

The end of the ENVRI project (1 November 2011 – 31 October 2014) was marked by a final event on 7 and 8 October 2014 in Amsterdam. The main part of the meeting focused on discussing a number of topics of common interest. To this end the participants of the final event were invited to express their opinions and recommendations.

Below are the 6 topics as selected by the ENVRI Management Committee. The participants at the ENVRI final event were split up in 5 groups to discuss their views on these topics. They were challenged to limit their opinions to 'one liners' if possible. The discussion outcomes from all 5 groups for each of the topics are below.

Topic 1

What are the (scientific) challenges of the environmental Research Infrastructures for the 10 years ahead and what should we start doing now?

- Make it possible to answer environmental science problems via finding, studying, trusting and using all needed available environmental information.
- Research infrastructures need to work continuously to be integral to their communities despite continuous changes in how they do science—the requirement for open access must be balanced with due attribution.
- The RI landscape is still fragmented and an adequate structure is missing to respond to emerging new environmental challenges > need community platform (as ENVRI) for working with interoperability, sustainability and scalability of services.
- Engage the users > enhance the awareness of the RIs, provide easy access to the users, build good user feedback loops.
- Identify data correlation from various domains; step away from discovery of evolving patterns by chance and move towards an interdisciplinary interpretation of data ^{1,2,3}.
 - ¹Organizational challenges: Communicate the idea of trans-national RI within the scientific communities; prepare the ground for “true” collaboration between different domains by mutual-trust-building and community-building activities between separate communities.
 - ²Methodological challenges: Make applied methodologies transparent and, as far as possible and useful, harmonize methodologies applied in different domains, for enabling communication between domains. Explain applied methodologies to the public in order to grow public acceptance of chosen way.
 - ³Technical challenges: Develop interoperability of data systems as a pre-requisite for data correlation.
- While travelling in a train, we need standards, professionalization, and clients on board of our trains.

Topic 2

Many environmental infrastructures have a distributed structure to produce and process data. How to best organise and/or improve the cooperation between distributed entities?

- Find the societal and environmental common goals and problems to create a community and to make sure the community has enough resources.

- The only way to improve links is via close communication – there is no one solution for all cases.
- Two approaches for the policy and for the research infrastructure level.
 - Policy level: need common agreed visions and policies between organisations and entities,
 - RI level: Open accessible data catalogues, RI services, virtual research environment, RM
- Establish a RI culture of collaboration based on “delegation” to autonomous sub-structures. Allow fuzzy boundaries between entities. De-centralized structures are considered a valuable approach for fostering collaboration between distributed entities.
- While operating our train company, we need long-term concessions, accessible time-tables and maps to plan ahead.

Topic 3

The environmental infrastructures often depend on other facilities, such as national facilities or external IT services. What should be done to optimise effective solutions?

- Communities (“bridges”) and key interface people (“shipping lines”) to work continuously together, co-design find the (also ad-hoc) solutions together.
- National facilities: funding support from governments to support national facilities to work with RIs
- External IT services: The IT service landscape is also complex and not fully understood by RIs, external IT services should be long-term sustained. This is not the current situation as many RIs are investing in-house services.
- Outsourcing is necessary to manage the torrent of data, so clear service-level agreements are required just as for commercial contracts, providing long-term guarantees in the face of service transitions over the lifespan of an infrastructure.
- Establish personal point of contact” between science and IT service for both sides in the background “interpreter” facilities. Identify and develop potential PoC; this will define a new “job description”.
- Establish an accurate, non-scientific language allowing scientists to translate complex scientific methodologies into an abstract description of work, using common vocabulary.
- We want to travel from Kiruna to Naples without having to change trains or changing gauges. That requires an open an open market and transnational access.

Topic 4

Our environment is a global system. How to improve in this regard the international role of European environmental research infrastructures?

- Doing excellent research is what really matters. And that it is going faster than anywhere else. Then will have global influence. Top scientists, taking the lead are important. RIs have to engage with those scientists to ensure they are on-board and the RIs are at the centre of the community, leading the way with infrastructure support.
- Something like ENVRI can be the ‘meeting point’ where the different domains (e.g.: marine, or climate...) come to build a catalogue of international counterparts (i.e.: landscape analysis), and advertise/orchestrate the relationships, the achievements, proofs of concept (in the beginning), etc.

- Improve visibility on the international level through presentations on scientific conferences, etc and with high-level document distribution (need to be easily available). Present a focussed common vision of the RIs to inform the society and secure the ENVRI leadership in a global environmental landscape.
- Improve our capacity for implementation of new ideas in multi-national collaborations, (highlighted through good examples).
- Use the existing international networks or initiatives to find the contact points.
- Prioritize what needs global collaboration most urgently.

Topic 5

What can be recommended on career development for staff within and among environmental research infrastructures?

- RIs should provide an incentive for researchers to feel rewarded when working in them, maintaining a permeable structure of short-term positions, that would allow them to do their science outside the RI and later come back and forth, to keep improving the RI.
- The 'sustainability' of expert involvement can be enhanced with a data citation plan to show the importance and performance of (in-situ) data scientists. This also helps in developing a career management plan at the European scale securing long-term positions. This may imply a reorganisation of institutions.
- Define and offer different career roles within a research infrastructure. Ensure a return ticket to science from other roles, e.g., by offering scientific credit for producing the data.
- Foster human capital: provide inter-infrastructure information about vacancies, job opportunities, people exchanges, etc. Establish a joint website to publish it (ENVRIPLUS can implement it).
- Need industry-standard, transferable peer-recognised career pathways on a par with existing traditional research/academic pathways.
- Need to provide reasonable security of employment e.g., 5 years. Possibility of renewal makes it more attractive.
- ESFRI ENV RIs could collaborate together to bring this about. Is an EU level issue perhaps because distributed RIs specifically have this challenge.

Topic 6

Are there new ways of interactions between research infrastructures and their users, and to structure user's feedback to the infrastructures?

- Develop improved ways of data presentation which includes (anonymous) registration, short feedback (e.g. via pop-up window, 'I like') and modified easy virtual research environments as a way to run user workshops. Create an outreach plan for data and paper publications to be managed, tracked and communicate by a single office.
- Professional marketing skills and multiple channels of communication are important. Need to recognise that different approaches are needed to different age groups, etc. Make people, particularly students, aware of what is available for them. Offer trainings, hackathons, etc.
- Running summer schools is an effective way of bringing together seasoned experts and young researchers. Any RI should be running summer schools.

- Offer user-friendly feedback possibilities for the end-users of the services (star systems / happy faces, reviews, helpdesk) that don't necessarily require registration.
- Direct interface and communication between users and RI through a dynamic consultation group of users and social media
- RIs should become communities where users are encouraged to participate in them, using the services from the RI, and also publicly reporting back on what they use: it can be called: "ENVRIstore".