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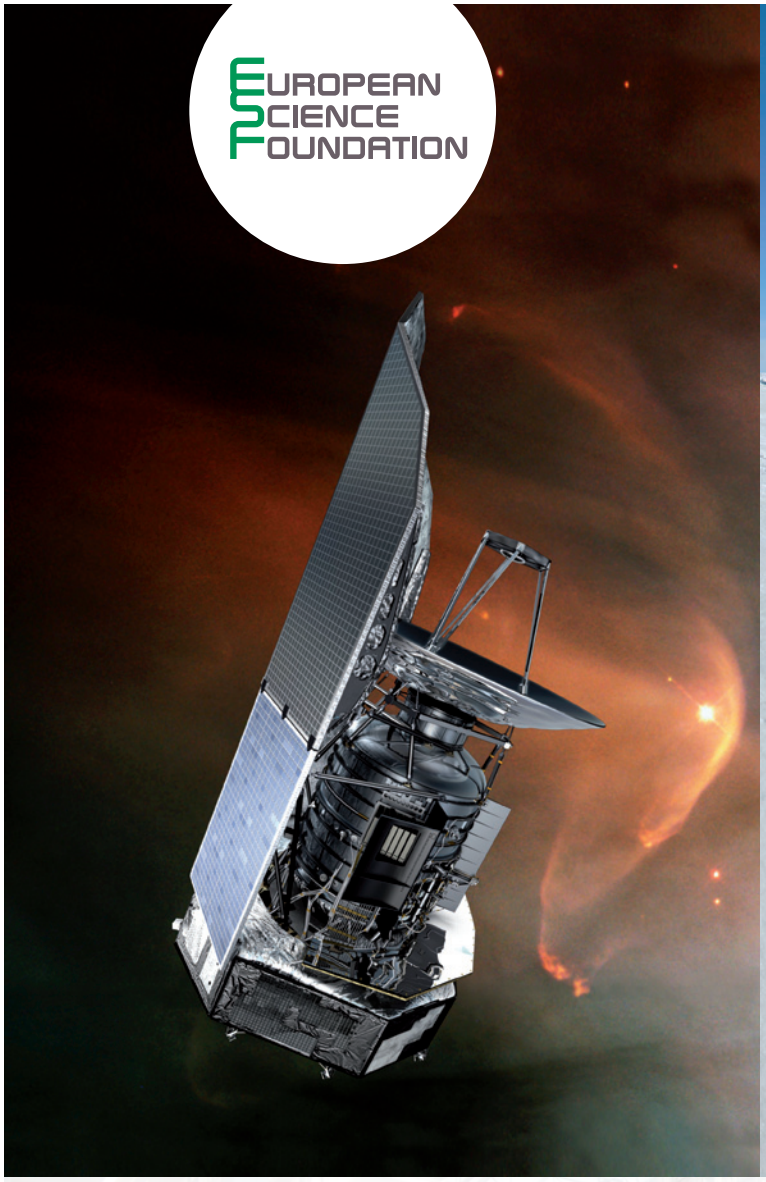

Research Infrastructures in the European Research Area

A report by the ESF Member Organisation Forum on Research Infrastructures

European Science Foundation (ESF)

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- Joint strategy development and strategic cooperation with regard to research issues of a European nature.
- Development of best practices and exchange of practices on science management, to benefit all European organisations and especially newly established research organisations.
- Harmonisation of coordination by MOs of national programmes and policies in a European context.

www.esf.org/mo-fora

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Foreword

The infrastructure supporting research is of growing importance for modern science in many research disciplines, from the humanities and social sciences, through life and natural sciences, to physics and engineering. As research infrastructure increases in importance, questions about how to finance, organise and manage it have become a serious topic for funding and research organisations. The European Science Foundation's Member Organisation Forum on Research Infrastructures has been a platform for discussing the adequate treatment of infrastructure-related issues. Funding procedures, access rules, running costs, personnel and renewal are among the issues that benefit from being discussed on a European level.

This report gives an overview of the intentions, results and conclusions of the MO Forum over the last three years. Beginning with the rationale for the MO Forum on Research Infrastructures, the paper continues with a presentation of the activities of the Forum and their outcomes, including the legacy of the Forum for research infrastructures in Europe. Special attention is paid to the MERIL Project (Mapping of the European Research Infrastructure Landscape), conducted by the ESF in close connection to the Forum, which has contributed to a substantial updating of information on existing research infrastructures across Europe.

ESF governance has instructed the executive to continue and further develop the work on the MERIL platform following the completion of the EC funded phase.

The paper is mainly addressed to facility managers, RI operators, research and funding organisations, and will enable them better to decide how to provide modern and appropriate boundary conditions for users of research infrastructures, as well as to assess the quality of their operation.

Johannes Janssen
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Executive Summary

It is increasingly recognised that the infrastructure supporting scientific activity is a fundamental to modern research in many, if not most areas. Some disciplines, such as physics and astronomy, have a long history of planning, building and operating the infrastructure they need for their science. By contrast, life sciences and humanities, to name just two examples, are newer to this field.

The national research funding and research performing organisations of Europe cover all areas of research and consequently fund the construction and operation of most of the individual research infrastructures of Europe. The Member Organisation Forum on Research Infrastructures (MOFRI) of the European Science Foundation (ESF), launched in January 2010, was a first attempt to bring together national agencies from all over Europe for joint discussions of policy on research infrastructures (RIs).

Complementing the work of ESFRI[1] on future needs for pan-European RIs, the Forum focused on the efficient utilisation of existing RIs, covering a broad range from regional to European relevance. In the framework of the Forum, a dedicated project, 'Mapping of the European Research Infrastructure Landscape (MERIL)', was launched in October 2010, with support from the European Commission, in order to address the need for an inventory of research infrastructures both as a basis for policy making and as a source of information for researchers.

Quality standards for individual research infrastructures were defined through the Forum with the input of researchers from various fields and endorsed by EUROHORCs.[2] These standards, designated the 'Basic Requirements', aim especially at defining a minimum level of quality in the provision of access to a research infrastructure, and thus constitute a guideline for operators of RIs to ensure a high quality user service.

Cooperation between ESFRI and MERIL resulted in the so-called 'Common Features' of RIs. They describe a model against which to assess any given RI. The Common Features also define the criteria for inclusion of RIs in the MERIL inventory. The challenging task of making a comprehensive inventory of European RIs will be completed in 2013. A database and portal are already in place, and the ESF member organisations have agreed to support the MERIL project beyond the end of the EC contract in December 2012, in order to allow for consolidation and exploitation of the database. An important new feature of the approach of the MERIL inventory is to have instituted eligibility checks of prospective entries by national contact persons, providing in this manner a consistent link between the national and the European level.

Alignment and complementarity with related initiatives on the European level, rather than competition or overlap, were guiding principles of all MOFRI work, which ensured that the Forum could make a unique contribution to European policy making on research infrastructure. Shared quality standards and a common understanding of RIs will contribute towards harmonisation of efforts in Europe and to the realisation of the ERA. The MO Forum on Research Infrastructures was a successful first step in this direction – the collaborative effort will therefore be continued in a working group of Science Europe with the aim of intensifying cooperation in decision making on research infrastructures in Europe.

1. European Strategy Forum on Research Infrastructures
2. European Heads of Research Councils, which was succeeded by Science Europe in October 2011

1. Introduction

Europe and its individual nations have a strong history in the field of research infrastructure. As the location for CERN (est. 1952), it has given leadership to global science, and through successive EU Framework programmes it has expanded the definition of individual research infrastructures (RIs) and demonstrated the benefits of cooperation and collaboration between national centres. This report understands research infrastructures as facilities, platforms, resources and related services used by the scientific community to conduct research.

Finding a balance between the interests of researchers, RI operators, funding agencies, governments and the European Commission (EC), given inherent tensions between local, national and federal perspectives, is a challenge in this field of policy. However, in recent decades the RI sector in Europe has flourished, with the definition of research infrastructure expanding from physics-based machines to incorporate any centre of knowledge or facility which is core to a particular research discipline, such as a database or museum, as well as distributed RIs working over multiple sites.

The infrastructure supporting research activities is increasingly recognised as a vital prerequisite for modern research in many, if not most areas. The interests of governments in forward-planning for research infrastructure have been addressed through ESFRI, The European Strategy Forum for Research Infrastructures, an intergovernmental body supported by the Commission to examine the needs for new RI investments across the research base. The interests of RI operators have been addressed through associations such as EIROforum[3] for the international research centres and ERF[4] for the national centres. The ESF Member Organisation Forum on Research Infrastructures (MOFRI)[5] launched in January 2010 was a first venture in examining RI policy from the perspective of the national research funding and performing agencies that in general bear the costs of the construction and operation of RIs, including the ESFRI projects.

Most of those national research funding and research performing organisations were members of the EUROHORCs, now transformed to Science Europe, and/or the ESF. It was, therefore, natural for the EUROHORCs and ESF to consider the issue of research infrastructures both in their Road Map and in their Action Plan towards a European Research Area (ERA). While ESFRI has mostly been concerned with the planning and construction of new and pan-European RIs, the MOFRI had its focus on existing RIs, with a broad scope regarding the size and type of RI, in line with the wide-ranging responsibilities of the MOFRI partners.

This document reports on the outcomes of the work of the Forum, jointly with the EU-funded MERIL project which has fulfilled part of the MOFRI goals. A key challenge for the sector is the establishment of standards for what constitutes an RI, what services it should provide and how its quality can be assessed both ex-ante and ex-post. The report sets out the conclusions of the Forum on these key issues and establishes a baseline which policy makers and agency staff can use in the assessment of RIs.

3. See: www.eiroforum.org and Glossary of Actors, Annex IV

4. See: http://www.europeanresearchfacilities.eu/ and Glossary of Actors, Annex IV

5. See: http://www.esf.org/activities/mo-fora/research-infrastructures.html

2.
The MO Forum on Research Infrastructures

2.1 Mission

The ESF MO Forum on Research Infrastructures was a strategic initiative that brought together experts from 31 national research funding organisations and non-university research performing organisations. It interacted closely with European-level organisations, in particular the European Commission, ESFRI, the EIROforum and ERF among others. This MO Forum was created as a platform to discuss joint investment in the creation of research infrastructures, as well as issues of access, networking, evaluation and benchmarking. It was launched in January 2010 with the objective of developing comprehensive and common tools for the adequate treatment of research infrastructure-related topics (funding procedures, access rules, running costs, personnel, replacement, etc.).

The Forum was chaired by Johannes Janssen (DFG, Germany) and co-chaired by Christian Renner (DFG), John Womersley and Peter Fletcher (STFC, United Kingdom), Nicoletta Palazzo (CNR, Italy) and Christian Rolando (CNRS, France). It had a membership of 36 representatives of 31 ESF member organisations and 7 observers.

The group took as its reference the 2009 jointly produced document, the *EUROHORCs and ESF Vision on a Globally Competitive ERA and their Road Map for Actions*.[6] The Road Map described how the European research performing and funding organisations wished to contribute to building the ERA. From ten vision statements, ten action areas were derived to which the member organisations were willing to contribute. Vision point 7, 'World-Class Research Infrastructures', was directly addressed in Action point 8, 'Develop shared funding and exploitation of medium-sized research infrastructure', which further indicates how the issue should be addressed: "by establishing an ESF Member Organisation Forum; continued updating of the inventory of national research infrastructures with European significance; using ERA-Instruments[7] as a pilot project for collaboration in medium-sized research infrastructures."

The EUROHORCs and ESF member organisations represent important national stakeholders for RIs, since the vast majority of RIs in Europe are funded by national means. While ESFRI has been very successful in highlighting the importance of RIs and the necessity of building or upgrading major RIs of pan-European relevance, the many existing research infrastructures are still largely being treated individually in terms of funding, management, user access rules and so on. It was agreed that the establishment of a Forum for the research funding and research performing organisations would help to improve this situation by enabling an exchange of good practice among MOs and other stakeholders, the articulation of the views of MOs, and the re-diffusion of collective conclusions. In addition, the publication of the EUROHORCs-ESF Road Map was a sign of the commitment of the corresponding organisations to contribute to European aims and discussions on important topics. Last, but not least, the inclusion of medium-sized as well as pan-European RIs in the discussion increased the potential of the initiative to facilitate knowledge transfer from RIs with good experience to those with less.

6. http://www.eurohorcs.org/SiteCollectionDocuments/esf_Road%20Map_long_0907.pdf

7. An ERA-NET initiative for promoting infrastructure funding in the life sciences – see www.era-instruments.eu

2.2 Approach

In order to tackle these challenges the MOFRI set up four working groups during its launch conference in Strasbourg on January 2010.

- **Working Group 1: Access and Standards**
  - To collect existing information on standards;
  - Produce a new definition of the minimum requirements on how RIs should organise external access, and;
  - Elaborate an extended definition containing additional criteria for each research discipline.
- **Working Group 2: Funding and Evaluation**
  - To issue recommendations for joint cross border funding of the operating costs (by transnational users), and;
  - Encourage external access to RIs.
- **Working Group 3: Mobility and Networks**
  - To develop support and sustainability mechanisms for networks (development of funding schemes and/or incentives), and;
  - Enable networking of RIs (by offering opportunities for RI specific workshops, user meetings, interaction with external scientists/industry to exchange expertise, identify new developments).
- **Working Group 4: Mapping**
  - To update and upgrade the inventory of national research infrastructures with European significance, which became the MERIL project.

The outcomes of the activities of these four working groups between 2010 and 2012 structure the contents of this report, with some special emphasis given to the output of Working Group 4. This Working Group was mandated to address the need for an overview of existing RIs, on the national as well as the European level. Indeed, many organisations felt that any discussion of RI issues required an inventory of research infrastructures as a baseline both for policy making and for specific actions, such as on networking or transnational access. The European Commission had already made two attempts to map the European RI landscape[8] and even though only a very limited fraction of all RIs had been covered, useful conclusions had been drawn from those exercises.

An important aspect of the MOFRI was to give the ESF member organisations a voice in European discussions on research infrastructure issues. In 2010, the European Commission commenced a series of 'High-level Meetings' with several stakeholders attending the discussions. The aim of the meetings was to enable an exchange of views on topics like management, access, the international dimension and governance, in order to get a comprehensive picture of RI issues. The chair of the MO Forum, on behalf of the EUROHORCs, attended the five meetings that took place. A major result was the *Declaration of Common Intent*,[9] a document stating the commitment of the stakeholders to combine their efforts on important RI issues. The EUROHORCs adopted the declaration of intent in 2011. The joint workshop with ESFRI on European Relevance (see below) might be considered a prominent follow-up activity with origins in the high-level meetings.

Another MO Forum at the ESF dealt with Peer Review.[10] One of its main projects was the compilation of peer review procedures, resulting in the *European Peer Review Guide*,[11] published in April 2011. The MO Forum on Research Infrastructures contributed to the chapter on research infrastructures, setting out recommendations for review procedures for RIs. This report can be seen as informing on the standards and criteria that should be used in the peer review process.

2.3 Towards a common definition of research infrastructures

There was overwhelming consensus at the launch meeting of the MO Forum to adopt the definition of research infrastructures of the ERIC (the Community legal framework for a 'European Research Infrastructure Consortium'). Taking into account ESFRI definitions as well, the ERIC formulation was later streamlined to produce the following definition for implementation in the MERIL project:

A European Research Infrastructure is a facility or (virtual) platform that provides the scientific community with resources and services to conduct top-level research in their respective fields. These research infrastructures can be single-sited or distributed or an e-infrastructure, and can be part of a national or international network of facilities, or of interconnected scientific instrument networks.

The infrastructure should furthermore:

- offer top quality scientific and technological performance that is recognised as being of 'more-than-national relevance' (see also Section 3.2);

8. See http://www.riportal.eu for an existing inventory of RIs

9. See Annex VI

10. http://www.esf.org/activities/mo-fora/peer-review.html

11. http://www.esf.org/fileadmin/FlipBooks/Peer_Review/peer_review.html

- offer access to scientific users from Europe and beyond through a transparent selection process on the basis of excellence;
- have stable and effective management.

It was concluded that the Forum should focus on 'shared-access RIs', that is, research infrastructures in Europe open to external users. Moreover, another important decision at the launch meeting was to focus not only on 'medium-sized RIs', but rather to include all kinds of RIs complying with the definition above. Apart from avoiding having to define the vague term, 'medium-size', it was agreed that the relevant issues for cooperation on research infrastructure did not revolve around whether an RI was European, national or medium-sized. An inclusive approach was therefore adopted which demanded intensive communication with other stakeholders active in the discussions on RIs.

3. Outcomes

3.1 Access and Standards

The aim of Working Group 1 was to discuss basic and general standards for access to RIs. The pilot project 'ERA-Instruments' (an ERA-NET initiative for promoting infrastructure funding in the life sciences) had already published recommendations on access.[12] For the social sciences and the humanities the guidelines of the Data Seal of Approval[13] served as initial input. A dedicated workshop in Vienna in May 2010 with the working group members as well as additional guests produced the first draft of the 'Basic Requirements'. Consultation with the whole MO Forum and the ESF Scientific Committees and discussion of the final draft on the occasion of a MOFRI assembly meeting led to the final version that is presented in Annex VII. The 'Basic Requirements for Research Infrastructures in Europe' [14] of the MO Forum's Working Group 1 were consequently endorsed by both the EUROHORCs and the Scientific Committees of the ESF.

The Basic Requirements are a consensus of the Member Organisation Forum on Research Infrastructure and as such can only be seen as a minimum quality standard that should provide guidance both to funders and to managers of RIs. They are intended to be valid for all scientific disciplines and for RIs of all kinds and sizes, and should therefore be applicable to all RIs. In many cases the minimum requirements are coupled with recommendations which substantially exceed the minimum requirements and point towards best practice. In this way the requirements can provide a basis for the development of evaluation procedures, but they are clearly not evaluation criteria in and of themselves.

Not all aspects of establishing, managing or operating an RI are dealt with in this set of requirements and recommendations, but rather those that have a direct impact on external access.

The minimum requirements are in two parts. The criteria and issues identified in Part I are independent of the size or kind of RI under consideration, such as management of the RI, legal issues and good scientific practice, and aspects related to the user access model. Part II contains specific requirements addressing access to instrumentation and access to databases or repositories. The specific requirements for access to instrumentation are a straightforward extension of the general basic requirements. The specific requirements for databases and repositories on the other hand are substantially different and might require special attention. This to some degree mirrors the outcome of the MERIL/MOFRI/ESFRI workshop on European Relevance (see Section 3.2 below), at which it was concluded that further discussion was needed regarding RIs in the social sciences and the humanities. In the future development of MERIL, finer criteria could be built up regarding both physical and digital RIs, as well as the bridge between them.[15]

It is important to stress that the Basic Requirements represent a first attempt to itemise issues for the shared use of RIs; it is anticipated that the ongoing European and national discussions on RIs will lead to continuous revision and refinement.

12. http://www.era-instruments.eu/what_we_do/publications.html
13. http://www.datasealofapproval.org/
14. See Annex VII or http://www.dfg.de/download/pdf/foerderung/programme/wgi/basic_requirements_research_infrastructures.pdf

15. See: Research Infrastructures in the Digital Humanities. *ESF Science Policy Briefing 42.*

National agencies and European initiatives, principally the ESFRI projects, have partly established or are currently developing specific access models and associated quality assurance procedures. It is hoped that the minimum requirements are close to being a common denominator and thus can also serve as a basis for new models or procedures to be established. A common understanding of how RIs can optimally support scientific communities will certainly help in overcoming some problems of fragmentation and heterogeneity in Europe without sacrificing the benefits of diversity and flexibility.

3.2 Funding & Evaluation

Recognising that ESFRI had established a working group to examine the evaluation of research infrastructures, the MOFRI decided to build on that foundation, benefitting from the recently-published report of the ESFRI working group on evaluation.[16] The ESFRI Working Group on Evaluation of RIs had attempted to develop an evaluation methodology with criteria which could be used to identify 'pan-European' RIs.

The MO Forum collaborated with the ESFRI Working Group to ensure the transfer of understanding. The key principles in the ESFRI criteria are: scientific and technological excellence, socio-economic impact, and governance and financial management. As described above, the MOFRI Working Group 1 report on Basic Requirements for access had developed in more detail the standards required for access to RIs. These standards were then developed by the Forum into the Common Features of Research Infrastructures (see right) from which the threshold criteria for the inclusion of an RI in the MERIL database were derived (see Annex VIII).

The Forum did not set out to dictate how MOs or other agencies should apply the criteria set out in the above documents or assess an RI against them, considering this a matter for decision at agency level. However, with growing internationalisation of RIs and the expectation of transnational access funded through the EU Framework Programmes, it can be expected that agencies that do not apply equivalent criteria in their approval decisions may find that the RIs they fund are not accepted by the international research community as being of an appropriate standard.

16. *ESFRI Evaluation Report 2011*: http://ec.europa.eu/research/infrastructures/pdf/esfri_evaluation_report_2011.pdf#view=fit&pagemode=none

Common Features:

1. Scientific and technological excellence of the research infrastructure's operations, recognised by a relevant number of non-resident users attracted by
   - cutting edge technology and/or unique objects;
   - continuous technological watch, upgrade and updates;
   - training of the staff.
2. A professional management structure addressing:
   - a transparent access policy for researchers with clear indications of the selection and admission procedures for defining the priority of the projects of users, time needed for completion of the projects, and costs as well as publication policy;
   - a transparent access policy for industrial use addressing IP rights, cost and confidentiality;
   - a clear presentation of available services at the RI, the indication of the equipment, the hosting capacity, user assistance and the number of support staff;
   - quality assurance of all operations and processes, including training of staff and applied laboratory practices;
   - a sustainable business plan.
3. The governance of the research infrastructure organised in such a way that the decision making body is separated from the operational management.
4. The offer of education and training for students, researchers, technicians and engineers.
5. The capacity to generate impact not only at scientific and technical levels but also at socio-economic, societal and environmental levels.

The joint MOFRI-MERIL-ESFRI workshop on 'European Relevance' in April 2012 rather unexpectedly concluded that defining European relevance, despite the frequency with which the term is used, is actually very difficult. The Forum noted that in EU activities the terms 'pan-European' and 'regional'[17] were used of RIs without clear definitions. Given that a goal for the workshop was to develop guidance on the RIs to be included in MERIL, the workshop concluded that what mattered was establishing that an RI was of 'more-than-national relevance'. In addition to meeting the core quality criteria, it was concluded that evidence of the international need for and use of the RI was required to establish this.

17. For example, 'regional' may be used to mean either a part of a country (regions of Spain) or several European countries (Central European Region), without clear definition or distinction in some documents.

In the area of funding, the Forum again noted work being done by other groups. The European Commission organised an Expert Group to report on Cost Control and Management Issues of Global Research Infrastructures which set out the key principles that should be applied in planning and managing the construction and operation of an RI.[18] The OECD also produced a report on *Establishing Large Research Infrastructures*[19] which set out key issues to be considered by nations planning to develop multinational RIs. There is currently a G8-sponsored group, the Group of Senior Officials, which extends beyond G8 membership and has overlapping representation with the Forum and ESFRI. This group is examining key principles for the development of new global projects and ways to exchange information on new projects.

As with evaluation, the principles applicable at global level are the same at European or national level, but applied to a different target level according to the budget and number of partners. The Forum therefore concluded that it did not need to do more work on good practice in the area of funding. However, the Forum considered that an examination of funding issues from an individual MO's perspective would be a productive theme for future work. The principles in the reports described above call for coordination of processes, which is not always easy to achieve in practice. A joint study on ways to cooperate in agreeing planning and funding timetables could be helpful in smoothing the approval processes for future RIs.

3.3 **Mobility and Networks**

Mobility and networks were among key research infrastructure issues identified in the first MOFRI meeting in 2010, and were addressed by a dedicated Working Group.

Support instruments available at European level for these specific aspects at large pan-European research infrastructures are well known and established, whereas information on how mobility and network support is organised and provided by national and regional schemes for RIs is still fragmented. The Working Group recognised that such information would be very important in order to identify unexploited potential and stimulate the creation of new connections and collaborations between RIs.

In the growing worldwide competition for the best scientists and the most promising projects, the benefits of networking for RIs would include gaining European (or 'more-than-national') value, visibility and recognition as well as possibly getting access to new funding opportunities.

A critical issue discussed by the Working Group was the sustainability of networks and of their funding in particular, as existing instruments and schemes usually have a limited duration.

The training and mobility of personnel involved in RIs is also a critical aspect needing appropriate attention. As also outlined in the ICRI[20] 2012 conclusions and recommendations, an international framework to facilitate the training and mobility of staff at RIs would be highly desirable at all stages of an RI's realisation (planning, implementation and operation). An interesting initiative in this respect is the joint EIROforum and ERF proposal for a new scheme for staff mobility within European RIs[21] to respond to the increasing need for and demand for competent and experienced personnel and contribute to capacity building in Europe.

It was clear from the beginning that 'mobility' and 'networks' are horizontal issues closely interlinked with others dealt with in the other WGs, such as standards, funding and evaluation. The ultimate ambition is to develop adequate cross-border funding instruments that would foster mobility and networking. It was seen as a sequential process of establishing a map of European RIs, analysing the gaps and needs for networking and then jointly developing support measures. It was therefore decided that these issues would be followed up after completion of the 'Funding and Evaluation' topic, while agreeing that it might be worth deepening further the aspect of networking, which is recognised as fundamental for RIs, and stimulating more discussion and collaboration around it.

Building on the MERIL project and the future portal, an analysis of existing national and regional instruments and schemes to support networking and mobility could be undertaken in the future in order to contribute further to the discussions taking place in Europe and at the global level.

18. *Cost Control and Management Issues of Global Research Infrastructures; European Expert Group Report*; October 2010 http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=publications

19. *Establishing Large International Research Infrastructures: Issues and Options,* OECD, December 2010 http://www.oecd.org/sti/scienceandtechnologypolicy/47027330.pdf

20. International Conferences on Research Infrastructure

21. Research Infrastructures Staff Exchange (RISE): a new scheme for staff mobility within European Research Infrastructures http://www.europeanresearchfacilities.eu/IMG/pdf/ERF_EIROforum_mobility_october2011_final.pdf

3.4 Mapping of the European Research Infrastructure Landscape (MERIL)

There is broad agreement that the widening of access to research infrastructures across geographical and disciplinary borders would foster the creation of a true European Research Area. An inventory of research infrastructures was held to be a highly desirable tool for two main reasons: first, to enable scientists to locate and get access to available facilities and services for their research; and second, to allow funding and research organisations to analyse the European RI landscape, also with a view to informing investment decisions, including joint ventures where appropriate.

One of the MOFRI objectives was therefore to create an overview of research infrastructures in Europe. So far only a small number of countries in Europe have successfully mapped their national RI landscape; moreover, at international level, some specific criteria apply. Given the fact that there is wide diversity in types and sizes with domain-specific characteristics, it was decided to make the scope of the inventory independent of size and budget of the research infrastructure.

In 2009 the European Commission independently issued a call for a Coordination and Support Action specifically targeting the development of a "European Portal on Research Infrastructures' Services". Due to the great concordance with respect to the MO Forum's goals, it was agreed in the Forum's preparatory phase to respond to the call and begin the construction of a modern RI portal in alignment with the EC's requirements and views.

As a result, the European Science Foundation, supported by the EUROHORCs and ESF member organisations, submitted the proposal for the MERIL (Mapping the European Research Infrastructure Landscape) project to the European Commission. The MERIL project was successful in its bid to update and upgrade the existing RI portal and thus to create a dynamic online portal containing relevant information about RIs in Europe that are of 'more-than-national relevance'.

The project started its two-year funding period in October 2010, by which time support measures had been embedded into the MO Forum's activities. Initially, Working Group 4 on Mapping was set up, but it became obvious that the MERIL project would rely on support of more or less all working groups of the Forum.

To ensure commitment on a broad basis, the MERIL project targeted many stakeholders, including the 'scientific community' (through the ESF Scientific Committees and Expert Boards which are represented in the MERIL Science Advisory Board) as well as policy makers and funding agencies (ESFRI, ERF, EIROforum, the European Commission, Ministries and the MO Forum).[22]

> As of December 2012, the portal contained 945 national or international research infrastructures located in 25 countries, including 27 ESFRI 'Road Map' projects.

It was expected that this circle of stakeholders would in its entirety represent a rich source of information for the majority of the research infrastructures of European relevance. Some of them were already involved in the preparatory phase of the MERIL project in November 2009, and they all helped the MERIL team to build a comprehensive state-of-the-art analysis of existing national surveys, road maps and funding programmes. A representative of each of the stakeholders was nominated as a member of the MERIL Steering Committee.[23]

Additional parties were invited as observers to the various meetings of the MERIL project, for instance universities (EUA/LERU), OECD-GSF (Organisation for Economic Co-operation and Development, Global Science Forum) and international partners (e.g., the NSF).

Industry belonged to this second circle of stakeholders, but was not actively involved in the discussions, nor were international partners who might eventually be interested in using information from the portal and sharing their own with the European community.

In several stakeholder meetings and concurrent MERIL Steering Committee meetings, a common understanding was achieved on the following critical parameters for the collection of metadata from the RIs.

Definition of a Research Infrastructure

In defining what is meant by a research infrastructure, MERIL relied on the relevant discussions within the MO Forum (see Section 2.3 above). Specifically, the results of Working Group 2, the 'Common Features of Research Infrastructures', were used to screen RIs in the data-collection process (see Section 3.2 above).

Classification of RI (Scientific Domains/ RI categories)

A consultation of the scientific community through the ESF Science Units and Standing Committees

22. A Glossary of Actors is given in Annex IV
23. A list of Steering Committee members is given in Annex II

resulted in a list of 8 scientific domains and 71 RI categories, distributed among these domains, in order to classify the collected RIs. An RI may be assigned to more than one domain or category. While the lists of scientific domains and RI categories are a subject which can excite extensive discussion, it was decided to proceed with a given set and allow for adaption later on.

Data Model for describing the individual RI in the database

The data model (i.e., the set of data to be gathered for each RI) was designed for a relational database with sufficient search power. It was decided to restrict the model to a rather small amount of data so as to minimise the effort in data handling, verification and updating. It is assumed that web pages of the RIs provide full information with continuously updated content.

Web Portal

Using advanced information system technology in a carefully selected platform[24] a flexible database and web portal was built. The way it was designed will allow further development as a knowledge management tool with features such as regular updates and data standards ready for exchange with CERIF-compliant databases. The MERIL portal is geared towards modern web technology for making available all relevant information about the RIs with an easy-to-use frontend.

MERIL portal homepage: http://portal.meril.eu/

Identifying main sources of data in Europe

The MERIL stakeholders provided input to the list of European and national road maps, surveys and funding programmes. The scientific community which was consulted complemented this list with entries that were considered to be relevant to the European Research Area. The approach yielded a long list of potential entries for the MERIL portal. Only a small subset of the MERIL data model was compiled for each RI candidate in this long list.

There was strong consensus among the stakeholders that this list would require some kind of confirmation by national authorities that potential entries would meet the MERIL criteria, most notably the 'more-than-national relevance'. This screening was not intended to be a rigorous quality check or evaluation procedure, but was established to achieve consistent entries of the inventory. National representatives from funding agencies, ministries and institutions dealing with RIs, from all EU countries, were nominated by their organisations and asked to coordinate the shortlisting of RIs within their respective countries. These so-called 'national data intermediaries' carried out a relevance check for MERIL. The individual RI operators were subsequently asked to provide the full set of data and are authorised to update the data of the respective RI at any time. The MERIL stakeholders consider this continuous updating as critical to maintaining the functionality and relevance of the online portal.

Although the MERIL portal will be open to any new entry that complies with the definition and criteria, a systematic checking procedure has been put in place to ensure compliance and to work towards a common European approach to populating the MERIL database. This is an important step in creating the current content of the database and a new approach compared to the previous mapping exercises of the EC. The Forum recommends continuing the procedure for the check of 'more-than-national relevance', as carried out by the national data intermediaries, for every new entry in the database.

At the time of writing, MERIL is close to transition to the operational phase. The Beta version of the portal is already accessible at http://portal.meril.eu, and background information on the MERIL project can be found at www.meril.eu.

The inventory of research infrastructures made accessible through the portal represents a unique tool and source of information for the scientific community, policy makers and other stakeholders. Among the functions the portal is expected to serve are the following:

- Improving scientists' access to resources, services and facilities offered by modern research infrastructures;
- Promoting individual research infrastructures by raising their profile and fostering a greater sense of partnership across Europe;
- Allowing policy makers to assess the state of research infrastructures throughout Europe to pinpoint gaps or duplications and make decisions about where best to direct funding;

24. CONVERIS by AVEDAS AG

- Stimulating discussion among policy makers and research funders on RI funding and joint investment, where appropriate;
- Supporting the exchange of expertise and best practice among RI coordinators with a view to optimising the operation and exploitation of research infrastructures;
- Contributing with this state-of-the-art analysis to the planning for future needs in cooperation with the European Strategy Forum on Research Infrastructures (ESFRI).

The usage of the portal can naturally be investigated only after some time of operation. Similarly, its value in the analysis of the European RI landscape can only be assessed in the future. However, there is optimism that the new approach of MERIL in instituting a relevance check by national authorities before releasing data will provide a higher level of coherence of the data as compared to the previous RI portal. In most European countries a discussion about what should be listed in MERIL has started, and the feedback from the national data intermediaries is promising and relevant. There is already some evidence to suggest that countries which are preparing national surveys and road maps for RIs have benefitted from the Common Features, Scientific Domains and RI Categories that were developed in the MERIL project. One of the next steps will be a consistency check of the RI entries across the countries and scientific domains. Due to its design as a dynamic and flexible portal, MERIL offers opportunities for further development and analysis.

The MERIL portal is intended to become an interactive online tool for sharing knowledge about European research infrastructures that are of 'more-than-national relevance'. Collecting initial data and keeping it up to date is a continuous process that requires effort and support over a number of years. As such it can be considered an e-infrastructure with according operational and maintenance costs. While EC funding was limited to the construction phase of MERIL ending in 2012, for 2013 the member organisations of the European Science Foundation have committed funds to maintain the database and portal. This period will be used to explore opportunities and to find further support. Part of this exploration will consist of looking for potential new user groups and needs, in order to develop new services. The operational phase will, of course, monitor access to and usage of the portal. The resulting statistics can be structured in various ways, e.g., according to type of information or kind of user, as one indication of the relevance of the portal. A detailed evaluation, however, of the impact and usefulness of the MERIL portal for both its scientific users and the research organisations may take several years.

4. Outlook

4.1 Follow-up of the MO Forum on Research Infrastructures

The Forum has demonstrated that the national member organisations can work together and with ESFRI, the European Commission and other European bodies to develop and agree policy and principles for the research infrastructure sector. It has been an important step to extend the discussion of RI policy beyond ESFRI's work on large RIs to encompass the full range of national facilities. The close relation of the national agencies to the scientific communities is also beneficial. The need for coordination of initiatives around RIs is evident.

Members of the Forum appreciate that the steps taken during the lifespan of the MOFRI in establishing standards and evaluation criteria have produced a baseline which can now be built on to improve the coordinated development and operation of the facilities of Europe which are largely funded or operated by these organisations. MOFRI, for that reason, recommended the continuation of a platform for the member organisations to discuss RI issues.

Science Europe, as the successor of the EUROHORCs, has taken on the responsibility for the road map towards the ERA and has agreed to set up a working group on research infrastructure. Science Europe is aiming on a European level at joint policy making of the national research performing and funding organisations. As such, it appears ideally suited for hosting a follow-up platform to the MOFRI. This platform or working group can develop joint activities that can be undertaken by the members.

As noted previously, attention to networking beyond that funded by the EU and the coordination of funding and assessment between national agencies are clear areas for attention of the new Science Europe working group. From the feedback of the members, further topics for joint activities include:

- Management of RIs;
- Exchange of staff;
- Bilateral investments, joint funding;
- Transfer of best practice;
- Community-specific actions, e.g., for the social sciences and humanities;
- Promoting the understanding of the importance of RIs for the competitiveness of Europe;
- Further development of the MERIL database (see below).

In all of these actions it will be important to continue and develop the alignment between all the various bodies and initiatives in the RI area (ESFRI, ERF, EIROforum, High-level group at the EC, etc.) which has been a principle of the operation of MOFRI.

4.2 Operational phase of the MERIL portal

The end of the MOFRI and the launch of the MERIL portal largely coincide. The EC funding for the start-up of the MERIL project does not include support for its operation or future development. However, recognising the importance of the MERIL project for science and science policy in Europe, the ESF member organisations agreed in 2012 to support the operation and development of the portal in 2013. This will allow for some initial analyses both of the content and of the usage and impact of the database. The portal is constructed to be flexible and

procedures for updating and extending the content are already in place. A dedicated team at the ESF will work in 2013 to complete and harmonise the metadata on the indexed RIs, extend the mapping of eligible RIs and develop – in consultation with various stakeholder groups – new functionalities in the portal to allow for sophisticated analysis of the data on RIs in Europe. It will be imperative to raise consciousness of the availability of the portal to engage user groups and fully exploit the potential of the database as a tool and resource for science and policy making.

The final MOFRI workshop also made it possible to collect suggestions from the partners for the further development of the MERIL portal. Generally, there is broad interest in developing and expanding the scope of the portal. Besides issues of data quality and coherence it was suggested to align the data models and standards of national and MERIL databases to possibly interface them in an appropriate manner. Further topics for expanding the portal could be:

- RI-specific education and training functions;
- Engaging industry as stakeholders and including aspects related to innovation;
- Including not only existing RIs, but also plans and activities towards new RIs;
- Allowing scientists/users to give their views or communicate demands of specific areas;
- Promoting networking for building consortia to respond to EC calls for proposals.

It is anticipated that the success of the MERIL portal will become evident only with time, while updating the inventory and developing the portal requires a continuous effort right from the start. In the course of the year 2013 sufficient experience should be gained to plan the future of the portal and the inventory.

5.
Conclusions

Looking back at the development of the aims, the activities pursued and the results finally obtained, the character of the Forum is quite evident. Projects such as ERA-Instruments and MERIL that were both EC-supported and therefore given a fixed working programme, have to remain more or less close to their schedule and are not only obliged to achieve their objectives, but also the actions and deliverables initially set. In contrast, the Forum was able to refine its aims and also its internal structure based on the input from the participants (especially at the first assembly meeting), the interaction with other stakeholders (importantly ESFRI) and the general development on the European level (Horizon 2020, Science Europe). The openness to broad participation and the flexibility to develop activities and actions based on the requirements of the partners have been quite successful in this case and have led to tangible results, such as the Basic Requirements and the Common Features (see Chapter 3: Outcomes). The open and adaptive character seemed well suited for policy making. The interest of the Forum members in continuing the joint venture and the decision of Science Europe to set up a working group as follow-up to the Forum are clear indications that the MOFRI has been successful in bringing together national agencies of different kinds and with different expectations and engaging them in working together. There is no doubt that national organisations play a most important role in funding and operating RIs in Europe. The development of European RI policy is a challenge for a heterogeneous mix of agencies, circumstances and requirements. The past Forum and the future working group are enabling national views on RI issues to be presented with one voice to the European discussions and, thus, hopefully, to be heard.

Annexes

Annex I: **List of MOFRI members**

Forum Chair

- **Johannes Janssen**
  German Research Foundation (DFG), Germany

WG1: Access and Standards

Chair:

- **Christian Renner**
  German Research Foundation (DFG), Germany

Members:

- **Jean-Francois Masset**
  French Research Institute for Exploitation of the Sea (IFREMER), France
- **Richard Salives**
  French National Institute of Health and Medical Research (Inserm), France
- **Benoît Dardelet**
  National Centre for Scientific Research (CNRS), France
- **Isabel Figueiredo**
  Foundation for Science and Technology (FCT), Portugal
- **Jose L. Carrascosa**
  Council for Scientific Research (CSIC), Spain
- **Rüdiger Klein**
  All European Academies (ALLEA)

WG2: Funding and Evaluation

Chairs:

- **Peter Fletcher and John Womersley**
  Science and Technology Facilities Council (STFC), United Kingdom

Members:

- **Christoph Bärenreuter**
  Austrian Science Fund (FWF), Austria
- **Nadège Ricaud**
  Fund for Scientific Research (FNRS), Belgium
- **Christoph Ettl**
  Max-Planck-Society (MPG), Germany
- **Michael Ryan**
  Science Foundation Ireland (SFI), Ireland
- **Ruta Marcinkeviciene**
  Research Council of Lithuania, Lithuania
- **Susanne Rick**
  National Research Fund (FNR), Luxembourg
- **Cas Maessen**
  Netherlands Organisation for Scientific Research (NWO), The Netherlands
- **Cecilia Grevby**
  Swedish Council for Working Life and Social Research (FAS), Sweden
- **Recep Tugrul Ozdemir**
  The Scientific and Technological Research Council of Turkey (TÜBITAK), Turkey
- **Ben Turner**
  European Research Council (ERC) Executive Agency
- **Jean-Pierre Caminade**
  European Research Facilities Association (ERF)
- **Annika Thies**
  Helmholtz Association, Germany
- **Diego De La Hoz Del Hoyo**
  European Science Foundation (ESF)

WG3: Mobility and Networks

Chair:

- **Nicoletta Palazzo**
  National Research Council (CNR), Italy

Members:

- **Leo Budin**
  Croatian Academy of Sciences and Arts (HAZU), Croatia
- **Peter Samuely**
  Slovak Academy of Sciences (SAV), Slovakia
- **Tiberio Ezquerra**
  Council for Scientific Research (CSIC), Spain
- **Isabelle Verbaeys**
  Research Foundation – Flanders (FWO), Belgium

WG4: Mapping

Chair:

- **Christian Rolando**
  National Centre for Scientific Research (CNRS), France

Members:

- **Julia Chamot-Rooke**
  National Centre for Scientific Research (CNRS), France
- **Vladimir Nekvasil**
  Academy of Sciences of the Czech Republic, Czech Republic
- **Eeva Ikonen**
  The Academy of Finland, Finland
- **Emmanuelle Klein**
  National Institute for Agricultural Research (INRA), France
- **Johannes Janssen**
  German Research Foundation (DFG), Germany
- **Paul Burkhard**
  Swiss National Science Foundation (SNF), Switzerland
- **Jean Moulin**
  European Strategy Forum on Research Infrastructures (ESFRI)
- **Christian Kurrer**
  European Commission (EC)

Forum management

- **Paul Beckers**
  European Science Foundation (ESF)
- **Laura Marin**
  European Science Foundation (ESF)
- **Katie Luck**
  European Science Foundation (ESF)

Annex II: **List of MERIL Steering Committee members**

- **Liselotte Højgaard**
  Standing Committee of the European Medical Research Councils (EMRC)
  University of Copenhagen & Technical University of Denmark
- **Pieter Hooimeijer**
  Standing Committee for the Social Sciences (SCSS)
  Utrecht University
- **Karin Lochte**
  European Polar Board Executive Committee
  Alfred-Wegener-Institute (AWI) for Polar and Marine Research
- **Susan Schorr**
  Materials Science and Engineering Expert Committee (MatSEEC)
  Helmhotz-Zentrum Berlin für Materialien und Energie GmbH
- **Günther Rosner**
  Nuclear Physics European Collaboration Committee (NuPECC)
  FAIR
- **Jean-Pierre Swings**
  European Space Sciences Committee (ESSC)
  Université de Liège
- **Milena Žic-Fuchs**
  Standing Committee for the Humanities (SCH)
  University of Zagreb
- **Christian Kurrer**
  European Commission (EC), DG Research - Directorate B - European Research Area: research programmes and capacity
- **Johannes Janssen**
  ESF MO Forum on Research Infrastructures
  Deutsche Forschungsgemeinschaft (DFG)
- **Christian Rolando**
  ESF MO Forum on Research Infrastructures
  Centre National de la Recherche Scientifique (CNRS)
- **Jean Moulin**
  Belgian Federal Science Policy Office, ESFRI
- **Claudia Ritter**
  German Aerospace Centre, ESFRI
- **Carlo Rizzuto**
  ELETTRA, ERF
- **Peter Fletcher**
  Science and Technology Facilities Council (STFC)
- **Françoise Thibault & Jean Behue**
  French Ministry of Higher Education and Research
- **Annika Thies**
  Helmholtz Association of German Research Centres (Brussels)
- **Paul Beckers**
  MERIL Project Manager
  European Science Foundation

Annex III: **List of MOFRI meetings**

1st workshop, 11-12 January 2010, Strasbourg
- Establishment of Forum Aims and Objectives
- Establishment of Forum Steering Committee and Working Groups

1st Steering Committee meeting, 25 March 2010, Barcelona
- Establishment of Action Plans of Working Groups

Working Group 1 meeting, 27 May 2010, Vienna
- Refinement of Basic Standards for Access to Research Infrastructures document

2nd Steering Committee meeting, 12 July 2010, Paris
- Refinement of Action Plans of Working Groups

3rd Steering Committee meeting, 17 November 2010, Strasbourg
- Update on Working Group activities
- Establishment of further links to Mapping of the European Research Infrastructure Landscape (MERIL) project
- Contribution to MO Forum on Peer Review meeting

2nd workshop, 3-4 February 2011, Strasbourg
- Updates from ESFRI and OECD
- Presentations by representatives from MO Fora on:
  - Peer Review
  - Evaluation of Publicly Funded Research
  - European Alliance on Research Career Development
- Panel discussion on Relations to ESF Scientific Committees
- Presentation and finalisation of results of WG1: Access and Standards: basic requirements for access to Research Infrastructures

4th Steering Committee meeting, 6 May 2011, Strasbourg
- Update on Working Group activities
- Revision of Forum objectives
- Planning for the Forum's future and request for extension

3rd workshop and joint conference with ESFRI and MERIL Project: 23-24 April 2012, Frankfurt
- Examination of how to measure and evaluate the European/international relevance of Research Infrastructures
- Providing input to the MERIL Project
- Feeding into a position paper to be developed by the MO Forum

4th workshop – MO Forum and MERIL Final workshop, 12-13 November 2012, Strasbourg
- Presenting the final draft MOFRI/MERIL MO Forum Report
- Demonstration and discussion of the MERIL Portal
- Discussing further coordination of RI affairs on the European vs national vs regional level

Annex IV: **Glossary of Actors**

The launch of the **European Strategy Forum on Research Infrastructure (ESFRI)**[1] in 2002 was a milestone in the development of RI discussions at the European level. ESFRI published the influential ESFRI Road Map in 2006, with updates in 2008 and 2010 to strengthen neglected areas (e.g., life sciences) and incorporate projects that had ripened from emerging proposals to accepted projects. The implementation of ESFRI projects was addressed in a dedicated report in 2009. These and other publications of ESFRI are published on the ESFRI webpages.[2] An overview of national road maps is also provided by ESFRI although it is difficult to keep up to date with new or updated road maps popping up all across Europe.[3]

ESFRI has established a number of working groups. Three thematic working groups were engaged in the preparation of the ESFRI road maps and others were set up to address RI issues on a broad scale including one on evaluation and two new ones on socio-economic impacts and on innovation. An expert group on evaluation criteria/indicators of pan-European relevance has also been set up.

The **Unit for 'Research Infrastructures' in DG Research and Innovation** of the European Commission[4] has continuously supported ESFRI with a secretariat and has engaged with stakeholders in discussions, supporting – among other things – networking activities and preparatory work, both scientific and in science policy.

The **EU Framework programmes for RTD** have supported research infrastructures for many years, starting from the Large Installations Plan in FP2 in 1989. A key theme has been supporting transnational access to RIs to enable a wider researcher base to have access to RI capability. This has developed with networking and joint development activities into the successful Integrated Infrastructure Initiative (I3) awards of FP6 and FP7. With the addition of Design Study awards to support the development of new RI concepts, and the Consortium Preparation awards for projects on the ESFRI Road Map, FP7 is making a substantial contribution to the development of the European Research Area (ERA) in the RI sector across all research disciplines.

In addition, there are also more general initiatives in the RI field to promote policy development and exchange of best practice.

Realising and Managing International Research Infrastructures (RAMIRI),[5] for example, has been set up to develop programmes for training of RI managers. This has been done in a series of workshops. A training and networking programme is offered by a handful of major organisations in the field of RI and, recently, also teaching. RAMIRI is a project funded by the EC from 2008-2010 (RAMIRI) and 2010-2012 (RAMIRI-2). A handbook for RI managers has been announced.

ERAWATCH[6] more generally "provides information on European, national and regional research systems, policies, and programmes in the EU and beyond". It is a useful platform containing a variety of information also on RI funding.

ERA-Instruments[7] is a network of national research performing and funding organisations addressing specifically RI issues in the life sciences. It was supported by the EC from 2008 to 2011. The aim and scope of ERA-Instruments is partially comparable to the MOFRI, but ERA-Instruments has its focus on a specific domain, namely the life sciences. A number of recommendation papers have been published by ERA-Instruments that address issues of distributed RIs and are not necessarily restricted to the life sciences field.

ERAB, the European Research Area Board, has since 2009 published three papers on its long-term vision for the ERA and additionally concrete recommendations to the Commission for the near future. Recently, the third report has appeared including reflections on the implementation of the ERAB recommendations as well as a summary of them.[8] Both the reports as well as the recommended actions include various RI issues up to defined recommendations for individual RIs.

Independent from the EC, the **ERF** (European association of national Research Facilities laboratories) is an organisation founded in 2006 by institutions running synchrotrons and neutron sources. Although this organisation by itself represents only a small fraction of RIs they have pioneered the discussion of relevant topics with a broader audience. Four ERF workshops since 2009 have included the topics: open access, human capital, energy management and, recently, socio-economic impact. The results of these workshops as well as further publications are available from the web pages.[9]

1. http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri
2. http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri-publications
3. http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri-other-roadmaps
4. http://ec.europa.eu/research/infrastructures/index_en.cfm
5. http://www.ramiri.eu/
6. http://erawatch.jrc.ec.europa.eu/
7. www.era-instruments.eu
8. http://ec.europa.eu/research/erab/index_en.html
9. http://www.europeanresearchfacilities.eu/

EIROforum is, since 2002, a joint venture of several inter-governmental scientific research organisations that are responsible for infrastructures and laboratories: CERN, EFDA-JET, EMBL, ESA, ESO, ESRF, European XFEL and ILL. These organisations have extensive experience in running and managing large international research facilities with users or guests in large numbers and from all over the world and therefore much can be learned from the EIROforum members.

On a global level the **OECD Global Science Forum**[10] has published a very practical report on establishing large RIs that summarises a broad range of issues and pitfalls for the difficult process of setting up new RIs.

Finally and importantly, the European Conferences on Research Infrastructure (ECRI),[11] now transformed into the **International Conferences on Research Infrastructure** (ICRI),[12] have been the major events for discussing RI-related science policy issues as well as the required next steps in implementing the ESFRI road maps.

10. http://www.oecd.org/document/49/0,3746,en_2649_34269_50207665_1_1_1_1,00.html
11. ECRI 2005 in Nottingham: http://www.nottingham.ac.uk/ecriuk/; ECRI 2007 in Hamburg: www.ecri2007.eu; ECRI 2008 in Versailles; ECRI 2010 in Barcelona: www.ecri2010.eu
12. ICRI 2012 in Copenhagen: www.icri2012.eu

Lead Organisation for Exploitation of Medium-sized Research Infrastructure

Mandate of EUROHORCs to *the German Research Foundation*

Background

Medium-sized research infrastructures (RI) prove to be pillars of European Research. Recent developments – for instance in the area of data handling and standardisation, creation of core facilities, etc. – require a European discussion of these issues to retain the high standards attained so far. Joint activities will enable national research councils (RC) to improve their schemes and might result in joint investments.

Medium-sized RI are primarily supported and run by national RC. Hence, funding of RI is a core activity of most RC. Initial steps of creating networks have already been started, for instance ERA-Instruments.

Mandate to The German Research Foundation

The General Assembly of EUROHORCs mandates *The German Research Foundation* as the *Lead Organisation* for *"Exploitation of Medium-sized Research Infrastructure"*.

The German Research Foundation is asked to develop and implement a detailed concept and timetable to be presented at the GA meeting in October 2009 and to report regularly to the General Assembly and the Steering Committee of EUROHORCs.

Goals

The concept to be implemented shall serve the following goals:

Currently, an ESF MO Forum on Medium-sized RI is going to be implemented (starting 2010) which should serve as a platform for discussing and defining the goals. Goals to be envisaged on a midterm scale might comprise:

- to achieve a **definition of medium-sized RI** (i.e. facilities providing access to technologies/ data infrastructure, scope and limits of medium-sized RI (in terms of money?) compared to large scale RI as well as to regional/small size RI.) --> 2010
- discuss **standards** medium-sized RI should fulfil (information to external users, terms of reference, access rules, personnel) --> 2010
- how to get an **overview on medium-sized RI** (opportunities of updating existing portals, registration procedure, definition of categories/relevant data to be filled in by RI, annually updates) --> 2010-2012, later on open for updating the data/new entries
- enable **networking of RI** (by offering opportunities for RI specific workshops, user-meetings, interaction with external scientists/industry to exchange expertise, identify new developments) --> 2012-... if new calls are considered.
- encourage external **access to RI** (i.e. access rules, user fees, funding) --> 2011-...

Items to be addressed

Due to the different characters of medium-sized RI comprising technology facilities as well as data infrastructure, special attention has to be directed toward balancing the discussion of general aspects concerning all kinds of RI and the opportunities to enable treatment of RI specific topics.

Additionally, a clear definition of what should be considered a medium-sized RI is required, establishing distinction to ESFRI projects (and to infrastructures of regional relevance).

The discussion of access to RI is considered to be of high importance. A compilation of medium-sized RI could help scientists to identify appropriate facilities required for their research. One might think of creating a portal open for RI providing their techniques/data/services via a voluntary registration. That kind of portal would provide information on the offered opportunities and could be used by all scientists. To stimulate an active use of this portal (by RI as well as by the external scientists) the RC might think of incentives (for instance by funding user fees in case of registered RI).

Joint investments might be stimulated by the discussions but can hardly be imagined as a general goal because the agreement on joint investments will most probably rely on specific boundary conditions.

Joint activities in terms of networking several centres (financed by national means) should be strongly supported. A collection of already existing or pending collaborations between RI could be a starting point which might serve as best practice compilation for future activities.

Annex VI: **Declaration of Common Intent**

Between European research funding organisations, major stakeholders & advisory bodies on research infrastructures (RI)

The representatives of
ALLEA; EARTO; EASAC; EGI; EIROforum; ERF; EUROHORCs; NRENs; PRACE; TAFTIE; e-IRG and ESFRI
have agreed on the main challenges related to the governance and operation of research infrastructures, topics stimulated by the European Commission, on which they should jointly work during the following months in order to fulfil the objectives of the Europe 2020 Innovation Union initiative. These issues relate to:

- Developing a common approach for the evaluation of RIs (including e-Infrastructures) at national or European level (based on excellence, management, impacts)
- Development of coherent projects and initiatives on the basis of national and European priorities for world-class quality research infrastructures and research services
- Identifying and promoting best practices for RI governance, including cost control and long-term sustainability of resources
- Attraction of human resources, notably of high quality technical, engineering and managerial staff, and support to their training and mobility
- Promoting best practices for the optimal use of RIs by the research community, and for implementation of open access policies ensuring scientific excellence
- Improved interactions between the RI providers and the user communities, including industry as user and supplier, to fuel the research-innovation cycle
- Increased development and use of e-infrastructures as building blocks of pan-European RIs, in particular to improve access, availability and archiving of data as well as to build virtual research communities.

The undersigned agree to stimulate and to share work for the development of coordinated strategies and actions, which would encompass a wide range of activities, such as mutual dissemination of information, follow-up of the implementation of identified pan-European RI projects or development of best practices and elaboration of common guidelines (evaluation, innovation, international cooperation, etc.).

October 2010

Annex VII: **Basic Requirements for Research Infrastructures in Europe***

Part I: Basic requirements for all RIs with shared access

Management		
No.	**Required**	**Recommended**
M1	The management structure must be adequate for the size and category of RI	Dedicated (technical and administrative) managers are recommended for RIs with many projects/users
M2	Skilled staff, both scientific and technical, must support the RI and the user	Career options should be considered / supported. Training should be offered
M3	The RI has to define an access model that is consistently applied in sharing access with external users (cf. section *Information on the access model*). An explicit or implicit contractual relationship has to exist	The access model should be optimised for the needs of the users. Feedback analysis should be made for all aspects including training. Signed agreements should define rights and responsibilities
M4	RIs have to be able to estimate their total costs	RIs should be aware of and inform users about the total cost of the access (also to prove their expenses)
M5	The environmental impact of the RI is the responsibility of the RI management	

Regulation – Quality Assurance		
No.	**Required**	**Recommended**
L1	Use of a facility has to be acknowledged by the user in appropriate ways, e.g. in publications	Co-authorship on publication or patents is only warranted when substantial scientific input contributes to the publication. Users should be obliged to inform RIs about publications and patents based on the use of the RI
L2	RI must know and inform users about local (and other applicable) law and regulations relevant for access to the RI, also for incoming users from other countries. (Examples: In the country of the RI: data protection laws, importing samples, ethical regulations, liability, licensing, etc.)	RI can help users by collecting and presenting laws and regulations for the countries users come from. (Examples: In the country of the user: data protection laws, export of samples, liability, licensing, etc.)
L3	The RI management is responsible for adequate safety measures and users must be informed and, if need be, obliged to adhere	
L4	Applications for access must be treated confidentially	

Information for potential users		
General information		
No.	**Required**	**Recommended**
I1	Detailed information is available via www	All relevant information is both in English and national language(s)
I2	General description of the RI	Examples of usage, publications
I3	Contact details	Online submission of access requests

* Extracted from EUROHORCs/ESF 2011. A Contribution by the Working Group 1, 'Access and Standards', of the ESF MO Forum on Research Infrastructures. Endorsed by the EUROHORCs, 14 April 2011.

Information on the access model		
No.	**Required**	**Recommended**
I4	Availability at what times and with what service? Continuity of access and service in the future?	RI should offer reliable service with long-term perspective
I5	Information about training and specific assistance, also for subsequent data analysis	Provision of training and specified assistance
I6	Definition to whom access is allowed (private research? industrial users?)	Granting access to the private sector is encouraged, but industry should pay at least the full operational costs
I7	Are there costs for access? What cost models exist for public research, for private research?	Define the cost model and/or its available options No Disclosure Agreements (NDA) might be linked to higher costs for using publicly funded RIs
I8	Description of the selection process for access requests: • Who is doing it? • What are the criteria? • How long will it take?	The procedure should be adequate for the size and type of RI. Confidentiality should be explicitly confirmed
I9	Handling of results from data management to publication has to be clearly described. Standardised data formats have to be supported	Service and support with data handling (storage / access / transfer / processing) and presentation of models/ examples is recommendable
I10	Expectations of the RI regarding citation or acknowledgement of the use of the RI	Clear policy on co-authorships by members of the RI
I11	Responsibilities of owners and users need to be defined (e.g., for correctness, authenticity, storage, contribution and distribution of data)	RI should support quality control
I12	Treatment of intellectual property, data ownership, confidentiality (competition between scientific teams)	Presenting models or examples is helpful

Part II: Specific requirements depending on the category of RIs

Instrumentation, possibly including investigation of samples

Management		
No.	**Required**	**Recommended**
1	If access is (physically) limited (e.g., access to instrumentation) and access requests compete, a fair and transparent selection procedure is needed	Feasibility checks, e.g., by the RI management, are useful. A review panel (independent from the RI management) should decide in a fair and fast procedure on granting access to instrumentation. Constructive feedback should be given to declined applications.
2	Facilities must provide basic laboratory space for sample preparation and/or immediate set-up	

Regulation – Quality Assurance		
No.	**Required**	**Recommended**
3	The sample has to remain the property of the experimental team; the RI management must guarantee sending samples back and that nobody will divert the sample to another destination unless the samples are destroyed during the measurements	The use of a MTA (Material Transfer Agreement) is recommended
4	Property and licence rights about experimental arrangements made on the occasion of the investigation (sample environment, preparation, detection, data treatment, etc.) have to be shared appropriately between the user and the RI team	Ideally, an agreement should be in place beforehand; in unexpected cases parties should convene and decide upon sharing of 'innovation paternity' as soon as possible

Annex VII: **Basic Requirements for Research Infrastructures in Europe**

Information for potential users		
No.	**Required**	**Recommended**
5	Facilities must inform the user about measurement conditions and in what form samples need to be prepared	Special attention should be given to the handling of harmful or hazardous material. Users should be informed and instructed, if applicable
6	Information on any training or assistance that is provided for sample preparation and instrument use	Training and assistance should be provided
7	If physical presence is needed for access, RIs should inform users about possible accommodation	Support for accommodation is commendable

In the case of publicly funded research infrastructures for scientific use, access for users from industry should not compromise scientific use. A time share of up to 10% is usually acceptable.

Data repository

No.	**Required**	**Recommended**
1	The data repository ensures that research data is provided in suitable standardised formats and with sufficient information for others to assess the scientific and scholarly quality of the research data and compliance with disciplinary and ethical norms	The data producer should be obliged to provide the required metadata
2	The data repository ensures the integrity of the digital objects and the metadata	
3	The data repository ensures the authenticity of the digital objects and the metadata	
4	The data repository assumes responsibility for access to and availability of the digital objects. Provisions for continuity of access and service in the future are described by the data repository	
5	The data repository defines access regulations respecting licences, copyrights, personal data protection, etc., and obliges the data user to comply	
6	The data repository enables the users to utilise the research data and refer to them	
7	The data repository applies documented processes and procedures for managing data storage with defined workflows for archiving across the data life cycle	
8	The data repository has a plan for long-term preservation of its digital assets	Stable funding should have been secured

This list is largely derived from the list of requirements defined by the Data Seal of Approval (www.datasealofapproval.org).

Annex VIII: **Criteria for inclusion in the MERIL database**

Three primary factors are to be considered when deciding if an RI should be included in the MERIL database: Quality, Access and Management.

Quality

It is assumed that any RI funded by a national government or agency has already had some degree of quality assessment and will therefore meet acceptable quality standards.

The quality assessment of databases and collections requires a specific approach. It was agreed that for a database to be of more than national relevance it needs to be operating in a manner that enables its data or samples to be compared with those in other centres. This means that data should be easily and consistently retrievable, there should be appropriate metadata to enable the data to be analysed, compared and re-used, and that the RI is working to harmonised standards with other equivalent centres.

Access

To qualify for the MERIL database an RI must have clear and public rules and procedures for access to facility time or resource.

Access must be based on an assessment of the quality of the proposed use where there is a limited resource.

Significant time must be available for outside users, national or international, or in the case of an RI operating in extended experiment or campaign mode, there must be openness to new partners joining experiments.

Strong indicators of being of greater-than-national relevance are:

- Evidence of the attractiveness of the RI to users from abroad, either from data showing actual use by non-nationals, or user interest where the RI is not yet operating. RIs that restrict access only to national users are excluded;
- The existence of formal agreements with non-national partners.

Management

Minimum standards of management are necessary to ensure that an RI is able to fulfil its potential to support external non-national users:

- A single entry point for the RI must be clearly identifiable;
- There must be clear support arrangements for science users;
- There must be clear procedures for the management of data.

The RI must have funding approved for a period sufficient to deliver the type of access typical for that class of facility. In the case of new projects to be included in the database, initial funding for construction and a clear timetable for the opening of research services must be in place.

Annex IX: **List of abbreviations**

CERIF
Common European Research Information Format

ERA
European Research Area

ERIC
European Research Infrastructure Consortium

ERF
European association of national Research Facilities laboratories

ESF
European Science Foundation

ESFRI
European Strategy Forum on Research Infrastructures

EU
European Union

EUA
European University Association

EUROHORCs
European Heads of Research Councils

ICRI
International Conferences on Research Infrastructures

LERU
League of European Research Universities

MERIL
Mapping of the European Research Infrastructure Landscape

MO
Member Organisation

MOFRI
ESF Member Organisation Forum on Research Infrastructures

NSF
National Science Foundation (USA)

OECD
Organisation for Economic Cooperation and Development

RI(s)
Research infrastructure(s)

SE
Science Europe

Annex X: **Glossary of terms**

ESF Member Organisations (MOs):
Refers to ESF member organisations which are Research Performing Organisations (RPOs) and Research Funding Organisations (RFOs).

ESF MO Forum:
An output-oriented, issue-related venue for the member organisations, involving other organisations as appropriate, to exchange information and experiences and develop joint actions in science policy.

Research:
The activity performed by researchers in all sciences.

Research Funding Organisation:
A governmental agency or private organisation which funds research.

Research Infrastructure:
A facility or (virtual) platform that provides the scientific community with resources and services to conduct top-level research in their respective fields. These research infrastructures can be single-sited or distributed or an e-infrastructure, and can be part of a national or international network of facilities, or of interconnected scientific instrument networks.

Research Performing Organisation:
An institute or other organisation which is itself conducting research and which employs active researchers.

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