regions of Europe regardless whether their research organisations or countries are members of the RIs. By this, environmental RIs are maximising use and impact of information and knowledge provided. ENVRI^{PLUS} has the needed critical mass of RI operators to help European environmental and Earth system research communities to evolve towards open, interconnected, data-driven and computer-intensive science. All the ENVRI^{PLUS} actions are aiming for providing user-friendly means to perform modern science. ENVRI^{PLUS} is in the forefront of establishing policies and best practices for open access to the scientific data and publications (data identification and citation).

ENVRIPLUS draft plan for dissemination and exploitation project

The dissemination of the new knowledge and the guidelines, products, and services build up in ENVRI^{PLUS} is in the core actions in the project. This is because the main focus of ENVRI^{PLUS} cluster project is on serving the environmental RI community by providing common solutions to the shared problems and needs originating from the RI community.

ENVRI^{PLUS} will have a dedicated work package (WP18) on the dissemination actions. Moreover, in the WPs under the theme 3 (Access), theme 4 (Societal relevance and understanding), and theme 5 (Knowledge Transfer) will provide new knowledge and insights on efficient and productive dissemination actions that will be used to selecting and using the different dissemination means and to assess the dissemination impacts of the ENVRI^{PLUS} outcomes.

In the beginning of the project (M1-M6), the full ENVRI^{PLUS} dissemination strategy will be done (Task 18.1). The ENVRI^{PLUS} dissemination strategy will outline the 1) target audiences (scientific communities, policy makers, funding agencies/funders, industry partners, other projects/initiatives), 2) ENVRI^{PLUS} project identity (logo, templates for documents/slides etc.), 3) means of dissemination (promotional material, journal articles and other publications, social media, webpages etc.), 4) user and stakeholder engagement, and 5) impact assessment (incl. metrics for assessment). After the approval of the ENVRI^{PLUS} Dissemination strategy by Executive Committee, the Tasks 18.2-18.4 will start implementing the outlined dissemination actions. The WP18 will

work on in the very end of the project and the ENVRI^{PLUS} sustainability plan will outline how to sustain the ENVRI^{PLUS} project outcomes.

Data Management

The Data Management Team (described in section 3.2) is responsible of producing initial Data Management Plan in M6 of the project. The plan will be updated annually. The general guidelines of this plan structure will be as follows:

Data Generated: The amount of data generated by ENVRI^{PLUS} will be small compared to the data generated by the RIs themselves. Nevertheless, since the project will have a strong focus on supporting RIs in data management it will probably develop important insights that can be defined as ‘data about data’.

Data Standards: For most of the described data no standards are currently available. In fact, the project will foster the further development of metadata standards or data citation standards. The formats of the generated data will be harmonized with these new results during project progress.

Data Availability: The guiding rule is to have the data available with as open licence as possible, preferably Creative Commons CC-BY 4.0. There can be individual exceptions of this rule, especially considering datasets with personal information (i.e. related to Citizen Science activities). The produced datasets will stay as property of the beneficiaries and final decision of availability and licencing stays with the data owner.

Data Curation and Preservation: Initial curation and quality control is responsibility of the data producing Beneficiary. Data produced by the ENVRI^{PLUS} will be secured through the services of the project partner CSC who is partner in the long-term e-infrastructure EUDAT. EUDAT provides a data deposit and sharing service called B2SHARE designed for small-to-medium-sized datasets. Metadata collected this way is automatically included in the EUDAT meta-catalogue B2FIND and they are assigned with persistent identifiers, making the data accessible to other researchers by default. For larger datasets or whole data repositories, EUDAT provide the integrated B2SAFE service.

Knowledge Management Strategy

The main short-term aim of the knowledge created in this project is to benefit current and future RIs in their efforts to build services for users. For this reason fast and open access publication is a key priority of the project, and all of the project publications are expected to follow “Gold Model” open access, i.e. the publications are made with complete immediate open access. Only for very strong reasons can the publications be made with the “Green Model” open access, i.e. the publication is made available in a repository located in ENVRI^{PLUS} website, possibly after a reasonable embargo period. Requests for publications using the “Green Model” must be made, with detailed explanations for the reason, to ENVRI^{PLUS} Executive Board. Declined requests can only be amended by the General Assembly. As in general requirements of H2020 projects, all ENVRI^{PLUS} publications will be open access. The developments in the Theme 2 will optimally adopt industrial and open standards, and the software will be managed and released in future as open source. The license like Apache will be considered.

b) Communication activities

The ENVRI^{PLUS} has a wide range of communication activities here categorised by the user groups they are targeting at: Project members, environmental RIs, scientific, societal and economic sectors. Internal communications of the project are handled by the Management team together with WP18, organizing the project webpages, email lists, social media etc. The objectives of such communication are efficient and timely distribution of Project progress and issues to the project participants.

The environmental RIs are engaged many ways, of which the vision to be far most effective is the overall WP structure, which is based on direct participation of the RI personnel in the development of the ENVRI^{PLUS} products and solutions, enabling direct usability of the results in RI development. Important part of the RI communication activities are done in Theme 6: Participation of RIs (also outside of ENVRI^{PLUS} consortium, with possibilities of new developing RIs) to Board of European Environmental Research Infrastructures (BEERi) in Task 17.2 provides two-way connection to the coordinators of the RIs in the environmental sector. To ensure that the ENVRI^{PLUS} is serving the entire environmental RI community - also the new RIs – a dedicated virtual Environmental Research Infrastructure Community Platform will be established. In addition to virtual platform the task 17.3 will organise annual gathering of all the environmental RIs, EC funded I³ and IAs, and other relevant RI networks and scientists/science communities interested in environmental RI matters. The objective of

this activity is to directly contact environmental RIs and make sure the ENVRI^{PLUS} products and services are useful and are used in the community.

The communications to policy makers in local, national and international level are handled in WP17, where ENVRI^{PLUS} will participate in the regional RI discussions and share best practices related to the regional level RI developments, and will also participate in any needed collaborative work and dialogs with other cluster projects funded by the INFRADEV-4 call. Importantly, this task will promote policy and strategy communication with European and international strategy and funding bodies, such as dialogs with ESFRI forum and its working groups, EC, Joint Programming Initiatives and Belmont Forum. The aim of such activities is to maintain the visibility of the environmental cluster and ENVRI^{PLUS} with these critical groups.

Efficiency of communication strategy is clearly monitored at single RI level, with on one side, wide participation to ENVRI^{PLUS} activities and, on the other, by the level to which ENVRI^{PLUS} tools are implemented by the single RIs.

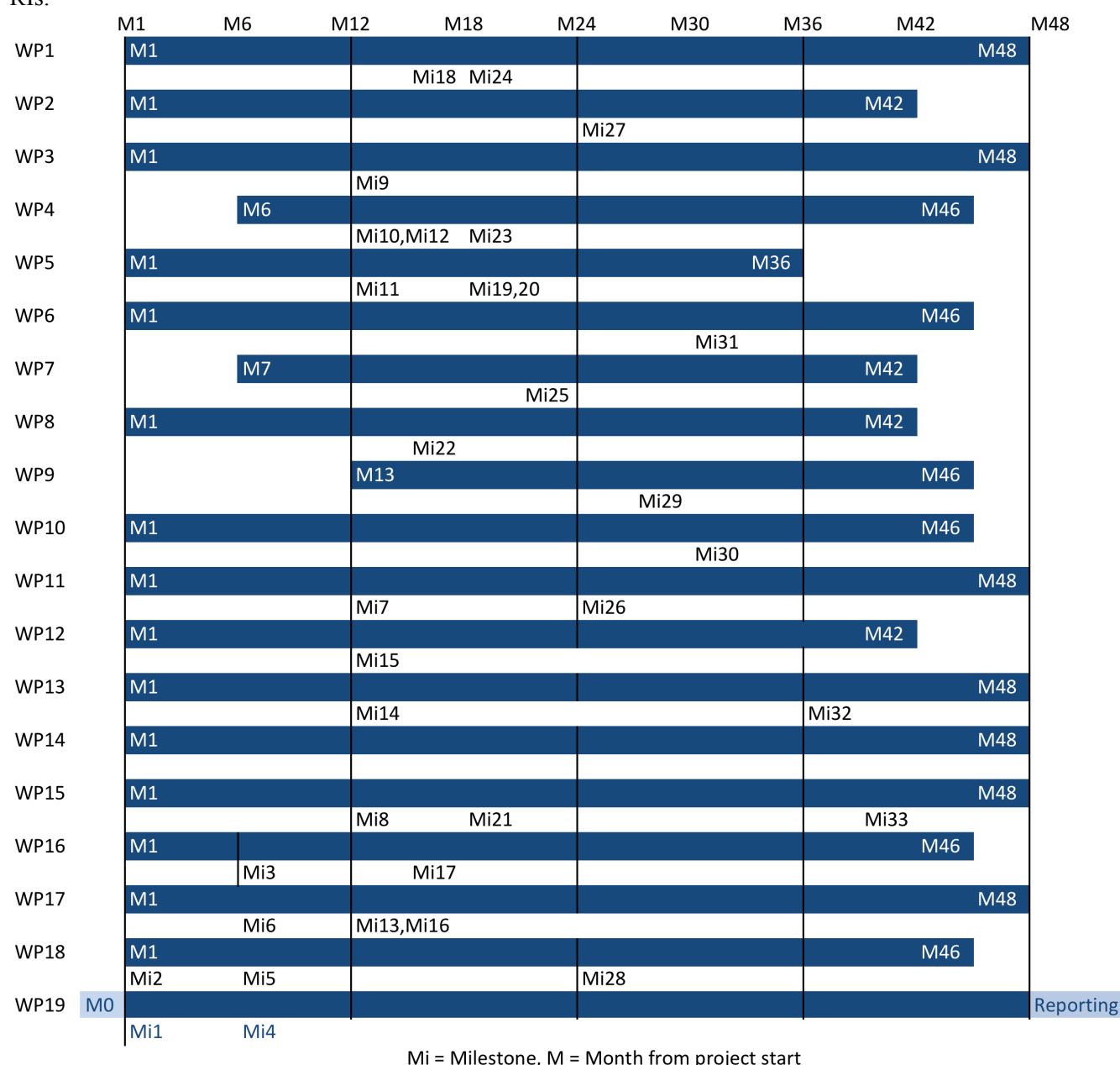


Figure 3: GANTT chart of the ENVRI^{PLUS} project. The starting and ending points of the Work packages are included, as are major Milestones.

3. Implementation

ENVRI^{PLUS} consists of one management and 17 research and innovation work packages. The R&I WPs are further organized under conceptual Themes, as explained in the *Concept and Approach* section. The structure of the individual work packages is designed to be modular, making risks contained, and maintaining internal

cohesion, with the WPs producing products directly to RIs and other user groups. The Theme level management is strategic, and is directly responsible to maintain communications with the specialists from different fields with the overall project leadership and associated RIs via BEERi advisory board. It is important to notice that many of the WPs contain large effort from one or two main partners with small efforts from many of the RIs. This co-design approach was chosen to make sure that the products, services and solutions have immediate applicability to RIs, and keep the ENVRI^{PLUS} idea of providing multidisciplinary and cost-effective solutions to all environmental fields. Figure 4 shows the overall project timing (GANTT chart) and Figure 3.2 shows the major interactions between the WPs (PERT diagram) with associated direct benefits for the RIs.

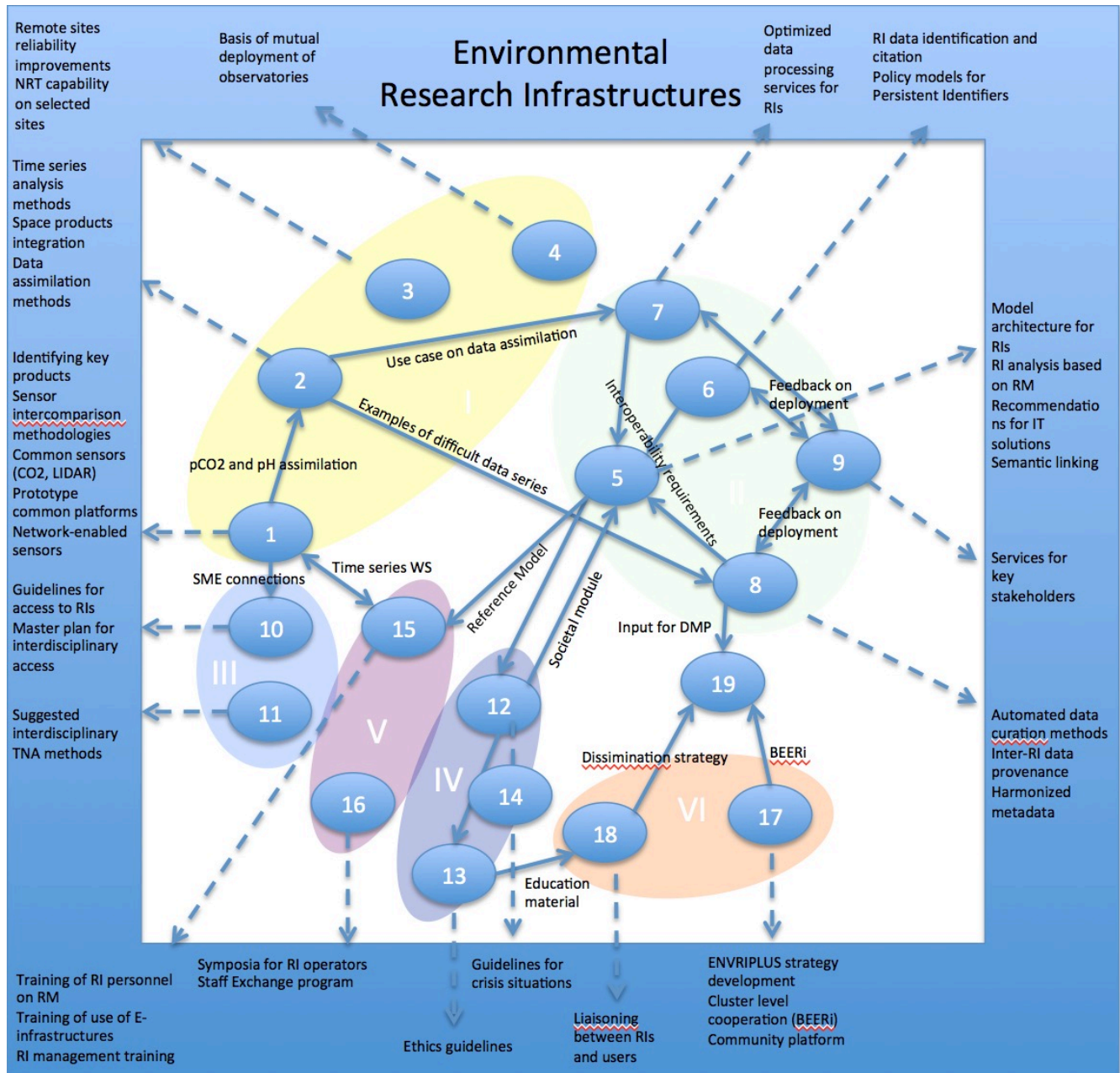


Figure 4: PERT diagram showing the major interconnection between the Work Packages (shown in ellipses). Also the major products for Environmental RIs are shown

3.1 *Work plan - Work packages, deliverables and milestones*

Theme 1: Technical innovation

Scientific observations and the related technologies are the foundation of many Environmental RIs. The diverse community contributing to ENVRI^{PLUS} uses a large variety of technologies, measuring parameters ranging from atmospheric concentration of trace gases through metabolomics to detect biodiversity and deep ocean salinity to Earth crust motions. However, the numerous technologies available rely on a few fundamental physical principles and have several technical aspects in common. Ample opportunity for collaborative work across disciplines exists. The goal of Theme 1 is to ensure common development and application efforts and generate innovation that are not possibly achieved by single RIs because:

- Many RIs have developed highly innovative instrumentations for specific purposes but potential applications outside of the original domain yet remains to be investigated. ENVRI^{PLUS} can act as catalyst for technology transfer amongst RIs.
- New emerging technologies enable sensors with higher precision or lower energy consumption so that they can cover a wider range of applications. RIs in ENVRI^{PLUS} share the challenges of autonomous operations, processing capability, and availability of multiple sensors due to reduced costs. The resulting changes in observation strategies during the next decade will be outlined in ENVRI^{PLUS}.
- However, scientific achievements are enabled by the smart use of technologies that are reused from different fields of application. Further developments in scientific theory and new scientific breakthroughs will put new demands to technology. RIs can learn from each other to enhance their cooperation with industry partners in developing new technologies.
- The fact that grand challenges such as climate change require cross-domain answers provokes new technological concepts in the design of observational networks. ENVRI^{PLUS} will be the ideal place to develop prototypes of interdisciplinary technical cooperation and joint operation of distributed networks, cross benefiting from the total infrastructure.
- Many RIs face the challenge that new and exciting technologies of today are tomorrow's standards. This requires thorough evaluation of potentials and limitations of the methodology and standardisation activities with national and European metrological institutes and SMEs. Collectively, environmental RIs need to be at the forefront of the establishment of new standards and metrological references.

ENVRI^{PLUS} is unique as it provides the proper environment to 1) develop a common set of specifications, 2) stimulate developments in the private sectors by opening larger markets than individual RIs and 3) align and reinforce their procurements. The appearance and marketability of innovative high performance instrumentation stimulated by the needs of RIs will also enable new applications, possibly in research communities and citizen science.

ENVRI^{PLUS} will induce a strong step-forward in respect to the current landscape of RIs in Europe in terms of innovation potential because it brings together a very strong technological expertise existing in the various RIs (micro- and nano-electronics, nanotechnologies, photonics, advanced materials, industrial biotechnology and advanced production technologies) and offers unprecedented cross-fertilization potential. Furthermore, it brings together the required critical mass of scientists and engineers to stimulate developments in the private sectors by opening larger markets than individual RIs. Cross-fertilization of technologies between RIs opens the way to new applications and therefore to new markets for specific technologies. Trans-domain requirements for harmonization will lead to the need for new standards that will be established in relation with industry and users, to promote European-based practices and strengthen the European position in the development of global standards. Because ENVRI^{PLUS} will represent a very community of users but also because links with SMEs are already established in the single RIs, the project is the ideal technological platform to bring common achievements.

Theme 2: Data for Science

Environmental Research infrastructures are expected to become important pillars not only for supporting their own communities, but also (a) for inter-disciplinary research and (b) for the European Earth Observation Program Copernicus as a contribution to the Global Earth Observation System of Systems (GEOSS). As such, it is very important that data-related activities the ENVRI^{PLUS} RIs be well integrated. This requires common policies, models and e-infrastructure to optimise technological implementation, define workflows, and ensure coordination, harmonisation, integration and interoperability of data, applications and other services between the ESFRI and other research infrastructure initiatives in the environment thematic area. The key is interoperating common metadata systems (utilising a richer metadata model as the ‘switchboard’ for interoperation with formal syntax and declared semantics). The metadata characterises data, services, users and ICT resources (including sensors and detectors). This approach provides an e-infrastructure that is virtualised for end-users but within which expert domain users and ICT experts can work to provide improved services as requirements evolve.

The objectives of this theme are:

- to optimize data processing and to develop common models, rules and guidance for research data workflow documentation;
- to facilitate data discovery and use, and to provide integrated end-user information technology to access heterogeneous data sources;
- to make data citable by developing existing approaches with practical examples, exchange of expertise, and agreements with publishers;
- to facilitate discovery of software services and their composition;
- to characterise users and build a community evolving from current RI communities;
- to characterise ICT resources (including sensors and detectors) to allow virtualisation of the environment (for instance onto Grid- or Cloud-based platforms) such that data and information management and analysis is optimised in use of resources and energy usage;
- to facilitate the connection of users, composed software services, appropriate data and necessary resources in order to meet end-user requirements.

ENVRI^{PLUS} will build upon (a) the work done and results of ENVRI, (b) the work done and the results of individual RIs (particularly those within the ESFRI framework), and (c) the results of e-infrastructure initiatives such as EGI and HELIX-Nebula.

The following overarching principles should be applied to all project outputs:

- Simple but effective. Scientists should be able to optimize the data pipeline from distributed data generators to storage in an easy but effective way, generating appropriate metadata at all stages to allow later access to information on provenance and curation.
- Interdisciplinary but with common rules. Semantic management is required to address the complex and diverging data models and conceptual frameworks used by different science and monitoring domains. Common rules for workflow and tool documentation are essential.
- Rich tools but low learning curves. Common access is required to tools including software services that can connect to heterogeneous datasets and be composed within workflows to form an appropriate application instance. Effective re-use of workflows requires the existence of repositories for workflow curation, which depend in turn on high quality contextual metadata.
- Data driven but traceable and citable. The necessity to trace the provenance of data and tools implies recording of the temporal aspects of relationships between datasets, between datasets and services, between datasets and persons or organisations, etc. Both data and tools must be citable.
- Scientist-centred but with a high quality of user experience (QoE). Scientific users require an environment where virtualised access is provided for interdisciplinary interoperation. It is assumed the end-user researchers are expert in their own domains and will wish to have easy access.
- Extensible yet robust. Available resources evolve over time; RIs must be able to federate over a disparate set of resources and services and survive changes in that set. This implies elastic scalability of processing, data storage, and networking linked with increasing user demands.
- Providing appropriate trust, security and privacy. Although generally research data (and at least some of the associated software) is open, there is a need to (a) allow for embargo periods to permit prior publication; (b) protect privacy if individual persons are somehow identified; (c) carry through interoperation trust/security/privacy parameters from one domain to another.

The **Data to Science** theme tackles these issues, with specific attention to the development model and the functionality that is commonly and urgently required by the ENVRI^{PLUS} RI projects. To maximally reuse existing technologies and solutions, this work package will not only closely review early results from ESFRIs (such as ICOS, EUROARGO, EPOS and SIOS), but also interact with computational e-Infrastructures (such as EGI and CLOUD Nebula), platforms (such as DIRAC), data infrastructure (such as EUDAT and D4Science), and other initiatives that work on related issues. It will also consider existing models and standards when applicable to maximize opportunities for interoperation, e.g. CERIF from EPOS for facilities, services and resources or DCAT for high-level exposure of basic dataset information.

Based on the demands collected from each domain – whether currently represented by an RI or not – requirements of RIs and their individual current solutions are characterised with considerations on underlying common technology and engineering challenges. With several iterative steps involving RI communities, RI IT experts and IT technology providers, general and overarching activities were identified. This approach is used to (a) reduce risk; (b) maximise utilisation of e-infrastructures in individual RIs developed with EC or other public funding; (c) provide an opportunity for convergence of ideas among the RIs without losing the work already done; and (d) maximise the chances of successful interoperation between environmental RIs both technically and in human dimensions.

Furthermore this approach aligns with on-going work and trends in the provision of e-Infrastructure – especially Grid-based (EGI and others), Cloud-based (HELIX-Nebula and others) and data-centric projects such as EUDAT, as well as preservation projects such as SCAPE and APARSEN, the Internet of Things and Future Internet and the developments being proposed (and in some cases implemented) under the umbrella of RDA, including management of big data. Assuming an appropriate metadata standard is chosen this approach can extend to embrace open government data providing additional resources to researchers, as well as easing the input from research into government policy making.

Theme 3: Access to RIs

The ultimate success of research infrastructures is measured by the research that is carried out based on the data, software services, ICT and technical resources and user expertise that the RI offers. The access to RI across disciplines and the flexible response to the evolving needs in the scientific community are key factors for sustainability of RIs. Hence offering seamless access to a broad multidisciplinary community is a common goal of the environmental RIs. The access to RIs includes the modes of access, the kinds of products offered to access, and the type of usage (Figure 5). Typically various modes of access and types of data are used in combination. Both, cost efficiency and scientific return of RIs are enhanced by multiple-purpose use and use across disciplines, as well as by joint use with other institutions or projects. Enhanced capacities for remote access on "demand" and for remote observation campaigns enable RIs to reach a broader community.

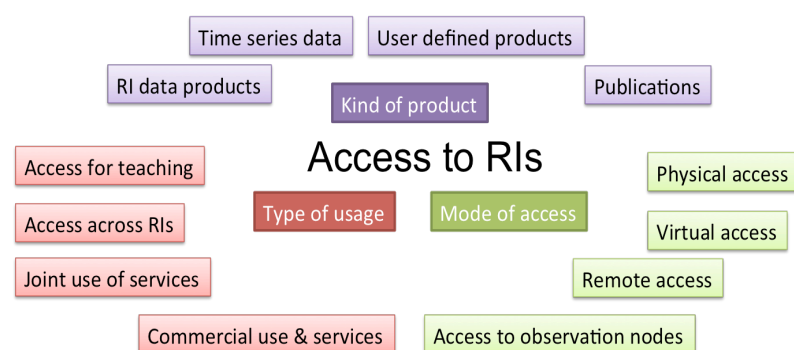


Figure 5: Access to RIs: Develop governance tools to facilitate common, fair, and scientific merit based virtual, remote and physical access to environmental research infrastructures and to the data that they provide with sustainable and adjustable tools (WP10). Improve access to environmental RIs through exploring and promoting synergies of joint observation sites, and cross-cutting research. Identify requirements for the governance tools of RIs. (WP11)

Collaborations among RIs and with other observational facilities are often limited to single domains and RIs, while many platforms have the potential to address multi-disciplinary research. The RIs are however often operated in a complex way, involving different institutes and operators or research-consortia without legal framework. This limits the capacity of research infrastructures to offer physical access, in particular TNA, which is an important tool in this context. A further difficulty can lie in the logistics, as is the case for mobile platforms, like Research Vessels or Research Aircraft. Finally technical difficulties lie e.g. in adjusting and defining observation modes and communicating research plans and results across disciplines. The Access Theme consists of two work packages: WP10 addresses the development of governance tools of RIs that ensures sustainability and at the same time allows for the flexibility to adjust to changing research needs. WP11 identifies the needs to enhance RIs' efficiency, interoperability, and accessibility and extend their deployment in new research areas

and new communities. Project participants who contribute to the access theme come from the different environmental domains and bring in experience with e.g. planning and reviewing RIs and their governance structures, cruise planning, sharing RI sites, e-infrastructure projects as well as research work across disciplines.

Theme 4: Societal Relevance and Understanding

As societies constantly have to adapt to environmental challenges, data from environmental RIs play an important role in societal decision processes. This requires a specific culture of translating the data into an inter-disciplinary understanding of human-environmental systems (HES) and is called ‘environmental literacy’⁴. Theme 4 will provide tasks to further develop environmental literacy and train environmental RIs to participate in trans-disciplinary analyses and decision making processes. It will help develop a common voice for environmental RIs, and address common ethical problems such as data integrity and responsibility for communication of environmental knowledge. Finally, it will value and strengthen participation of citizens in environmental science. It will be strongly connected to all previous Themes.

Several approaches offer frameworks to cope with the complexity of human-environment relationships⁵. Introducing these approaches within ENVRI^{PLUS} is strongly connected to the ambition of the project to develop holistic understanding of the whole Earth System by multi-dimensional thinking (Chap. 1.4, Fig. 2). Furthermore, it is related to Chap 2.2 (measures of impact) because it gives the opportunity to clearly show the relevance of environmental RIs by providing knowledge to face the grand environmental challenges. Through this knowledge important economic worth is provided and RIs should be able to demonstrate this. (The important aspect of *direct* economic impact of RIs is concentrated in Theme 1 and not repeated here).

Ethical questions concern all RIs and it is important to raise awareness during their development. Institutional RIs (e.g. ERICs) have to appoint an ethical advisory board. Cross-fertilization by establishing a shared ethical reference framework contributes to the development of a consistent European RIs ecosystem. Since the two questions of generating measures on societal impact and reflecting the ethical aspects are very close the method is in the first two WP is quite similar.

Participative science is a win-win activity between environmental RIs and the public. It raises awareness of citizens and also provides valuable data in monitoring change in the natural world. Thus, it is a key activity to increase environmental literacy. Furthermore, citizens’ connection with the scientific community not only ensures trust in the data provided by environmental RI’s but by contributing to that data, citizens are empowered by becoming involved in the scientific process.

Theme 5: Knowledge transfer

Theme 5 ensures the cross-fertilisation and knowledge transfer of new technologies, best practices, approaches and policies of the RIs by generating training material for RI personnel, build platforms and training material for (scientific) users of the RIs, set up a specific training program for Environmental RI managers and facilitate inter-RI knowledge transfer via a dedicated cross-domain staff exchange program;

Besides this focus on RI staff and persons directly related to RI’s, this theme will also reach out and develop training material for secondary school students and teachers, to introduce them in an attractive way with issues involved with environmental research and the role of the RIs within this research.

Theme 6: Communication and dissemination

ENVRI^{PLUS} acts as a common community platform for the whole Environmental and Earth Science Research infrastructure landscape and its extended user communities. Through this representation of the wider community ENVRI^{PLUS} is able to coordinate, communicate and liaise with the national, regional, European and international environmental RI communities, their scientific users, funding bodies and stakeholders. Theme 6 focuses on

⁴ Scholz RW (2011) Environmental Literacy in Science and Society. Cambridge University Press, Cambridge 631pp

⁵ Collins SL, Carpenter SR, Swinton SM, et al. (2011) An integrated conceptual framework for long-term social-ecological research. Front Ecol Envir. doi:10.1890/100068

EEA (1999) Environmental indicators: Typology and overview, EEA, Copenhagen, Technical report No 25. <http://www.eea.europa.eu/publications/TEC25>. Accessed June 2011.

Mirtl M., Orenstein DE., Wildenberg M., Peterseil J., Frenzel M. (2013) Development of LTSER Platforms in LTER-Europe: Challenges and Experiences in Implementing Place-Based Long-Term Socio-ecological Research in Selected Regions. In: SINGH, JS., et al. (eds) Long term Socio-Ecological Research Studies in society nature interactions across temporal and spatial scales. Springer, Dordrecht.

Shibata H, Bourgeron P (2011) Challenge of International Long-Term Ecological Research network (ILTER) for Socio-Ecological Land Sciences. Global Land Project NEWS No. 7:13-14.

coordinating internal and external communication, supporting the community in developing and implementing the long-term ENVRI strategy and organisation of the dissemination and outreach of ENVRI^{PLUS}. In addition, Theme 6 facilitates the raising of awareness and engagement of the current and potential users of ENVRI^{PLUS}. Particular attention is given to providing joint activities with users and stakeholders (such as SMEs, industry and policy makers at large) in order to capture the feedback needed from the end-users for providing novel RI services and solutions for the community.

The activities of Theme 6 contribute to reducing the fragmentation of the environmental RI landscape through the enhancement of operational efficiency and provision of RI services for the users by seeking the optimal economies of scale and identification of suitable common guidelines and operations. The activities of Theme 6 in ENVRI^{PLUS} can potentially be seen as the European contribution to international RI collaborations in the field of environmental research infrastructures. ENVRI^{PLUS} will deliver state-of-the-art knowledge of the environmental RI landscape, user requirements and the investment needed to support the sustainability among the environmental RIs and RI community as a whole.

3.2 Management structure and procedures

3.2.1. Project organizational structure

The overall management structure and procedures on the ENVRI^{PLUS} outlined below, are based closely on DESCA Horizon 2020 Model Consortium Agreement “Governance structure for Medium and Large Projects” outline (www.DESCA-2020.eu).

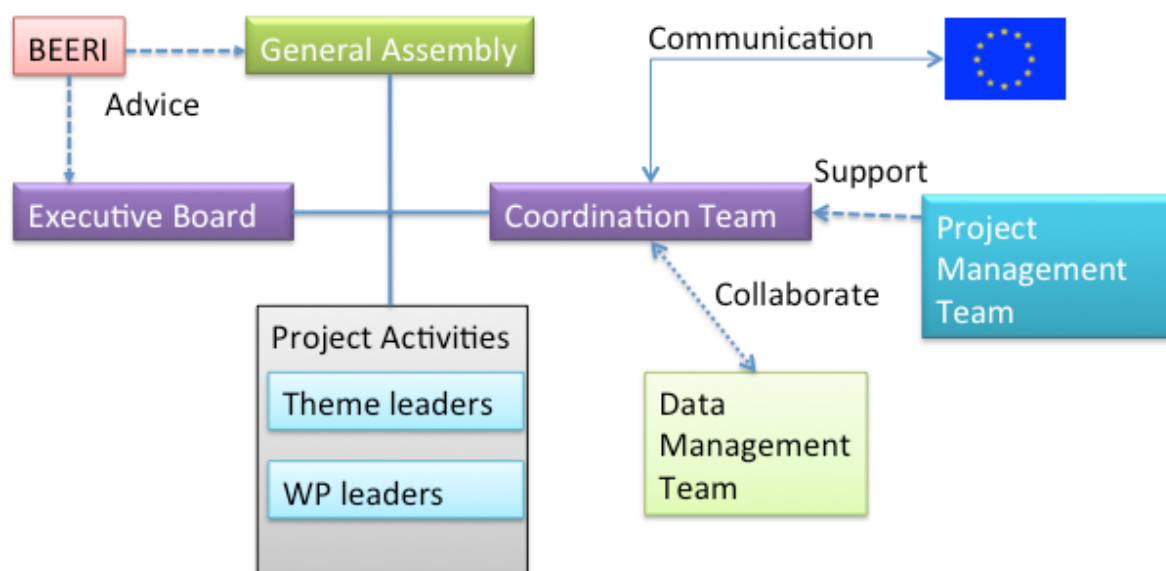


Figure 6: Overview of ENVRI^{PLUS} organizational structure

3.2.1.1 Official Consortium bodies

General Assembly

General Assembly (GA) is the ultimate decision-making body of the consortium. It consists of one authorized representative of each Party (beneficiary or linked Third Party). The GA meetings are chaired by the Coordinator. The GA will have at least one meeting per calendar year, co-incident with the Project annual meeting. Details of the meeting preparation, notice and agenda preparation are detailed in the Consortium Agreement. The first GA meeting will be organized during project kick-off. The GA is responsible of

- Content, finances and intellectual property rights;
- Evolution of the consortium;
- Appointment of Executive Board Members, Executive Board Chairperson, and if necessary, the replacements for Theme and WP leaders and co-coordinator.

ENVRI^{PLUS} Executive Board

ENVRI^{PLUS} Executive Board (EB) is the supervisory body for the execution of the Project, which shall report to and be accountable to the GA. The EB is responsible for the proper execution and implementation of the

decisions of the GA. The EB monitors the effective and efficient implementation of the Project. In the case of abolished tasks as a result of a decision of the GA, the EB shall advise the General Assembly on ways to rearrange tasks and budgets of the Parties concerned taking into consideration the legitimate commitments taken prior to the decisions. Initial EB members are all Theme leaders and additional representatives of Research Infrastructures participating in the project to maintain necessary interdisciplinarity, continuity and experience. To maintain domain representativeness in the EB, the initial chair will represent the Marine domain. Any changes to EB composition by GA must maintain the representativeness of the EB by including at least one representative of each domain RIs participating in the project, and all of the Theme leaders. Executive Board meetings are chaired by EB chairperson, selected by the GA. The EB will have meetings at least quarterly with one meeting in coordination with annual GA meetings, but will meet either in person or virtually when requested by two EB members. Details of the meeting, notice and agenda preparation will be defined in the Consortium Agreement. Members of the coordination team and Executive board are of:

- Prepare the meetings, propose decisions and prepare the agenda of the General Assembly
- Seeking a consensus among the Parties
- Collect information at least every 6 months on the progress of the Project, examine that information to assess the compliance of the Project with the Consortium Plan and, if necessary, propose modifications of the Consortium Plan to the General Assembly;
- Agree on the Members of the Management Support Team, upon a proposal by the Coordinator;
- Support the Coordinator in preparing meetings with the Funding Authority and in preparing related data and deliverables;
- Prepare the content and timing of press releases and joint publications by the consortium or proposed by the Funding Authority;
- Any other tasks specified in the Consortium Agreement or required by the General Assembly.

Project Coordination team

Project Coordinator is Dr. Werner L. Kutsch, the Director General of ICOS RI. The Coordinator is the intermediary between the Parties and the Funding Authority. The Coordinator is responsible of

- monitoring compliance by the Parties with their obligations;
- keeping the address list of Members and other contact persons updated and available;
- collecting, reviewing and submitting reports, other deliverables (including financial statements and related certifications) and specific requested documents to the Funding Authority;
- transmitting documents and information connected with the Project to any other Parties concerned;
- administering the financial contribution of the Funding Authority and fulfilling the financial tasks described in Consortium Agreement;
- providing, upon request, the Parties with official copies or originals of documents which are in the sole possession of the Coordinator when such copies or originals are necessary for the Parties to present claims;
- If one or more of the Parties is late in submission of any project deliverable, the Coordinator may nevertheless submit the other parties' project deliverables and all other documents required by the Grant Agreement to the Funding Authority in time.

The Project Co-coordinator is a special position required due the interdisciplinary nature of ENVRI^{PLUS}. If needed, GA can nominate a new co-coordinator or abolished the position. The project Co-coordinator is Dr. Paolo Laj, senior scientist involved at U. Grenoble (France) with long-term experience in INFRA projects in FP6 and FP7, and he will use 25% of his work time during the ENVRI^{PLUS} for co-coordinator duties with physical location within the UHEL. The Co-coordinator is responsible of

- Maintaining the interests of RIs in all project work by following the project progress with the Theme and WP leaders, specifically concentrating on the usability of project results on RIs from different domains (Marine, Solid Earth, Atmosphere, Biosphere);
- Communicating the project results to RIs participating in the project, and to any identified new RIs;
- Coordinating and moderating activities related to the project results and data handling (including directing the Data Management Team) in order to facilitate the use of new ideas, services as well as intellectual property rights for the benefit of the RIs as well as society at large

Management Support Team

The ENVRI^{PLUS} Management Support Team (MST) consists of one project science manager (initially Dr. Ari Asmi) and one administrative person, nominated by the EB upon proposal by the Coordinator. The MST assists and facilitates the work of the Executive Board and the Coordinator for executing the decisions of the General Assembly as well as the day-to-day management of the Project.

3.2.1.2 Additional project bodies

These bodies are not directly part of the Consortium agreement, and are part of the project management structure with differing tasks in the Project.

Theme leaders

Theme leaders lead the overall progress of the Themes, and maintain Theme internal communication and cohesion with the WP leaders. They also report the progress of the Themes to the EB and Coordinator and work with the Co-coordinator to maintain the interdisciplinary RI interest in the Theme products. They also report on the progress of the Milestones and work towards the ENVRI^{PLUS} objectives relevant to their themes, and suggest actions to the EB. The Theme leaders also gather and convey to the co-coordinator information about results and data handling processes in order to facilitate the use of new ideas, services as well as intellectual property rights. The need of Theme Leaders comes from the extensive scope of the project and their main work is to act as middle management of the project acting as intermediates between direct project tasks and EB and the coordination team. Small amount of project resources are reserved for Theme leader work in the WP19.

Work Package leaders

Work Package leaders are responsible on the WPs meeting their objectives. They also maintain communications inside the WP, present the WP results in project meetings and report on the WP progress to Theme leaders and the Coordinator, and, if needed, to EB or GA. They also are responsible to keep project deliverables in time and do the initial quality control on WP deliverables.

BEERi – Board of European Environmental Research Infrastructures

BEERi is an advisory panel consisting of senior representatives (RI directors or coordinators) of the environmental field RIs giving direct guidance to the ENVRI^{PLUS} project management and giving strategic view to the project progress, acting as internal advisory board representing the needs of environmental RIs. It is organized by WP17 and chaired by WP17 leader. The GA accepts the members of the BEERi upon proposal of WP17 leader. The BEERi has meetings in minimum every year immediately before annual GA meeting (with exception of first meeting directly after the first GA in Kick-off), other meetings are organized by the WP17 leader if needed. The BEERi meetings include report of the project progress by the Co-coordinator, followed by discussion on guidance notes directed by WP17 leader. The Coordinator can require members of BEERi to sign non-disclosure agreements.

Data Management Team

The data management team is responsible for providing the ENVRI^{PLUS} with Data Management Plans (DMP) during the project period. The management team consists of Co-coordinator (chair), MST representative (responsible of drafting the DMP text), representative of partner CSC (representing EUDAT services for data management) and Theme 1, 2 and 3 leaders. The GA confirms the membership of Data Management Team during annual GA meeting. The initial DMP will be made as a deliverable of WP19 and subsequent annual updates will be also delivered via WP19. The DMP will be based on guidelines given in section 2.2.

3.2.2. Risk Management and project progress

Risk management requires risk identification, control, and recording of risks, highlighting of the consequences and the appropriate management actions. Main risks are identified in the Table 3.2b. The Project management team will perform a regular risk monitoring by analyzing the progress in the project (via milestones and deliverables) and by observing the early-warning signals of potential deviations and conflicts. The work package leaders are also responsible for reporting to Coordination and the Executive Board any apparent and imminent risks immediately. Executive Board will decide upon and immediately carry out remedial actions. The consortium agreement will also provide for additional tools to minimize and mitigate risks in the consortium. Often the deviations and conflicts are related to the communication barriers, slow recruitment processes, or technology related objectives. The close and regular communication of project management team and the coordination with Executive Board, Theme and WP leaders will give an indication of potential deviation early enough to react on the delay and conflicts. The efficient coordination, communication and dissemination of the project progress to the project partner are the keys to success.

3.3 Consortium as a whole

3.3.1 Research Infrastructures

The ENVRI^{PLUS} brings together the RI directors/coordinators, RI managers, operators and other technical staff of the major European Environmental research Infrastructures. During the proposal preparation the whole environmental RI landscape was analysed in order to ensure that the consortium covers the whole landscape. The consortium has balanced representativeness of the different domains (atmospheric, marine, biodiversity/ecosystem and solid Earth) of the environmental community. Overall, 22 RIs are contributing to ENVRI^{PLUS} and the maturity levels varies among the RIs. Eleven of the research infrastructures are listed on the ESFRI roadmap (three listed in the Biomedical and Lifescience cluster) and the rest of the RIs are either advanced or starting communities of the RI networks. The joint activities to solve common problems will guarantee the development of shared solutions and cross-fertilization from more developed RIs to starting communities. The consortium is equipped with the skills of RI-internal experts and with external experts on technology, ICT, access, societal aspects, training, coordination, and dissemination. In addition, when necessary the consortium will be complemented by external experts in industry and SMEs.

The ENVRI^{PLUS} consortium comprises 22 RIs in the broader sense of definition as explains in Chapter 1.3. They are represented in the project by either their legal entity (e.g EISCAT_3D by EISCAT Scientific Association) or by European research organisations if the RI does not have legal yet. The Research infrastructures participating in the ENVRI^{PLUS} are listed in Table 1 (page 4). Here are short descriptions of the ENVRI^{PLUS} RIs with the indication of participating organisations that are representing the given RI in the project.

ACTRIS - Aerosol, cloud and trace gases research infrastructure

ACTRIS is a European RI Project aiming at integrating European ground-based stations equipped with advanced atmospheric probing instrumentation for aerosols, clouds, and short-lived gas-phase species. ACTRIS have essential role to support building of new knowledge as well as policy issues on climate change, air quality, and long-range transport of pollutants.

Coordinating institutions: CNR, CNRS, **Coordinators:** G. Pappalardo, P. Laj

Representing organisations in ENVRI^{PLUS}: CNR, CNRS, NILU

AnaEE - Infrastructure for Analysis and Experimentation on Ecosystems

AnaEE is a RI for experimental manipulation of managed and unmanaged terrestrial and aquatic ecosystems. It will support scientists in their analysis, assessment and forecasting of the impact of climate and other global changes on the services that ecosystems provide to society. AnaEE supports European scientists and policymakers to develop solutions to food security and environmental sustainability, with stimulating the growth of bioeconomy. AnaEE's building blocks *in natura* and *in vitro* experimental platforms equipped with the latest technology and sophisticated analytical and modeling platforms coupled to observation sites that will provide indispensable calibration and validation of datasets throughout Europe.

Coordinating institution: Institut National de la recherche Argonomique (INRA), France, **Coordinator:** Dr. habil. Abad Chabbi

Representing organisations in ENVRI^{PLUS}: INRA, CNR

EISCAT_3D - Multi-static phased array radar system

EISCAT_3D is a multi-static phased array radar system dedicated to observations of the Earth's polar atmosphere above the northern Scandinavian Peninsula. The project is run by EISCAT Scientific Association an existing international research infrastructure that is currently funded and operated by research councils and funding organizations in Norway, Sweden, Finland, Japan, China and the United Kingdom and has its headquarters in Kiruna, Sweden. The ESFRI selected EISCAT_3D for inclusion in the Roadmap 2008 for Large-Scale European Research Infrastructures.

Coordinating institution: EISCAT Scientific Association, **Coordinators:** Ingrid Mann (FP7 project) Craig Heinselman (EISCAT Director)

Representing organisations in ENVRI^{PLUS}: EISCAT

ELIXIR - European infrastructure for biological information

ELIXIR is an inter-governmental organisation which builds on existing life sciences data resources and services within Europe to orchestrate the collection, quality control and archiving of large amounts of biological data. It follows a hub-and-nodes model, with a single Hub located at EMBL-EBI in Hinxton, Cambridge, UK (with EMBL providing the legal entity) and a growing number of Nodes located at centres of excellence throughout Europe. ELIXIR is an ESFRI Research Infrastructure in permanent operations phase since 2013. The ELIXIR Consortium Agreement established ELIXIR as an independently governed entity within the legal framework of EMBL. Governments and ministries of ELIXIR Member States are responsible for contributing funding for the

ELIXIR Hub and coordinating the scientific community in their country into a national Node that provides services to the ELIXIR community, including data resources, tools, Compute provision, Standards development, Training and support to Industry.

Coordinating institution: ELIXIR is an established independent research infrastructure under the EMBL intergovernmental framework

Coordinator: Dr Niklas Blomberg, ELIXIR Director

Representing organisations in ENVRI^{PLUS}: EMBL-EBI

EMBRC - European Marine Biological Resource Centre

The European Marine Biological Resource Centre is a distributed European RI in implementation. EMBRC is based on national nodes located in marine research stations and science institutes in European member states and associated countries. The main objective of EMBRC is to develop a strategic delivery mechanism for the provision of excellent and large-scale marine science in Europe. EMBRC will establish a European portal to a comprehensive range of marine coastal ecosystems and marine biological resources including established and novel marine model organisms for research purposes. EMBRC will provide access to state-of-the-art research facilities, equipment and streamlined services for users.

Coordinating institution(s): EMBRC is led by the EMBRC Implementation Board, **Coordinators:** EMBRC is led by the Implementation Board (IB). Chair of IB: Ricardo Migueis (PT), Vice Chairs of IB: Jean-Pierre Caminade (FR) and Salvatore La Rosa (IT)

Representing organisations in ENVRI^{PLUS}: MBA and USTAN

EMSO - European Multidisciplinary Seafloor & water column Observatory

EMSO is a large-scale European ESFRI RI for strategically placed, deep sea observatories with the essential scientific objective of real-time, long-term monitoring of environmental processes related to the interaction between the geosphere, biosphere, and hydrosphere. It is a geographically distributed infrastructure composed of several deep-seafloor and water-column observatories, which is deployed at key sites in European waters, spanning from the Arctic, through the Atlantic and Mediterranean, to the Black Sea (8 operating out of 12). EMSO is the sub-sea segment of the Global Monitoring for Environment and Security COPERNICUS initiative and significantly enhances the observational marine capabilities of European member states. Currently, EMSO submitted the first stage of the ERIC application and plan to submit the second and final one by the end of 2014.

Coordinating institution: Italy, INGV (Istituto Nazionale di Geofisica e Vulcanologia), **Coordinator:** Paolo Favali

Representing organisations in ENVRI^{PLUS}: INGV, IFREMER

EPOS - The European Plate Observing System

EPOS is a long-term plan to facilitate integrated use of data, models and facilities from distributed research infrastructures for solid Earth science in Europe. With the goal of a better understanding of the active Earth system processes controlling earthquakes, volcanic eruptions, unrest episodes and tsunamis as well as those driving tectonics and Earth surface dynamics. EPOS aims to build an efficient and comprehensive research platform for the Earth sciences in Europe relying on new e-science opportunities through the construction of a distributed e-infrastructure (EPOS Core Services). EPOS will allow the Earth Science community to make a significant step forward by developing new concepts and tools for accurate, durable, and sustainable answers to societal questions concerning geo-hazards and those geodynamic phenomena (including geo-resources) relevant to the environment and human welfare.

Coordinating institution: Istituto Nazionale di Geofisica e Vulcanologia (INGV), Rome, Italy, **Coordinator:** Massimo Cocco

Representing organisations in ENVRI^{PLUS}: INGV, NERC, ETHZ, EMSC

EURO-ARGO - European contribution to Argo program

The objectives of the Euro-Argo ERIC are to optimize, sustain and improve the European contributions to Argo and to provide a world-class service to the research (ocean and climate) and operational oceanography (Copernicus Marine Service) communities. Euro-Argo also aims at preparing the next phase of Argo with an extension to deeper depths, biogeochemical parameters and observations of the polar regions. The Euro-Argo research infrastructure comprises a central facility and distributed national facilities. On May 2014, the EC awarded European legal status (ERIC) to the central facility. Euro-Argo aims at developing a capacity to procure and deploy and monitor 250 floats per year and ensure that all the data can be processed and delivered to users (both in real-time and delayed-mode).

Coordinating institution: IFREMER, **Coordinator:** Pierre-Yves le Traon

Representing organisations in ENVRI^{PLUS}: EURO-ARGO ERIC and IFREMER

EUROFLEETS2 - New operational steps towards an alliance of European research fleets

The EUROFLEETS2 aims at construction of a pan-European distributed research fleet infrastructure with common strategic vision and coordinated access to European marine research vessels and equipment. The EUROFLEETS2 is a RI project of EC FP7. EUROFLEETS2 aims to provide 73 fully funded days of ship time on 8 Global/Ocean class research vessels and 127 days of ship time on 14 Regional class research ships incl. the use of large equipment such as ROVs and submersibles. EUROFLEETS2 provides 104 fully funded days of marine equipment-time to carry out ship-based research activities within any field of marine science. EUROFLEETS2 promotes information sharing, identification of new collaborative frameworks, development of common software tools and innovative integration schemes. The long-term objective of EUROFLEETS2 is to prepare the insertion of a group of innovative and inter-operable Regional Research Vessels in the ESFRI roadmap.

Coordinating institution: Ifremer, **Coordinator:** Jacques Binot

Representing organisations in ENVRI^{PLUS}: IFMEMER

ESONET VI – European Seafloor Observatory NETwork

ESONET-Vi is a consortium focusing on deep-sea observatories built upon ESONET (European Seafloor Observatory NETwork) activities, in complement to the EMSO observatories infrastructures. The consortium aims at defining a perennial integration at European level of scientists from numerous laboratories using data collected by deep sea observatories. ESONET-Vi organizes exchange of personal between its members, organizes joined experiments on EMSO observatories, promotes development of new scientific packages on the existing observatories, organizes workshops on data exploitation, management and dissemination, new sensor technologies, inter-comparison of results. ESONET-Vi allows linking geographically scattered complementary research, industrial and governmental elements in Europe to rapidly transfer and implement research results into science and industrial applications.

Coordinating institutions: Universitet I Tromsø and Ifremer, **Coordinator:** Interim Ifremer (Jérôme Blandin)

Representing organisations in ENVRI^{PLUS}: IFREMER and University of Tromsø (UiT)

EUROGOOS - European Global Ocean Observing System

EuroGOOS, the European Global Ocean Observing System, is an International Non-Profit Association of national governmental agencies and research organisations, committed to European-scale operational oceanography within the context of the intergovernmental Global Ocean Observing System (GOOS). It was founded in 1994 and has today 37 members from 18 European countries providing operational oceanographic services and carrying out marine research. Six regional sea areas, where operational systems are being developed, have been defined: the Arctic (Arctic ROOS), the Baltic (BOOS), the North West Shelf (NOOS), the Ireland-Biscay-Iberian area (IBI-ROOS) and the Mediterranean (MONGOOS). Strong cooperation within these regions, enabling the involvement of many more regional partners and countries, forms the basis of EuroGOOS work, and is combined with high-level representation at European and Global forums.

Coordinator(s): Erik Buck

Representing organisations in ENVRI^{PLUS}: EUROGOOS

FIXO3 - Fixed Open Ocean Observatory network

The Fixed point Open Ocean Observatory network (FixO3) seeks to integrate European open ocean fixed point observatories and to improve access to these key installations for the broader community. These will provide multidisciplinary observations in all parts of the oceans from the air-sea interface to the deep seafloor. Coordinated by the National Oceanography Centre, UK, FixO3 will build on the significant advances largely achieved through the FP7 programmes EuroSITES, ESONET and CARBOOCEAN. With a budget of 7 Million Euros over 4 years the project has 29 partners drawn from academia, research institutions and SME's. 23 observatories are involved in FIXO3, among them 15 offer Trans-National Access.

Coordinating institution(s): NERC-NOC (National Oceanography Centre), **Coordinator(s):** Richard Lampitt

Representing organisations in ENVRI^{PLUS}: NERC-NOC, PLOCAN, IFREMER

IAGOS - In-service Aircraft for a Global Observing System

IAGOS is a new European research infrastructure which implements and operates a global observation system for atmospheric composition by deploying autonomous instruments aboard a fleet of passenger aircraft. The European consortium behind IAGOS includes research centres, universities, national weather services, airline operators and aviation industry. IAGOS provides freely accessible data for users in science and policy including air quality forecasting, verification of CO2 emissions and Kyoto monitoring, numerical weather prediction, and validation of satellite products. It is considered a major contributor to the in-situ component of Copernicus Atmospheric Services. In combination with its predecessor programs MOZAIC and CARIBIC, IAGOS allocates

long-term observation data of atmospheric chemical composition in the upper troposphere and lowermost stratosphere since 1994, while the most recent IAGOS-CORE aircraft went into service in 2014.

Coordinating institutions: Forschungszentrum Jülich, CNRS Laboratoire d'Aerologie, **Coordinators:** Valerie Thouret (CNRS), Andreas Petzold (FZ Jülich)

Representing organisations in ENVRI^{PLUS}: Forschungszentrum Jülich (FZJ), CNRS

ICOS – Integrated Carbon Observation System

ICOS RI provides the long-term observations required to understand the present state and predict future behaviour of the global carbon cycle and greenhouse gas emissions. The objectives of ICOS RI are to provide effective access to a single and coherent data set to facilitate research into multi-scale analysis of greenhouse gas emissions, sinks and the processes that determine them, and to provide information, which is profound for research and understanding of regional budgets of greenhouse gas sources and sinks, their human and natural drivers, and the controlling mechanisms. ICOS RI tracks carbon fluxes in Europe and adjacent regions by observing the ecosystems, the atmosphere and the oceans through integrated national station networks, European central facilities and distributes the GHG data to the users via ICOS Carbon Portal. ICOS will submit its ICOS ERIC STEP2 application in Autumn 2014 to EC.

Coordinating institutions: University of Helsinki and Finnish Meteorological Institute, Finland,

Coordinator: Dr. habil Werner Kutsch

Representing organisations in ENVRI^{PLUS}: UHEL, FMI, LU, UNITUS, CEA, GEOMAR

INTERACT - International Network for Terrestrial Research and Monitoring in the Arctic

INTERACT is a network of terrestrial field bases in arctic and mountain areas of the Northern Hemisphere. The network provides an efficient platform for coordinated research, monitoring and logistics by sharing experiences and coordinating activities and by making the network infrastructures available to specialized scientific networks and organizations as well as to research and monitoring programmes and projects. INTERACT is funded under the EU's 7th Framework Programme for the period 2011-2014.

Coordinating institution: LU

Coordinator: Prof. Terry V. Callaghan

Representing organisations in ENVRI^{PLUS}: UCPH

IS-ENES2 – RI for the European Network for Earth System Modelling

IS-ENES2 is the second phase of the I3 infrastructure project for the European Network for Earth System Modelling (ENES). ENES gathers the community working on climate modeling and providing access to model data from WCRP international coordinated experiments in support of the IPCC assessments. IS-ENES infrastructure encompasses climate models and their environment tools, model data and the interface of the climate modeling community with high-performance computing, in particular the European RI PRACE. It aims to further integrate the community, foster the development of Earth system models, facilitate high-end experiments and ensure the dissemination of model results for a large user community.

Coordinating institution: CNRS,

Coordinator: Dr Sylvie Joussaume

Representing organisations in ENVRI^{PLUS}: CNRS, DKRZ

JERICO - Towards a joint European research infrastructure network for coastal observatories

Coastal observations are an important part of the marine research. However significant heterogeneity exists in Europe concerning technological design of observing systems, measured parameters, practices for maintenance and quality control, as well as quality standards for sensors and data exchange. The main challenge for the research community is to increase the coherence and the sustainability of these dispersed infrastructures by addressing their future within a shared pan-European framework. Main objective of JERICO is to provide a Pan European approach for a European coastal marine observatory network, integrating infrastructure and technologies such as moorings, drifters, ferrybox and gliders. JERICO intends to contribute to the international and global effort on climate change research (GEOSS), to provide coastal data inputs for operational ocean observing and forecasting, and also to answer to some of the needs of the environmental research and societal communities.

Coordinating institution: Ifremer,

Coordinator: Patrick Farcy

Representing organisations in ENVRI^{PLUS}: IFREMER

LIFEWATCH - European e-Science infrastructure for biodiversity and ecosystem research

LifeWatch is operating an e-Infrastructure for basic research on biodiversity and ecosystems, but also supports research for the protection, management and sustainable use of biodiversity. The infrastructure includes facilities

for data integration and interoperability; capabilities to create workflows of analytical and modelling tools; and a Service Centre providing special services for scientific and policy users, including training and research opportunities for young scientists. Its architecture supports access to and the integration of external resources such as data from associated infrastructures and distributed computational capacity from high performance clusters. User groups may create their own e-laboratories or e-services within the common architecture of the infrastructure. LifeWatch enables distributed large scale and collaborative systems research on biodiversity complexity.

Coordinating institutions: University of Sevilla (for JRU LifeWatch-Spain), University of Amsterdam (NL), University of Salento (IT),

Coordinators: coordinated by Executive Board (Benjamin Sanchez-Gimeno, Peter H. van Tienderen, Alberto Basset)

Representing organisations in ENVRI^{PLUS}: Univ.Salentino (UNILE), Univ. Amsterdam (UvA)

LTER - The Long-term Ecological Research Network

LTER-Europe (European Long-term Ecosystem Research network of 21 national LTER networks): Comprises about 400 formally acknowledged ecosystem research sites (65% terrestrial, 26% aquatic and 9% transitional waters LTER Sites) and 35 LTSE Platforms for socio-ecological research at the regional scale. The infrastructures are operated by around 100 institutions. LTER-Europe has condensed research sites originally set up in varying contexts, which focus on investigating entire ecosystems. Sites and national networks comply with a site classification reaching from highly instrumented master sites (19%), to regular LTER sites (44%), extensive (24%) and emerging sites (4%).

Coordinating institution: Environment Agency Austria,

Coordinator Michael Mirtl, Chair of LTER-Europe,

Representing organisation in ENVRI^{PLUS}: Environment Agency Austria

SEADATANET - Pan-European infrastructure for ocean & marine data management)

The overall objective of the SeaDataNet II project is to upgrade the SeaDataNet infrastructure into an operationally robust and state-of-the-art Pan-European infrastructure for providing up-to-date and high quality access to ocean and marine metadata, data and data products originating from data acquisition activities by all engaged coastal states. SeaDataNet is undertaken by the National Oceanographic Data Centres (NODCs) and marine information services of major research institutes from 30 coastal states bordering the European seas. It also includes Satellite Data Centres, expert modelling centres, and the international organisations IOC, ICES and EU-JRC in its network. SeaDataNet II provide data access and data products services to the end-users and intermediate user communities, e.g. to COPERNICUS Marine Core Services (MyOcean), and establishing SeaDataNet as the core data management component of the EMODNet infrastructure and contributing on behalf of Europe to IOC/IODE – Ocean Data Portal (ODP), and GEOSS. It aims to achieve INSPIRE compliance and to contribute to the INSPIRE process for developing implementing rules for oceanography.

Coordinating institution(s): Ifremer,

Coordinator(s): Michele Fichaut

Representing organisations in ENVRI^{PLUS}: IFREMER

SIOS – Svalbard Integrated Arctic Earth Observing System

The Svalbard integrated Earth observing system (SIOS) will be a regional observational system for long term measurements in and around Svalbard. The SIOS Knowledge Center (SIOS-KC) will develop methods for how observational networks useful for global change studies are to be designed and implemented. SIOS will set an example for how to systematically construct observational networks in the Arctic. SIOS will enhance the scientific environment in Svalbard by providing the core measurement program and the special expertise of the Knowledge Center.

Coordinating institution(s): Research Council of Norway, **Coordinator(s):** Dr. Jon Børre Ørbæk

Representing organisations in ENVRI^{PLUS}: CNR, RCN

The contribution of the research infrastructures in the ENVRI^{PLUS} and their representing partner organisations in particular project work has been indicated as a subscript of the participant acronym represented RI, i.e. ACRONYM_{RI}, or e.g. UHEL_{ICOS}. Some participant organisations are representing several RIs and the subscript defines which role the participant is having on each task. Those participants not connected to RIs, but providing special expertise, subscript_{EXP} is used.

3.3.2 Themes and Work Packages

The workflow in all themes and work packages is organized in a way that the project will meet the set project objectives. The project structure enables that the specific needs and challenges gathered from RIs. Solutions will