D18.5
RI INNOVATION AND INDUSTRY LIAISON PREPAREDNESS ROADMAP

WORK PACKAGE 18 Dissemination, Liaison and Collaboration

LEADING BENEFICIARY: EMSO ERIC

Author(s):	Beneficiary/Institution
John Picard	EMSO ERIC
Vito Vitale	Consiglio Nazionale delle ricerche (CNR)

Accepted by: Helen Glaves (WP 18 leader)

Deliverable type: [white paper]

Dissemination level: PUBLIC

Deliverable due date: 30 June 2019

Actual Date of Submission: 05 July2019

Project internal reviewer(s):	Beneficiary/Institution
Technical Reviewer	Helen Glaves, UKRI, United Kingdom
RI Reviewer	Paolo Laj, University of Grenoble

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654182

Document history:

Date	Version
01 July, 2019	Draft for comments
04 July, 2019	Approved by EMSO ERIC Director General, Juanjo Dañobeitia
05 July, 2019	Submitted to Reviewers

DOCUMENT AMENDMENT PROCEDURE

Amendments, comments and suggestions should be sent to the author John Picard
john.picard@emso-eu.org

TERMINOLOGY

An ENVRI project glossary is provided online here:
https://envriplus.manageprojects.com/s/text-documents/LFCMXHHCwS5hh

PROJECT SUMMARY

ENVRIplus is a Horizon 2020 project bringing together Environmental and Earth System Research Infrastructures (RIs), projects and networks with technical specialist partners to create a more coherent, interdisciplinary and interoperable cluster of Environmental Research Infrastructures across Europe. It is driven by three overarching goals: 1) promoting cross-fertilization between infrastructures, 2) implementing innovative concepts and devices across RIs, and 3) facilitating research and innovation in the field of environment for an increasing number of users outside the RIs.

ENVRIplus aligns its activities to a core strategic plan where sharing multi-disciplinary expertise will be most effective. The project aims to improve Earth observation monitoring systems and strategies, including actions to improve harmonization and innovation, and generate common solutions to many shared information technology and data related challenges. It also seeks to harmonize policies for access and provide strategies for knowledge transfer amongst RIs. ENVRIplus develops guidelines to enhance transdisciplinary use of data and data-products supported by applied use-cases involving RIs from different domains. The project coordinates actions to improve communication and cooperation, addressing Environmental RIs at all levels, from management to end-users, implementing RIs' staff exchange programs, generating material for RIs' personnel, and proposing common strategic developments and actions for enhancing services to users and evaluating the socio-economic impacts.

ENVRIplus is expected to facilitate structuring and improve quality of services offered both within single RIs and at the pan-RI level. It promotes efficient and multi-disciplinary research, offering new opportunities to users, new tools to RIs' managers and new communication strategies for environmental RI communities. The resulting solutions, services and other project outcomes are made available to all environmental RI initiatives, thus contributing to the development of a coherent European RI ecosystem.

TABLE OF CONTENTS

Contents

DOCUMENT AMENDMENT PROCEDURE **2**

TERMINOLOGY **2**

PROJECT SUMMARY **2**

TABLE OF CONTENTS **3**

ABSTRACT **4**

EXECUTIVE SUMMARY **4**

PART I – RI INDUSTRY-LIAISON TARGET GROUPS FOR INNOVATION COOPERATION **6**

PART II – STATUS OF CURRENT ENVRI ONLINE INNOVATION-COOPERATION SERVICES AND INFORMATION FOR INDUSTRY **10**

PART III – THE ENVRIPLUS "RI INNOVATION AND INDUSTRY-LIAISON PREPAREDNESS ROADMAP" **13**

PART IV- CONCLUSIONS **19**

FOLLOW-UP AND IMPLEMENTATION: ENVRI FAIR **20**

BIBLIOGRAPHY **21**

APPENDIX A- ENVRI Industry-Liaison Target Groups 23

APPENDIX B - QUESTIONNAIRE RI INNOVATION READINESS 76

ABSTRACT

Recent reports from the Intergovernmental Panel on Climate Change (IPCC) call for urgent measures to manage and mitigate climate change risks. The European Commission is adopting a number of environmental policy instruments, ranging from mandatory rules to voluntary tools, aimed at ensuring that European industry works towards a high level of environmental protection, minimizes its environmental footprint and increases its sustainability. How can the ENVRIplus cluster play an active role in supporting industry in the required transition to a circular and green economy?

In responding to the EU pledge to scale up actions to reduce climate change hazards and transform the threats of climate change into opportunities for new solutions and technologies developed by industry, this paper proposes a roadmap for the ENVRIplus community to engage actively with industrial partners to create more sustainable partnerships.

The mission to become more proactive with industrial users is now feasible, as more and more environmental research infrastructures in the ESFRI Roadmap approaching or in the implementation phase and are rolling out services to users. They now recognize the urgency of finding ways to better develop closer links with Industry and to visibly demonstrate their relevance in promoting innovation and economic benefits for their Member countries and Europe as a whole.

The "Research Infrastructures Innovation-Preparedness Roadmap" proposal developed in ENVRIplus WP18 and documented in this paper offers a set of guidelines to help the ENVRI cluster of RIs to do this. It suggests a set of basic measures and actions they can adopt and undertake to organize and position themselves more effectively in identifying and dialoguing with prospective private sector partners. The Roadmap has two overarching objectives:

1. develop a common methodology and set of action items to help the ENVRI RIs "walk the talk" vis-à-vis strengthening innovation-partnering with industry - something they regularly emphasize in their project proposals and presentations but generally do not know how or have difficulty effectively putting into practice; and,
2. work towards being able to offer ESFRI a regular source of RI innovation success stories to complement those on RI scientific achievements, and thus help better showcase the return-for-money of the large public investments in the 50+ RIs on the ESFRI Roadmap each costing an average of €1.5 billion to construct and between €2 and €120 million annually to operate (source ESFRI).[1]

EXECUTIVE SUMMARY

Much has been said and written since the launch of the ESFRI Roadmap in 2006 about the importance and challenge of strengthening RI research-industry collaboration as a way of spurring innovation. The ESFRI Innovation Working Group report "Innovation-Oriented Cooperation of Research Infrastructures (RIs)" provides a detailed explanation of why boosting RI innovation cooperation is considered such a priority opportunity by the European

[1] EC Memo "ESFRI: research infrastructures for Europe" Brussels 2012

> "RIs in Europe will serve as high-performance platforms for cooperation among universities, enterprises and research institutes. The resulting innovation ecosystem will spur new ideas, solutions and innovations of benefit to the European economy and society, as well as science. Special attention should be paid to nurturing the SMEs that supply them, collaborate with them, or spin-off from them."
>
> *European Infrastructures and the Europe 2020 Strategy "Inspiring Excellence"*
> Carlo Rizzuto, ESFRI Chair 2008-2010

Commission and ESFRI. In a nutshell, it emphasizes how the mounting global concern with climate change and the environment offers ENVRIs unprecedented opportunities to position themselves not only as purveyors of world-class environmental science but also as powerful "Innovation Platforms" able to drive the development of cutting-edge new environmental technologies, solutions, tools and applications in close partnership with industry, particularly with SMEs.

Despite the talk, however, the reality, is that RI collaboration with industry continues to lag. Not only is commercialization an area which is traditionally very challenging for public scientific organizations (not just in Europe) for reasons we describe below but also because most RIs lack a systematic approach to establishing a continuous and fruitful dialogue with industry.

The ENVRIplus "RI Innovation-Preparedness Roadmap" presented here tries to narrow this gap by offering RI's, particularly ESFRI Landmarks, a recipe-list of pro-active measures whose main objectives are firstly to help better structure RIs internally to deliver effective industry-liaison initiatives, and secondly to spur them to better communicate and "package" Success Stories of existing ties with industry to clearly demonstrate the significant economic benefits stemming from public investments in the ESFRI Roadmap.

This paper is organized as follows:

Part 1 describes the different types of RI industry interlocutors and relationships, their needs and main areas of opportunity for cooperation;

Part 2 examines a selection of Landmark and Project based ENVRI RIs, and presents their the current level of innovation interaction with the private sector illustrated on their websites with emphasis on key criteria such including their innovation strategy, commercialization and industry collaboration promotion organizational setup, types and frequency of partnering activities, type of online information they make available to industry, and communication of success stories.

Part 3 is the heart of this paper – presentation of the RI Innovation-Preparedness Roadmap proposal with its four main pillars, the suggestions for effective Industry Liaison Officer recruitment, and a list of 14 key "RI-preparedness" recommendations;

Lastly, **Part 4** sums up the Roadmap's key take-home messages and follow-up implementation activities due to be carried out in the 4-year H2020 cluster project, ENVRI-FAIR, launched in early 2019.

PART I – RI Industry-liaison target groups for innovation cooperation

> "The innovation potential of RIs is associated with their **construction and upgrade phases**, when the drive to push back technical boundaries stimulates or enables development with high technology companies… and with their **operational phases** when service provision to users can lead to .. novel ways of exploitation, as well as with the re-use of data.
>
> ESFRI Working Group on Innovation Report 2016: "Fully Exploit the potential of RIs as Innovation Hubs"

This Roadmap identifies four main types of potential industry targets Research Infrastructures should seek to establish strong links with:

1. **"Industry Association and Interest Group "Aggregators"** – Pan-EU and national industry federations and associations, as well as environmental lobby and interest groups that actively follow and advise on environmental issues and technology developments on behalf of private sector members and stakeholders. Such organizations usually have strong sectoral focus and expertise, and can be valuable partners in helping pre-qualify and recruit RI company interlocutors and focused brokerage events participant. Examples include The International Association of Oil and Gas Producers, IOGP, the European Association of Remote Sensing Companies, EARSC, and the European Network of Environmental Professionals, ENEP. Appendix 1 lists 26 such aggregator organizations with their coordinates and profiles, most of which have offices in Brussels.

2. **Industrial suppliers – the "Upstream Model"**. As ESFRI states in its Scripta volume on RI Innovation cooperation:

> *The permanent race for the best valuable investment forces RI managers to seek industrial suppliers of unique components and services at the cutting-edge of the technological possibilities. In the construction and major upgrade stages of RIs – design, engineering, commissioning – industry acts mainly as a provider of state-of-the art technologies, new designs, components, software, under standard procurement conditions or in closer collaborative conditions.*
>
> ESFRI Working Group RI Innovation Cooperation

ENVRIplus Deliverable 1.1 *Emerging Technologies, Emerging Markets: Fostering the Innovation Potential of Research Infrastructures* from Work Package 1 details the wide range of opportunities which exist between RIs and industry as a supplier, the "upstream business model".

Environmental observations performed by RIs are dedicated to answering the grand challenges (ENVRIplus Theme 4). D1.1 describes how this involves dealing with hundreds of types of measurements by means of myriads of different sensors installed on numerous types of platforms performing measurements in all environmental domains. It outlines examples of RI technological advances in the four environmental domains, i.e. the atmosphere (ICOS, IAGOS, ACTRIS, SIOS project, ACTRIS), marine (EURO-ARGO, EMSO, JERICO project), ecosystem / biosphere (ANAEE) and solid earth (EPOS) domains, and the opportunities they offer for cooperation with industry, particularly with SMEs.

Similarly, the EU FP7 project NEXOS study "*Marine Sensors; the market, the trends and the value chain*" offers a detailed analysis of innovation cooperation opportunities with industry in the development of multi-functional maritime sensors throughout the entire value chain. This includes sensor manufacturing, sensor development and integrating platforms as well as adapting the sensors to the needs of the maritime observations, operating them, analyzing the collected data and exploiting the results of the observations. Stakeholder groups range from: i) sensor manufacturers; ii) sensor developers; iii) service providers and iv) end-users of environmental monitoring services.

3. Intermediary "midstream" SMEs

A large group of potential RI industry partners is constituted by intermediary ICT companies such as data SMEs active in enabling and enhancing key aspects of the digital transformation and big data revolution. These companies are natural allies of RIs in building open data access, big data management, ensuring interoperability, and adoption of the FAIR principles that promote findability, accessibility, interoperability and reuse of data.

4. "Downstream" environmental monitoring market SME applications developers, integrators and services providers

According to the consultancy, Markets&Markets™, the Environmental Monitoring Market is growing by 7% a year and will be worth 25.5 billion dollars by 2024.[2] North America holds the largest share of this market, with Europe not far behind with growth of the environmental observation services market exploding, mainly driven by the big data revolution. Satellites, in-situ data acquisition systems such as Research Infrastructures and finally also citizens are delivering huge quantities of complementary environmental data.

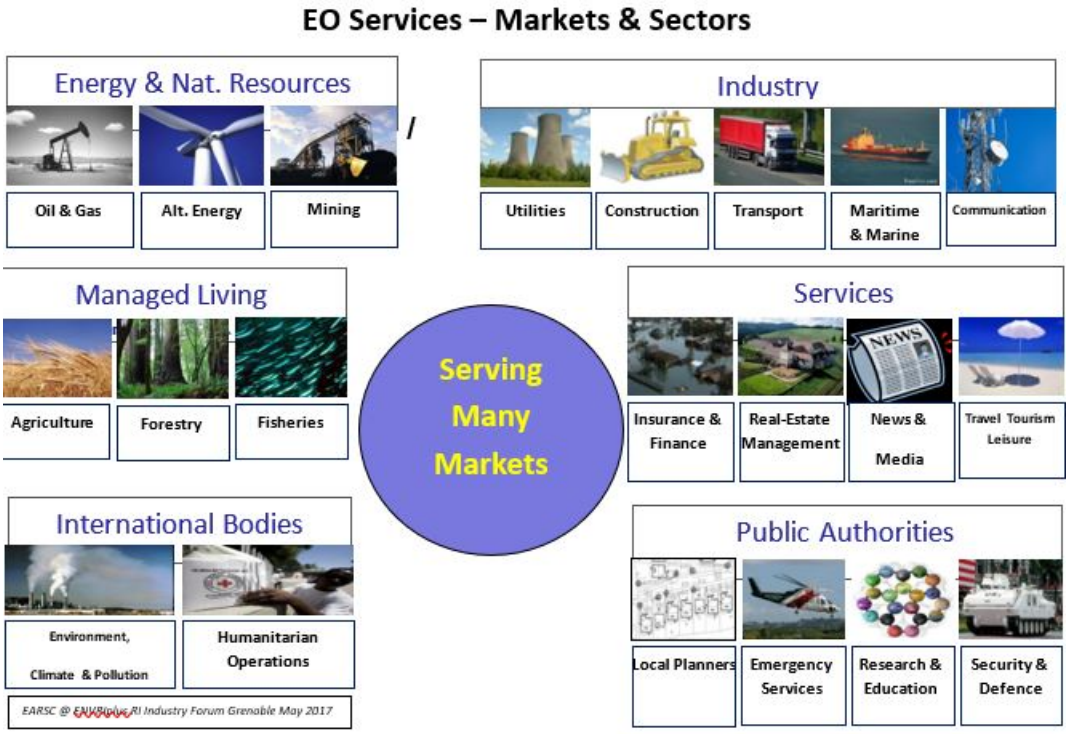
Similarly, according to Copernicus (https://www.copernicus.eu/en), the European market for downstream information products and big data analytics is growing even faster, at over 14% a year. 3 Technological capabilities such as machine learning, artificial intelligence, and cloud computing improve the ability to extract market intelligence grows. These trends come together to lower the barrier to entry for downstream information and analytics-based services," states Dallas Kasaboski, Senior Analyst at US Earth Observations (EO) consultancy, NSR.

---

[2] *Report "Environmental Monitoring Market by Product – Global Forecast to 2024*

[3] *Source: PwC Market Report – issue 2 – feb. 2019 – P7 The Copernicus Marine Service contributes mainly to Ocean Monitoring but also contributes to the growth of other transverse segments such as Renewable Energy and Oil & Gas..*

Figure 1



Source: "The challenge for geo-spatial service providers in the Digital Economy"
Mónica Miguel-Lago: EARSC Executive Secretary
Presentation at ENVRIplus First RI Industry Partnering Forum – Grenoble May 2017

Examples of the growing opportunities arising from the huge variety and combination of environmental observation data sources include [4]:

- The future evolving market for carbon trading where global intelligence is essential for policy makers and commercial actors. New information products to support the market will be needed. According to the World Bank, the value of the carbon pricing market in 2018 is $82bn – an increase of 56% in just one year.[5]

- Agriculture services both to serve farmers in precision farming methods and to help them address increasingly demanding environmental goals such as the EU water quality directive where EO data together with in-situ, meteorological, biological and socio-economic data will inform policy makers and citizens regarding healthy and sustainable practices.

- Health services where EO data combined with in-situ and meteorological data can inform on conditions and risk as well as providing evidence for policy decisions ranging from construction to schools and urban planning. Such an approach supports the Smart Cities initiative of the EU.

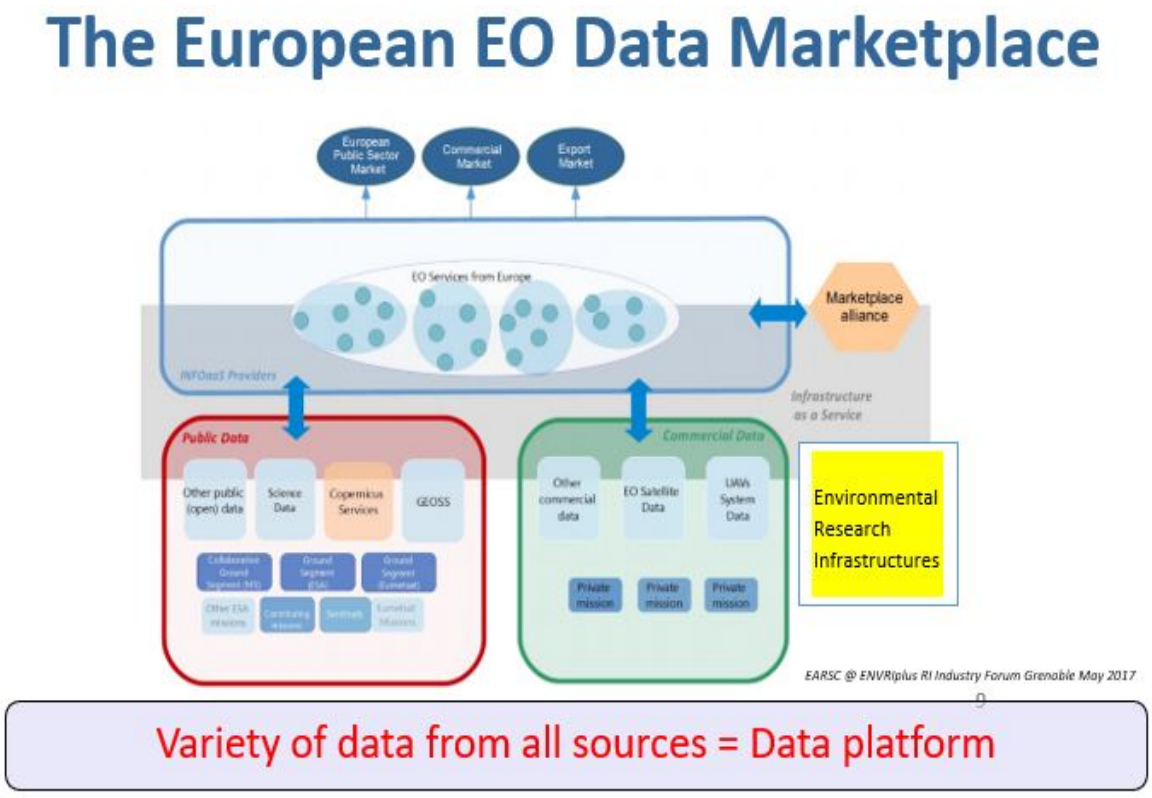
4 EARSC Position Paper "Creating a European Marketplace for Earth Observation Services" 2016

5 "World Bank Group. 2019. State and Trends of Carbon Pricing 2019. Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/31755 License: CC BY 3.0 IGO."

- Marine observation information which can serve commercial companies (shipping, fisheries, offshore) as well as citizens (coastal waters, beaches) and policy makers (mitigation, sustainable development and sustainable exploitation of resources) linked to scientific communities providing research into the environment and the global climate system;

- Citizen risk from natural hazards and supporting mitigation through better, more-directed information allowing citizens to take more-informed decisions and supporting public security services to protect them from extreme events.

Figure 2.- European Earth Observations Market



Source: EARSC Position Paper "Creating a European Marketplace for Earth Observation Services" 2016

PART II – Status of current ENVRI online Innovation-Cooperation Services and Information for Industry

The Innovation-Preparedness Roadmap proposal evolved in ENVRIplus mainly in response to the realization that the environmental RIs, although recognizing **the importance of cooperation** with the private sector to boost sustainability and show economic benefits, in many cases appeared to experience great difficulty in developing strong links with industry.

A survey of the websites of a sample of ESFRI environmental research infrastructures (8 LANDMARKS and 2 PROJECTS chosen at random) conducted in the Spring of 2019 (see below) confirmed that most RIs provide very little information specifically geared to educate or attract potential private sector users and prospective innovation partners. Few if any RI websites feature any kind of Success Story or Use Case describing successful collaborative projects with industry – examples which would be useful to the Commission to demonstrate the relevance of European RIs not only in promoting excellent science but also in advancing innovation, economic growth and jobs.

The Survey looked at a selection of eight key criteria taken from of a larger "RI Innovation-Preparedness Questionnaire" developed in ENVRIplus (see Appendix 2) which listed 13 factors identified in WP18 as most relevant prerequisites for successfully adopting and implementing the Innovation Roadmap. The eight criteria were:

1. **Organization**: does the RI have an Innovation and Industry Liaison organizational structure with a central Innovation-Services Hub to educate, drive and guide RI innovation preparedness and work plans together with at least one Industry-liaison expert in each RI facility or node?
2. **Staff**: Does the RI have at least one industry-communications expert with both scientific and commercial PR skills available to lend support to activities of the industry-liaison staff?
3. **Strategy**: Does the RI produce an annual Innovation and Industry Liaison Strategy and as a part or addition of its Business Plan?
4. **Access**: does the RI website feature an interactive entry point for industry providing one-stop-shopping access to services, news and information on activities and opportunities for collaboration?
5. **Governance**: Does the RI maintain an active Industry Advisory Committee made up of multi-disciplinary, gender-balanced representatives of the key relevant industry and technology sectors;
6. **Use cases:** Whether the RI publishes online Success Stories and Use Cases describing fruitful partnerships and projects with companies, particularly with SMEs;
7. **Capacity building:** Does the RI run regular Training Programs and Workshops on focused innovation topics for RI Staff, open also to private-sector engineers and managers; and,
8. **Outreach:** Whether the RI publish an online program of industry-partnering workshops and brokerage events.

Survey of 10 sample ENVRIs' current online Industry-partnering services & information

In this Deliverable, we decided to opt for a non-invasive website survey of the following 10 research infrastructures:

1. EISCAT (LANDMARK)
   Next generation European Incoherent Scatter radar system
   An upgrade of the EISCAT systems to investigate the atmosphere and near-Earth space environment

2. EPOS ERIC (LANDMARK)
   European Plate Observing System
   A long-term plan for the integration of national and transnational research infrastructures for solid Earth science

3. EMSO ERIC (LANDMARK)
   European Multidisciplinary Seafloor and water-column Observatory
   Interactive, real-time ocean observation systems to address societal and scientific challenges

4. IAGOS (LANDMARK)
   In-service Aircraft for a Global Observing System
   Global-scale and long-term atmospheric monitoring system from commercial aircraft

5. ICOS ERIC (LANDMARK)
   Integrated Carbon Observation System
   High precision scientific data on carbon cycle and greenhouse gas budgets to support climate action

6. LIFEWATCH ERIC (LANDMARK)
   e-Infrastructure for Biodiversity and Ecosystem Research
   A distributed e-Infrastructure to support research and sustainability of biodiversity and ecosystems

7. EURO-ARGO ERIC (LANDMARK)
   European contribution to the international Argo Programme
   The European contribution to the global sea and ocean in depth profiling by floats

8. EMBRC (LANDMARK)
   European Marine Biological Resource Centre
   A world-class platform for fundamental and applied research on marine bioresources and marine ecosystems

9. ACTRIS (PROJECT)
   Aerosols, Clouds and Trace gases Research Infrastructure
   Ground-based stations to understand past, present and predict future evolution of the atmosphere

10. ANAEE (PROJECT)
    Infrastructure for Analysis and Experimentation on Ecosystems
    Integrated experimentation to forecast the impacts of climate and land-use changes on ecosystems

Figure 4 Survey of online ENVRI Innovation-Preparedness information and services targeting Industry

Environmental Research Infrastructures:	EISCAT	EPOS	EMSO	IAGOS	ICOS	LIFEWATCH	EURO-ARGO	EMBRC	ACTRIS	ANAEE
RI Innovation & Industry Liaison Officer(s) and/or Innovation Services Center	✗	✗	√	✗	✗	√	✗	√	✗	✗
Communications Officer w commercial experience	✗	✗	✗	✗	✗	√	✗	✗	✗	✗
RI Annual Innovation & industry Liaison Strategy	✗	√	✗	✗	✗	✗	✗	√	✗	√
RI website Innovation Menu Tab: Services & Information for Industry	✗	√	✗	✗	✗	✗	✗	√	√	√
Active Industry Advisory Committee	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Online Industry-Cooperation Use Cases and Success Stories	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
RI annual staff innovation Training Program	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Online Program of RI-industry joint workshops and brokerage events	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗

In a nutshell, the survey showed that ENVRIs have little or no public persona when it comes to the pursuit of innovation cooperation with industry and place very little effort and emphasis on developing cohesive RIs' innovation strategies and implementation programs. Despite the fact that all or most have fruitful relationships with companies of one kind or another, primarily at the node level with suppliers and users, few if any have developed any kind of organized or systematized approach to nurturing and building on these industry linkages to produce results that can constitute public Innovation Success Stories for the RI and for ESFRI as a whole. We venture several possible reasons for this:

- Firstly, the 25+ ENVIRplus RIs are at very different stages of "innovation preparedness", a few are advanced but most if not many have not even really addressed or thought deeply about the subject.
- In many RIs, services to users are not yet well defined or operational yet so innovation activities understandably are often simply premature. Many RIs still do not have proper business plans with User Strategies based on detailed market analyses and business development precepts. This makes it difficult to attract interest by companies in partnering other than simply as a supplier;
- In general, there continues to exist a "culture gap" among RI researchers when it comes to "business". Many scientists are generally not comfortable with the subject and often feel out of their depth and ill at ease with commercial matters, terms like "client", "marketing". "balance sheet", "technology transfer" and "venture finance" and when interacting with private sector people with vastly different expectations relative to time scales and definitions of success.
- As stated above, researchers understandably tend to put their science activities first and are often just so engrossed and busy doing research or managing projects that they cannot deal with things, which are seen as lower priority as unfortunately innovation generally is. Building an RI from the ground up to deliver consistent scientific excellence is a complex and challenging matter and is very work-intensive.
- Last but not least, RI personnel generally lack the required background, skills and experience to tackle bridging the science-industry/commercialization divide (which is very real and challenging) and therefore often tend to opt out rather than commit to contributing to a necessarily intensive pro-active team effort. Promoting innovation linkages with industry effectively requires continuous effort and specific competencies including a mix of technological savvy, scientific knowledge and business acumen. Research experience is important but a business background and mentality are essential.

PART III – The ENVRIPLUS "RI Innovation and Industry-Liaison Preparedness Roadmap"

Here we come to presenting the actual specifics of the Roadmap proposal.

The Roadmap proposal: 5 key Actions to help structure and organize the way ENVRIs engage with industry:

1. Establish a pan-ENVRI Innovation and Industry Services and Support Central Hub;
2. Develop a network of RI-based Industry-liaison and innovation-communications specialists working in a hub-and-spoke collaboration setup with the Hub;
3. Adopt a set of core competencies for RI innovation staff;
4. Implement the Roadmap's list of 14 recommended key actions RIs should take to begin to establish a common system and level of "innovation-partnering preparedness";
5. Explore building a strategic alliance relationship between **the central ENVRI Innovation Hub and the European Institute of Innovation and Technologies (EIT, https://eit.europa.eu) Knowledge & Innovation Communities (KICS)** for cooperation on joint Entrepreneurship Training programs and Industry-partnering events recruitment.

Action 1. Structure: RI Innovation-Preparedness Services Hub and Network

- Establish a central, dedicated **RI Innovation Services Hub or Center** responsible for facilitating, promoting, training, advising, building up knowledge on all aspects of RI industry innovation partnering and commercialization matters as a pooled, shared service available to RIs; the Hub also leads the regular collective, harmonized dissemination of RI-Industry cooperation results and success stories to the Commission and to ESFRI;

  The Innovation Hub supports and complements local RI innovation staff, focusing also on adding value in situations involving:

  - Multidisciplinary aspects;
  - Industry-academia research collaboration across a range of parties;
  - Cross-RI interactions in multiple domains, with and without industry partners
  - Connections to international partners.

A sample RI Innovation-Services Homepage and list of information services for industry:

Welcome to the ENVRI Innovation-Services Hub Portal!

Our team of Industry-liaison specialists are available to assist with collaboration with industry and technology transfer and provide access to free and easy access to real time legal support and partnering advice from a team of innovation specialists.

We also aim to be a central expertise center for ENVRIs, providing online access to essential tools and resources for RI-industry collaboration support such as information and guidelines on Procurement, Intellectual Property Rights, Technology Transfer, Contractual Agreements and processes (e.g., intellectual property agreements, patents, copyright, trademark, service mark, trade secret, confidentiality agreements, sponsored research agreements, material transfer agreements, technology licenses) and focused activities such as Training, Workshops; Brokerage Events; Employment, Exchange and Stage Opportunities; Success Stories and News .

Services provided by the Innovation office include:

- Real time advice for RIs, free of charge;
- Template documents for frequently occurring technology transfer situations (MTA, CDA, etc.)
- Yearly joint industry/RI workshops on innovation, knowledge sharing etc.
- Guidelines and assistance with cross-infrastructure, industry/academia collaboration and knowledge sharing;
- Access to specialist knowledge in relation to business development and legal, regulatory or ethical aspects;
- On a case-by-case basis, hands on involvement by Innovation Office staff with real collaboration and negotiation cases.

Action 2. Adopt key RI "Innovation-Preparedness" Action-Plan Recommendations

The Roadmap proposes 14 key recommendations ENVRIs need to put in place in order to establish a common baseline for developing systematic innovation-partnering industry-liaison programs.

14 RI "INNOVATION-READINESS" ACTION-PLAN RECOMMENDATIONS

1. Introduce "Innovation Cooperation with Industry" as a priority in every ENVRI's Annual Strategic Plan
2. Ensure that its website homepage has a high-level "Industry" or "Innovation" menu tab and section
3. Prepare an annual Innovation and Industry-Liaison Strategy as an annex to the RI Business Plan
4. Hire a full-time Innovation/Industry Liaison officer(s) (see competencies recommendations below)
5. Hire a Communications Officer(s) with commercial experience
6. Set a target for how much cooperation with Industry should ideally contribute to RI annual revenues (%)
7. Establish a multi-disciplinary, gender-balanced, Industry Advisory Committee
8. Highlight four Industry-cooperation Success Stories on its website and in annual reports to the EC and ESFRI
9. Make sure its Data Portal offers users open, user-friendly access to RI data and services
10. Publish an online RI Services Catalog, inclusive of specific services/opportunities for/with industry
11. On its website, make readily available a standard R Service-level Agreement and IP Policy Guideline for SMEs interested in licensing RI data to (co-)develop value-added products and applications
12. Establish an annual Training Action Plan and Program as annexes to the Business Plan in consultation with industry to bring together RI researchers and company engineers and managers
13. Develop an RI Talent-Attraction Exchange Program with industry to train the next generation of young scientists and engineers;

Action 3. Develop a network of RI-based Industry-liaison and innovation-communications specialists working in a hub-and-spoke collaboration setup with the Hub

Constitute, and appropriately fund, an ENVRI Innovation-Cooperation Officer Network made up of an industry-liaison specialist with proven business-science promotion background and track record and an English mother-tongue Communications Officer with good commercial/PR communication skills and experience resident in each RI and ready to work as a team with the central Hub, and in close consultation with RI Industry Advisory Committees, on a pro-active,

pan-EU, industry-liaison Action PLAN centered on a focused work program of communications and outcall initiatives.

That said, the EU Horizon 2020 **INFRAINNOV-02-2019 project** Network of research infrastructure Industrial Liaison Officers" calls for the establishment of a structured RI Industry Liaison Officer network. The project should help greatly to accelerate implementation of the ENVRI ILO network envisaged by this Roadmap.

Horizon 2020 -
European research infrastructures (including e-Infrastructures)

INFRAINNOV-02-2019: Network of research infrastructure Industrial Liaison Officers

Specific Challenge: Industrial Liaison Officers of Research Infrastructures play an essential role for stimulating effective and tighter links with industry. They can learn from each-others and exchange information on awareness/communication strategies, procurements activities and industry requirements, to raise the level of innovative actions arising from Research Infrastructures and maximize the impact of their actions.

Scope: **Proposals will establish a network of Industrial Liaison Officers (ILOs) of pan-European research infrastructures, in particular ESFRI landmarks and projects or other relevant world class research infrastructures with a European membership and governance.** The consortium should have a good representation of experienced and less experienced ILOs. Proposals should address: exchange of best practices; enhanced cross-border and cross-thematic brokerage events; joint awareness campaigns towards industry (including SMEs) on the potential of research infrastructures for their activities, including specific support to industrial partners in acquiring the know-how related to procurements within Research Infrastructures.

The development and maintenance of portals of calls, tenders, future needs and technology transfer opportunities, from research infrastructures requiring similar technological developments, could also be considered.

Action 4. Define and adopt a common set of RI Industry-Liaison Officers (ILOs) required core competencies

RI industry-liaison staff need to be highly competent, experienced individuals with specific knowledge of technology transfer and commercialization strategies, including patenting processes, along with excellent market insight, extensive professional networks and a clear view and understanding of key science themes and drivers.

ILOs must also have adequate legal and economic competence to judge whether an invention or process is patentable or not, sufficient marketing and business skills in order to find commercial partners and good negotiation and social skills to be able to finalize an advantageous agreement.

RI Industry-Liaison Officers ideally should have the following characteristics:

- Ability to earn respect and standing to act as an internal champion and external ambassador of the industry and innovation portfolio;
- Ability in developing/implementing an RI Industry Innovation Partnering Strategy and Action Plan;
- Capacity to grasp technical concepts quickly, and work with others to translate these into commercially viable proposals;
- Solid understanding of the supply sector for research infrastructures;
- Experience in working with international, cross-functional teams;
- Excellent oral and written English communication, presentation and liaison skills;
- Ability to work with the RI Legal office in negotiating and overseeing successful contractual agreements and processes (e.g., intellectual property agreements, patent, copyright, trademark, service mark, trade secret, confidentiality agreements, sponsored research agreements, material transfer agreements, technology licenses, etc.);
- Ability to guide RI Communications officers in developing effective PR hardcopy and online messaging and tools in support of ILO industry-partnering activities;
- Ability to organize periodic Industry Advisory Committee meetings and workshops, events with RI industry partners;
- Ability to prepare periodic Reports, use cases and Success Stories on RI innovation collaboration with industry together with the RI Communications Office for RI management, ESFRI and the EC.

Action 5. Partner with EIT on joint RI entrepreneurship training and industry-attraction to focused RI partnering events

On March 5, 2018 ENVRIplus representatives and European Institute of Innovation and Technology (EIT) management met for at EIT headquarters in Budapest to explore opportunities for structured collaboration between ENVRI RIs and EIT Knowledge & Innovation Communities (KICS) in focused Roadmap innovation promotion activities such as RI industry liaison, partnering events and related training. Participants identified numerous collaboration themes which could form the basis for follow-up and a potential formal MoU accord between EIT and the Board of European Environmental Research Infrastructures (BEERi) and/or between selected KICs and RIs. Of these, Entrepreneurship Training of RI personnel and joint recruitment at focused RI-industry partnering events were areas participants agreed offer the greatest opportunity and scope for cooperation.

Figure 3. Map of EIT Knowledge & Innovation Communities (KIC) and their reach across Europe

..

EIT European Institute of Innovation & Technology website

PART IV- CONCLUSIONS

The main suggested take-home messages we would like to communicate with this paper are the following:

1. Climate change, the digital revolution and the move to open science offer unprecedented opportunities for Research Infrastructures to play a key protagonist role in the major societal and economic transformations which have only begun to take place;

2. While ENVRIs' core mandate is as catalysts and enablers in the advancement of European scientific excellence, and as providers of high quality, continuous, environmental data they have an opportunity to become high-profile innovation-platforms for and with industry, particularly with SMEs, at the forefront in the development of a whole host of revolutionary, ground-breaking environmental monitoring technology solutions and data applications and services, many of which have not even been imagined yet;

3. While excellence in science remains the core mission of the RIs represented in the ENVRI cluster, environmental innovation-cooperation with industry has the potential to ignite economic growth and become the key to unassailable long-term sustainability of these RIs;

4. As shown by the survey, currently most RIs, even banner Landmarks, remain largely ignorant where it comes to collaborating successfully with industry other than with suppliers. They are totally unprepared mentally, structurally and organizationally to even start recognizing the enormous opportunities to be had by doing so;

5. This Roadmap makes two recommendations which are essential in changing this situation: 1. establish centralized RI Innovation Services hub-and-spoke configurations able to develop and offer pan-RI innovation know-how and services, and 2. Recruit RI staff with the required background and skills to liaise successfully with private companies and communicate effectively about and with industry;

6. Ideally, as a final suggestion, the Innovation Hub Service and Innovation Communications function should be centralized in ESFRI or the BEERi or some equivalent pan-ENVRI umbrella organization able to provide overview visibility and reach.

FOLLOW-UP and IMPLEMENTATION: ENVRI FAIR

The fact that this Roadmap proposal was so well received in ENVRIplus is a clear sign that the BEERi and participating RIs recognize fully the need to take concerted action in this area. However, the resources and time available in ENVRIplus for this activity were insufficient to actually begin implementing the recommendations and action items once the Roadmap was developed. All these initiatives can now be implemented in the ENVRI-FAIR project, and a dedicated task in Work Package 3 has been specifically designed to implement the Roadmap's main precepts, with the added benefit of focusing specifically on data-driven innovation and industry (see below). This is a narrower focus than that envisioned for ENVRIplus but one that embodies all the potential inherent in the exploding market for environmental applications and products in which RIs and industry working together can play such an important role.

ENVRI FAIR – RI PREPAREDNESS FOR DATA DRIVEN INNOVATION

Task 3.5: Fostering ENVRI data-driven Innovation
Task leader: EMSO ERIC; Participants: CNRS, UHEL, MARIS, INGV, M1-48

Task 3.5's objective is to spur innovation by strengthening ENVRI innovation-related cooperation with industry in the development of key RI data services areas- products, technologies and training. A comprehensive private sector uptake strategy will be developed centering on 1) **strengthening of RI innovation-cooperation preparedness along lines of the RI Innovation Preparedness Roadmap and framework developed in ENVRIplus;** and 2) promoting effective and continuous communication and liaison with industry clients including through close collaboration and partnering at the international level with leading industry associations, technology clusters, interest groups, facilitator organizations and sister innovation-minded RIs.

BIBLIOGRAPHY

1. Strategy Report; Landscape Analysis; Projects & Landmarks-ESFRI Research Infrastructures Roadmap 2018
2. ESFRI Scripta Vol2: Long-Term Sustainability of Research Infrastructures 2017
3. ESFRI Scripta Vol3: Innovation oriented Cooperation of Research Infrastructures 2018
4. Working Group on Innovation Report to ESFRI 2016
5. Proposal to ESFRI on "Indicators Of Pan-European Relevance Of Research Infrastructures"
6. EARSC Position Paper 2016 *"Creating a European Marketplace for Earth Observation Services"*
7. *The challenge for geo-spatial service providers in the Digital Economy";* Miguel-Lago: EARSC Executive Secretary - Presentation at ENVRIplus First RI Industry Partnering Forum – Grenoble May 2017
8. European Commission 2018 Annual Economic Report on the EU Blue Economy
9. AEG Report: Assessing Projects on the ESFRI Roadmap 2013
10. Eco-Innovation Summary Report: Econ-Innovation and Cluster Policies in Europe
11. ENVRIplus D1.1 *Emerging Technologies, Emerging Markets: Fostering the Innovation Potential Of Research Infrastructures*
12. MarketsandMarkets *Report "Environmental Monitoring Market by Product – Global Forecast to 2024*
13. Evaluating and Monitoring the Socio-Economic Impact of Investment in Research Infrastructures – Technopolis Group 2015
14. Earth Observation Benefits to Blue Growth – Copernicus 2019
15. CORBEL project Innovation Help Desk
16. Sustainability Issues in Funding Research Infrastructures – Antonella Calvia-Goetz, European Investment Bank. Presentation; EIB conference on RI Funding Madrid 2016
17. US International Trade Administration Environmental Technologies Market Report 2017
18. Private Sector Innovation and Environmental Research Infrastructures – Ari Asmi Presentation at Envriplus Dissemination Event Brussels 04 June 2019
19. Role of the Industrial Liaison Officer - NSF Engineering Reseach Centers (ERC) Best Practices Manual 2012
20. Copernicus Market Report – issue 2 – February 2019 – P7;
21. EU FP7 NEXOS Project Report: *Marine Sensors: the market, the trends and the value chain;* Johan Gille, Linette de Swart, Ioannis Giannelos, Eric Delory, Ayoze Castro GreenInnovate Europe EEIG, Brussels 2011

22. Communication, EC. “Europe 2020 Flagship Initiative - Innovation Union.” 06 October 2010.

23. Eco-Innovation Observatory. The eco-innovation challenge - pathways to resource efficient Europe. Brussels: Funded by the European Commission, DG Environment, 2011.

24. ECORYS. Study on competitiveness of the EU eco-industry. Part 1. Brussels: European Commission, Directorate-General Enterprise and Industry, 2009.

ENVRI Industry-Liaison Target Groups

WP 18

DISSEMINATION, LIAISON AND COLLABORATION

TASK 18.5

ENVRI INDUSTRY-LIAISON TARGET GROUPS

John Picard (EMSO ERIC)
John picard@emso-eu.org
May 2019

ENVRI plus

Environmental Research Infrastructures Providing Shared Solutions for Science and Society

Task 18.5 DEVELOPING AN ENVRI INDUSTRY-LIAISON STRATEGY AND ACTION PLAN

1. With RIs, develop a **master list** (this ppt) of pan-European industry trade associations/interest groups/'aggregators', by sector. Choose organizations with reach and "lobby-power" which can act as potential partners for ENVRIplus in an outreach and dissemination campaign to their member companies and experts ;

2. With RIs, vet and prioritize this list and reduce to a **shortlist** of prime potential targets;

3. Identify **entry point** for each target (usually CEO or Head of Business Development /R&D);

4. Prepare effective ENVRIplus promotional material highlighting **benefits and commitments** for interlocutors;

5. Launch **outcall program** by ENVRIplus Innovation specialists: **on-site visits** to each target;

6. Extend outreach campaign to selected individual companies and experts;

7. Establish Industry Consultation Group(s).

Task 18.5 ENVRI INDUSTRY LIAISON TARGERS: RELEVANT INDUSTRY SECTORS

aerospace; agrifood; aquaculture; biotechnology; electronics; energy & power; fishing & fisheries; forestry; health; ICT; geographic information systems (GIS); insurance; marine; mining; metals & raw materials; oil & gas; pharmaceuticals; ports; waterways & coastal; pulp & paper; shipping; space; tourism; transportation; travel; water & wastewater.

Task 18.5 TARGET TYPES

1. European **Environmental Interest Groups** with industry connections;

2. Private Sector EU **Lobby Organizations** (Climate Change, Energy, AgFood etc.);

3. Pan-European **Industry/Trade Federations & Associations**;

4. Key European Technology **Clusters**

Task 18.5 TARGETS - INTEREST GROUPS

1. EIT European Institute of Innovation and Technology
2. EUROCHAMBRES Federation of National EU Chambers of Commerce
3. BUSINESS EUROPE
4. ENEP European Network of Environmental Professionals
5. FEANI Federation of National European Engineering Associations
6. EIB European Investment Bank
7. Insurance Europe Federation
8. CDP Carbon Disclosure Project
9. C40 Cities Climate Leadership Group
10. CAN EUROPE Climate Action Network
11. ETUC Association of European Trade Unions
12. CLG The Prince of Wales' Corporate Leaders Group
13. BDV Big Data Value Association
14. European Alliance / Future Earth

Task 18.5 TARGETS – INDUSTRY/TRADE ASSOCIATIONS

1. COPA-COGECA European Farmers & Agri-Cooperatives Association
2. FEAP Federation of European Aquaculture Producers
3. EUROSPACE European Space Industries Association
4. BLUE MINING European Deep Sea Mining Consortium
5. CEFIC European Chemical Industries Council
6. EUNITED European Engineering Industries Association
7. SEMI EUROPE Electronics & Nanotechnology Industry Association
8. EECA European Electronic Components Manufacturers Association
9. SEA European Ships and Maritime Equipment Association
10. ECSA European Shipowners' Association
11. PEMA Port Equipment Manufacturers Association
12. SOLARPOWER EUROPE European Photovoltaic Industries Association

Task 18.5 TARGETS – INDUSTRY/TRADE ASSOCIATIONS (cont.)

13. EURELECTRIC European Electricity Industry Association
14. ECPA European Crop Protection Industry Association
15. EUROFER European Steel Industry Association
16. EUROMETEAUX European Non-Ferrous Metals Industry Association
17. FUELSEUROPE – European Petroleum Refining Industry Association
18. IOGP EUROPE – International Association of Oil and Gas Producers
19. CEPI – Confederation of European Paper Industries
20. EFPIA – European Federation of Pharma Industries and Associations
21. EBE – European Biotechnology Network
22. ETOA – European Tour Operators Industry Association
23. ECTAA – European Travel Agents and Tour Operators Association
24. EU-ROBOTICS – European Automotion and Robotics Industries Association
25. EARSC – European Association of Remote Sensing Companies
26. EURISY – European Satellite Applications Industry Association

1. PAN-EUROPEAN ENVIRONMENTAL INTEREST / LOBBY GROUPS

1. EUROPEAN INSTITUTE OF INNOVATION AND TECHNOLOGY - EIT

The **European Institute of Innovation and Technology (EIT)** is an independent body of the European Union set up in 2008 to spur innovation and entrepreneurship across Europe.
EIT seeks to offer businesses new opportunities to commercialise the most up-to-date and relevant research findings and thereby give Europe first-mover advantage in the latest technological and non-technological fields as well as in open innovation. In return, research organisations benefit from additional resources, an enhanced networking capacity, and new research perspectives stressing interdisciplinary approaches in areas with strong societal and economic relevance. EIT's headquarters are in Budapest, Hungary.

Based in Berlin, EIT's **Climate-KIC** is Europe's largest public-private innovation partnership working together to address the challenge of climate change. Climate-KIC drives innovation in climate change through creative partnerships large and small, local and global, between the private, public and academic sectors.
Its **partners** bring their industry experience to the community and are connected through **centres across Europe**.

2. THE ASSOCIATION OF EUROPEAN CHAMBERS OF COMMERCE AND INDUSTRY - EUROCHAMBRES

Established in 1958 as a direct response to the creation of the European Economic Community, the **Association of European Chambers of Commerce and Industry, EUROCHAMBRES**, acts as the eyes, ears and voice of the business community at EU level.

Based in Brussels, EUROCHAMBRES represents over 20 million businesses in Europe through 45 **members** (43 national associations of chambers of commerce and industry and 2 transnational chamber organisations) and a European network of 1700 regional and local chambers. More than 93% of these businesses are small and medium sized enterprises (SMEs). Chambers' member businesses employ over 120 million people.

3. BUSINESS EUROPE

BUSINESS EUROPE is a leading advocate for growth and competitiveness at European level, standing up for companies across the continent and campaigning on the issues that most influence their performance. Business International speaks for all-sized enterprises in 34 European countries whose national business federations are its direct members.

Headquartered in Brussels, the organization works on behalf of its member federations to ensure that the voice of business is heard in European policy-making. It interacts regularly with the European Parliament, Commission and Council as well as other stakeholders in the policy community. It also represent European business in the international arena, ensuring that Europe remains globally competitive.

Business Europe wants the European Union to regain its global innovation leadership, scaling up investment in R&D combined with a more qualitative approach, building a true culture of innovation and science-based policy making, encouraging reasonable management of risk, removing obstacles to commercialisation of research results, building innovation clusters and networks between companies and research institutes, enhancing the regulatory framework supporting innovation and streamlining EU funding mechanisms.

4. EUROPEAN NETWORK OF ENVIRONMENTAL PROFESSIONALS – ENEP

ENEP is the **European Network of Environmental Professionals** (previously known as EFAEP - The European Federation of Associations of Environmental Professionals). Its **membership** represents 22 European Environmental Organisations and over 45,000 individual professionals. ENEP is the leading environmental professional networking organisation across Europe.

5. EUROPEAN FEDERATION OF NATIONAL ENGINEERING ASSOCIATIONS - FEANI

Founded in 1951, the **European Federation of National Engineering Associations (FEANI)** represents 350 member national engineering associations in 32 European countries, all of which are recognised in their countries as the representatives of the engineering profession at the national level. Through these national associations, FEANI represents the interests of approximately 3,5 million professional engineers in Europe.

FEANI is a founding member of the World Federation of Engineering Organisations (WFEO) and collaborates with many other organisations dealing with engineering and technology issues and engineering education.

Based in Brussels, FEANI is officially recognised by the European Commission as representing the engineering profession in Europe. The federation also has consultative status with UNESCO, UNIDO and the Council of Europe.

6. THE EUROPEAN INVESTMENT BANK - EIB

The **European Investment Bank (EIB)** is the European Union's bank. Based in Luxembourg, it is the only bank owned by and representing the interests of the European Union Member States. It works closely with other EU institutions to implement EU policy. As the largest multilateral borrower and lender by volume, EIB provides finance and expertise for sound and sustainable investment projects which contribute to furthering EU policy objectives. More than 90% of its activity is focused on Europe but it also supports the EU's external and development policies.

Supporting investment that is geared towards innovation, skills and greater competitiveness is part of EIB's mission to foster sustainable growth and jobs in Europe. In 2015, EIB supported innovation and skills with EUR 18.7bn of EIB Group loans in Europe, out of which EUR 16.13 billion were provided by the EIB and the remaining EUR 2.54 billion by the European Investment Fund (EIF). Europe is facing a major challenge in terms of competitiveness and innovation. This is why the EIB Group is partnering with others to help innovators turn good ideas into business realities. It supports innovative projects from large-scale research and research infrastructures to small, hi-tech start-ups and specialised spin-offs.

7. INSURANCE EUROPE

Insurance Europe is the European insurance and reinsurance federation. Through its 34 member bodies, the national insurance associations, Insurance Europe represents all types of insurance and reinsurance undertakings, eg pan-European companies, monoliners, mutuals and SMEs.

Insurance Europe, which is based in Brussels, represents undertakings that account for around 95% of total European premium income. Insurance makes a major contribution to Europe's economic growth and development. European insurers generate premium income of almost €1 170bn, employ over one million people and invest nearly €9 900bn in the economy.

8. THE CARBON DISCLOSURE PROJECT - CDP

The **Carbon Disclosure Project (CDP)** uses the power of measurement and information disclosure to improve the management of environmental risk. By leveraging market forces including shareholders, customers and governments, CDP has incentivized thousands of companies and cities across the world's largest economies to measure and disclose their environmental information. It puts this information at the heart of business, investment and policy decision making.

Based in London, CDP holds the largest collection globally of self reported climate change, water and forest-risk data. Through its global system companies, investors and cities are better able to mitigate risk, capitalize on opportunities and make investment decisions that drive action towards a more sustainable world.

CDP works with thousands of **companies** to tackle climate change;
CDP works with 822 institutional **investors** holding US$95 trillion in assets to help reveal the risk in their investment portfolios;
CDP drives more sustainable **water** use by business;
Some 89 purchasing organizations are using the global CDP system to mitigate environmental risk in their **supply chains**; and,
CDP's **forest** program works with companies to address deforestation risks.

9. C40 CITIES CLIMATE LEADERSHIP GROUP

The **C40 Cities Climate Leadership Group** is a network of the world's megacities committed to addressing climate change. Through its far-reaching **membership**, C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change. Cities are where the future happens first.

C40, now in its 10th year, connects more than 80 of the world's greatest cities, representing over 600 million people and one quarter of the global economy. Created and led by cities, C40 is focused on tackling climate change and driving urban action that reduces greenhouse gas emissions and climate risks, while increasing the health, wellbeing and economic opportunities of urban citizens. C40 is based in New York City; its European headquarters are in London.

10. CLIMATE ACTION NETWORK EUROPE - CAN EUROPE

Climate Action Network (CAN) Europe is Europe's largest coalition working on climate and energy issues. With over 120 **member organisations** in more than 30 European countries - representing over 44 million citizens - CAN Europe works to prevent dangerous climate change and promote sustainable climate and energy policy in Europe.

CAN's mission is to support and empower civil society organisations to influence the design and development of an effective global strategy to reduce greenhouse gas emissions and ensure its implementation at international, national and local levels in the promotion of equity and sustainable development.

11. EUROPEAN TRADE UNIONS ASSOCIATION - ETUC

Based in Brussels, the **European Trade Unions Association (ETUC)** comprises 89 national trade union confederations in 39 countries, plus 10 European trade union federations.

ETUC believes that Europe's existing economic model is unsustainable for the environment, for society and for the economy. There is no question of choosing between employment and environmental protection. Europe has the means and the obligation to pursue both objectives. There can be no employment or social justice on a devastated planet. Improving energy and natural resource efficiency also means cutting production costs and boosting the development and durability of European companies. Exploring the synergies between environmental and economic policy could create millions of jobs in improving energy efficiency, developing renewables, and moving to a circular economy.

The recent COP21 Paris agreement framed what the global action against climate change will look like in the future. Keeping in mind its strengths and weaknesses, the ETUC and its affiliates will work to transform the political success of COP21 into a long term success for the planet and for workers and their communities.

12. THE PRINCE OF WALES' CORPORATE LEADERS GROUP - CLG

The **Prince of Wales's Corporate Leaders Group (CLG)** is a select group of European business leaders working together under the patronage of His Royal Highness The Prince of Wales to advocate solutions on climate change to policymakers and business peers within the EU and globally.

CLG members are committed to playing a leadership role in securing a just, low carbon transition, both in terms of changing their own businesses and sectors, and advocating change in the wider economic and political context. With offices in Cambridge and Brussels, the CLG brings European business leaders together to advocate for policy change in relation to climate change and a low carbon transition, drawing on high-level convening, thought leadership, business innovation and new partnerships as required.

The CLG is composed of major companies including market leaders and household names that are representative of the majority of EU member states. It is deliberately composed to represent a broad cross section of business sectors, including service providers, retailers and consumer goods companies, infrastructure operators, energy generators, energy producers, energy intensive industries, advanced manufacturing, and technology suppliers.

13. BDV BIG DATA VALUE ASSOCIATION

The **Big Data Value Association** is a fully self-financed non–for-profit organisation under Belgian law. Currently there are 24 founding **members** from large and SME industry and research. The BDVA is the industry-led contractual counterpart to the European Commission for the implementation of the EU's **Big Data Value Public-Private Partnership initiative**.

The **Big Data Europe (BDE) Project** is designed to enable European companies to build innovative multilingual products and services based on semantically interoperable, large-scale, multilingual data assets and knowledge, which are currently available in various licenses and business models. In this context, BDE aims to collect ICT infrastructure requirements from data-intensive science practitioners, in order to tackle the wide range of societal challenges that arise in the seven areas of Climate, Energy, Food, Health, Transport, Security and Social Sciences.

14. EUROPEAN ALLIANCE & FUTURE EARTH

European Alliance is a bottom-up network of the European global change research national committees of the International Council for Science, ICSU. Based in Helsinki, European Alliance facilitates science-driven discussion on European interests and priorities in global change research and promotes European level stakeholder engagement in the new global change research initiative, Future Earth. To find out more about national committees in each member country, see the European Alliance member list.

The aim of the European Alliance is to build an active network of national committees which implement the co-design objective of Future Earth at the national and regional level. Sustainability problems are in many senses global, but the solutions are most often local and depend significantly on local conditions. The national committees of the European Alliance constitute an **extensive network of experts** and researchers working with global change issues in international cooperation. They provide understanding about local factors by acting as a link between the science community and the local decision-makers and stakeholders who are instrumental in implementing the solutions and adapting them to local needs.

2. PAN-EUROPEAN SECTORAL INDUSTRY ASSOCIATIONS

1. EUROPEAN FARMERS AND AGRI-COOPERATIVES ASSOCIATION - COPA-COGECA

Industry sector: AGFOOD

COPA (Committee of Professional Agricultural Organisations) is made up of 60 organisations from the countries of the European Union and 36 partner organisations from other European countries such as Iceland, Norway, Switzerland and Turkey. COPA's broad **membership** allows it to represent both the general and specific interests of farmers in the European Union. Established in 1958, COPA is recognised by EU authorities as the organisation speaking on behalf of the European agricultural sector as a whole.

COGECA (General Confederation of Agricultural Cooperatives in the European Union) represents the general and specific interests of some 40,000 farmers' cooperatives employing some 660,000 people. COGECA's **members** account for a global annual turnover in excess of EUR 300 billion throughout the enlarged Europe. COGECA is recognised by the European Institutions as the main representative body and voice of the entire European agricultural and fisheries cooperative sector.
COPA-COGECA is based in Brussels.

2. FEDERATION OF EUROPEAN AQUACULTURE PRODUCERS - FEAP

Industry sector: AGFOOD

Established in 1969, **the Federation of European Aquaculture Producers (FEAP)**, is the united voice of the European aquaculture production industry, being the Federation of National aquaculture associations in Europe that represent professional fish farming.

With **26 members** drawn from 22 States across the European continent, FEAP represents more than 2 million tons of produce, an ex-farm value in excess of € 8 billion and 100,000 direct jobs in coastal and rural areas. FEAP has its headquarters in Liege, Belgium.

3. EUROPEAN SPACE INDUSTRIES ASSOCIATION – EUROSPACE

Industry sector: ICT, SPACE

Based in Paris, **Eurospace** is the trade association of the European Space Industry. Eurospace member companies today represent 90% of the total turnover of the European Space Industry.
Eurospace members are the main European space systems manufacturers and launch services providers. They range from large satellite systems integrators to smaller equipment manufacturers , small systems manufacturers, service operators to launch systems architect and launcher elements manufacturers or engineering and software services. Launch service provider Arianespace is also a member. The Eurospace membership covers 14 European countries.
Eurospace is part of the Aerospace and Defence Industries Association of Europe (ASD) which represents the aeronautics, space, defence and security industries in Europe in all matters of common interest with the objective of promoting and supporting the competitive development of the sector. ASD's membership is composed of major European aerospace and defence companies and national associations. In 2014 over 3000 aeronautics, space and defence companies in these countries employed more than 795,000 people and generated a turnover of €199.4 billion.

4. BLUE MINING DEEP SEA MINING CONSORTIUM

Industry sectors: MINING, MARINE

Blue Mining is an international European partnership of 19 large industry and research organisations on various maritime fields of expertise focused on developing solutions that will bring sustainable deep sea mining a big step closer. The Blue Mining consortium addresses all aspects of the deep sea mining value chain, from resource discovery to resource assessment and from exploitation technologies to the legal and regulatory framework.

5. EUROPEAN CHEMICAL INDUSTRY COUNCIL - CEFIC

Industry sector: CHEMICALS, MATERIALS

As the voice and forum of the European chemical industry, the **European Chemical Industry Council (CEFIC)** is a committed partner to EU policymakers, facilitating dialogue with industry and sharing its broad-based expertise. CEFIC represents 29,000 large, medium and small chemical companies in Europe, which directly provide 1.2 million jobs and accounts for 17% of world chemical production. Based in Brussels since its founding in 1972, it interacts every day on behalf of its **650 members** with international and EU institutions, non-governmental organisations, the international media, and other stakeholders. Its members and affiliates constitute one of the most active networks of the business community, complemented by partnerships with industry associations representing the numerous sectors in the value chain.

Representing the entire range of chemicals production, Cefic is active in **7 programs** covering: Energy and Climate Action; Industrial Policy; Legislation & Institutional Affairs; Product Stewardship; Research & Innovation; and, Public Affairs Sustainability.

6. EUROPEAN ENGINEERING INDUSTRIES ASSOCIATION - EUNITED

Industry sector: ENGINEERING, AUTOMATION, ROBOTICS

The **European Engineering Industries Association (Eunited)** is the only direct company membership association supporting the global competitiveness of European equipment suppliers. It represents companies that design and produce specialist machinery and equipment operated in advanced factories all over the word to produce, to automate and monitor, to transport, to recycle, to power, or for cleaning and maintenance purposes. A vast range of industrial and consumer goods and innumerable processes along complex supply chains (from extraction to re-use) depend on advanced manufacturing equipment, which largely determines performance in terms of productivity, energy and resource utilisation.

EUnited provides a channel for companies to communicate with the European Institutions and partner organisations and to articulate the role of equipment suppliers in technical standards development, policy formulation, trade issues and legislation. Within a single European association, member companies are organised in six sectors which are Robotics, Cleaning, Metallurgy, Municipal Equipment, Valves and Vehicle Cleaning.

7. ELECTRONICS INDUSTRY ASSOCIATION EUROPEAN DIVISION - SEMI EUROPE

Industry sectors: MICROELECTRONICS, NANOTECHNOLOGIES (multisectoral)

SEMI is the global industry association serving the manufacturing supply chain for the micro- and nano-electronics industries, including semiconductors, photovoltaics (PV), high-brightness LED, flat panel displays (FPD), micro-electromechanical systems (MEMS), printed and flexible electronics, related micro- and nano-electronics.

SEMI's European headquarters are in Berlin. Its **members** are responsible for the innovations and technologies that enable smarter, faster, more powerful, and more affordable electronic products and devices that bring the power of the digital age to more people every day.

8. EUROPEAN ELECTRONIC COMPONENT MANUFACTURERS ASSOCIATION - EECA

Industry sectors: MICROELECTRONCS, SEMICONDUCTORS

Under the EECA umbrella organization, there are 2 autonomous industry associations, the EUROPEAN SEMICONDUCTOR INDUSTRY ASSOCIATION (ESIA) and the EUROPEAN PASSIVE COMPONENTS INDUSTRY ASSOCIATION (EPCIA) with members coming from the manufacturing and related industries as well as from national associations (see following slides).

8.1 EUROPEAN SEMICONDUCTOR INDUSTRY ASSOCIATION - ESIA

Industry sectors: MICROELECTRONCS, SEMICONDUCTORS

The **European Semiconductor Industry Association (ESIA)** is the voice of the Semiconductor Industry in Europe. Based in Brussels, its mission is to represent and promote its members and common interests of the Europe-based semiconductor industry towards the European Institutions and stakeholders in order to ensure a sustainable business environment and foster its global competitiveness.

The industry is ranked as one of the most R&D intensive sectors by the European Commission and supports around 200,000 jobs directly and more than 1,000,000 indirect jobs in Europe. The global turnover of the semiconductor sector alone was around €230 billion in 2013 while the value of products comprising micro- and nano electronic components represents around € 1,250 billion. The impact of micro- and nano-electronics on the whole economy is estimated at 10% of worldwide GDP.

8.2 EUROPEAN PASSIVE COMPONENTS INDUSTRY ASSOCIATION - EPCIA

Industry sectors: MICROELECTRONCS, SEMICONDUCTORS

The **European Passive Components Industry Association (EPCIA)** represents and promotes the common interests of the passive components manufacturers active in Europe to ensure an open and transparent market for passive components in Europe as part of the global market place.

Supported by EPCIA's **members** - large companies and a great number of SMEs (small and medium sized enterprises) - the passive component industry has accumulated considerable competence and know-how over the years. For example it has been capable of producing the sophisticated parts required for the European world-leading mobile phone and automotive industries. Electronic systems and equipment, as well as electronic components, are undergoing crucial changes. Increasing performance and miniaturisation are becoming standard requirements, as are decreasing prices. European industry has been able to face up to these challenges successfully.

9. EUROPEAN SHIPS AND MARITIME EQUIPMENT ASSOCIATION - SEA

Industry sectors: SHIPPING, TRANSPORTATION

SEA Europe, the European Ships and Maritime Equipment Association is the voice of the European maritime technology industry. Based in Brussels, SEA Europe promotes and supports **European business enterprises** which are involved in the building, construction, maintenance, repair and R&D of all types of ships and other relevant maritime structures, including the complete supply chain of systems, equipment and services.

10. EUROPEAN SHIPOWNERS' ASSOCIATION - ECSA

Industry sectors: SHIPPING, TRANSPORTATION

Based in Brussels, the **European Community Shipowners' Associations (ECSA)**, founded in 1965 is the trade association representing the national shipowners' associations of the EU and of Norway, equivalent to over 40% of the world fleet by gross tonnage. The EU shipping industry contributes 145 billion euros to the EU GDP and provides 2.3 million Europeans with promising careers both onboard and ashore.

ECSA promotes the interests of European shipping so that the industry can best serve European and international trade and commerce in a competitive free enterprise environment to the benefit of shippers and consumers and help formulate EU policy on critical maritime transport-related issues.

11. PORT EQUIPMENT MANUFACTURERS ASSOCIATION - PEMA

Industry sectors: PORTS, WATERWAYS, COASTAL

Advanced equipment and technology underpin the performance of today's seaport, marine and intermodal terminal industries. The London-based **Port Equipment Manufacturers Association (PEMA)** represents the interests of equipment and technology suppliers on a worldwide basis, providing a platform to inform, educate and promote best practice, both within the industries we serve and externally with port and terminal operators and other key stakeholders.

The **members** of PEMA are companies involved in the design, manufacture or supply of port equipment and technology, covering: port and terminal equipment; components and attachments for port equipment; technology that controls or interfaces with port equipment; consultants in port and terminal equipment design, specification and operations.

12. SOLARPOWER EUROPE - EUROPEAN PHOTOVOLTAIC INDUSTRY ASSOCIATION

Industry sectors: ALTERNATIVE ENERGY

SolarPower Europe, the new EPIA (European Photovoltaic Industry Association), is a members-led association representing organisations active along the whole photovoltaic industry value chain. With headquarters in Brussels, its aim is to shape the regulatory environment and enhance business opportunities for solar power in Europe.

13. EURELECTRIC EUROPEAN ELECTRICITY INDUSTRY ASSOCIATION

Industry sectors: POWER, ELECTRICITY

The **European Electricity Industry Association (EURELECTRIC)** represents the common interests of the electricity industry at pan-European level, plus its affiliates and associates on several other continents. Based in Brussels, its **members** represent the industry in 32 European countries.

Sustainability is at the core of the power sector's activities. EURELECTRIC's work in this area focuses on climate change, energy efficiency, environmental protection, health and safety, and resource efficiency. Its mission is to contribute to the development and competitiveness of the electricity industry, to provide effective representation for the industry in public affairs and to promote the role of a low-carbon electricity mix in the advancement of society.

14. EUROPEAN CROP PROTECTION INDUSTRY ASSOCIATION - ECPA

Industry sectors: AGFOOD

The European Crop Protection Industry Association (ECPA) represents the crop protection industry in Europe. Headquartered in Brussels, ECPA's **members** develop innovative and science-based solutions that keep crops healthy and contribute to provide Europeans a safe, affordable, healthy, and sustainable food supply.
ECPA encourages sustainable farming practices and the responsible use of crop protection technology important for the sustainable intensification of agriculture. For information on ECPA's projects on farmer health, food safety and the protection of water and biodiversity, click **here** .

15. EUROPEAN STEEL INDUSTRY ASSOCIATION - EUROFER

Industry sectors: STEEL

EUROFER, the European Steel Industry Association is located in Brussels and was founded in 1976. It represents 100 per cent of steel production in the European Union. EUROFER **members** are steel companies and national steel federations throughout the EU. The major steel companies and national steel federations in Switzerland and Turkey are **associate members**.

The European steel industry is a world leader in its sector with a turnover of about 170 billion euros and direct employment of about 330 thousand highly skilled people, producing on average 170 million tonnes of steel per year. More than 500 steel production sites in 24 EU Member States provide direct and indirect employment and a living for millions of European citizens. Closely integrated with the European manufacturing industries, steel producers provide the basic material for innovation, growth and wealth in Europe.

16. EUROPEAN NON-FERROUS METALS ASSOCIATION - EUROMETAUX

Industry sectors: METALS, RAW MATERIALS

Brussels-based **Eurometaux, the European Non-Ferrous Metals Industries Association**, is the voice of the European non-ferrous metals industry. Eurometaux asserts the contribution of the European industry and its products to sustainable development, as well as its members' and the industry's views and positions, whenever the opportunity to do so arises across all sectors of society.

Eurometaux 's priority policy areas are:

- Climate change and energy policy – impact of the enforcement of EU climate change policy;
- Security of raw materials supplies: EU Raw Materials Initiative ;
- EU chemicals policy – REACH implementation ;
- EU policies on recycling, sustainable use of resources, sustainable consumption and production ; and,
- EU trade policy and trade defence actions.

17. EUROPEAN PETROLEUM REFINING INDUSTRY ASSOCIATION - FUELSEUROPE

Industry sectors: ENERGY, OIL & GAS

FuelsEurope, the European Petroleum Refining Industry Association is the voice of the European petroleum refining industry. Established in 1989, it represents the interests of Companies conducting refinery operations in the EU with the EU Institutions.

FuelsEurope is a division of the European Petroleum Refiners Association, an AISBL operating in Belgium. The association's **members** are all the 41 companies that operate petroleum refineries in the European Economic Area. FuelsEurope works in close cooperation with the **National Oil Industry Associations (NOIAs)** of individual EU member states.

18. INTERNATIONAL ASSOCIATION OF OIL AND GAS PRODUCERS - IOGP

Industry sectors: ENERGY, OIL & GAS

The **International Association of Oil & Gas Producers (IOGP)** is the voice of the global upstream industry. IOGP members produce more than a third of the world's oil and gas. They operate in all producing regions: the Americas, Africa, Europe, the Middle East, the Caspian, Asia and Australia.

With headquarters in London and offices in Brussels, IOGP serves industry regulators as a global partner for improving safety, environmental and social performance. IOGP is dedicated to identifying and spreading good environmental practice wherever the upstream industry operates. Its work includes:

✓Ensuring continued access to new and known hydrocarbon sources;
✓Environmental management and reporting;
✓Gaseous emissions management; and,
✓Monitoring regulatory developments and developing advocacy positions.

19. CONFEDERATION OF EUROPEAN PAPER INDUSTRIES - CEPI

Industry sectors: PULP & PAPER

The **Confederation of European Paper Industries (CEPI)** is a Brussels-based non-profit-making organisation grouping the European pulp and paper industry and championing this industry's achievements and the benefits of its products. Through its 18 member countries (17 EU members plus Norway) CEPI represents some 515 pulp, paper and board producing companies across Europe, ranging from small and medium sized companies to multi-nationals, and 950 paper mills. Together CEPI's **members**, **networks** , and **corporate partners** represent 23% of world production.

20. EUROPEAN FEDERATION OF PHARMACEUTICAL INDUSTRIES AND ASSOCIATIONS - EFPIA

Industry sectors: PHARMACEUTICALS

The **European Federation of Pharmaceutical Industries and Associations (EFPIA)** represents the pharmaceutical industry operating in Europe. Through its direct membership of 33 national associations and 41 leading pharmaceutical companies, Brussels-based EFPIA is the voice on the EU scene of 1,900 companies committed to researching, developing and bringing to patients new medicines that will improve health and the quality of life around the world.

21. THE EUROPEAN BIOTECHNOLOGY NETWORK - EBE

Industry sector: BIOTECHNOLOGY

The **European Biotechnology Network (EBE)** is the European trade association that represents **biopharmaceutical companies** of all sizes operating in Europe. EBE's focuses on enhancing emerging healthcare technologies and promoting science innovation in Europe via expertise in SME eco-system funding & innovation model and emerging biotech & science - regulatory advancement and advocacy . EBE is based in Brussels.

22. EUROPEAN TOUR OPERATORS INDUSTRY ASSOCIATION - ETOA

Industry sector: TOURISM

Founded in 1989, the **European Tour Operators Association (ETOA)** is the leading industry association of European tour operators and tourism suppliers. Over 800 members contribute more than 15 billion euros of business within Europe and include tour and online operators, intermediaries and wholesalers, European tourist boards, hotels, attractions and other tourism suppliers.

ETOA offers an unparalleled networking/contracting platform for tourism professionals via the organisation of numerous high profile B2B events. ETOA provides advocacy support on a European level, high profile industry campaigns and B2B marketing representation opportunities; all in order to promote Europe as a number one tourism destination.

23. EUROPEAN TRAVEL AGENTS AND TOUR OPERATORS ASSOCIATIONS - ECTAA

Industry sector: TOURISM

The **European Travel Agents and Tour Operators Associations (ECTAA)** represents the national associations of travel agents and tour operators of 27 EU Member States, of 2 EU accession countries as well as of Switzerland and of Norway. ECTA also has 3 international Members: Tunisia, Morocco and Israel. See **here** for a listing of ECTAA full members.

ECTAA is recognised in Brussels by industry and decision-makers alike as the main representation of European Travel Agents and Tour Operators, acting as a consultation partner on any policy that may have an impact on Travel Agents' and Tour Operators' activities and on tourism in Europe generally.

24. euROBOTICS

Industry sectors: ROBOTICS, AUTOMATION

euRobotics is a Brussels based international non-profit association of all stakeholders in European robotics. With over 250 members, euRobotics is buildsing upon the success of the European Robotics Technology Platform (EUROP) and the academic network of EURON and is poised to become the sole main voice of the European robotics community as a whole.

25. EUROPEAN REMOTE SENSING INDUSTRY ASSOCIATION - EARSC

Industry sectors: EARTH OBSERVATION REMOTE SENSING

The **European Association of Remote Sensing Companies (EARSC)** is a professional industrial body (trade association) with the mission to foster growth of the Earth-observation (EO) services sector. Based in Brussels, EARSC is actively involved in coordinating and strengthening the EO chain and promoting the European geo-information industry.

The 74 **full members** of EARSC are companies supplying services in the growing market for the exploitation of EO data. Their main activities are acquiring and supplying data from satellite or airborne platforms and /or their conversion into geo-information products suitable and accessible for their clients.

26. European Satellite Applications Industry Association – EURISY

Industry sectors: Satellite applications (multisectoral)

The mission of **Eurosy, the European Satellite Applications Industry Association** is to raise awareness of emerging satellite application advances and solutions taking place in numerous areas, from transport to risk management, from habitat protection to energy, from climate change to the Internet of Things, to name a few.

Eurisy's **members** include most Space Agencies and governmental offices in charge of space affairs in Europe, and international organisations dealing with space matters. On the basis of its direct field work with end-users, Eurisy provides feedback to decision-makers on possible measures to overcome obstacles to the diffusion of space-derived innovation in society.

3. PAN-EUROPEAN TECHNOLOGY CLUSTERS

ESCA European Secretariat for Cluster Analysis
List of EU Environmental Technology Clusters

QUESTIONNAIRE RI INNOVATION READINESS

ENVRI Innovation Readiness Survey

Dear ENVRI Manager,
Please take 5 minutes to fill out this short survey on your RI's general innovation and industry-cooperation propensity

1. **Is Innovation Cooperation with Industry highlighted as a priority in your RI's Strategic Plan?**
   Mark only one oval.

   - ◯ Yes
   - ◯ No
   - ◯ Soon

2. **Does your RI have an Innovation /Industry Liaison officer (ILO) ?**
   Mark only one oval.

   - ◯ Yes
   - ◯ No
   - ◯ Soon

3. **Does your RI have a Communications Officer(s) with commercial experience?**
   Mark only one oval.

   - ◯ Yes
   - ◯ No
   - ◯ Soon

4. **How much does cooperation with Industry contribute to your RI's annual revenue (%)?**
   Mark only one oval.

   - ◯ Not at all
   - ◯ < 2%
   - ◯ 2 -5%
   - ◯ > 5%

5. **Does your RI's homepage have an "Industry" menu tab?**
Mark only one oval.

- Yes
- No
- Soon
- Not Appicable

6. **Does your RI prepare an annual Innovation Strategy?**
Mark only one oval.

- Yes
- No
- Soon

7. **Does your RI have an active Industry Advisory Committee / Board?**
Mark only one oval.

- Yes
- No
- Soon

8. **Does your RI website feature examples of recent, concrete Industry-cooperation Success Stories ?**
Mark only one oval.

- Yes
- No
- Soon

9. **Does your RI have an online Data Portal offering open access to core RI data?**
Mark only one oval.

- Yes
- No
- Soon

10. **Do you maintain an online Catalog of core RI User Services including specific services/opportunities for SMEs ?**
Mark only one oval.

- Yes
- No
- Soon

11. **Do you publish an online standard Service-level Agreement defining terms (i.e. IP rights) for SMEs to license your RI data to co-develop value-added commercial applications?**

Mark only one oval.

- Yes
- No
- Soon

12. **Does your RI host Training Programs/Workshops specifically to bring together researchers and private sector engineers/business people?**

Mark only one oval.

- No
- Sporadically
- Regularly

13. **Does your RI run Exchange Programs with industry targeting talent attraction of young scientists and engineers?**

Mark only one oval.

- Option 1
- Sporadically
- Regularly