# ESFRI

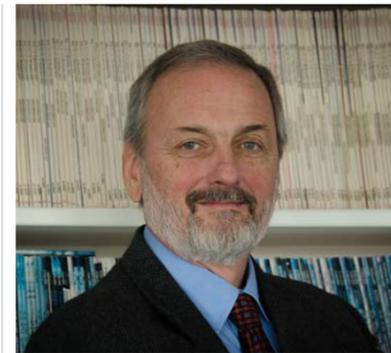# ANNUAL REPORT
# 2016

# FOREWORD FROM THE CHAIR

ESFRI prepares an Annual Report to summarise its main activities and results of the year. This report is published for transparent information on the activity of ESFRI to all interested stakeholders and the general public and it is in particular made available to the Council of the European Union and the European Parliament. The Report is not a strategy document, but provides an overview of the ESFRI activities and meetings – Plenary Forum, Executive Board and Working Group Chairs Meetings, Working Group Meetings and other events, conferences and workshops – organised during the year. It reports as well on ESFRI actions in the frame of the ERA Roadmap – linked to the implementation of ERA Priority 2B about Research Infrastructures - and on interfaces with ERAC.

ESFRI responds to mandates of the Competitiveness Council to develop specific deliverables – the Roadmap updates, the recommendations on investment strategies in e-Infrastructures and follow-up of implementation of ERA Priority 2B. Moreover, ESFRI develops its own initiatives of study and analysis of the Landscape of Research Infrastructures, their economy and industrial impacts as well as supports the European Commission in its work on specific topics.

The instruments of ESFRI in developing the Roadmap for pan-European Research Infrastructures are the Strategy Working Groups and the Implementation Group, addressing the evaluation of New Proposals, the Monitoring of Projects and the Periodic Review of Landmarks. The Strategy Working Groups perform the Landscape Analysis and continuously inform the Forum of new trends and news at European and global level in their domains. ESFRI also establishes *ad hoc* Working Groups to address specific issues, such as the relationship between Research Infrastructures, industry and innovation, the investment strategies in e-Infrastructures, and the long-term sustainability of Research Infrastructures. In addition, *ad hoc* Expert Groups can be created to address specific issues that require a specialist reference work to be delivered to the ESFRI Forum. *Ad hoc* Expert Groups may lead to publications as useful instruments for the public. A new series of ESFRI Scripta has been launched in 2016 with the publication of its first volume issued from the work of the Neutron Landscape Group that delivered and ended its mission in 2016.

I thank the former Chair John Womersley, who led ESFRI until the end of June 2016, the ESFRI Forum Delegates, all the members of ESFRI permanent and *ad hoc* Working Groups, *ad hoc* Expert Groups and the international experts that gave their advice during the evaluation procedures. I am grateful to the ESFRI Secretariat at Directorate-General for Research and Innovation and to the StR-ESFRI Project staff that has supported the Chairs, the Roadmap process, the network liaisons and dissemination actions, has created the esfri.eu website and organized the Exchange of Experience Workshops.

Giorgio Rossi
ESFRI Chair

# CONTENTS

# EXECUTIVE SUMMARY

The year 2016 was characterised by two main achievements for ESFRI: the publication of the Roadmap 2016 in the novel format and the launch of the Roadmap 2018 process.

On 10th March 2016, ESFRI officially presented the Roadmap 2016 during a one-day conference organised in Amsterdam by the Royal Netherlands Academy of Arts and Sciences – KNAW, in association with the Dutch Presidency and in close cooperation with the European Commission and the Dutch Ministry of Education, Culture and Science. The event, also broadcasted on the web, provided an overview of the Roadmap 2016, whose Part 1 was distributed in hard copies as well as integrally published – Parts 1, 2 and 3 – on the internet. The Roadmap 2016 was presented in a highly renovated format considering the whole lifecycle of Research Infrastructures (RIs). It contains 21 ESFRI Projects whose development is considered of strategic importance for the future competitiveness of the European Research Area. It also includes, for the first time, 29 ESFRI Landmarks representing Research Infrastructures which were listed in the previous editions of the ESFRI Roadmap, but have now completed their implementation or are under construction. The Roadmap is complemented with a Landscape Analysis (LA), which provides an overview of the European ecosystem by identifying the main RIs operating transnational access in Europe and major new or ongoing projects with an outlook to the global landscape of relevance. The Permanent Working Groups, the Strategy Working Groups in five domains (SWGs) and the Implementation Group (IG), performed the evaluation of the new proposals, the assessment of the ESFRI Projects and carried out the Landscape Analysis to keep the Forum informed of new trends and news at European and global level in their domains, as well as to respond to the invitation by the Competitiveness Council to broaden the view of ESFRI beyond the list of projects, gaining a comprehensive overview of the investments in RIs and of their impacts.

Following the publication of the ESFRI Roadmap 2016, the Forum further refined its roadmap update process and methodology for the evaluation of New Proposals, the Monitoring of Projects and the Periodic Review of Landmarks, reinforcing the lifecycle approach and in order to address the progress towards implementation and the performance during operation and long-term strategy respectively.

On 4th October 2016, ESFRI officially launched the process that will lead to the Roadmap 2018, with a presentation event during the International Conference on Research Infrastructures – ICRI 2016 in Cape Town. In January 2017, an Info Day was dedicated to the submission and selection of new proposals and an Exchange of Experience Workshop explaining the Monitoring initiative of the ESFRI Projects and the Pilot Periodic Review of the ESFRI Landmarks. Both events were organised in Málaga by the Spanish Delegation in close cooperation with the European Commission and the StR-ESFRI Project[1].

In addition to these activities, ESFRI established *ad hoc* Working Groups in order to respond to mandates of the Competitiveness Council to address specific issues. In March 2016, ESFRI published the final report of the Working Group on Innovation, offering its contribution to the development of a strategy aimed at strengthening and improving the relations between Research Infrastructures and Industry and to promote the potential for innovation of Research Infrastructures in all its aspects. By the end of 2016, ESFRI prepared a draft conclusion from the Working Group on the investment strategies of the Member States in e-Infrastructures for research and innovation, including high performance and distributed computing, scientific data and networks, and formulated recommendations for how mechanisms for coordinating these strategies could be implemented.

Moreover, ESFRI developed its own initiative of study and analysis of the landscape of neutron sources as part of the Landscape Analysis of Analytical Research Infrastructures. To this end, ESFRI established a Neutron Landscape Group (NLG), which resulted in a report which was published as the first volume of the new series called ESFRI Scripta.

Finally, following an invitation of the Council to the European Commission to prepare together with ESFRI and relevant stakeholders an action plan on long-term sustainability of Research Infrastructures, ESFRI established a dedicated *ad hoc* Working Group to prepare an input to the Commission on how to effectively address this challenge.

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[1] **Support to Reinforce the European Strategy Forum for Research Infrastructures**, StR-ESFRI is a project funded under H2020 (grant agreement n° 654213)

# STRATEGY REPORT AND ROADMAP 2016

The update of the Roadmap 2016 is a deliverable mandated by the Competitiveness Council which adopted the conclusions of the meeting of 26th May 2014 on Implementation of the roadmap for the European Strategy Forum on Research Infrastructures. The Competiveness Council *"WELCOMES the plans of ESFRI to update its roadmap in 2015/2016; CALLS on ESFRI to continue the prioritisation of all the research infrastructure projects of the ESFRI roadmap, and INVITES the Member States to consider putting forward further projects for possible inclusion in this roadmap update"*[2].

To accomplish this mandate, ESFRI has undertaken a process that was completed at the beginning of 2016 with the publication of the Roadmap 2016. The first months of the year were dedicated to the intense editorial work around the contents and the publishing project for the Roadmap 2016, previously approved during the 55th Plenary Forum on 8th December 2015 in Brussels.

On 10th March 2016, ESFRI presented its Roadmap 2016 update identifying new Research Infrastructures of strategic pan-European interest corresponding to the long-term needs of the European science and innovation communities in all areas of research. The whole document was presented during a one-day conference organised in Amsterdam by the Royal Netherlands Academy of Arts and Sciences – KNAW, under the Dutch Presidency

in close cooperation with the European Commission and the Dutch Ministry of Education, Culture and Science. The event, also broadcasted on the web, provided an overview of the Roadmap 2016, that was distributed in hard copies – only Part 1 – and made available for consultation or download on the dedicated websites – complete document of Part 1, 2 and 3.

The ESFRI Strategy Report on Research Infrastructures has a completely renewed format with respect to the previous editions. It adopts a more focused, strategic approach to Research Infrastructures across their lifecycle.
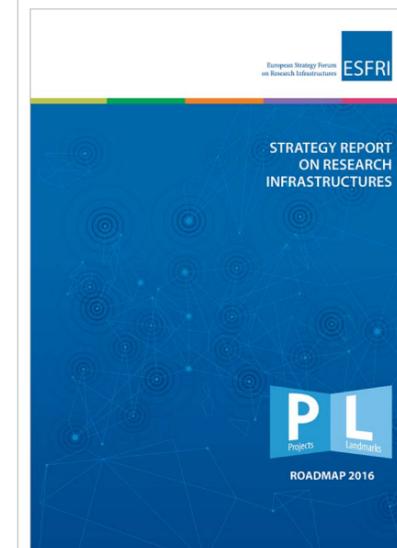
The complete document can be consulted by downloading a pdf, by browsing an interactive pdf or a minisite via an entry page hosted at the esfri.eu website. The ESFRI Roadmap 2016 is also available for downloading from the European Commission website.

2. **Conclusions of the Council of the European Union of 26 May 2014** on the Implementation of the roadmap for the European Strategy Forum on Research Infrastructures. Doc. 10257/14

http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%2010257%20 2014%20INIT

In response to the invitation by the Competitiveness Council to broaden the view of ESFRI beyond the Roadmap list of Projects and Landmarks gaining a comprehensive overview of the investment in RIs and of their impacts, the Roadmap 2016 is made of three parts, devoted to different aspects:

- **Part 1** is the only one printed and distributed in hard copies. It identifies methods, procedures and conclusions of the ESFRI Roadmap 2016. It contains the list of the 21 ESFRI Projects, Research Infrastructures with a high degree of maturity – including five new projects and one reorientation – and 29 ESFRI Landmarks, Research Infrastructures that reached the implementation phase by the end of 2015;

- **Part 2** contains the detailed description of all ESFRI Projects and ESFRI Landmarks in dedicated and detailed cards;

- **Part 3** contains the Landscape Analysis, a key ingredient of the new ESFRI evaluation methodology, that provides the current context, in each domain, of the operational national and international RIs open to European scientists and technology developers through peer-review of competitive science proposals. It was prepared by the five Strategy Work Groups of ESFRI, while the e-Infrastructure

Reflection Group - e-IRG - have elaborated the e-Infrastructures landscape, transversal to all domains.



## Research Infrastructures listed on the ESFRI Roadmap

The list of Research Infrastructures included in the ESFRI Roadmap 2016 represents the portfolio of options in all domains allowing the European Member States and Associated Countries to develop a sustainable policy of competitiveness in science and innovation. The Roadmap 2016 list features the ESFRI Projects together with the ESFRI Landmarks, in order to represent different stages in the lifecycle of the Research Infrastructures, with emphasis on excellence, impact, sustainability and on the need of continuous support.

The list contains 21 Projects and 29 Landmarks identified by their acronym, full name, legal status, reference financial data and date of entry in the ESFRI Roadmap. Descriptive cards of each Project and Landmark are included in Part 2.

The **21 ESFRI Projects** consist of nine from the Roadmap 2008, six from the Roadmap 2010, five new projects plus one reoriented project that were selected from among those proposals that were submitted by ESFRI Delegations or EIROforum organisations by March 2015. ESFRI introduced an important condition for proposals to be eligible for evaluation: a proposal must demonstrate a funding commitment from the submitting Member State, Associated Country or EIROforum organisation, along with a political commitment from at least two others. This requirement strengthened the transparency of the submission process and forced a dialogue and crosscheck between the research communities and the concerned governments from the very beginning of the RI project. The six new Projects were selected among 20 eligible proposals.

ESFRI performed an in-depth evaluation of the eligible proposals with the help of the Strategy Working Groups with respect to their scientific excellence, pan-European relevance, socio-economic impact and e-needs. The degree of maturity of submitted proposals was assessed against key indicative requirements developed by the ESFRI Implementation Group.

Among the 21 ESFRI Projects – included in the Roadmap in order to underline their strategic importance for the European Research Infrastructure ecosystem and to support their timely implementation – four are in the Energy domain, five in the Environment area, eight in the Health & Food field,

three in Physical Sciences & Engineering and one belongs to the Social & Cultural Innovation sphere. The ESFRI Projects can be at different stages of their preparation according to the date of inclusion in the ESFRI Roadmap.

The **29 ESFRI Landmarks** are listed as successfully implemented ESFRI projects that are delivering science services or effectively advancing in their construction. Among ESFRI Landmarks, 27 are Research Infrastructures that were implemented or started implementation under previous editions of the ESFRI Roadmap. During the evaluation process of the 20 eligible new proposals, two have been evaluated and assessed as already under construction and therefore are included in the Roadmap 2016 as ESFRI Landmarks. This list demonstrates successful fulfilment of the "Europe 2020 Flagship Initiative – Innovation Union" which stated that "by 2015, Member States together with the Commission, should have completed or launched the construction of 60% of the priority European Research Infrastructures currently identified by the European Strategy Forum for Research Infrastructures (ESFRI)"[3].

Among the 29 ESFRI Landmarks – included in the Roadmap as reference elements of competitiveness of the European Research Area – one is in the Energy domain, five in the Environment area, six in the Health & Food field, eleven in Physical Sciences & Engineering, five in the Social & Cultural Innovation sphere and one belongs to

the e-Infrastructure group. In order to effectively exploit their full potential for the European Research Area, the ESFRI Landmarks need continuous support for successful completion, operation and upgrade in line with the optimal management and maximum return on investment.

## Landscape Analysis

The ESFRI objective is to identify a limited number of projects with a high degree of maturity, that enhance European science and innovation competitiveness. This is also pursued by performing a **Landscape Analysis** of the Research Infrastructures accessible to European science and industry, with the aim to identifying their strengths, potential and weaknesses in all fields of research.

The Landscape Analysis identifies the main RIs operating open access in Europe, in all fields, and major new or ongoing projects. This includes national, regional and international facilities as well as consortia that offer integrated services and transnational access to state-of-the-art resources for research.

The Landscape Analysis is a reference document for information and does not represent in any way a prioritization of ESFRI for future investments or the view or any commitment on the part of ESFRI members.

3. **Europe 2020 Flagship Initiative Innovation Union,** COM(2010)546final; SEC(2010)1161

https://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf

# STRATEGY REPORT AND ROADMAP 2018

As a follow-up of the Roadmap 2016, during the meeting of 27th May 2016, the Competitiveness Council *"ACKNOWLEDGES the efforts made by ESFRI to further prioritise Research Infrastructure projects on the ESFRI Roadmap, WELCOMES the identification of ESFRI Landmarks, RECOGNISES their continued strategic role in driving scientific excellence and innovation in Europe and CALLS on ESFRI to closely monitor the implementation of ESFRI projects, to periodically assess the scientific status of ESFRI Landmarks, and to prepare the next ESFRI Roadmap update in 2018"*[4].

Following the publication of the Roadmap 2016, ESFRI reaffirmed its commitment in implementing the full evaluation methodology, as for the Roadmap 2016, in order to identify the most relevant and promising new RIs – or major upgrades of existing ones – covering all scientific areas.
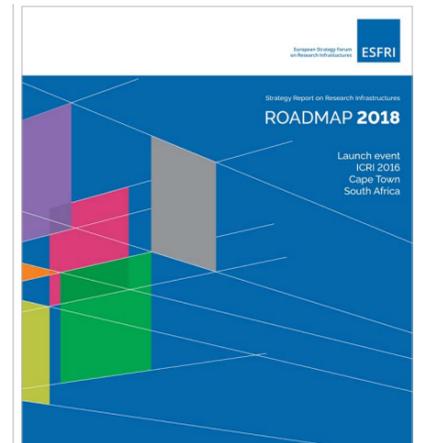
On 4th October 2016, ESFRI launched the process that will lead to the Roadmap 2018 update during the International Conference on Research Infrastructures – ICRI 2016 – that took place in Cape Town. The event, also broadcasted on streaming, provided the international community with the rationale for the update and an overview of the methodology that ESFRI will adopt for the selection of new proposals and the procedure of monitoring that will qualify ESFRI Projects reaching the 10-year term as ESFRI Landmarks. ESFRI introduced also the Periodic Review of ESFRI Landmarks that will lead to the identification of opportunities for inte-

gration and internationalisation of the Research Infrastructures portfolio.

On that occasion, ESFRI informed the audience that a dedicated Information Day, followed by an Exchange of Experience Workshop, was going to be organised in January 2017 in Málaga by the Spanish Delegation in close cooperation with the European Commission and the StR-ESFRI Project. For that time, ESFRI provided a Public Guide for Users.

The Info Day was a public event dedicated to the overview of the methodology that ESFRI adopts for the selection of new proposals. The deadline for the submission of proposals is 31st August 2017 at 18:00 CET. The Exchange of Experience Workshop was also a public event that, by invitation, allowed ESFRI Projects and ESFRI Landmarks to exchange experiences and best practises in view of their monitoring and periodic review.



Continuing its incubator role, ESFRI organizes the **Selection of new proposals**, leading to the identification of additional RIs of strategic importance for Europe. New Research Infrastructures – or major upgrades of existing ones – on the Roadmap will be selected with respect to the quality of their scientific case and their advanced degree of maturity which includes a completed feasibility study, commitment of a multinational consortium as well as support of at least three governments.

At the same time ESFRI develops a comprehensive methodology for the **Monitoring of the ESFRI Projects** already on the Roadmap. The monitor-

4. **Conclusions of the Council of the European Union of 27 May 2016** on FP7 and the Future Outlook: Research and innovation investments for growth, jobs and solutions to societal challenges. Doc. 9527/16

http://data.consilium.europa.eu/doc/document/ST-9527-2016-INIT/en/pdf

# INDUSTRY-ORIENTED COOPERATION OF RESEARCH INFRASTRUCTURES

ing process involves an evaluation of the evolution and actualization of the scientific case as well as an assessment of the progress of the projects towards implementation, including the commitment of an established international consortium of owners, agreement on the budget for the construction phase and a solid concept for the governance model and financing the whole lifecycle of the infrastructure. Those projects that fail to achieve implementation within the ten-year period will be removed from the Roadmap, fostering further prioritisation of RI investments in Europe.

In addition to this, responding to the invitation of the Competitiveness Council, ESFRI also launches a pilot exercise with four ESFRI Landmarks to explore the ways of effective monitoring of RIs which are already implemented or under construction. The **Pilot Review of the ESFRI Landmarks** addresses the evolution and actualization of the scientific case and the RI implementation, at the same time identifying their main long-term sustainability challenges. This exercise will help in developing a comprehensive and robust methodology for the periodic review applicable to all Landmarks in the future together with clear and well accepted criteria.

The position of all the ESFRI Research Infrastructures in the European research landscape will be sketched

and understood in the framework of the updated **Landscape Analysis** – with global perspective – across the science domains. The ESFRI Roadmap process now incorporates the necessary steps to further strengthen the RI ecosystem in the years to come.

ESFRI will continue to update its roadmap periodically, offering opportunities to new projects in all fields of science.

In the meeting of 31st May 2011, the Competitiveness Council adopted conclusions on the Development of the European Research Area (ERA) through ERA related groups and *"IN-VITES the European Strategic Forum on Research Infrastructures (ESFRI) to also contribute towards supporting the implementation and monitoring of progress of the Innovation Union initiative, and provide input, as appropriate, to the development of a proposal on the ERA Framework"*[5].

In this context, ESFRI mandated in 2013 an *ad hoc* Working Group on Innovation to prepare input on the broad lines of a strategic plan for an industry-oriented cooperation of the Research Infrastructures. The mandate was extended in 2015 and the Working Group delivered the final report during the 56th Plenary Forum held on 11th March 2016 in Amsterdam, when ESFRI adopted the recommendations for stimulating the various facets of innovation and industrial cooperation in RIs.

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5. **Conclusions of the Council of the European Union of 31 May 2011** on Development of the European Research Area (ERA) through ERA related groups. Doc. 11032/11

http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%2011032%202011%20INIT

# ESFRI RECOMMENDATIONS ON A STRATEGIC PLAN FOR AN INDUSTRY-ORIENTED COOPERATION OF RESEARCH INFRASTRUCTURES

- A change of culture is needed in both RIs and industry. Industry should become more RI oriented and RIs more business oriented. All stakeholders should be better informed on, and more aware of, the existing potential for cooperation and of its huge socio-economic impact. Moreover, as shown in the report, innovation and industrial cooperation are obviously important factors that strengthen the RI long-term sustainability and contribute to the broadening and diversification of international cooperation links..

- Raising awareness on RI opportunities and services and on RIs' socio-economic impact is needed in all directions: towards RIs themselves, industry and a wider audience (including policy decision makers and the general public). The role of professional intermediaries (e.g. Industry Liaison Office(r)s), of independent Industry Advisory Boards and of specifically dedicated cooperation mechanisms and tools is absolutely essential to strengthen and improve the cooperation between RIs and industry, and between RIs themselves. New initiatives should be taken to increase the attractiveness of RIs for industry. Dissemination and stimulation actions should be carried out in close connection with sectorial industrial organisations and RTOs, with the support of the EU. In order to move from the paradigm of technology transfer (TT) to the paradigm of knowledge transfer (KT), training of a new generation of engineers in industry more aware of science and RIs, as well as training of a new generation of researchers, more receptive to IPR issues and of industry needs, including mobility from academia to industry, are two essential blocks.

- The concept of "industry as a full partner" (both as a supplier and as a user) should be proactively put in practice; this implies to promote more extensive partnerships on joint R&D projects and cooperative programmes, including the development of advanced technologies and innovation, training and exchange programmes, etc. RIs can offer industrial companies to be immersed in active ecosystems of innovation based on their complementary broad range of competences and skills. They are indeed most often located in S&T areas that include state of the art enabling technologies and support services. Such an environment makes more likely to grow a unique ecosystem around RIs well suited for innovation where research teams, small high-tech enterprises, spin-off and start-up companies, detached labs of big companies, TTOs and ILOs staffs all together exploit the "business at walking distance" advantage in working together on common issues in the same place.

- A favourable political, regulatory, legal and financial environment is another condition for the successful implementation of a strategy aimed to strengthen and improve the relations between RIs and industry and to promote the potential for innovation of RIs in all its aspects. A series of needs expressed by industry and the RIs should be met and this calls for action by the funding agencies and political authorities e.g. on public procurement policies, IPRs, the knowledge of RI markets, the rules regulating State aids, dedicated funding mechanisms, etc.

- Innovation should be considered in all its aspects. Indeed, RIs serve science and technology but also policy-making and society. The social, societal, ecological and public sector dimensions of innovation are particularly important for the ESFRI RIs in the Environmental, Health and Food and Social Sciences and Humanities sectors (and also for Analytical facilities). Most of them were built for their mixed scientific and societal impact, providing new knowledge, data and services to increase the security, well-being and prosperity of a society faced with a series of Grand Challenges. Increasing the RI industrial cooperation is also important in this context, for both society and the economy.

- Research data represents significant financial assets and business opportunities. It is also obvious that it is often still unclear how and on what conditions actors outside academia, especially commercial actors, can use such data due to IP and privacy issues. Re-use of data, away from its initial purpose, demonstrates the innovative opportunities that access to, and curation of data can achieve. Raising awareness of this opportunity with industry and developing transparent data management policies, including pricing policies if appropriate, should be considered as a key focus that can reap rewards for all involved, in a win-win approach to innovation between RIs and industry (co-sharing risks and benefits).

- Finally, successful innovation should be an in-built part of an organisation's business strategy and strategic vision, where conditions are created to facilitate innovative thinking and creative problem solving. As such, RIs (whether distributed or single-sited) should consider adopting a programme of self-assessment with "evolving through innovation" being the principal motive in carrying out such a process.

# MEMBER STATES' INVESTMENT STRATEGIES IN E-INFRASTRUCTURES

In the meeting of 29th May 2015, the Competitiveness Council adopted conclusions on open, data-intensive and networked research and *"IN-VITES ESFRI to explore mechanisms for better coordination of Member States' investment strategies in e-infrastructures, covering also HPC, distributed computing, scientific data and networks"*6.

To respond to the invitation by the Council, ESFRI established an *ad hoc* Working Group to prepare input for ESFRI on how to address the Council conclusions. Based on the report from the Working Group, ESFRI adopted the recommendation during its 59th Plenary Forum that took place on 9th December 2016 in Brussels.

In this recommendation, ESFRI advises to establish urgently a convergent policy of funding mechanisms for e-Infrastructures at the various levels (institutional, regional, national, European). Such policy could include support and financing of e-Infrastructures for scientific users, providing incentives to researchers to generate FAIR (Findable, Accessible, Interoperable, and Re-usable) and reproducible (+R) data, as well as the development of enabling e-tools/e-technologies and the mainstreaming of support actions addressing e-needs of all levels of intervention. ESFRI also suggested to act as strategy forum of funders of e-Infrastructures for European science as a key element of support of a coherent approach to policy-making on Research Infrastructures in Europe. ESFRI recognizes that funding of HPC Tier-Zero facilities does impact on industrial policy and requires a comprehensive approach. Below the complete text.

6. **Conclusions of the Council of the European Union of 29 May 2015** on Open, data-intensive and networked research as a driver for faster and wider innovation. Doc. 9360/15
http://data.consilium.europa.eu/doc/document/ST-9360-2015-INIT/en/pdf

# ESFRI RECOMMENDATION ON COORDINATION OF MEMBER STATES' INVESTMENT STRATEGIES IN E-INFRASTRUCTURES

- ESFRI aims to contribute to an effective and efficient approach to e-infrastructure and services (vertical and horizontal) for European science and its competitiveness in the global scene building on existing Research Infrastructures and electronic Infrastructures.

- ESFRI advises to establish **urgently a convergent policy of funding mechanisms** for e-Infrastructures at the various levels (institutional, regional, national, European). Such policy could include **support and financing of e-Infrastructures** for scientific users, providing incentives to researchers to generate **FAIR**[1] **and reproducible (+R) data**, as well as the development of enabling e-tools/e-technologies and the mainstreaming of support actions addressing e-needs of all levels of intervention.

- ESFRI suggests to act as **STRATEGY FORUM OF FUNDERS** of the e-Infrastructures for European science as a key element *of support of a coherent approach to policy-making on research infrastructure in Europe.*

- ESFRI could be effective in facilitating the coordination of national and European efforts in e-Infra-structures for research and innovation, following the model that has been put in place for Research Infrastructures. The global dimension of e-Infrastructures shall also be addressed in a coherent way.

- ESFRI advises to proceed by **building on the EOSC HLEG vision**[2] and by **strengthening the data FAIR+R generator role of Research Infrastructures** and the coordination of science and innovation communities also at broad international level as described by the e-IRG roadmap[3].

- ESFRI advises that **urgent actions** must be taken to support the **training and hiring of e-infrastructure experts/scientists** and to expand the **data literacy** at all levels of education and innovation activities to enable the return from the investment in e-Infrastructures and Research Infrastructures and maximize societal benefits.

- ESFRI advises that **deploying strategic joint e-services**, including standardization and assisted open access, can be **most efficiently done at least at European level.**

- ESFRI recognizes that the capacity of distributed High Performance and High Throughput Computing, of communication networks for scientific data, and of transversal e-services, should be **strengthened by building on national resources** and adding an effective coordination and a possible additional funding such to realize a full European-scale impact.

- ESFRI recognizes that the funding approach to **HPC Tier-Zero facilities** bears challenges similar to more centralised large-scale Research Infrastructure facilities[4] with direct industrial policy implications and should be dealt with accordingly.

1. Findable, Accessible, Interoperable, and Re-usable

2. Realising the European Open Science Cloud Report 2016

3. e-IRG Roadmap 2016

4. ESFRI Strategy document and Roadmap 2016

# LONG-TERM SUSTAINABILITY OF RESEARCH INFRASTRUCTURES

**ESFRI WORKING GROUPS**

In the meeting of 27th May 2016, the Competitiveness Council discussed the ESFRI 2016 Roadmap and the Long-term sustainability (LTS) issue. In this context, the Competitiveness *Council "UNDERLINES the importance of ensuring long-term sustainability of Research Infrastructures and invites the Commission to prepare together with ESFRI and relevant stakeholders a targeted action plan"*[4].

In order to comprehensively respond to the Council conclusions, covering the full spectrum of the LTS debate, ESFRI set up an *ad hoc* Working Group. The work focuses on the pre-conditions identified by the consultation launched by the Commission in December 2015. These pre-conditions include funding and governance aspects of RIs, socio-economic impact as well as the management and exploitation of data and the innovation potential of RIs.

The objective of this WG is to provide a consolidated input to the European Commission for the preparation of the action plan mentioned in the Council conclusions, addressing the Long-Term Sustainability of Research Infrastructures.

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4. **Conclusions of the Council of the European Union of 27 May 2016** on FP7 and the Future Outlook: Research and innovation investments for growth, jobs and solutions to societal challenges. Doc. 9527/16

http://data.consilium.europa.eu/doc/document/ST-9527-2016-INIT/en/pdf

# PERMANENT WORKING GROUPS

Since 2006, ESFRI has presented a series of Roadmap updates supporting a coherent and strategy-led approach to the development of pan-European Research Infrastructures, which would ensure that scientists in Europe have access to world-class facilities enabling them to do cutting-edge research.

This has been possible by establishing the Strategy Working Groups in five research domains and the Implementation Group, transversal to all research areas. These permanent Working Groups periodically performed an in-depth analysis of the scientific aspects and the maturity features of the Research Infrastructures of ESFRI portfolio.

# STRATEGY WORKING GROUPS

The Strategy Working Groups – SWGs – are the ESFRI instruments to analyse the scientific aspects of Research Infrastructures in a given field of research.

Each SWG consists of a number of members nominated by ESFRI Delegations, ensuring complementary expertise and realising an adequate and fair balance of the different scientific communities of Europe in the field. The SWGs include EC representatives and at least one e-IRG expert. The SWGs are in general chaired by ESFRI Delegates. However, the SWG can be chaired by a "Permanent Expert" not belonging to a Delegation. The SWG Chair participates/reports regularly to the ESFRI Forum and dedicated ESFRI Executive Board meetings. A deputy Chair can be identified within the SWG if it is deemed necessary.

|  | *Until June 2016* | *From July 2016* |
|---|---|---|
| ENE | **Ricardo Migueis** | **Harald Bolt** |
| ENV | **Gelsomina Pappalardo** | **Gelsomina Pappalardo** |
| H&F | **Gabriela Pastori** | **Gabriela Pastori** |
| PSE | **Giorgio Rossi** | **José Luis Martinez** |
| SCI | **Jacques Dubucs** | **Jacques Dubucs** |

| ENE | **Energy** |
|---|---|
| ENV | **Environment** |
| H&F | **Health & Food** |
| PSE | **Physical Sciences & Engineering** |
| SCI | **Social & Cultural Innovation** |

Five SWGs are active as of 2016:

The SWG Chairs responsible for the evaluation of the scientific case and Landscape Analysis for the Roadmap are reported in the following table. As the ESFRI Chair mandate was complete, a new panel of SWG Chairs were appointed during the 57th ESFRI Forum meeting in Geneva.

Following the publication of the Roadmap 2016 and in view of the forthcoming update of the Roadmap 2018, ESFRI mandated its Strategy Working Groups to:

- scout and monitor the general development of the European and Global Research Infrastructures ecosystem in the field by performing a Landscape Analysis. Update the LA by identifying the existing relevant RIs open to use by European or full international users and analyse the overall capacity in the given field and the potential for upgrade/increase of quality and capacity connected with these RIs. Identify existing new or on-going projects at national/regional/international level that impact the field and evaluate the overall increase in quality/capacity expected in the relevant time scale. Identify trends of the evolving use and need of research infrastructure in the different domains to address the dynamical aspects of the landscape;

- evaluate the new Proposals in view of their scientific quality and impact on the overall landscape (filling of gaps, upgrading quality or capacity, replacing obsolete RIs, pushing leadership, increasing competitiveness); identify the fulfilment of the criteria for "preparation stage". Each project evaluated for the science aspects and pan-European relevance by the SWG will also be evaluated, in a parallel independen-

dent way by the IG. The results of both evaluations will be harmonized by joint work sessions of SWG and IG to produce an Evaluation Report Summary that will provide the relevant information for the ESFRI EB recommendations to the Forum;

- monitor the ESFRI Projects according to the methodology set by the Roadmap 2018 Guide established by ESFRI;

- perform, along with the Implementation Group, the pilot review of selected ESFRI Landmarks as indicated by ESFRI;

- contribute to the definition of rules and methodology for promoting to the status of Landmark of those projects (2008) ending their residency on the Roadmap with a successful record of implementation and/or delivery of science results, and fulfilling the definition of a Landmark as reported in the Roadmap 2016.

The new Terms of Reference – ToR – of SWGs were approved by written procedure after the 58th Plenary Forum in Matera.

# ENE
## ENERGY

## ENE SWG ACTIVITY

The **first meeting** of the Strategy Working Group on Energy – ENE SWG – took place on 29th November 2016 in Brussels, after the establishment of the new Chair in summer and the update of members of the group during autumn. Discussion was about:

- information on status and tasks of the group for the Roadmap 2018 update;

- agreement on general organization of the group and timelines for Roadmap 2018 update;

- selection of rapporteurs and constitution of subgroups with regard to monitoring of 2010 and 2008 Projects;

- draft structure for the Landscape Analysis.

New members have been nominated. The updated list of members for the ENE SWG is reported below.

| Name | Affiliation | Country |
|---|---|---|
| **Chair** | | |
| **BOLT** Harald | Forschungszentrum Jülich | DE |
| **ARZBERGER** Isolde | Forschungszentrum Jülich | DE |
| **BLAABJERG** Frede | Aalborg University | DK |
| **DARIE** George | Politechnica University Bucharest | RO |
| **GONCALVES** Helder | Laboratório Nacional de Energia e Geologia-LNEG | PT |
| **HAUKSDÓTTIR** Steinunn | Iceland Geosurvey-ISOR | IS |
| **JARRAUD** Nicolas | Cyprus Institute | CY |
| **JEENINGA** Harm | Energy research Centre of the Netherlands-ECN | NL |
| **KURKI-SUONIO** Taina | Aalto University | FI |
| **MARTINEZ** Diego | CIEMAT/Platforma Solar Almeria | ES |
| **e-IRG Representative** | | |
| **MEYER** Norbert | Poznań Supercomputing | PL |
| **MONTAGNE** Xavier | Ministère de l'Education nationale, de l'Enseignement supérieur et de la Recherche | FR |
| **OLSSON** Lisbeth | Chalmers University | SE |
| **ROBBA** Michela | University of Genova | IT |
| **ROBERTS** Roland | Uppsala University | SE |
| **RøKKE** Nils Anders | SINTEF | NO |
| **ŠARLER** Božidar | University of Nova Gorica | SI |
| **SMOLINSKI** Adam | Central Mining Institute | PL |
| **SORIA LASCORZ** Enrique | CIEMAT | ES |
| **STEKL** Ivan | Czech Technical University | CZ |
| **TATARAKIS** Michael | CPPL TEI Crete | EL |
| **TRAN** Minh Quang | Swiss Federal Institute of Technology-EPFL | CH |
| **EC Representative** | | |
| **QUENTAL** Nuno | DG Research & Innovation | EC |
| **EC Representative** | | |
| **ROBIN** Agnes | DG Research & Innovation | EC |

# ENV

## ENVIRONMENT

### ENV SWG ACTIVITY

The Strategy Working Group on Environment – ENV SWG – met twice in 2016: on 28th April and 20th October. Other activities were conducted offline, mainly via e-mail. In the first part of the year, before the ESFRI roadmap publication, the ENV SWG work was focused mainly on the consolidation of the text for the Landscape Analysis.

The **first meeting** after the publication of the ESFRI Roadmap 2016 was held on 28th April in Brussels. The ENV SWG members discussed on how to proceed further for the Landscape Analysis. It was decided that in the next update more focus should be given to the socio-economic aspects. The assessment of socio-economic impact for large distributed RIs, as in the case of ENV RIs, lacks well-established models. Beside the impact on innovation, related to the cooperation with the private sector, and the impact on the specific research area related to the improvement of knowledge (excellent research), it should be considered that ENV RIs play a key role in terms of services for society and this impact should be properly assessed. Recommendations to the EB were related to the evaluation process for the new Roadmap 2018: it is recommended that the SWG should work more closely with the IG during the various steps of the evaluation process. It is

also necessary to ask ESFRI Delegates to nominate new members to replace those who have left the ENV SWG.

The **second meeting** was held on 20th October 2016 in Brussels. In this meeting, the Group established i) the draft working group for the Landscape Analysis – composed by 11 members; ii) the panels for monitoring the three ESFRI Projects that entered the Roadmap in 2008 (EISCAT_3D, EPOS and SIOS); iii) the panel for the ESFRI Landmark selected for the Pilot Periodic Review (ICOS).

New members have been nominated. The updated list of members for the ENV SWG is reported below.

**ENV SWG MEMBERSHIP
(as of December 2016)**

| Name | Affiliation | Country |
|---|---|---|
| **Chair** | | |
| **PAPPALARDO** Gelsomina | National Research Council of Italy | IT |
| **Vice-Chair** | | |
| **VOLZ** Andreas | Forschungszentrum Jülich | DE |
| **BEGUSCH-PFEFFERKORN** Karolina | Federal Ministry of Science, Research and Economy | AT |
| **DE JONGE** Marc | NWO Earth and Life Sciences | NL |
| **FIGUEIRA** Rui | Instituto Superior de Agronomia da Universidade de Lisboa | PT |
| **FLAUD** Jean-Marie | Ministère de l'Education Nationale, de l'Enseignement Supérieur et de la Recherche | FR |
| **FRIBERG** Magnus | Swedish Research Council | SE |
| **GIARDINI** Domenico | ETH Zürich | CH |
| **HODGSON** Sophie | Natural Environment Research Council (NERC) | UK |
| **IITAL** Arvo | Tallinn University of technology | EE |
| **IMS** Rolf A. | University of Norway | NO |
| **LINDSTRÖM** Kai | Åbo Akademi University | FI |
| **LYKOUSIS** Vasilios | Hellenic Centre for Marine Research (HCMR) | EL |
| **MAREK** Michael | Academy of Sciences Czech Republic | CZ |
| **PILEGAAR** Kim | DTU Environment, Technical University of Denmark | DK |
| **PIPAN** Tanja | Karst Research Institute, Research Centre of the Slovenian Academy of Sciences and Arts | SI |
| **SANTAMARIA** Jesús Miguel | University of Navarra | ES |
| **e-IRG Representative** | | |
| **VAN RIJN** Arjen | National Institute for Subatomic Physics (Nikhef) | NL |
| **VERREET** Gert E.Y. | Flanders government, department Economy, Science and Innovation-EWI | BE |
| **VULTURESCU** Viorel | National Authority for Scientific Research and Innovation | EL |
| **EC Representative** | | |
| **JOHANSSON** Anna-Maria | DG Research & Innovation | EC |

# H&F

## HEALTH & FOOD

### H&F SWG ACTIVITY

The Working Group on Health & Food – H&F SWG – met four times in 2016: on 24th February, 26th May, 8th September and 29th November.

In the **first part of the year**, the group devoted time for discussions on the launch of the ESFRI Roadmap 2016, lessons learned and next steps for ESFRI. As part of this, H&F SWG provided e-IRG with lessons learned, as below:

- the interactions with e-IRG via expert representatives at the SWG were excellent;

- e-needs are part of scientific evaluations as well as implementation issues (data policy, data management etc.), so is also evaluated by IG. SWG and IG should continue evaluating the e-needs section because both perspectives are important;

- currently, the e-needs questions are closed questions leading to yes or no answers. These need to be refined;

- RIs in the H&F domain are almost purely based on data; the e-needs section is therefore very important. There is a need to include tailored questions specifically for H&F SWG

in addition to standard questions. Questions shouldn't be purely about data itself, but about metadata – i.e. interpreting the data for useful information, tailored questions for data stewardship – i.e. fair, interoperable, accessible, etc. should be included. Also there should be a guideline to what is required from these data questions.

The group also initiated discussions on current, new and emerging projects, and analysed in detail the diagrams created for the Health & Food Landscape. This preliminary discussion fed into successive meetings and discussions on gap analysis. The group anticipated that there might be more gaps found in the future, which are at the boundary between H&F and other SWGs. These may not necessarily be new ESFRI RIs, but need to be recognised and explored in discussion with the SWGs. The group initiated the planning of a new workshop, between H&F SWG and the EC, towards fostering interactions between ESFRI RIs and Joint Programming Initiatives – JPIs – and other large EU programmes. H&F SWG programme of work for 2016 was outlined. ECRIN and EPCTRI were invited to give a presentation at the May meeting. The discussion was very fruitful and highlighted the excellent progress of both ECRIN and EPCTRI, and in their joint work, which has led to two EC-funded projects. An initial discussion of the methodology for measuring socio-economic impact of Health & Food RIs identified the need to establish parameters that are both generic and specific to Health & Food.

In the **second half of the year**, the group concentrated on preparations for the launch of the Roadmap 2018 process and initiated its Landscape Analysis. The programme of work

2016-17 was updated to include the Monitoring of the projects 2008 and 2010, and the Pilot Review of Landmarks. The group identified potential new RIs in preparation and shared information about national roadmaps. Members agreed the format and structure as well as the criteria for the Landscape Analysis exercise. H&F SWG also elaborated in more detail a number of boundary areas with other SWGs, which will form a short paper to be distributed to the SWG Chairs for discussion. A joint discussion of the five Chairs in Matera indicated an interest in developing this joint work.

For the socio-economic impact methodology, the group adopted the Benefits Framework as the basis. The Chair of H&F SWG was re-elected by ESFRI Forum, and a new Vice-Chair was elected within H&F SWG (Maria Anvret, SE).

In November, all preparations for the monitoring and pilot review led to the updated Conflict of Interest register and the establishment of the review teams. The group also held a preliminary discussion on the progress of Projects and Landmarks.

On the Landscape Analysis, members have been completing a matrix, as in the previous Landscape Analysis for Roadmap 2016, which considers all latest national roadmaps, and relevant official national strategies. H&F SWG provided feedback to e-IRG expert Sergi Girona on the e-IRG Roadmap 2016 draft.

New members have been nominated. The updated list of members for the H&F SWG is reported below.

**H&F SWG MEMBERSHIP**
**(as of December 2016)**

| Name | Affiliation | Country |
|------|-------------|---------|
| **Chair** | | |
| **PASTORI** Gabriela | Biotechnology and Biological Sciences Research Council | UK |
| **Vice - Chair** | | |
| **ANVRET** Maria | University of Gothenburg | SE |
| **BAKKER** Martijntje | The Netherlands Organisation for Health Research and Development-ZonMw | NL |
| **BANCI** Lucia | University of Florence | IT |
| **BJÖRKROTH** Johanna | University of Helsinki | FI |
| **DE ANDRÉS MEDINA** Rafael | Instituto de Salud Carlos III-ISCIII | ES |
| **e-IRG Representative** | | |
| **GIRONA** Sergi | Barcelona Supercomputing Center | ES |
| **GOLDMAN** Serge | Université libre de Bruxelles - Hôpital Erasme | BE |
| **GUITTET** Eric | Ministry of Higher Education and Research | FR |
| **JESPERSEN** Jørgen B. | Aarhus University | DK |
| **KOLLIAS** George | University of Athens | EL |
| **LÆGREID** Astrid | NTNU | NO |
| **LOHMANN** Karin | PT-DLR on behalf Federal Ministry of Education and Research | DE |
| **MLINARIČ-RAŠČAN** Irena | University of Ljubljana | SI |
| **NOVAK** Michàl | Slovak Academy of Sciences | SK |
| **O'DRISCOLL** Mairéad | Research Strategy and Funding Directorate | IE |
| **OZGOREN** Murat | Dokuz Eylul University | TR |
| **POPA** Mona | University of Agronomic Sciences and Veterinary Medicine of Bucharest | RO |
| **SEDLÁČEK** Radislav | Institute of Molecular Genetics of the ASCR | CZ |
| **XENARIOS** Ioannis | University of Lausanne | CH |
| **EC Representative** | | |
| **RIBEIRO** Margarida | DG Research & Innovation | EC |

# PSE

## PHYSICAL SCIENCES & ENGINEERING

### PSE SWG ACTIVITY

The Working Group on Physical Sciences & Engineering – PSE SWG – met twice in 2016, and only after the publication of the ESFRI Roadmap. In the first months of the year, however, the group worked through an intense exchange of e-mails concerning the finalisation of the Landscape Analysis to be included in the Roadmap 2016.

The **first meeting** was held on 10th May 2016 in Milan, the last under the chairmanship of Mr. Giorgio Rossi. The meeting was attended by 15 participants, including four observers and an invited speaker, Mr. Colin Carlile which co-chaired, together with Ms. Caterina Petrillo, the Neutron Landscape Group – NLG. The NLG is an *ad hoc* Expert Group mandated in 2014 by the Physical Sciences & Engineering Strategy Work Group to develop a thorough analysis of the European Landscape of Research Infrastructures devoted to Neutron Scattering, and its evolution in the next decades. Mr. Carlile presented the full report of the main findings of the NLG. An abstract was already included in the Landscape Analysis of the Roadmap 2016. The PSE SWG welcomed the proposal to publish the full report as the first volume of the ESFRI Scripta series and decided to inform the Forum during the 57th Plenary meeting.

In addition, the PSE WG discussed on the steps required for the process leading to the Roadmap 2018. Keeping into account the lessons learnt in preparing the Roadmap 2016, the preliminary schedule and procedures for the ESFRI Roadmap 2018 were presented, with a special attention to the tasks expected for the PSE SWG.

A **second meeting** was held on 30th November 2016 in Brussels for planning the future work related to the ESFRI Roadmap 2018 update. The organization of the Landscape Update, the Pilot Periodic Review for the SPIRAL2 project and the Monitoring of the 2008 Project CTA have been discussed. The new members of the PSE were introduced and an internal organization in 4 thematic subgroups was envisaged. Also, it was discussed the need to have a clear template (or clear guidelines) for these exercises (Landscape and Landmark), to achieve a coherent and efficient result. These templates or guide should be also shared with the different SWG, for that reason the EB was requested to fix a common frame for the different SWG.

New members have been nominated. The updated list of members for the PSE SWG is reported below.

## Name — Affiliation — Country

**Chair**

| Name | Affiliation | Country |
|---|---|---|
| **MARTÍNEZ PENA** Josè Luis | Consejo Superior de Investigaciones Científicas | ES |
| **ABELA** Rafael | Paul Scherrer Institute | CH |
| **ANTIČIĆ** Tome | Rudjer Boskovic Institute | HR |
| **ČEH** Miran | Jozef Stefan Institute | SI |
| **CLAUSEN** Kurt | Paul Scherrer Institute | CH |
| **DIETER** Ralph | BMBF | DE |
| **FAGAS** Georgios | Tyndall National Institute | IE |

**e-IRG Representative**

| Name | Affiliation | Country |
|---|---|---|
| **GENOVA** Francoise | MENESR | FR |
| **GHITA** Dan | Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering | RO |
| **GONÇALVES** Bruno | Instituto de Plasmas e Fusão nuclear | PT |
| **HARRISON** Andrew | DIAMOND Light Source | UK |
| **HOOIJER** Christa | FOM foundation | NL |
| **HUOTARI** Simo | University of Helsinki | FI |
| **KLOO** Lars | KTH Royal Institute of Technology | SE |
| **LÉVAI** Péter | Wigner Research center for Physics | HU |
| **MATHON** Marie-Hélène | MENESR | FR |
| **PETRILLO** Caterina | Università degli Studi di Perugia | IT |
| **RAMIREZ** Rafael | Universidad Carlos III de Madrid | ES |
| **TEMST** Kristiaan | KU Leuven | BE |
| **VAN SAARLOOS** Wim | FOM Foundation | NL |
| **ZOCCOLI** Antonio | Instituto Nazionale di Fisica Nucleare | IT |

**EC Representative**

| Name | Affiliation | Country |
|---|---|---|
| **FROISSARD** Philippe | DG Research & Innovation | EC |

## Observers

| Name | Affiliation |
|---|---|
| **BARTH** Matthias | DLR |
| **BRACCO** Angela | NuPPEC |
| **BUTTERWORT** Jonathan | CERN |
| **ELSEN** Eckhard | CERN |
| **GIANOTTI** Fabiola | CERN |
| **MASIERO** Antonio | ASPERA (then APPEC) |
| **MEYER** Uwe | JINR |
| **PESCHKE** Christoph | DLR |
| **RUSAKOVITCH** Nikolai | JINR |

# SCI
## SOCIAL & CULTURAL INNOVATION

### SCI SWG ACTIVITY

The Working Group on Social & Cultural Innovation – SCI SWG – met three times in 2016: on 11th January, 12th May and in October 2016, each time in Brussels. Other activities were conducted by e-mail or skype.

The **first meeting** (16 participants) was devoted to the following topics:

- Debriefing and discussion on the process and outputs of the ESFRI Roadmap update 2016 exercise

  - Discussion on the *Emerging* category of ESFRI projects

  - Landscape Analysis. The LA produced by the Drafting Group – Jacques Dubucs, Peter Elias, Bjørn Henrichsen, Istvan Kenesei, Bente Maegaard and Mike Martin – has been accepted with a few adjustments resulting from the necessity of an harmonization with the work done by the other SWGs

- Definition of objectives for the SCI-SWG during the next year

  - Role of the SCI-SWG in helping RIs projects to develop. Attention will be paid to the financial sustainability of SSH RIs, especially to the resources needed for the pre-processing of SSH data (SSH RIs are not only about storage and dissemination of data). It is important to convince universities and stakeholders to consider this issue, which is not obvious at the moment and hinders sometimes the development of new projects. A questionnaire has been sent to all infrastructures, to be filled by the end of January

- Demonstration of impact of SSH RIs. In a self-critical view of the process of LA, the SWG considers that this demonstration, conceptually and qualitatively, has not been accomplished in a completely satisfactory manner. Progress should be made, and it has been decided to devote more activity of the Group to this question. Mike Martin has agreed to organize a conference in 2017 in Switzerland, in which two particular problems could be tackled:

- assessment of the counterfactual aspects of this impact (e.g. what should be funded for research projects, if the relevant RI did not exist). It is important to keep in mind the difference between the return on investment on costs saved by RIs and the return on investment on costs spent on RIs. SSH RIs facilitate and are not necessarily producing, while a stringent method of calculation is nowadays problematic

- characterization, assessment and increase of societal impact of SSH RIs. An effort will be made to involve more actively policy makers in the dissemination of the data provided by SSH RIs (e.g. longitudinal surveys as ESS or SHARE are crucially relevant for public decision making in domains as employment or health)

The **second meeting** (9 participants) has been mainly focused on:

- The denomination of the SWG ("Societal and Cultural Innovation", instead of "Human and Social Sciences"). The discussion led to the unanimous conclusion that the current denomination should not be changed, based on the possibility of defending in this way the contribution of Humanities to social and cultural innovation

- The decision of inviting RIs projects leaders in the morning of the meetings, on the understanding that these "interviews" should not be regarded as assessments, but as explorative dialogues

- Convergence between social, environmental and biological data - Synergy with other SWGs, specially H&F SWG

The **third meeting** (10 participants) had the following agenda:

- According to our previous decision of inviting SSH RIs leaders, presentation by Rory Fitzgerald, coordinateur of ESS and SERISS, on the convergence of data infrastructures and subsequent discussion

- Periodic review of Landmarks: appointment of experts within the SWG to evaluate ESS

- Update of the Landscape Analysis: appointment of a new drafting group in the SWG

- Preparation of the Conference on Impact decided during the previous meeting

- Preparation of the assessment of the new projects for ESFRI 2018 roadmap update

- Information about the RI aspects of the European Year of Cultural Heritage 2018 (presentation held by Emanuela de Menna "Sustainable management of Natural Resources", from EC DG EAC)

New members have been nominated. The updated list of members for the SCI SWG is reported below.

**SCI SWG MEMBERSHIP
(as of December 2016)**

| Name | Affiliation | Country |
| --- | --- | --- |
| **Chair**<br>**DUBUCS** Jacques | Ministry of Higher Education and Research | FR |
| **e-IRG Representative**<br>**ARGYRAKIS** Panos | Aristotle University, Thessaloniki | EL |
| **BRUSTMANN** Ursula | Ministry of Science, Research and Economy | AT |
| **BUCCHI** Massimiano | Trento University | IT |
| **CONSTANTOPOULOS** Panos | Athens University of Economy and Business | EL |
| **DEBOOSERE** Patrick | Free University of Brussels | BE |
| **DOOLEY** Brendan | Cork University | IE |
| **EDLING** Christopher | Lund University | SE |
| **HENRICHSEN** Bjørn | Norwegian Center for Research in Data | NO |
| **HOFFERT** Elena | Ministry of Higher Education and Research | FR |
| **KENESEI** Istvan | Academy of Sciences | HU |
| **KREJČÍ** Michael | Academy of Sciences | CZ |
| **LUTZ** Georg | University of Lausanne/FORS | CH |
| **MAEGAARD** Bente | Copenhagen University | DK |
| **MOULIN** Claudine | Trier University | LU |
| **OROSOVA** Olga | Pavol Jozef Šafárik University in Košice | SK |
| **SARKAR** Ranjana | Federal Ministry of Education and Research | DE |
| **VAN LEEUWEN** Marcus | NWO | NL |
| **WOOLLARD** Matthew | University of ESSEX/ UK Data Archive | UK |
| **EC Representative**<br>**THEOFILATOU** Maria | DG Research & Innovation | EC |

# IMPLEMENTATION GROUP

The Implementation Group – IG – is the ESFRI instrument to analyse the maturity features of Research Infrastructures in all field of research.

The IG consists of the Chair, five to nine ESFRI Delegates, an expert of e-IRG and a representative of the European Commission. The IG activities are supported by external experts appointed for specific tasks.

The IG Chair responsible for the Assessment of Implementation for the Roadmap 2016 was David Bohmert and Odd Ivar Eriksen was appointed as new IG Chair at the 57th Plenary Forum in Geneva.

Following the publication of the Roadmap 2016 and in view of the forthcoming update of the Roadmap 2018, ESFRI mandated its Implementation Group to:

- assess the maturity of new Proposals in view of their inclusion in the Roadmap 2018. Each project evaluated for the science aspects and pan-European relevance by the SWG will also be evaluated, in a paralle and independent way, by the IG. The results of both evaluations will be harmonized by joint work sessions of SWG and IG to produce an Evaluation Report Summary that will provide the relevant information for the ESFRI EB recommendations to the Forum;

- periodically monitor the ESFRI Projects. ESFRI will periodically monitor all ESFRI Projects and provide guidance to them to move towards full implementation

- contribute to the periodic review of ESFRI Landmarks. ESFRI will follow the progress in the lifecycle of the ESFRI Landmarks and the continuous fulfilment of their mission at the highest quality and impact level, also in view of highly complementary projects being developed and impacting the same community. When needed specific suggestions for improvement or remedy of weaknesses will be given. ESFRI Landmarks that will fail to maintain the expected standard after a specific assessment may eventually leave the roadmap;

## INNOVATION GROUP

- propose conclusions, recommendations and decisions on the status proposals, ESFRI Projects and ESFRI Landmarks to the Executive Board and the Plenary Forum;

- offer targeted and specific support to ESFRI Projects to move towards implementation and to ESFRI Landmarks;

- contribute to the further development of the methodology for ESFRI roadmap updates.

The new Terms of Reference – ToR – of IG was approved during the 58th Plenary Forum in Matera.

**IG MEMBERSHIP (as of December 2016)**

| Name | Affiliation | Country |
|---|---|---|
| **Chair** | | |
| **ERIKSEN** Odd Ivar | The Research Council of Norway | NO |
| **CHARDONNET** Christian | Ministère de l'Education nationale, de l'Enseignement supérieur et de la Recherche | FR |
| **FIGUEROA** Inmaculada | Ministry of Economy, Industry and Competitiveness | ES |
| **e-IRG Representative** | | |
| **HOLMGREN** Sverker | NordForsk | SE |
| **HRUŠÁK** Jan | Academy of Sciences of the Czech Republic | CZ |
| **LEANDRO** Cristiana | FCT, Foundation for Science & Technology | PT |
| **LENOIR** Laurence | Belgian Science Policy Office-BELSPO | BE |
| **MIHAIL** Iulia | Ministry of Research and Innovation | RO |
| **RIDDER-NUMAN** Jeannette | Ministry of Education, Culture and Science | NL |
| **RYAN** Michael | Science Foundation Ireland | IE |
| **EC Representative** | | |
| **TUINDER** Harry | DG Research & Innovation | EC |

The Working Group on Innovation – INNO WG – was set-up in 2013 in order "to propose to the Forum the broad lines of a strategic plan for an industry-oriented cooperation" of the Research Infrastructures to contribute to the implementation of the ESFRI's Strategy and Roadmap 2016. It follows the Conclusions of the Council of the European Union of 31st May 2011 that "INVITES the European Strategy Forum for Research Infrastructures (ESFRI) to contribute towards supporting the implementation and monitoring of progress of the Innovation Union initiative, and provide input, as appropriate, to the development of a proposal on the ERA Framework"[5].

The objectives that have been recognised by the Forum can be summarized as follows:

- to identify and promote the innovation and industrial capabilities of the RIs on the ESFRI Roadmap;

- to strengthen the cooperation of pan-European RIs with industry;

- to stimulate, where appropriate, the industrial involvement in the conceptual design phase of RIs;

- to promote the access of industrial users to the RIs.

The INNO WG – chaired by Jean Moulin – held 8 meetings in which representatives of the various categories of stakeholders were successively invited to participate and to present their experiences, needs and expectations.

The Group presented its final report to ESFRI at the 56th Plenary Forum held on 11th March 2016 in Amsterdam, according to the mandate given in 2013 and extended in June 2015, and following the conclusions of the discussion of the interim report presented at the 53rd Plenary Forum held on 12th June 2015 in Lisbon. It is focused on the main objectives which were defined by the Forum, namely to contribute to the development of a strategy aimed to strengthen and improve the relations between Research Infrastructures and Industry and to promote the potential for innovation of Research Infrastructures in all its aspects. A set of conclusions and recommendations has been drawn to the attention of Research Infrastructures managers and ESFRI in the perspective of the further implementation of the ESFRI Roadmap.

5. **Conclusions of the Council of the European Union of 31 May 2011** on Development of the European Research Area (ERA) through ERA related groups. Doc. 11032/11

http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%2011032%202011%20INIT

**INNO WG MEMBERSHIP
(as of May 2015)**

| Name | Affiliation | Country |
|------|-------------|---------|
| **Chair** | | |
| **MOULIN** Jean | Belgian Federal Science Policy Office, BELSPO | BE |
| **2015** | | |
| **CAMINADE** Jean-Pierre | Ministère de l'Education nationale, de l'Enseignement supérieur et de la Recherche | FR |
| **2015 (since 2015)** | | |
| **DOUGAN** Claire | STFC | UK |
| **2015** | | |
| **ENACHESCU** Marius | University Politehnica of Bucharest | RO |
| **2015** | | |
| **GOTTER** Roberto | Consiglio Nazionale delle Ricerche | IT |
| **2015 (since 2014)** | | |
| **LAAKSONEN** Leif | e-IRG / CSC | FI |
| **2015** | | |
| **PAKKANEN** Raimo | TEKES | FI |
| **2015** | | |
| **ROBIN** Agnès | DG Research and Innovation | EC |
| **2015** | | |
| **RYAN** Michael | SFI | IE |
| **2015** | | |
| **UHLÍR** David | South Moravian Innovation Center | CZ |
| **2015** | | |
| **WEGENER** Henrik | DTU | DK |

## Former members

| | | |
|------|-------------|---------|
| **2013** | | |
| **FABIANEK** Bernhardt | DG Research & Innovation | EC |
| **2013 replaced by Hendrik Volrath, 2014** | | |
| **LINN** Alexander | Forschungszentrum Jülich GmbH | DE |
| **2013 replaced by Jutta Illichmann, 2014** | | |
| **LOSKILL** Renate | BMBF | DE |
| **2013 replaced by Ione Isasa, 2014** | | |
| **MAMIMAARAN** Sivasegaram | DG Research & Innovation | EC |
| **2013** | | |
| **MIGUEIS** Ricardo | Portuguese Foundation for Science and Technology | PT |
| **2013 - 2014** | | |
| **VAN HELLEPUTTE** Johan | IMEC | BE |
| **2013- 2014** | | |
| **WOODMAN** Penny | STFC | UK |

# E-INFRASTRUCTURES GROUP

The Working Group on Investment Strategies in e-Infrastructures – e-INFRA WG – was set-up in 2015 in order to respond to the Conclusions of the Council of the European Union of 29th May 2015 that "INVITES ESFRI to explore mechanisms for better coordination of Member States' investment strategies in e-Infrastructures, covering also HPC, distributed computing, scientific data and networks"[6].

To comprehensively respond to the invitation by the Council and to ensure optimal coverage of the competences needed, ESFRI decided to draw also on the competence of the e-Infrastructure Reflections Group (e-IRG) and created an *ad hoc* working group that provides input and draft recommendations. [1]

The main goal of the e-INFRA WG is to analyse the investment strategies of the Member States in e-Infrastructures for research and innovation, including high performance and distributed computing, scientific data and networks, and formulate recommendations for how mechanisms for coordinating these strategies could be implemented. Since direct knowledge and decision-making power of the current funding models, governance strategies and best practices at Member State level is a necessary element for formulating effective recommendations, experts are sought whose profile includes these competences. Also, the competence of the group should cover national and European aspects of both horizontal (generic) and vertical (topical) e-Infrastructure and Research Infrastructures, including both strategic planning and governance.

The e-INFRA WG – chaired by Mr. Sverker Holmgren, who in 2016 served as Chair of the e-Infrastructure Reflection Group – consists of nine high-level members linked with funding decision bodies, five technical experts and European Commission representatives from DG RTD and DG CNECT.

The preliminary findings and recommendations of the e-INFRA WG was presented at the 57th Plenary Forum on 3rd June 2016 when Mr. Holmgren presented the hitherto work of the Group underlining that the first expected deliverable

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6. **Conclusions of the Council of the European Union of 29 May 2015** on Open, data-intensive and networked research as a driver for faster and wider innovation. Doc. 9360/15

http://data.consilium.europa.eu/doc/document/ST-9360-2015-INIT/en/pdf

# LONG-TERM SUSTAINABILITY GROUP

of the WG was on HPC. During the 58th Plenary Forum on 23rd September, Mr. Sverker Holmgren updated the Forum on the findings of the Group and underlined that further work was needed to reach concrete, operational conclusions to respond effectively to the request from the Council. A joint meeting of the ESFRI Executive Board and the e-INFRA WG was organised on 7th November 2016 to finalise the work and draft a list of "bullet points" that summarize the response of ESFRI to the mandate. The "bullet points" were further discussed by the e-INFRA WG and the e-IRG was consulted on this matter (Bratislava November 2016).

The report has been submitted to the 59th Plenary Forum on 9th December 2016 to be discussed and approved, and consequently presented to the Research Working Party, following which the Council took note of the report.

| Name | Affiliation | Country |
|---|---|---|
| **Chair** <br> **HOLMGREN** Sverker | NordForsk | SE |
| **e-IRG Representative** <br> **BALINT** Lajos | National Information Infrastructure Development Institute | HR |
| **BALLESTERO** Fernando | Ministry of Economy and Competitiveness | ES |
| **BRONNIMAN** Peter | State Secretariat of Education, Research and Innovation | CH |
| **COCCO** Massimo | EPOS (Coordinator) | IT |
| **FERREIRA** Joao Nuno | Ministry of Education and Science, National Research Council | PT |
| **FOUILLAT** Pascal | Ministry of Higher Education and Research | FR |
| **HEY** Tony | Department of Business, Innovation and Skills | UK |
| **e-IRG Representative** <br> **LAAKSONEN** Leif | CSC | FI |
| **e-IRG Representative** <br> **MEYER** Norbert | Poznan Supercomputing | PL |
| **NOVAK** Ondrej | Ministry of Education, Youth and Sports | CZ |
| **PROYKOVA** Ana | HPC lab in Sofia Tech Park | BG |
| **e-IRG Representative** <br> **VAN RIJN** Arjen | Nikhef | NL |
| **e-IRG Representative** <br> **VANDERBROECKE** Rosette | BELSPO and Flemish Supercomputer Centre | BE |
| **ZEISEL** Herber | Federal Ministry of Education and Research | DE |
| **EC Representative** <br> **BURGUENO-ARJONA** Augusto | DG Research & Innovation | EC |
| **EC Representative** <br> **QUINTANA** Octavi | DG Research & Innovation | EC |

The Working Group on Long-term Sustainability – LTS WG – was set-up in 2016 in order to comprehensively respond to the Conclusions of the Council of the European Union of 27th May 2016 that "UNDERLINES the importance of ensuring long-term sustainability of Research Infrastructures and INVITES the Commission to prepare together with ESFRI and relevant stakeholders a targeted action plan"[4].

The objective of the LTS WG is to provide a consolidated input to the European Commission – EC [1]– for the preparation of the Action plan mentioned in the Council conclusions, addressing the long-term sustainability of Research Infrastructures. The Sustainability debate is focusing on the pre-conditions identified by the consultation launched by the Commission in December 2015[7]. These pre-conditions include funding and governance aspects of RIs, socio-economic impact as well as the management and exploitation of data and the innovation potential of RIs. All relevant stakeholders will have the opportunity to state their position, as these pre-conditions clearly call for a multi-stakeholder approach.

The LTS WG – chaired by Mr. Jan Hrušak – consists of high-level representatives of funding decision bodies, Research Infrastructures managers/experts and European Commission representatives from DG RTD and DG CNECT.

Since its establishment, the Group met once and organised a Workshop – in collaboration with the European Commission – on 25th November 2016 in Brussels, in which representatives of the various categories of stakeholders were invited to participate and to present their experiences, needs and expectations.

A first draft of the results of the LTS WG was provided by the end of 2016, whereas the final report will be prepared by March 2017 to be delivered to the Competitiveness Council in June 2017.

4. **Conclusions of the Council of the European Union of 27 May 2016** on FP7 and the Future Outlook: Research and innovation investments for growth, jobs and solutions to societal challenges. Doc. 9527/16

http://data.consilium.europa.eu/doc/document/ST-9527-2016-INIT/en/pdf

7. EC Stakeholder Consultation Report.

https://ec.europa.eu/research/infrastructures/pdf/lts_report_062016_final.pdf

# NEUTRON LANDSCAPE GROUP

**LTS WG MEMBERSHIP**
**(as of December 2016)**

| Name | Affiliation | Country |
|---|---|---|
| **Chair** | | |
| **HRUŠAK** Jan | Academy of Sciences of the Czech Republic | CZ |
| **Vice - Chair** | | |
| **LENOIR** Laurence | Belgian Federal Science Policy Office, BELSPO | BE |
| **CAMINADE** Jean-Pierre | Ministère de l'Education nationale, de l'Enseignement supérieur et de la Recherche | FR |
| **CLAUSEN** Kurt | PSI - Swiss Academies | CH |
| **COCCO** Massimo | EPOS (Coordinator) | |
| **HARRISON** Andrew | DIAMOND Light Source | UK |
| **HENRICHSEN** Bjørn | Director of NSD – Norwegian Centre for Research Data | NO |
| **MIRON** Catalin | ELI-DC (Deputy DG) | |
| **PETRILLO** Caterina | ESS-neutron Council | IT |
| **RITTER** Claudia | DLR Project Management Agency | DE |
| **SARKJOIA** Merja | Academy of Finland | FI |
| **EC Representative** | | |
| **BURGUENO ARJONA** Augusto | DG Research & Innovation | EC |
| **EC Representative** | | |
| **FROISSARD** Philippe | DG Research & Innovation | EC |

The Expert Group on Neutron Landscape – NLG – was mandated in 2014 by the Physical Sciences & Engineering Strategy Work Group, to develop a thorough analysis of the European Landscape of Research Infrastructures devoted to Neutron Scattering, and its evolution in the next decades.

ESFRI felt the urgency of such analysis, since many reactor-based neutron sources will be closed down in the next years due to national decisions, while the European Spallation Source – ESS – in Lund will be fully operative only in the mid or late 2020s. It was necessary to analyse at the appropriate level the implications in terms of capacity and capability of neutron science in Europe, both during the crossover period of national reactors with the ESS, and in the longer term. This rationale led ESFRI to create the Neutron Landscape Group – NLG, co-chaired by Prof. Colin Carlile, former Director General of the ILL and of the ESS, and Prof. Caterina Petrillo, now Vice-Chair of the ESS Council.

The NLG has delivered its preliminary report in January 2016. An abstract of the main findings was included in the Landscape Analysis of the Roadmap 2016 where the forthcoming publication of the full report was announced. The NLG provided and presented the full report during the PSE SWG meeting held on 10th May in Milan. ESFRI approved its publication as ESFRI Scripta Vol. 1 during the 57th Plenary Forum on 3rd June 2016 in Geneva.

# EXECUTIVE BOARD

## 2nd March 2016

**Brussels, European Commission**

The first Executive Board meeting of the year was held at the European Commission in Brussels. The EB confirmed that the mandates of all members of the Executive Board and Chairs of Strategy Working Groups would have expired at the end of June, therefore the Chair proposed to the Forum to open a call for candidates for all the positions, apart from the new ESFRI Chair who had already been elected.

In order to improve the Roadmap update process, the EB discussed lessons learnt from the 2016 exercise, based on the document prepared by Mr. David Bohmert. The EB agreed on main improvements to be introduced when drafting the Roadmap 2018 Guide. Preliminary planning of the 2018 Roadmap update was also discussed.

The EB analysed the Competitiveness Council conclusions on the ERA Roadmap and on the ERA Advisory Structure, focusing on their impact on ESFRI. The EB exchanged views on how the proposed standard clauses should be reflected in ESFRI Procedural Guidelines, how ESFRI could reinforce its relationship with ERAC and on the role of ESFRI in delivering on the ERA Priority 2B on Research Infrastructures. It was agreed that the Secretariat would prepare a detailed information note on this topic, for analysis in the Forum meeting in June in Geneva.

The EB also agreed on the Terms of Reference for the High-Level Group on ERINHA to be proposed for adoption in the Forum meeting in Amsterdam.

Finally, the EB took stock of the preparatory work for the 2016 Roadmap Launch event and the Exchange of Experience Workshop to be held in Amsterdam.

## 25th May 2016

**Brussels, European Commission**

The meeting was a supplement to the ordinary Executive Board Meetings which usually precede the scheduled Plenary Forum Meetings.

Following the call for candidates to the Executive Board and for the Chairs of the Strategy Working Groups, the EB reviewed the CVs and application letters received from Delegations. The EB agreed that it was important to ensure appropriate experience and expertise across different scientific domains and competences of the Forum, as well as a good gender and geographical balance, while avoiding duplication with Chairs of working groups. Taking this into account, the EB agreed to recommend to the Forum the list of candidates that best fulfilled these conditions, in the view of elections that would be held during the Forum meeting in Geneva on 3rd June.

The first draft of the Roadmap 2018 Guide was presented to the EB. The discussion focused on the specificities of distributed RIs, the evaluation process, the evaluation of the scientific case, the scoring, the requirements of a financial commitment and political support, the pilot review of Landmarks and the update of the landscape analysis.

The EB discussed the set-up of the *ad hoc* WG on Long-Term Sustainability of RIs. The EB agreed to appoint Mr. Jan Hrušák as Chair of the Group and discussed the proposal of the Term of Reference and the Members of the group.

The revised ToR of the WG on Implementation were presented. The EB agreed to table the document for approval by the Forum.

The PSE SWG Chair reported the conclusions of the Neutron Landscape Group and the proposal to publish the report as the first volume of the ESFRI Scripta series.

The concept of the ERA Monitoring Mechanism was presented to the EB in the context of ESFRI responsibility to follow up the implementation of ERA Priority 2B. The EB agreed to propose to the Forum that would provide data on the country membership in ESFRI Landmarks and potential membership in ESFRI Projects, as well as an analysis of the content of na-

tional roadmaps, in line with the description of the headline indicator for Priority 2B.

The EB also stressed the importance of the WG on e-Infrastructures, as the ESFRI response to the request of the Council. It was noted in particular that the Group had a slower start than expected and therefore its progress needed to be regularly monitored.

## 2nd June 2016

**Geneva, Switzerland**

The meeting preceded the 57th Plenary Forum on 3rd June.

The meeting focused on further discussion of the Roadmap 2018 Guide and actions expected for the launch of the process leading to the Roadmap 2018 update – the international launch during the International Conference on Research Infrastructures (ICRI 2016) in Cape Town and the Info Day, followed by an exchange of Experience Workshop, to be organised in Europe.

The EB also discussed how to respond to the Competitiveness Council conclusions on the review of ERA advisory structure and the accompanying standard clauses for the procedural guidelines, prepared by ERAC. It was agreed to propose to the Forum to add a separate chapter in the ESFRI Procedural Guidelines, which would be dedicated to the implementation of ERA Priority 2B. In relation to this priority ESFRI could use the standard clauses, adapted to ESFRI's way of working.

The Chair of the Working Group on Investment Strategies on e-Infrastructures reported on the progress of the Group. The EB noted that the key questions refer to what would be an appropriate funding model for e-Infrastructures in Europe and how an effective governance system for e-Infrastructures could be organised at the European level. The EB agreed that the timeline of the WG could be extended by a few months until an agreement on the governance of the e-Infrastructures funding would be found.

In response to the request for an ESFRI contribution to ERAC Opinion on the European Innovation Council, the EB agreed

that the report of the WG on Innovation is a very good basis for ESFRI inputs into the debate. In addition to this, the EB proposed to underline in the workshop on the EIC that RIs are an important part of the innovation ecosystem, that EIC should focus more on bottom-up innovation (low TLRs) than on close-to marker (high TLRs), that RIs are very well placed to stimulate blue sky innovation and that EIC should look into involving SMEs more in boosting innovation.

## 8th July 2016

**Brussels, European Commission**

This meeting was organised to give an opportunity to the newly elected Executive Board and SWG Chairs to discuss the work plan, organisation of the EB and the division of tasks.

The discussion developed on the Roadmap 2018 Guide and the Questionnaires for the Submission of new Proposals, the Monitoring of Projects and the Periodic Review of Landmarks. The EB also examined the work plan proposed for the Roadmap 2018 update.

The composition of Strategy Working Groups was discussed, as well as the necessity to update the Terms of Reference to the 2018 Roadmap process. It was agreed that SWG Chairs would contact the hitherto members to verify if they were willing to continue and would then report on the gaps in the composition.

The Chairs of Working Group on Long-Term Sustainability of Research Infrastructures and Working Group on Investment Strategies in e-Infrastructures reported on the progress of the groups.

## 22nd September 2016

**Matera, Italy**

This Executive Board Meeting preceded the 58th Plenary Forum Meeting on 23rd September.

Following the request of the Forum in Geneva, the Secretariat presented the proposed revision of the Procedural Guidelines to take into account the Council conclusions of 1st December 2015 on the review of ERA advisory structure. The changes proposed were welcomed by the EB which agreed that a final draft be prepared for discussion by the Forum in December.

The EB noted that it would be useful to resume the preparation of an Annual Report of ESFRI activities as a reference document, also containing the special report on Priority 2B that ESFRI must produce for ERAC. The EB agreed to make a proposal to the Forum on the structure for such report.

The EB reviewed the revised version of the Roadmap 2018 Guide and agreed to propose it to the Forum for adoption, alongside with the submission form and the monitoring questionnaires for Projects and Landmarks.

The EB discussed the details of the Roadmap 2018 process presentation during ICRI and noted that it was important to highlight the breath of ESFRI activities, underlining the added value in Europe as well as the global dimension of ESFRI RIs. The importance of underlining the robustness and objectivity of the ESFRI methodology was also stressed.

The EB reviewed the membership situation in the Strategy Working Groups and agreed to ask the Forum for further nominations.

The membership situation in the WG on Implementation was reviewed and the EB noted that with the three new members, the Group had reached the necessary capacity to carry out the work envisaged for the 2018 Roadmap update.

Update on the WG on LTS was provided to the EB. The Group was fully staffed and had held its first meeting, with a view to preparing a report in the first quarter of 2017.

The EB reviewed the progress of the WG on e-Infrastructures and agreed that, considering the importance of this work for an ESFRI response to the request of the Council, the next meeting of the Group would be called by the EB and the EB members would participate in the meeting.

# 7th November 2016

## Cologne, Germany

This was an additional meeting convened by the ESFRI Chair together with the Working Group on Investment Strategies on e-Infrastructures. The outcomes of the work of the Group were discussed and a response to the mandate of the Competitiveness Council was jointly drafted with a view to have a final discussion and adoption by ESFRI before the end of the year, and delivered to the Council.

# 8th December 2016

## Brussels, European Commission

This was a meeting preceding the 59th Plenary Forum Meeting on 9th December.

The EB discussed the final outcomes of the WG on e-Infrastructures and agreed on a draft recommendation to the Council to be tabled for adoption at the forthcoming meeting of the Forum.

ESFRI was asked by ERAC to provide inputs on the interim evaluation of Horizon 2020 and the preparation of the next Framework Programme. The EB agreed to prepare an ESFRI Position for discussion in the forum meeting in March 2017.

The EB reviewed the progress of the Roadmap 2018 update, concluded that the work was on track. A procedure for the Landmark selection from among ESFRI Projects was discussed. The EB agreed that the aim was to maintain a high quality of the ESFRI Roadmap. The organisation and goals of informal interviews with 2008 Projects were discussed. It was noted that these interviews were not part of the formal monitoring exercise, but aimed at clarifying the process to the projects and getting a general idea about their progress towards implementation.

The results of the work of the High-level Group on ERINHA were presented to the EB, which concluded that the report

of the HLG was accepted and the Group had fulfilled its mandate. It was noted that the work of the HLG was very useful and could be potentially used in the future in exceptional cases.

The EB also reviewed progress of the organisation of the Roadmap 2018 Info Day in Malaga as well as agreed on the need for a comprehensive discussion on the scope and harmonisation of the Landscape Analysis for the Roadmap 2018.

Finally, the EB was informed about the progress of the WG on LTS of RIs.

# PLENARY FORUM

## 11th March 2016

### Amsterdam, The Netherlands

The 56th Plenary Forum took place in Amsterdam on 11th March, after the Launch event of the ESFRI Roadmap 2016, hosted by the Dutch Presidency of the European Union. The second part of the Plenary Forum was a joint meeting with the e-Infrastructure Reflection Group.

### UPDATES

The Chair stressed that the Launch event of the ESFRI Roadmap 2016, taken place on 10th March, was widely agreed to have been very successful. The Chair also reported on the Exchange of Experience Workshop on Preparatory Phases, held on 9th March in Amsterdam. The Chair underlined that the workshop had been well attended with about 70 participants and that the feedback was very positive.

The EC Delegate, Mr. Octavi Quintana informed the Forum about the upcoming Call for Preparatory Phases and Early Phases opening on 15th March for the new 2016 ESFRI Projects and for Emerging Projects and with deadline on 22nd June 2016.

### NEW TERM OF ESFRI EXECUTIVE BOARD AND SWG CHAIRS AND ELECTION

The Chair confirmed that, as agreed by the Forum, all extended mandates would expire at the end of June. The Chair proposed to open a call for candidates for all vacant posts - the new EB members and SWG Chairs - to be appointed during the 57th Plenary Forum in Geneva.

### WORKING GROUP ON INNOVATION

The Chair recalled the mandate of the Working Group on Innovation and invited the Chair of the Group, Mr. Jean Moulin to present its final report. The Chair invited the Forum to pro-

vide final comments and suggestions to the report by the end of March. The report was finally approved by written procedure.

### ROADMAP PROCESS

A reflection was made on the lessons learnt from the Roadmap 2016 process in light of the preparation of the guide for the Roadmap 2018 update. The Vice Chair proposed a timeline which stipulated the launch of the ESFRI Roadmap 2018 process in October 2016 during ICRI conference in Cape Town, the deadline for submission of proposals in August 2017 and the adoption of the Roadmap in mid-2018. This timeline was accepted by the Forum.

### EUROPEAN RESEARCH AREA COMMITTEE – ERAC

The Chair informed the Forum about the ERAC Steering Board meeting held in Brussels on 3rd March 2016 where ESFRI was represented by Mr. Jean Moulin. It was noted that ESFRI has prepared detailed plans of activities which is fully in line with discussions in ERAC and that ESFRI is ahead of the other Groups in structuring the work plan. The Chair noted that in the draft ERAC Progress Report the ESFRI contribution has been taken fully into account. The Chair also mentioned that in light of the ongoing discussion on Procedural Guidelines of ERA-related Groups, ESFRI needs to analyse the proposed standard clauses as well as intensify its dialogue with the ERAC. ESFRI was invited by ERAC to make a presentation on the way of working in the Steering Board meeting on 28th May.

### GROUP OF SENIOR OFFICIALS

The Vice Chair – who is member of the GSO as one of the 4 European members of G7 – reported on the outcomes of the 7th GSO meeting held on 1-2 February 2016 in Sydney, Australia. The Forum was informed that the GSO decided on the outline of the next report due in September 2017 when the G7 Science Ministers' Meeting will take place.

### JOINT MEETING WITH E-IRG

The Chairs of ESFRI and e-IRG, Mr. John Womersley and Mr. Sverker Holgreen, noted that the joint meeting was a way of building stronger collaborations between the two groups.

A special thanks was given to the e-IRG members who actively participated in the ESFRI Roadmap 2016 update with their contribution to assess e-needs of the new proposals of Research Infrastructure. The ESFRI Chair underlined that their involvement at an early stage would be crucial to support the forthcoming Roadmap 2018 process in the strategic evolution of the e-Infrastructural aspects and investments evaluation, in line with the Council Conclusions of 29 May 2015 that led to the creation of the Working Group on Investment Strategies in e-Infrastructures (e-INFRA WG).

The e-INFRA WG Chair presented the Council Conclusions background and highlighted that the Group would analyse Member States investment strategies in e-Infrastructures for R&I, including high performance and distributed computing as well as scientific data and networks. It would then formulate recommendations on how mechanisms to coordinate these strategies could be implemented.

Preliminary findings, focusing specifically on HPC, would be presented in the 2nd quarter of 2016 and the final report was expected to be delivered to the Council during the 4th quarter of 2016.

The e-IRG Chair highlighted that e-IRG was developing an e-IRG Roadmap and that the Group would need ESFRI's involvement. The e-IRG Chair also mentioned that e-IRG was working on the European Open Science Cloud concept and it would welcome ESFRI's inputs.

## 3rd June 2016

### Geneva, Switzerland

The 57th Plenary Forum was the last chaired by John Womersley. It was hosted in Geneva on 3rd June at the Biotech Campus.

### UPDATES

The Chair briefly reported on his activities since the 56th Forum in Amsterdam. He mentioned his presentation of the ESFRI Roadmap 2016 to the Competitiveness Council on 27th May and the positive reaction, from the Ministers who expressed strong support for ESFRI and recognised the robust methodology employed to develop the Roadmap.

The EC Delegate, Mr. Octavi Quintana, informed the Forum about the release of the EC Communication on the European Cloud Initiative: building a competitive data and knowledge economy in Europe, issued on 19th April 2016. Mr. Octavi Quintana showed the main features of this Communication and its implications for ESFRI.

### NEW TERM OF ESFRI EXECUTIVE BOARD AND SWG CHAIRS AND ELECTION

ESFRI elected 7 members for the new Executive Board – Mr. Jan Hrušak (CZ), Mr. David Bohmert (CH), Ms. Agnieszka Zalewska (PL), Ms. Elisabeth Verges (FR), Mr. Dietrich Nelle (DE), Mr. Yannis Ioannidis (EL), Ms. Inmaculada Figueroa (ES), besides Mr. Giorgio Rossi – the new ESFRI Chair – and the EC Delegate (Mr. Octavi Quintana). ESFRI also elected SWG Chairs: Mr. Harald Boldt (DE) for ENE SWG, Ms. Gelsomina Pappalardo (IT) for ENV SWG, Ms. Gabriela Pastori (UK) for H&F SWG, Jose Luis Martinez (ES) for PHY SWG, and Mr. Jacques Dubucs (FR) for SCI SWG. The Forum appointed the new EB members and SWG Chairs. The new nominees officially started on 1st July.

### WORKING GROUP ON IMPLEMENTATION

The ToR of the WG on Implementation were adopted by the Forum. The IG Chair asked Delegations to suggest potential external experts, as the WG was updating currently updating a pool of experts for the assessment of implementation.

## WORKING GROUP ON INVESTMENTS STRATEGIES IN E-INFRASTRUCTURES

The e-INFRA WG Chair, Mr. Sverker Holmgren updated the Forum on the progress of the Group, referring to the need for a pan-European anchor for e-Infrastructures as it is the case for ESFRI infrastructures.

Mr. Holmgren presented the hitherto work of the Group underlining that the first expected deliverable of the WG will be on HPC. He also reported that the WG has been reflecting on the Cloud Initiative Communication. The WG has in particular identified that there is a need to create a platform for negotiating national contributions to pan European e-Infrastructures, as political awareness on the relevance of e-Infrastructures is still missing in the national frameworks.

## WORKING GROUP ON LONG-TERM SUSTAINABILITY

As a follow-up of the Competitiveness Council conclusions, the Chair proposed to establish a dedicated Working Group on Long-term Sustainability that would provide inputs to the work of the Commission. The Forum appointed Mr. Jan Hrušak as Chair of this WG and asked the ESFRI Secretariat to launch the call for nominations. The Chair also invited Delegations to update their participation in other Working Groups.

## ROADMAP PROCESS

Mr. David Bohmert presented a first draft of the Roadmap 2018 Guide and the rationale behind the document, whose intention is to reinforce the strategic approach to the development of Research Infrastructures in Europe. The Forum discussed main issues such as the requirements for stakeholders' commitment and the need to develop a robust process for the pilot review of Landmarks. The Delegations were asked to revise the draft Guide in time for a second interaction and approval in the 58th Forum in September.

The Forum approved the timeline which stipulated the launch of the ESFRI Roadmap 2018 process in October 2016 during ICRI conference in Cape Town, followed by an Information Day in January organised by the Spanish Delegation. The deadline for submission of proposals would be on 31st

August 2017 and the adoption of the Roadmap in September 2018.

## HIGH LEVEL GROUP ON ERINHA

The High Level Group on ERINHA informed the Forum that the consortium was very eager to continue the work and it was developing a renewed scientific agenda. Mr. Odd Ivar Eriksen noted that the IG recommendations were taken very seriously by the ERINHA consortium. Mr. Bohmert asked the Forum to extend the mandate of the Group until end of 2016, when a consensus on the scientific portfolio of ERINHA was expected.

## COUNCIL CONCLUSIONS ON ERA ADVISORY STRUCTURE

The Forum discussed the Council conclusions on the ERA advisory structure to streamline the procedures of the groups and the main implications for ESFRI as well as how to incorporate into the Procedural Guidelines the standard clauses developed by ERAC. The Forum decided to add a dedicated section to the ESFRI Procedural Guidelines that will cover the interactions of ESFRI with ERAC as well as the ESFRI work related to the ERA Roadmap.

The Chair drew the attention of the Forum to the fact that, within the ERA Progress Report, ESFRI was asked to provide data for indicators agreed to monitor progress of ERA Priority 2B. The Commission presented draft data for each of the three indicators. For the headline indicator, the Forum agreed to provide a qualitative analysis of national roadmaps, validated by Delegations. Regarding the side indicators on the percentage of ESFRI Projects and ESFRI Landmarks in which a given country participates, it was agreed to use data available in the 2016 Roadmap, supplemented by Delegations if any change in membership had occurred in the meantime. It was, in particular, agreed to take as main reference the number of prospective memberships for ESFRI Projects and memberships for ESFRI Landmarks, accompanied by a carefully worded explanation of the meaning of the data.

## FORMAL HANDOVER OF THE ESFRI CHAIR

This Forum meeting was the last one for Mr. John Womersley as Chair. The ESFRI Forum applauded the Chair for his work, presented to him a Roadmap signed by all the Delegates present at the meeting, and welcomed Mr. Giorgio Rossi as the new Chair of ESFRI.

# 23rd September 2016

**Matera, Italy**

The 58th Plenary Forum of ESFRI was the first chaired by Giorgio Rossi. It was hosted in Matera on 23rd September by the University of Basilicata, with welcome speeches by local authorities.

## UPDATES

The Chair welcomed the new members of the Working Groups on Long-term Sustainability and on Implementation and thanked the ESFRI Delegations for the effective commitment in their constitution. He also asked the Delegates to update their participation in the Strategy Working Groups and informed the Forum that their Terms of Reference was under revision.

The Chair presented to the Forum the first volume of the ESFRI Scripta series entitles "Neutron scattering: present status and future perspectives". This ESFRI Scripta Vol.1 reproduces the concluding report of an *ad hoc* group mandated in 2014 by the Physical Sciences & Engineering Strategy Work Group (PSE SWG), to develop a thorough analysis of the European Landscape of Research Infrastructures devoted to Neutron Scattering, and its evolution in the next decades.

The Chair proposed to reintroduce the ESFRI Annual Report. The Forum welcomed this proposal.

Within the updates from the Forum members, 14 Delegations took the floor informing the forum about their national roadmaps, participation in ESFRI RIs as well as other national activities related to RIs.

The Commission informed the Forum about the MFF review proposal submitted to the European Parliament, the 'State of the EU' speech of President Juncker and the call for proposals for Preparatory Phase and Early Phase of ESFRI projects.

## ROADMAP PROCESS

The Forum adopted the ESFRI Roadmap 2018 Guide, the ESFRI Roadmap 2018 Submission form, the Monitoring Questionnaire for 2008 and 2010 Projects and the Pilot Landmarks Review Questionnaire.

The Chair informed the Forum about the details of the launch event organised for the ESFRI Roadmap 2018 process on 4th October during the ICRI conference in Cape Town. He also presented the proposed visual identity for the ESFRI Roadmap 2018 which was welcomed by the Forum.

The Chair reminded the Forum of the context for organising a dedicated Information Day in Europe, followed by an Exchange of Experience Workshop. The meetings, planned on 17-18 January 2017 in Malaga, would offer the possibility for new projects to get well acquainted with the ESFRI requirements and methodology, which is the primary aim of the Info Day, and for the existing ESFRI Projects to understand the requirements for moving to the implementation stage, which will be the focus of the EoE workshop.

## STRATEGY WORKING GROUPS

The SWG Chairs updated the Forum on their last meetings as well as about the composition of the Groups. In particular, they called Delegates for new nominations to cover some competence and expertise gaps.

Most of them noted that a first discussion on the update of the Landscape Analysis had already started as a follow-up of the Roadmap 2016, observing that clear interfaces across domains had been undertaken. Some SWG Chairs noted that a preliminary work was done on analysing the socio-economic impact of Research Infrastructures in their domain.

The ESFRI Chair informed the Forum that the Terms of Reference of SWGs had been updated to be aligned with the Guide. The document was approved by written procedure.

## WORKING GROUP ON IMPLEMENTATION

The IG Chair, Mr. Odd-Ivar Eriksen, thanked delegations for new nominations which significantly strengthened the Group and allowed it to be fully constituted and start the work. He also asked the Forum for suggestions of the experts that could be used by the IG for the update process of the Roadmap. The needed profile required a general expertise in developing and managing RIs.

## WORKING GROUP ON INVESTMENTS STRATEGIES IN E-INFRASTRUCTURES

The e-INFRA WG Chair, Mr. Sverker Holmgren, updated the Forum on the meetings of the Group and underlined that further work was needed. He also informed the Forum that a joint meeting of ESFRI Executive Board and the e-INFRA Group would be organised at the beginning of November. The ESFRI Executive Board would meet with the members of the Group to try to reach concrete, operational conclusions on how to respond effectively to the requests by the Council.

## WORKING GROUP ON LONG-TERM SUSTAINABILITY

The LTS WG Chair, Mr. Jan Hrušak, informed the Forum on the membership, the topics and the work plan of the Group. He advised Delegates that a large Stakeholder Workshop was forthcoming on the 25th November.

## EUROPEAN RESEARCH AREA COMMITTEE – ERAC

The Chair informed the Forum that the report was prepared as ESFRI contribution to the ERA Progress Report 2016, which built on ESFRI contribution to the ERAC Annual Report. The contribution was approved by the Forum.



## 59th PLENARY FORUM
# 9th December 2016

### Brussels, European Commission

The 59th Plenary Forum of ESFRI was hosted by the European Commission DG-RTD in Brussels on 9th December.

## UPDATES

The Chair reported on ongoing ESFRI activities, such as the Procedural Guidelines revision, the Monitoring of the 2008 and 2010 Projects, the Pilot Periodic Review of Landmarks, the drafting of the Landscape Analysis update, the recommendations on Coordination of Investment Strategies in e-Infrastructures and the contribution to ERAC.

The Chair reported on his participation, as ESFRI representative, to the event "Building the European Research Area in partnership with Turkey" on the 24th November and the ERAC Plenary Meeting.

The Forum Delegations updated their position on ERIC participation and on national roadmap procedures and processes planned for the Roadmap 2018 update.

The EC Delegate, Mr. Octavi Quintana, informed the Forum about the Interim evaluation of H2020, which is linked with the ex-ante impact assessment and the preparation of FP9. Mr. Octavi Quintana updated the Forum on international cooperation in Research & Innovation, a crucial point of the Competitiveness Council meeting of 28-29 November.

## ROADMAP PROCESS

Mr. David Bohmert provided an overview of the Public Roadmap Guide for the 2018 Update to be published online after the Forum approval by written procedure.

Mr. Sverker Holmgren informed the Forum that the e-IRG Guidelines on e-needs would be published in January, as a reference document for the Roadmap 2018 Update.

The Chair noted that the Monitoring of the 2010 Projects and the Pilot Landmarks review had started with the interest of all 2010 Projects to undergo Monitoring and the agreement of the selected Landmarks to take part in the Pilot Periodic Review. The Monitoring of the 2008 Projects would start afterwards. The Forum discussed these processes in detail.

The Chair illustrated the rationale for having the ESFRI Monitoring System – ESFRI MOS – to allow for a follow-up of ESFRI Projects and Landmarks along their lifecycle and to easily access their data. ESFRI MOS is a central online platform which allows a monitored interaction of Project Coordinators, Delegates, ESFRI Secretariat - for viewing, editing, adding, and querying Part A (later Part B, C) information on ESFRI Projects & Landmarks. It will facilitate the process of publication of the Roadmap in 2018 – namely the project fiches.

The Chair informed the Forum about the details of the Information Day and Exchange of Experience Workshop organised for the launch of the ESFRI Roadmap 2018 process and hosted on 17-18 January in Malaga.

## HIGH LEVEL GROUP ON ERINHA

Members of the High Level Group on ERINHA informed the Forum about the very positive uptake of the recommendations by ERINHA leading to a complete reset of the scientific case as well as the substantial progress of the project. In particular, ERINHA reshaped its scientific agenda to respond to European needs.

The IG Chair, Mr. Odd Ivar Eriksen, reported on the impact that the readjustment of the research portfolio had on the business plan development. Mr. Eriksen informed the Forum that ERINHA intends to establish an AISBL under Belgian Law.

Mr. David Bohmert, who acted as Secretary to the Group, asked the Forum to terminate the mandate of the Group. The Forum acknowledged the work of the HLG and confirmed that the project was ready to join the monitoring exercise for the 2018 Roadmap.

## STRATEGY WORKING GROUPS

The ENV SWG Chair, Ms. Gelsomina Pappalardo, reported on two previous meetings in April and November. In particular, the Landscape Analysis was being updated – focusing on the gap analysis and socio-economic impact. ENV SWG is involved in the monitoring exercise of three 2008 projects – EISCAT_3D, EPOS and SIOS.

The H&F SWG Chair, Ms. Gabriela Pastori, underlined that the WG was committed to reviewing the Landscape Analysis. Ms. Pastori also reiterated the need to explore potential connections with other scientific areas. The WG already set-up their review teams and CoI matrix. A matchmaking exercise with JPIs and large research programmes and RIs was envisaged for 2017.

The PSE SWG Chair, Mr. Jose Luis Martinez, thanked the Forum for the new nominations and identified the area of astrophysics and astroparticles as the one that still needs additional expertise. In the context of this WG, the EIROforum institutions were asked to update their representatives, who act as observers. Mr. Martinez noted that the reference to engineering was too general and broad and that there may be a need to create a sub-Group, which would be dealing with RIs

for Engineering. In this field, the planning for the 2008 projects monitoring exercise comprises CTA and SPIRAL 2 participates in a pilot Landmarks review.

The SCI SWG Chair, Mr. Jacques Dubucs, noted that in the social and cultural innovation area Pan-European coverage was highly relevant for the development of this field. He stressed that there was a need to improve and synchronize the work with other Groups (eg. ERIHS was in close connection with other scientific fields) and also to deal more efficiently with impact. Mr. Dubucs also informed the Forum that the SCI SWG would organize a conference in Switzerland on impact of RIs – to have a more precise description of the concept. Relevant policy makers had already been invited.

## WORKING GROUPS ON IMPLEMENTATION

The IG WG Chair, Mr. Odd Ivar Eriksen, reported on the composition of the Group and requested the Forum Delegations to identify experts on implementation to participate in the following monitoring exercises.

## WORKING GROUP ON INVESTMENTS STRATEGIES IN E-INFRASTRUCTURES

The e-INFRA WG Chair, Mr. Sverker Holmgren, recalled the mandate of the Group as well as the scope of e-Infrastructures and their relationship with ESFRI Research Infrastructures. Mr. Holmgren reported on the recent activities of the Group, namely a recommendation to the Council on possible mechanisms to coordinate national investments in e-Infrastructures. Mr. Holmgren also provided the underlying analysis and rationale for this recommendation and asked the Forum to consider the mandate of the Group as fulfilled.

Following a discussion on the text of the recommendation, the Forum adopted the document.

## WORKING GROUP ON LONG-TERM SUSTAINABILITY

The LT WG Chair, Mr. Hrušak, reported on the approach taken by the Group and the composition of the drafting groups as

well as on the meetings that had been held over the previous 3 months. Mr. Hrušak presented the planned timeline of the work of the Group and a proposed structure of the report. The outcomes of the Group would be provided to the European Commission to support the preparation of the Staff Working Document.

Mr. Antonio Di Giulio, Head of Unit for Research Infrastructures at the European Commission, recalled the general role of ESFRI in the context of the Commission work on long-term sustainability of RIs. Mr. Di Giulio informed the Forum about the outcomes of the Stakeholder Workshop on long-term sustainability, which was attended by over 150 participants. Mr. Di Giulio recalled that the Commission also engaged in discussions with other stakeholders on the topic, which includes Member States. He invited Delegations to submit national position papers on this topic if a country wished to directly engage in the discussion.



## ESFRI ANNUAL REPORT 2016

The Chair presented a structure of a first draft of the 2016 Annual Report and asked for feedback. Mr. Rossi stressed the usefulness of such a document for internal reference and also for presenting to the general public the main activities of ESFRI and enhancing its transparency. The Forum welcomed the draft.

## HORIZON 2020 INTERIM EVALUATION

The Chair explained to the Forum that ERAC asked for ESFRI inputs to the ERAC position on the interim evaluation of H2020. It was agreed that the EB would prepare a draft contribution by mid-February, taking into account the work of WG on LTS.

# ROADMAP 2016
## PART 1

# DIGITAL ROADMAP 2016
## PART 1, 2, 3

The Part 1 of the Roadmap 2016 was edited and published in hard copies on March 2016 to identify the new features and conclusions of the ESFRI Roadmap 2016 in terms of the methods and procedures that led to the call, the evaluation and selection of the new ESFRI Projects and the definition and assessment of the ESFRI Landmarks. It contains the lists of 21 Projects and 29 Landmarks as identified by their acronym, full name, lifecycle stage, legal status, reference financial data and date of entry in the ESFRI Roadmap. An analysis of the impact of Research Infrastructures on structuring the European Research Area as well as the global research scene, and of the overall contribution to European competitiveness is also presented. The ongoing coaching and monitoring action of ESFRI is explained at the relevant stages of lifecycle of the Research Infrastructures. A methodological section is followed by considerations on the lessons learnt in realizing the ESFRI Roadmap 2016.

This publication was developed by the StR-ESFRI Project, funded by the EU under Horizon 2020, and with the support of the ESFRI Secretariat. Published by the Science and Technology Facilities Council in February 2016, this work was licenced under Creative Commons Attribution 3.0 Unported License. ISBN: 978-0-9574402-4-1

The full Roadmap 2016, consisting of Part 1 along with Part 2 and Part 3, has been published in the form of a digital report.

Part 2 contains the description of each of the ESFRI Projects and ESFRI Landmarks. Each project is represented by a dedicated card reporting the outline of the Research Infrastructure, the background and the steps for implementation. Each landmark card reports the general description, the current activity and the impact of the Research Infrastructure. Reference information about the coordinator, the member and participating countries, the timeline and the updated estimate of construction and operation costs are reported in each card, along with the indication of the headquarters and website.

Part 3 contains the Landscape Analysis that provides the current context, in each domain, of the operational national and international Research Infrastructures open to European scientists and technology developers through peer-review of competitive science proposals. The Landscape Analysis identifies the existing resources, the gaps and the potential evolution of each field in the foreseeable future. It represents an impression of the European RI ecosystem. This responds to the invitation by the Competitiveness Council to broaden the view of ESFRI beyond the Roadmap list of projects and to prepare a general overview and survey of the whole Research Infrastructure system in Europe. The Landscape Analysis is a key ingredient of the new ESFRI evaluation methodology as it supports the understanding of the impact of new projects. It does not represent in any way the view or prioritization of ESFRI or of any Member State for commitments or future investments. ESFRI in no case acts as an advocate of specific potential future projects.

The complete document can be consulted by downloading a pdf, by browsing an interactive pdf or a mini-site through an entry page hosted on the esfri.eu website. The ESFRI Roadmap 2016 is also available for download on the European Commission site.

This publication was developed by the StR-ESFRI Project, funded by the EU under Horizon 2020, and with the support of the ESFRI Secretariat

# ESFRI SCRIPTA – VOL.1

As a part of the complementary publications of the Roadmap 2016 the first volume of the series ESFRI Scripta has been edited and published with the title "Neutron scattering facilities in Europe: present status and future perspectives". It is available in hard copy and online on the esfri.eu and the European Commission websites.

The ESFRI Scripta Vol.1 reproduces the concluding report of an *ad hoc* Expert Group mandated in 2014 by the Physical Sciences & Engineering Strategy Work Group of ESFRI, to develop a thorough analysis of the European Landscape of Research Infrastructures devoted to Neutron Scattering, and its evolution in the next decades. ESFRI felt the urgency of such an analysis, since many reactor-based neutron sources will be closed down in the next years due to national decisions, while the European Spallation Source – ESS – in Lund will be fully operative only in the mid or late 2020s. It was necessary to analyse at the appropriate level the implications in terms of capacity and capability of neutron science in Europe, both during the crossover period of national reactors with the ESS, and in the longer term. This rationale led ESFRI to create the Neutron Landscape Group – NLG, co-chaired by Prof. Colin Carlile, former Director General of the ILL and of the ESS, and Prof. Caterina Petrillo, now Vice-Chair of the ESS Council.

The NLG has delivered its preliminary report in January 2016. An abstract of the main findings was included in the Landscape Analysis of the Roadmap 2016 where the forthcoming publication of the full report was announced. The NLG provided and presented the full report during the PSE SWG meeting held on 10th May in Milan. ESFRI approved its publication as ESFRI Scripta Vol. 1 during the 57th Plenary Forum on 3rd June 2016 in Geneva.

The ESFRI Scripta Vol. 1 was developed on behalf of the Physical Sciences & Engineering Strategy Working Group by the StR-ESFRI Project and with the support of the ESFRI Secretariat. Published by Dipartimento di Fisica – Università degli Studi di Milano in September 2016, this work was licenced under Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. ISBN: 978-88-901562-5-0

# CONTRIBUTION TO THE ERAC ANNUAL REPORT 2016

ESFRI is one of the ERA-related Groups and is expected to contribute to the work of European Research Area Committee upon specific mandate, namely the implementation of ERA Priority 2B on Research Infrastructures.

The ESFRI Chair, *ex officio*, is a member of the ERAC Steering Board, along with the Chairs of the other ERA-related Groups. The ESFRI Chair is not a member of the ERAC, but is often invited to ERAC Plenary meetings.

ERAC invited the ERA-related Groups to provide a contribution to the ERAC Annual Report 2016. ESFRI submitted the first draft of its contribution in September 2016 and a second was adopted at the 60th Plenary Forum on 7th March 2017 in Lisbon. Below the complete text.

**ERA Roadmap Priority 2B**

European Strategy Forum on Research Infrastructures (ESFRI) is responsible for the implementation of the ERA Roadmap Priority 2B: Making optimal use of public investments in Research Infrastructures.

**Key achievements supporting the implementation of the ERA Priority 2B**

ESFRI addresses ERA Priority 2B, which aims at strengthening the European Research Area in the field of Research Infrastructures, by:

- supporting a coherent and strategy–led approach to policy making on Research Infrastructures in Europe, as it gives national authorities constantly updated information on the existing landscape of Research Infrastructures and new opportunities for international and national initiatives for strengthening European science competitiveness (without implications of a priori commitments);

- facilitating multilateral initiatives leading to a better use and development of Research Infrastructures acting as an incubator for pan-European and global Research Infrastructures by foster-

ing a dialogue between national governments, the science stakeholders, the EC and the relevant players at regional, national and international level;

- establishing and updating a European Roadmap for Research Infrastructures (new and major upgrades, pan-European interest) for the coming 10-20 years continuously refining the selection and assessment methodology and stimulating the implementation of these facilities;

- monitoring of Research Infrastructures listed in the ESFRI Roadmap.

In 2016 ESFRI supported the development of the ERA primarily through the following activities:

- Finalisation and publishing of the ESFRI Roadmap 2016;

- Developing a refined procedure for the 2018 ESFRI Roadmap update;

- Preparing recommendations for the Competitiveness Council on better coordination of Member States' investment strategies in e-infrastructures;

- Establishing a Working Group on long-term sustainability of Research Infrastructures.

**ESFRI Roadmap 2016**

In the beginning of the year, ESFRI finalised its 2016 Roadmap, whose launch took place on the 10th of March during a one-day conference organised in association with the Dutch Presidency in Amsterdam by the Royal Netherlands Academy of Arts and Sciences (KNAW), in close cooperation with ESFRI, the European Commission and the Dutch Ministry of Education, Culture and Science. The event, also broadcasted on the web, provided an overview of the Roadmap 2016, which was distributed in hard copies as well as published on the internet.

The Roadmap process stimulated the dialogue between ERA countries, science stakeholders, the European Commission and the relevant players at regional, national and international level, which contributes to fostering scientific excellence and competitiveness of the ERA. With the 2016 Roadmap, ESFRI has developed and applied a lifecycle approach to investments in Research Infrastructures (RI), supporting Member States and Associated Countries in coordination of their national strategies and funding decisions. ESFRI has had a positive impact on structuring the ERA also by supporting a more optimal interplay between regional, national and European RI funding instruments.

The Roadmap contains **21 ESFRI Projects** whose development is considered of strategic importance for the future competitiveness of the European Research Area. It also includes **29 ESFRI Landmarks** representing Research Infrastructures, which were listed in the previous editions of the ESFRI Roadmap, but have now completed their implementation or are under construction.

The Roadmap is complemented with a **Landscape Analysis**, which provides an overview of the European RI ecosystem by identifying the main RIs operating transnational access in Europe and major new or ongoing projects with an outlook to the global landscape of relevance. This includes national, regional and international facilities as well as consortia that offer integrated services and transnational access to state-of-the-art resources for research. The Landscape Analysis is an indicative reference document and does not represent in any way the view or prioritisation of ESFRI or any national financial and political commitment. ESFRI produces the Landscape Analysis as a way to respond to the invitation by the Competitiveness Council to broaden the view of ESFRI beyond its Roadmap. The thorough knowledge of the RI Landscape and of its dynamics is a prerequisite for developing optimal strategies in the field of RI aimed at strengthening the competitiveness and value (excellence and impact) of European research.

### 2018 ESFRI Roadmap update

Following the publication of the ESFRI Roadmap 2016, the Forum refined its roadmap update process and methodology, reinforcing further the life-cycle approach and providing a more effective framework for further coordination of national investments in Research Infrastructures across the ERA.

Continuing its incubator role, ESFRI will organise the **Selection of new proposals**, leading to the identification of additional RIs of strategic importance for Europe. New Research Infrastructures – or major upgrades – on the Roadmap will be selected with respect to the quality of their scientific case and their advanced degree of maturity which includes a completed feasibility study, commitment of a multinational consortium, as well as support of at least three governments.

At the same time ESFRI developed a comprehensive methodology for **monitoring of ESFRI Projects** already on the Roadmap. The monitoring process involves an evaluation of the evolution and actualisation of the scientific case as well as an assessment of the progress of the projects towards implementation, including the commitment of an established international consortium of owners, agreement on the budget for the construction phase and a solid concept for the governance model and financing the whole lifecycle of the infrastructure. Those projects that fail to achieve implementation within the ten-year period will be removed from the Roadmap, fostering further prioritisation of RI investments in Europe.

In addition to this, responding to the invitation of the Competitiveness Council, ESFRI also launched a pilot exercise with four ESFRI Landmarks to explore the ways of effective monitoring of RIs that are already implemented or under construction. The **Pilot Review of the ESFRI Landmarks** addresses the evolution and actualisation of the scientific case and the RI implementation, at the same time identifying their main long-term sustainability challenges. This exercise will help in developing a comprehensive and robust methodology for the periodic review applicable to all Landmarks for future updates of the Roadmap together with clear and well accepted criteria.

The position of all the ESFRI Research Infrastructures in the European research landscape will be outlined or presented in the framework of the updated **Landscape Analysis** – with global perspective – across the science domains.

ESFRI officially launched the process that will lead to the Roadmap 2018 on 4th October 2016, with a presentation event during the International Conference on Research Infrastructures in Cape-Town. The presentation was followed-up on 17th-18th January 2017 with a dedicated Info-Day on submission and selection of new proposals and an Exchange of Experience Workshop explaining the monitoring initiative of ESFRI Projects and the pilot review of the ESFRI Landmarks.

The ESFRI Roadmap process now incorporates the necessary steps to further strengthen the RI ecosystem in the years to come. ESFRI will continue to update its roadmap periodically, offering opportunities to new projects in all fields of science.

### Permanent Working Groups of ESFRI

ESFRI has five Strategy Working Groups which support the Forum with scientific expertise across all the areas covered by the Forum. They include:

- Strategy Working Group on Energy

- Strategy Working Group on Environment

- Strategy Working Group on Health and Food

- Strategy Working Group on Physical Sciences and Engineering

- Strategy Working Group on Social and Cultural Innovation

The expertise gathered in the Groups is essential in the preparation of the Landscape Analysis for the ESFRI Roadmap as well in the scientific evaluation of new RI proposals and monitoring of ongoing ESFRI projects.

ESFRI also has a permanent Working Group on Implementation which is responsible for the assessment of maturity of new RI proposals and the monitoring of progress in implementation of ongoing ESFRI projects.

### ESFRI report on strengthening the relations between Research Infrastructures and industry and innovation

Following up on the invitation of May 2011 from the Council of the EU to ESFRI to "*contribute towards supporting the implementation and monitoring of progress of the Innovation Union initiative*", ESFRI established in 2013 a dedicated Working Group with the aim to contribute to the development of a strategy aimed to strengthen and improve the relations between Research Infrastructures and Industry and to promote the potential for innovation of Research Infrastructures.

The final report from the Group was adopted by ESFRI in April 2016. The report provides a comprehensive analysis of the role and place of Research Infrastructures in the innovation chain identifying the different forms of RI-industry interactions and relationships. It discusses the role of industry as suppliers of equipment and services for RIs, and as users of RIs. The report also considers Research Infrastructures as data generators and identifies the broader socio-economic impacts of RIs.

The report proposed a comprehensive set of recommendations to all actors and stakeholders, including the RIs, public authorities at regional, national and European level, as well as to the business sector, on how to strengthen the impact of RIs on industry and innovation in order to fully exploit the potential of RIs to address societal challenges.

### ESFRI recommendation on better coordination of Member States' investment strategies in e-Infrastructures

In the meeting of the Competitiveness Council of May 28-29 2015, the Council adopted conclusions on open, data-intensive and networked research, which invited ESFRI to explore mechanisms for better coordination of Member States' investment strategies in e-Infrastructures, covering also HPC, distributed computing, scientific data and networks. To respond to the invitation by the Council, ESFRI established a dedicated Working Group. Based on the report from the Working Group, ESFRI adopted the recommendation during its 59th meeting on 9 December 2016 in Brussels.

In this recommendation, ESFRI advises to establish urgently a convergent policy of funding mechanisms for e-Infrastructures at the various levels (institutional, regional, national, European). Such policy could include support and financing of e-Infrastructures for scientific users, providing incentives to researchers to generate FAIR (Findable, Accessible, Interoperable, and Re-usable) and reproducible (+R) data, as well as the development of enabling e-tools/e-technologies and the mainstreaming of support actions addressing e-needs of all levels of intervention. ESFRI also suggested to act as strategy forum of funders of e-Infrastructures for European science as a key element of support of a coherent approach to policy-making on research infrastructure in Europe. ESFRI recognizes that funding of HPC Tier-Zero facilities bears challenges similar to more centralized large-scale Research Infrastructure facilities with direct industrial implications and should be dealt with accordingly.

### Working Group on Long-Term Sustainability of Research Infrastructures

In the meeting of 27th May 2016, the Competitiveness Council discussed the ESFRI 2016 Roadmap and the long-term sustainability (LTS) issue. In this context, the Competitiveness Council underlined the importance of ensuring long-term sustainability of Research Infrastructures and invited

the Commission to prepare together with ESFRI and relevant stakeholders a targeted action plan.

In order to comprehensively respond to the Council conclusions, covering the full spectrum of the LTS debate, ESFRI set up a dedicated Working Group. The work focuses on the pre-conditions identified by the consultation launched by the Commission in December 2015. These pre-conditions include funding and governance aspects of RIs, socio-economic impact as well as the management and exploitation of data and the innovation potential of RIs.

The objective of this WG is to provide a consolidated input to the European Commission for the preparation of the action plan mentioned in the Council conclusions, addressing the long-term sustainability of Research Infrastructures.

## EXCHANGE OF EXPERIENCE WORKSHOP

## MAKING EFFECTIVE USE OF HORIZON 2020 PREPARATORY PHASE FUNDING

# 9th March 2016

## Amsterdam, The Netherlands

This Workshop, organised by the StR-ESFRI Project in close cooperation with ESFRI and the European Commission, was mainly aimed at scientific leaders and managers of ESFRI Projects and Emerging Projects listed on the ESFRI Roadmap 2016, currently implementing or preparing for a Preparatory Phase under Horizon 2020. Representatives of selected ESFRI Landmarks were also invited to discuss their experiences with such projects.

The core aim of this event is to provide a platform for effective, high-level interaction – exchange of experiences –, coordination and networking between ESFRI Projects and selected ESFRI Landmarks on the one hand, and the European Commission, ESFRI Working Group on Implementation and ESFRI Strategy Working Groups on the other hand.

The workshop thus mobilises substantial combined expertise – best practise – in setting up pan-European RIs with the aim to:

- present the new concept of Preparatory Phase Projects;

- discuss how to identify and overcome the main bottlenecks in RI implementation and how to effectively use EU funding to that end;

- inform about the current ESFRI strategy.

The first session of the workshop was dedicated to the *ESFRI roadmap process, and links with national RI roadmaps* followed by an explanation about *Smart Specialisation Strategies* presented by the ESFRI Vice Chair Giorgio Rossi. Thereafter *lessons learnt from ESFRI evaluation and assessments of implementation* were presented by David Bohmert, the former Chair of the ESFRI working group of Implementation. Paul Tuinder from the European Commission introduced the *Preparatory Phase funding under Horizon 2020.* Each presentation is shortly summarized in the following chapters.

The second part of the workshop was dedicated to panels about three main issues a) Governance, b) Funding and c) Legal issues. This part started with respectively three short keynote speeches of Landmark projects to stimulate discussions on each topic.

The workshop was attended by more than 70 participants representing the target group such as scientific leaders and managers of ESFRI Projects, listed on the ESFRI Roadmap 2016 currently implementing or preparing for a Preparatory Phase under Horizon 2020. Other participants were representatives of selected ESFRI Landmarks Ministries, the European Commission, national managing authorities, and ESFRI members, multipliers of the scientific community and other ERA stakeholders or policy makers in order to exchange their views and experiences with the relevant target group. According to a survey which was conducted after the end of the workshop it turned out that 99% of the participants were very satisfied/satisfied with the content and the workshop quality. The common view expressed that the discussions and presentations of speakers helped to find answers regarding main challenges the ESFRI projects are currently facing. A sensitive issue about exchange of experiences is still the implementation of contact points or communication platforms to get promptly relevant information on challenges they must face.

## ROADMAP 2016 LAUNCH EVENT

# 10th March 2016

## Amsterdam, The Netherlands

On March 10th 2016, ESFRI launched its Roadmap 2016 update during a one-day conference organised in Amsterdam by the Royal Netherlands Academy of Arts and Sciences – KNAW, in association with the Dutch Presidency and in close cooperation with ESFRI, the European Commission and the Dutch Ministry of Education, Culture and Science. The conference was attended by around 200 participants, and followed by another 200 persons live via web streaming. The event included speeches by Mr. Robert-Jan Smit, Director General for Research and Innovation at the European Commission and Mr. Sander Dekker, Dutch State Secretary for

Science and Education. Mr. John Womersley, the ESFRI Chair gave an overview of the Roadmap 2016 and the details of the new RIs included in the Roadmap were presented by their coordinators.

## ROADMAP 2018 PROCESS LAUNCH EVENT

# 4th October 2016

## Cape Town, South Africa

On 4th October 2016, ESFRI launched the process that will lead to the Roadmap 2018 update during the International Conference on Research Infrastructures – ICRI 2016 – that took place in Cape Town. The event, also broadcasted on streaming, provided the international community with the rationale for the update and an overview of the methodology that ESFRI will adopt for the selection of new proposals and the procedure of monitoring that will qualify ESFRI Projects reaching the 10-year term as ESFRI Landmarks. ESFRI introduced also the Periodic Review of ESFRI Landmarks that will lead to the identification of opportunities for integration and internationalisation of the Research Infrastructures portfolio.

# UPDATE OF THE ESFRI ROADMAP 2016

Conclusions of the Council of the European Union of 26th May 2014 on Implementation of the Roadmap for the European Strategy Forum on Research Infrastructure (ESFRI)[2].

The Council of the European Union:

RECALLING its Conclusions of 11 December 2012, endorsing the Commission Communication on A reinforced European research area partnership for excellence and growth, and emphasising the need for renewing and adapting the mandate of the European Strategy Forum on Research Infrastructures – ESFRI – to adequately address the existing challenges and also to ensure the follow-up of implementation of already on-going ESFRI projects after a comprehensive assessment, as well as the prioritisation of the infrastructure projects listed in the ESFRI roadmap;

TAKING NOTE of the ESFRI report of 7 April 2014 entitled the prioritisation of support to ESFRI projects for implementation:

a. WELCOMES the contribution of ESFRI to the objectives of the European Research Area and to achieving the Innovation Union commitment on Research Infrastructures.

b. ACKNOWLEDGES the work done by ESFRI to identify priority projects which are mature enough to be under implementation 2015-2016 and whose timely implementation is considered essential to extend the frontiers of knowledge in the fields concerned.

c. NOTES that ESFRI has identified three projects from the ESFRI roadmap as priorities in that they are pushing the boundaries of scientific excellence, are strategically relevant for Europe, and are ready for immediate action (part 1 of the Annex).

d. NOTES that ESFRI has identified nine additional projects that could reach implementation phase by 2015-2016 (part 2 of the Annex).

e. NOTES that ESFRI has presented an analysis of the need to support some already implemented projects for sus-

tainability and European coverage (part 3 of the Annex), and a note on the potential for distributed infrastructures to deliver integrated services and hence greater scientific impact in biomedical research and in environmental research.

f. CONFIRMS the Member States' commitment to focus their available national resources on the respective prioritised projects they are financially participating in.

g. INVITES the Commission, under Horizon 2020, to complement the Member States' own financial commitments through a one-time financial contribution for the priority projects, and to financially support the other projects identified by ESFRI and listed in the Annex.

h. ENCOURAGES Member States to consider investing in the implementation and operation of ESFRI projects using also European Structural and Investment Funds (ESIF) by including Research Infrastructures in their Research and Innovation Strategies for Smart Specialisation and by using the possibility of financing operations outside the ESIF programme areas; INVITES the Commission and the Member States' authorities to enhance synergies between ESIF and Horizon 2020.

i. RECOGNISES the importance and progress of those further ESFRI projects that are already under implementation, or well on the way towards it.

j. WELCOMES the plans of ESFRI to update its roadmap in 2015/2016; CALLS on ESFRI to continue the prioritisation of all the research infrastructure projects of the ESFRI roadmap, and INVITES the Member States to consider putting forward further projects for possible inclusion in this roadmap update.

2. **Conclusions of the Council of the European Union of 26 May 2014** on the Implementation of the roadmap for the European Strategy Forum on Research Infrastructures. Doc. 10257/14

http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%2010257%202014%20INIT

# UPDATE OF THE ESFRI ROADMAP 2018

Conclusions of the Council of the European Union of 27th May 2016 on FP7 and the Future Outlook: Research and innovation investments for growth, jobs and solutions to societal challenges[4].

The Council of the European Union:

RECALLING its Conclusions of 26 May 2014 on the Implementation of the Roadmap for the European Strategy Forum on Research Infrastructure (ESFRI) which welcomed the plans of ESFRI to update its roadmap in 2015/2016 and called on ESFRI to continue the prioritisation of all the research infrastructure projects of the ESFRI roadmap,

a. UNDERLINES the importance of Research Infrastructures for a functioning ERA and an innovative and competitive Europe, and WELCOMES the Strategy Report and Roadmap Update 2016 developed by the European Strategy Forum on Research Infrastructures (ESFRI);

b. ACKNOWLEDGES the efforts made by ESFRI to further prioritise Research Infrastructure projects on the ESFRI Roadmap, WELCOMES the identification of ESFRI Landmarks, RECOGNISES their continued strategic role in driving scientific excellence and innovation in Europe and CALLS on ESFRI to closely monitor the implementation of ESFRI projects, to periodically assess the scientific status of ESFRI Landmarks, and to prepare the next ESFRI Roadmap update in 2018;

c. RECOGNISES that research infrastructures and e-infrastructures are becoming more and more interlinked, STRESSES the need for intensified cooperation between ESFRI and other stakeholders and ENCOURAGES their joint efforts for coordination of the national e-infrastructures investment strategies.

4. **Conclusions of the Council of the European Union of 27 May 2016** on FP7 and the Future Outlook: Research and innovation investments for growth, jobs and solutions to societal challenges. Doc. 9527/16

http://data.consilium.europa.eu/doc/document/ST-9527-2016-INIT/en/pdf

# INDUSTRY-ORIENTED COOPERATION OF RESEARCH INFRASTRUCTURES

Conclusions of the Council of the European Union of 31st May 2011 on the Development of the European Research Area (ERA) through ERA related groups[5].

The Council of the European Union:

INVITES the European Strategic Forum on Research Infrastructures (ESFRI) to also contribute towards supporting the implementation and monitoring of progress of the Innovation Union initiative, and provide input, as appropriate, to the development of a proposal on the ERA Framework.

5. **Conclusions of the Council of the European Union of 31 May 2011** on Development of the European Research Area (ERA) through ERA related groups. Doc. 11032/11

http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%2011032%202011%20INIT

# MEMBER STATES' INVESTMENT STRATEGIES IN E-INFRASTRUCTURES

# LONG-TERM SUSTAINABILITY OF RESEARCH INFRASTRUCTURES

Conclusions of the Council of the European Union of 29th May 2015 on Open, data-intensive and networked research as a driver for faster and wider innovation[6].

Conclusions of the Council of the European Union of 27th May 2016 on FP7 and the Future Outlook: Research and innovation investments for growth, jobs and solutions to societal challenges[4].

The Council of the European Union:

a. STRESSES the importance of PRACE, a world-class European High Performance Computing (HPC) infrastructure for research that provides access to computing resources and services for large-scale scientific and engineering applications; ACKNOWLEDGES the need to develop the new generation of HPC technologies and CALLS for the reinforcement of the interconnected network of data processing facilities GEANT. In this respect,

b. INVITES ESFRI to explore mechanisms for better coordination of Member States' investment strategies in e-infrastructures, covering also HPC, distributed computing, scientific data and networks.

The Council of the European Union:[1]

UNDERLINES the importance of ensuring long-term sustainability of Research Infrastructures and INVITES the Commission to prepare together with ESFRI and relevant stakeholders a targeted action plan.

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6. **Conclusions of the Council of the European Union of 29 May 2015** on Open, data-intensive and networked research as a driver for faster and wider innovation. Doc. 9360/15

   http://data.consilium.europa.eu/doc/document/ST-9360-2015-INIT/en/pdf

4. **Conclusions of the Council of the European Union of 27 May 2016** on FP7 and the Future Outlook: Research and innovation investments for growth, jobs and solutions to societal challenges. Doc. 9527/16

   http://data.consilium.europa.eu/doc/document/ST-9527-2016-INIT/en/pdf

## ESFRI Chair

**WOMERSLEY John**
Science and Technology Facilities Council
john.womersley@stfc.ac.uk

**ROSSI Giorgio**
Università degli Studi di Milano
giorgio.rossi2@unimi.it

## ESFRI Vice Chair

**HRUŠAK Jan**
Academy of Sciences of
the Czech Republic
hrusak@kav.cas.cz

# MEMBER STATES

## AUSTRIA

**WESELKA Daniel**
Austrian Federal Ministry of Science,
Research and Economy
daniel.weselka@bmwfw.gv.at

## BELGIUM

**LENOIR Laurence**
Belgian Science Policy Office – BELSPO
e-mail: laurence.lenoir@belspo.be

**LUXEN André**
University of Liège
e-mail: aluxen@ulg.ac.be

## BULGARIA

**KUZOV Orlin**
Ministry of Education and Science
okouzov@mon.bg

**PROYKOVA Ana**
Sofia University, Faculty of Physics
anap@phys.uni-sofia.bg

## CROATIA

**ANTIČIĆ Tome**
Ruder Boskovic Institute
Tome.Anticic@irb.hr

**SKOČILIĆ Zeljka**
Ministry of Science and Education
Zeljka.Skocilic@mzo.hr

## CYPRUS

**ASPRIS Christos**
Directorate General for European
Programmes, Coordination
and Development
caspris@dgepcd.gov.cy

**EPAMINONDOU Evgenios**
Permanent Representation of the
Republic of Cyprus to the EU
eepaminondou@dgepcd.gov.cy

## CZECH REPUBLIC

**HRUŠAK Jan**
Academy of Sciences of
the Czech Republic
hrusak@kav.cas.cz

**VENTLUKA Petr**
Ministry of Education, Youth and Sports
petr.ventluka@msmt.cz

## DENMARK

**CHRISTENSEN Lars**
Ministry of Higher Education and Science
lach@fi.dk

## ESTONIA

**RÄIM Toivo**
Ministry of Education and Research
toivo.raim@hm.ee

**REIMAND Indrek**
Ministry of Education and Research
indrek.reimand@hm.ee

## FINLAND

**KAUPPINEN Petteri**
Ministry of Education, Science and Culture
petteri.kauppinen@minedu.fi

**MAIJALA Riitta**
Academy of Finland
riitta.maijala@aka.fi

## FRANCE

**CHARDONNET Christian**
Ministère de l'Education nationale,
de l'Enseignement supérieur
et de la Recherche
christian.chardonnet@recherche.gouv.fr

**VERGÈS Elisabeth**
Ministère de l'Education nationale,
de l'Enseignement supérieur
et de la Recherche
elisabeth.verges@recherche.gouv.fr

## GERMANY

**NELLE Dietrich**
Federal Ministry of Education and Research
Nelle@zbmed.de

**VIERKORN-RUDOLPH Beatrix**
Federal Ministry of Education and Research
beatrix.vierkorn-rudolph@bmbf.bund.de

## GREECE

**IOANNIDIS Yannis**
Athena-Innovation
yannis@athena-innovation.gr

**KOUTROKOI Maria**
Ministry of Culture, Education
and Religious Affairs
mkoutr@gsrt.gr

## HUNGARY

**LÉVAI Péter**
Hungarian Academy of Sciences
plevai@rmki.kfki.hu

**SZABÓ István**
National Research, Development
and Innovation Office
istvan.szabo@nkfih.gov.hu

**TOTHNE VIZKELETY Barbara**
(Deputy Member)
National Research, Develpoment
and Innovation Office
Barbara.vizkelety@nih.gov.hu

## IRELAND

**O'CONNOR Nicki**
Higher Education Authority (HEA)
noconnor@hea.ie

**RYAN Michael**
Science Foundation Ireland
michael.ryan@sfi.ie

## ITALY

**PAPPALARDO Gelsomina**
Consiglio Nazionale delle Ricerche
- Istituto di Metodologie per l'Analisi
Ambientale – CNR-IMAA
gelsomina.pappalardo@imaa.cnr.it

**TOCCHINI-VALENTINI Glauco**
Consiglio Nazionale delle Ricerche  – CNR
gtocchini@ibc.cnr.it
gtocchini@emma.cnr.it

## LATVIA

**DEPKOVSKA Anita**
Ministry of Education and Science
of the Republic of Latvia
Anita.depkovska@izm.gov.lv

**JEKABSONE Inga**
Ministry of Education and Science
of the Republic of Latvia
inga.jekabsone@izm.gov.lv

## LITHUANIA

**PETRAUSKAITĖ Rūta**
Research Council of Lithuania
ruta@hmf.vdu.lt

**RAZMAITĖ Renata**
Ministry of Education and Science
of the Republic of Lithuania
Renata.Razmaite@smm.lt

## LUXEMBURG

**KERGER Robert**
Ministère de la Culture, de l'Enseignement
supérieur et de la Recherche
robert.kerger@mesr.etat.lu

**WENANDY Lynn**
Ministère de la Culture, de l'Enseignement
supérieur et de la Recherche
lynn.wenandy@mesr.etat.lu

## MALTA

**MICALLEF Joseph**
University of Malta
joseph.micallef@um.edu.mt

**SAMMUT Nicholas**
University of Malta
nicholas.sammut@um.edu.mt

## POLAND

**DREWNIAK Dariusz**
Ministry of Science and Higher Education
dariusz.drewniak@mnisw.gov.pl

**ZALEWSKA Agnieszka**
Polish Academy of Science
Agnieszka.Zalewska@ifj.edu.pl

## PORTUGAL

**CASTANHO Miguel**
Foundation for Science & Technology
miguel.castanho@fct.pt

**LEANDRO Cristiana**
Foundation for Science & Technology
cristiana.leandro@fct.pt

## ROMANIA

**MIHAIL Iulia**
Romanian Office for Science
and Technology to the UE
iulia.mihail@ancs.ro

**VULTURESCU Viorel**
Ministry of National Education
and Scientific Research
Viorel.vulturescu@ancs.ro

### SLOVAK REPUBLIC

**PLAVČAN Peter**
Ministry of Education, Science, Research
and Sport of the Slovak Republic
peter.plavcan@minedu.sk

**HALADA Lubos**
Institute of Landscape Ecology SAS
lubos.halada@savba.sk

### SLOVENIA

**CEH Miran**
Institut Jozef Stefan
miran.ceh@ijs.si

**KRALJ Albin**
Ministry of Education, Science and Sport
albin.kralj@gov.si

### SPAIN

**FIGUEROA Inmaculada**
Ministry of Economy, Industry
and Competitiveness
inmaculada.figueroa@mineco.es

**MARTÍNEZ José Luis**
Consorcio ESS Bilbao
jlmartinez@essbilbao.org
martinez@icmm.csic.es

### SWEDEN

**HALLERÖD Björn**
Swedish Research Council
Bjorn.Hallerod@vr.se

**JOHNSSON Mats**
Ministry of Education and Research
mats.johnsson@gov.se

### THE NETHERLANDS

**RIDDER-NUMAN Jeannette**
Ministry of Education, Culture and Science
j.w.a.ridder@minocw.nl

**DUIJN Hans Van**
National Permanent Committee
for Large-scale Scientific RIs
m.marges@nwo.nl

### UNITED KINGDOM

**HARRISON Andrew**
Diamond Light Source Ltd
andrew.harrison@diamond.ac.uk

**PASTORI Gabriela**
Biotechnology and Biological Sciences
Research Council – BBSRC
gabriela.pastori@bbsrc.ac.uk

### EUROPEAN COMMISSION

**QUINTANA Octavi**
Directorate - General for
Research & Innovation
Octavi.Quintana-Trias@ec.europa.eu

# ASSOCIATED COUNTRIES

### ALBANIA

**YLLI Alban**
Institute of Public Health
albanylli@yahoo.co.uk

### ARMENIA

**HAROUTIUNIAN Samvel**
RA MES State Committee of Science
sharout@ysu.am

**SAHAKIAN Vardan**
RA MES State Committee of Science
v.sahakian@scs.am

### BOSNIA AND HERZEGOVINA

**CAMUR VESELINOVIČ Biljana**
Ministry of Civil Affairs
biliana.camur@mcp.gov.ba

**MIRAŠČIJA Ammar**
Ministry of Civil Affairs
ammar.mirasciia@mcp.gov.ba

### ICELAND

**JÓNSDÓTTIR Ásdís**
Ministry of Education, Science and Culture
asdis.jonsdottir@mrn.is

**STEPHENSEN Eirikur**
University of Iceland
esteph@hi.is

### ISRAEL

**HORN David**
Tel Aviv University
horn@tau.ac.il

### LIECHTENSTEIN

**A. HEEB Frank**
Office of Economic Affairs
frank.heeb@avw.llv.li

### MACEDONIA

**CVETKOVSKA Meri**
Ss. Cyril and Methodius University - Skopje
m.cvetkovska@ukim.edu.mk

### MOLDOVA

**TIGINYANU Ion**
Academy of Sciences of Moldova
tiginyanu@asm.md

### MONTENEGRO

**SENDELJ Ramo**
Mediterranean University
ramo.sendelj@unimediteran.net

### NORWAY

**ERIKSEN Odd Ivar**
The Research Council of Norway
oie@forskningsradet.no

**HENRICHSEN Bjørn**
Norvegian Centre for Research Data
bjorn.Henrichsen@nsd.no

### SERBIA

**BUGARSKI Branko**
Ministry of Education, Science and
Technological Development
branko.bugarski@mpn.gov.rs

### SWITZERLAND

**BOHMERT David**
Swiss National Science Foundation – SNSF
david.bohmert@snf.ch

**Martin KERN**
Federal Department of Economic
Affairs, Education and Research
martin.kern@sbfi.admin.ch

**Nicole SCHAAD** (NCP/expert)
National Research and Innovation – NFI
nicole.schaad@sbfi.admin.ch

### TURKEY

**OZGOREN Murat**
Dokuz Eylul University
murat.ozgoren@deu.edu.tr

# OBSERVERS

### FAROE ISLANDS

**SØLVARÁ Annika**
The Faroese Research Council
annika@gransking.fo

### UKRAINE

**SHAPOVAL Stella**
Ministry of Education and
Science of Ukraine
s.shapoval@mon.gov.ua

# EXECUTIVE SECRETARIAT

**SOBCZAK Dominik**
ESFRI Executive Secretary
DG Research & Innovation, Unit B.4
dominik.sobczak@ec.europa.eu

**RIBEIRO Margarida**
DG Research & Innovation, Unit B.4
margarida.ribeiro@ec.europa.eu

**VRANCIANU Eusebiu**
DG Research & Innovation, Unit B.4
eusebiu.vrancianu@ec.europa.eu

# ASSISTANTS TO THE CHAIR

### To WOMERSLEY John

**DAVIS Zena**
Science and Technology Facilities Council
zena.davis@stfc.ac.uk

### To ROSSI Giorgio

**CARPINETI Marina**
Università degli Studi di Milano
marina.carpineti@unimi.it

**DONZELLI Maddalena**
Università degli Studi di Milano
maddalena.donzelli@unimi.it