

STATE OF PLAY OF THE IMPLEMENTATION OF THE PROJECTS ON THE ESFRI ROADMAP 2010

Report of the Implementation Group to the ESFRI
Forum

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EXECUTIVE SUMMARY

The ESFRI Implementation Group (IG) was set up late in 2011 to support the ESFRI projects to reach the 60% implementation goal that was set by the Innovation Union Flagship Initiative. This report on the state of play of the implementation of the projects listed on the ESFRI Roadmap 2010 provides the ESFRI Forum with an overview of the bottlenecks and obstacles experienced by these projects on their way towards and during implementation. As it refers to the Roadmap 2010, this report covers the status and development of the 38 projects that are currently listed on the Roadmap, excluding the 10 projects that were already considered to be under implementation in the Roadmap 2010.¹

The work of the IG is based on the questionnaire distributed in preparation of the Amsterdam Workshop of September 2011, presentations made by several project coordinators during the IG meetings, and the insight gathered by the exchange of experiences workshops organised by CoPoRI in Hamburg and in Brussels in 2012.

For the purpose of this report the IG has defined that an ESFRI project can be considered to be '**under implementation**' when:

agreed statutes or other legal provisions for the construction and operation of the RI are present, a stable legal governance structure is in place and there is budget commitment for the different stages of the research infrastructure (RI) (construction, operation, and winding-up).

However, in some instances, a project may be considered to be under implementation when the countries involved in the project have commonly agreed to proceed with its implementation, even though the previous conditions are met for the construction phase only. In such cases, the agreement to proceed with the implementation of the project should include provisions setting the framework and conditions for the negotiations on the legal, governance and financial aspects of the future operation.

During the ESFRI IG meetings the chairs of the different ESFRI Strategy Working Groups, who are all members of the ESFRI IG, presented the state of play of the projects in their domain. This report includes their overviews. It is important to note that the information in this report and the included overviews are snapshots in time reflecting the status of the 38 projects on the ESFRI Roadmap 2010 as determined in November 2012, based on the information provided by the various stakeholders.

The Commission, together with ESFRI, has set up an *Expert Group on Assessment* (EGA) to evaluate the financial and managerial maturity of all 38 projects listed on the ESFRI Roadmap. The EGA will report on each individual project and make recommendations on how to best address specific bottlenecks and indicate the feasibility for these projects to be implemented by 2015. The report of the Expert Group is expected later this year. The IG will take up the advice of the EGA in order to further assist projects with their implementation.

Although the ESFRI projects face many challenges, the overall picture is generally satisfactory. The more advanced projects have found ways to overcome the challenges related to financial, legal, technical and siting issues. Newer projects are learning from them and adjusting their implementation process accordingly. All of the 16 projects planned to be under implementation by the end of 2012 are making good progress. A few are slightly delayed with status or firm financial commitments but have plans in place and will be under implementation in 2013.

However, this does not mean that all problems are solved or that the ESFRI projects no longer need support. Obtaining financial commitment from research councils and Member States is still very challenging. A very important conclusion of the Amsterdam workshop and the ESFRI IG is that early political commitment is crucial for the ESFRI projects and the successful implementation of the Roadmap. The involvement of funding organisations and interaction with them should be initiated even prior to projects being put onto the Roadmap.

Another important conclusion from the Amsterdam workshop is that a template of ERIC Statutes is needed to support those RI preparing the establishment of an ERIC and to facilitate the adoption process at the level of the European Commission. This template is developed by the ERIC committee and will be distributed together with the new guidelines in the middle of 2013.

¹ CESSDA, European Social Survey, SHARE, ESRF, XFEL, ILL 20/20, FAIR, SPIRAL 2, PRACE, JHR

In short, the IG concludes that 17 RIs on the ESFRI Roadmap 2010 are currently under implementation.² Adding to these the 10 RIs already defined as being under implementation on the ESFRI Roadmap 2010, the total of 27 projects that are currently under implementation makes up 56% of the 48 ESFRI projects. The goal, as set out by the Innovation Union Flagship Initiative, to reach 60% implementation of the 48 ESFRI projects by 2015 is therefore nearly met.

Part 1 of this report introduces the working methods and definitions used. Part 2 looks at the bottlenecks identified by the IG and part 3 gives an overview of the projects in the 6 domains. Part 4 comprises the sum of recommendations and conclusions of the Implementation Group.

² Based on information collected in November 2012.

1 INTRODUCTION

Research Infrastructures (RI) are a key component of the European Research Area bringing together a wide variety of stakeholders to search for solutions to the scientific problems being faced by society today. They offer unique research opportunities to users from different countries and from different disciplines, attract young scientists and help to shape scientific communities. RIs are playing an increasingly important role in the advancement of knowledge and the development of technology to help Europe compete in an increasingly globalized knowledge economy.

The European Strategy Forum on Research Infrastructures (ESFRI) was set up to support a coherent and strategy-led approach to policy making on RI in Europe and to facilitate multilateral initiatives leading to a better use and development of RI. The ESFRI Roadmap for Research Infrastructures, published in 2006 and updated in 2008 and 2010, is a vital policy document which paves the way for the planning, implementation and upgrading of RI for the coming decades. RI contribute to making the Europe 2020 Strategy and its Innovation Union Flagship Initiative³ a reality. Moreover, RI should help realize the potential of the regions, increase international cooperation and continue their opening to, and partnership with, industrial researchers to help address societal challenges as well as to support EU competitiveness. ESFRI has provided through the roadmap an incentive to the different national prioritisation processes.

Since the publication of the first roadmap in 2006, 48 projects have been identified as being of pan-European (and potentially global) relevance. Of these, 10 were considered "under implementation" in the 2010 ESFRI Strategy Report and Roadmap update. The projects on the roadmap are very diverse in size and character: the construction costs vary between 2M€ and 1.100M€, the operation costs between 2M€ and 120M€ p.a.

According to its renewed and adapted mandate⁴ "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", ESFRI has the responsibility to assist the scientific communities with the implementation and use of new RI. The ESFRI delegates play an important role in working with governments and the European Commission to allocate the necessary funding for the RI. Political commitment to invest in pan-European RI, for example with structural funds, is crucial for the implementation of the roadmap projects.

The implementation of the projects on the ESFRI Roadmap is at present a priority for ESFRI and the European Commission (EC) in order to fulfil the commitment of the Innovation Union Flagship Initiative that *"By 2015, Member States together with the EC should have completed or launched the construction of 60% of the priority European Research Infrastructures currently identified by ESFRI. The potential for innovation of these infrastructures (including ICT) should be increased. (...)"*

1.1 Working method

The ESFRI Implementation Group (IG), set up late in 2011 to support the ESFRI projects in reaching the 60% implementation goal (see Annex 2), reports on the state of play of the implementation of the projects on the ESFRI Roadmap 2010 to the ESFRI Plenary Forum and provides conclusions on the bottlenecks and obstacles experienced by the projects and recommendations on how to overcome them.

The Amsterdam Workshop "Implementation of projects on the ESFRI Roadmap" which took place on 19 September 2011, and the questionnaire distributed at this workshop, formed the basis of the work of the IG. The workshop gathered information from each ESFRI project and discussed the bottlenecks of the implementation phase, in particular how close each project is to a "go-decision" by a group of countries or legal entities. All 38 coordinators of the projects on the page 22 of the 2010 ESFRI Roadmap were asked to answer 6 questions on their progress towards implementation.

The workshop provided useful insights on governance, legal aspects, financial aspects, mobility & access and the bottlenecks in the implementation of the projects. It addressed many issues related to the acceleration and improvement of the implementation and procedures. It also proposed raising the issue of the implementation and Member States' commitment at the ministerial level during the Danish Presidency. A letter was consequently sent to the Competitiveness Council on 31st May 2012 (see Annex 7), to which many countries responded positively and led finally to the renewed and adapted mandate of

³ Council conclusions of 26 Nov. 2010 on Europe 2020 flagship initiative "Innovation Union".

⁴ Council Conclusions of 11 Dec. 2012 on "A reinforced European research area partnership for excellence and growth."

ESFRI. The IG took the overall conclusions and remarks of this workshop into consideration and started its work directed towards presenting a first draft report during the 42nd ESFRI Plenary Forum in September 2012.

The Chairs of the Strategic Working Groups (SWGs) provided an overview of their field to the IG. Their findings on the state of play of governance, legal aspects, financial aspects, mobility & access of the 38 projects are in Chapter 2 along with comparative conclusions and recommendations with regards to the legal, governance and financial aspects and the issue of transnational access.

A high level Expert Group on Assessment (EGA) has also been set up by the Commission and ESFRI (see Annex 5) to assess progress towards the Innovation Union objective of launching or completing the construction of 60 % of the ESFRI projects by 2015. Their aim is to evaluate the financial and managerial maturity of the ESFRI projects, rather than their scientific merits. The group will identify specific bottlenecks and make recommendations on how to best address them as well as indicating the feasibility for these projects to be implemented by 2015. The IG Chair is adjunct member of the EGA and acts as liaison.

The IG also cooperates closely with the EU-funded project *Communication and Policy development for Research Infrastructures in Europe* (CoPoRI) which undertakes communication activities and organises workshops on subjects of specific interest for ESFRI. CoPoRI is complementary to both the IG and the Expert Group on Assessment and the IG Chair is one of the mentors of CoPoRI. A Workshop on 'Exchange of Experience (EoE)' on the lessons learned by ESFRI projects and of the preparation for ERIC applications was organised by CoPoRI on 11th June 2012 in Hamburg. Results from the workshop (e.g. chapter about Trans-National Access Policy) are incorporated in this report.

1.2 Definitions

In the framework of this report, the IG considers that an ESFRI project can be considered to be ***under implementation*** when the following conditions are met:

- agreed statutes or other legal provisions for the construction and operation of the RI are present;
- a stable legal governance structure is in place and;
- there is budget commitment for the different stages of the RI (the construction, operation and winding-upstage).

In some instances, a project may be considered to be ***under implementation*** when the countries involved in the project have commonly agreed to proceed with its implementation, though the previous conditions – agreement on the RI's institutional and governance framework, as well as financial sustainability – are met for the construction phase only. In such cases, the agreement to proceed with the implementation of the project should include provisions setting the framework and conditions for the negotiations on the legal, governance and financial aspects of the future operation.

Moreover, the IG considers an ESFRI project to be in the ***preparatory phase***, when it has an officially allocated budget from the European Commission for a specific time period in order to arrange the legal, governance and financial conditions to start the implementation of the project.

The IG also defines the ***interim phase*** for projects that ended the official ***preparatory phase***, but that do not yet meet the legal, governance and financial conditions that are necessary to be considered as ***under implementation***.

This report analyses the obstacles and bottlenecks faced by the projects on the ESFRI Roadmap on their way towards implementation at various levels: governance, legal aspects, financial aspects and transnational access. Below are some elements of understanding on each of these dimensions.

- The '**Governance**' of RI corresponds to the sets of institutional structures, principles, rules and procedures through which the interests of the various stakeholders as well as the lines of authority, responsibility, and accountability between them find their expression. The governance principles of the RI must be clear and detailed enough so as to ensure that strategic decisions can be made, that the top management of the infrastructure has sufficient power to implement them and remains, at the same time, duly accountable for its actions, and finally that the overall organisation is flexible and reactive enough to find efficient solutions to critical problems. In the context of a Research Infrastructure, the governance model should have a strong political dimension allowing the balanced representation of the interests of the members, while enabling the professional management of the organisation.

Discussing the governance of a project on the 2010 Roadmap should answer the following questions: What phase is the project in? What is, in case it has been defined, the foreseen governance structure? To what extent has it been realised? Is there a site issue? In the case of a distributed facility: are the plans in line with the ESFRI definition on page 8 of the 2010 Roadmap, i.e. a 'common legal form', 'single Management Board' and represent pan-European interest? What are the positive and negative experiences with the chosen governance model? What are the major bottlenecks concerning the life cycle management and the management structure?

- The '**Legal aspects**' of RI concern primarily the legal form that has been identified and agreed amongst the member for establishing and operating the RIs. There are currently a variety of legal instruments under consideration for RIs, varying from European Research Infrastructure Consortium (ERIC) to special projects under EMBL, international associations (e.g. AISBL) and national limited companies (e.g. GmbH). The choice for a certain legal instrument is very much dependent on the membership of the RI (states or research organisations), the importance of exemption of VAT (substantial central procurements during construction and operation), the ability of the members to support membership of the legal entity chosen under their national regulatory systems and the necessity to guarantee long-term financial commitments for common investments. The choice of a legal form sets boundary conditions for the governance (decision making), liability limits for members and for reporting and accounting requirements for the management of the RI. Although the choice of a suitable legal form for the RI takes substantial time for the members to agree, it does not seem until now to be a blocking point for the establishment of RIs.
- The **financial dimension** considered in this report deals mainly with the capacity of the Research Infrastructure projects of the ESFRI Roadmap to create the conditions of their financial sustainability. For most RI, financial sustainability cannot be completely achieved from the outset as the funding model of RIs usually implies the combination of various types of resources. However, the founding agreement allowing construction to start requires in the vast majority of cases that an agreement is passed between several parties (countries or organisations), whose contributions, once pooled, ensure a sufficient level of financial sustainability for the implementation, subsequent operation and winding-up of the infrastructure. A precondition to this agreement is the availability of sufficient financial information on the various phases of development of the Research Infrastructure. This financial data should be as comprehensive and reliable as possible and reflect the common understanding of the future contributors on the critical components of the infrastructure and the acceptable level of risk.
- **Trans-National Access policy.** Most RIs are familiar with the EC funded scheme for support to trans-national access for user groups or individual researchers. Currently there is no EU-wide policy for access to RIs since this is often dependent on specific negotiations for their funding and development.

2 BOTTLENECKS

ESFRI RIs are making good progress towards implementation. However certain bottlenecks have been identified, in particular relating to the difficulty in securing the required financial investment and to issues concerning the definition and establishment of a suitable governance model.

The most frequently cited bottleneck to implementation for ESFRI RI is the challenge of developing a suitable **funding model**, which is at the same time sustainable, equitable and realistic, and in securing the necessary funding from Member States (MS) or Associated Countries (AC). This is exacerbated by the current economic crisis. ESFRI RIs are operating in a climate where many governments have had to introduce austerity measures and where the overall economic mood is one of uncertainty. Even when MS/AC are supportive of a particular Research Infrastructure, providing the required financial investment is proving to be a major practical challenge. This is as much a challenge for those RI planning to charge access fees as for those which will provide access free of charge.

A particular problem for many distributed RI is to secure sufficient **investment of MS or AC for the coordinating activities** of the central hub. Funding for these activities is imperative if the Research Infrastructure is to remain a single, coherent infrastructure. Yet RI note that it is easier to secure funding from MS/AC for activities that will take place within that country. A secondary challenge for many of the same distributed RI is to evaluate the full construction and operation costs. The actual costs usually depend on which countries participate, and what services they provide, so accurately estimating this in advance can be challenging.

The speed and process by which MS/AC make **political decisions** on each Research Infrastructure can vary considerably from one country to another and is determined by their differing procedures and priorities. Some MS/AC already have well developed National Roadmaps in place; others are still in progress. This variation between countries can pose challenges to RI trying to synchronise their operational deployment as can the varying timescales by which MS/AC make financial commitments. In some MS/AC a national contribution can be made relatively swiftly and at any time, in others Research Infrastructure investments are made at intervals of often up to two years following competitive calls for proposals.

Another bottleneck to the implementation of ESFRI RI relates to **governance**. Designing an appropriate governance model, which provides the sufficient level of independence to the sites involved and yet still ensures an integrated and effective management of the infrastructure as a whole is a real challenge. This bottleneck seems to apply equally to single-sited RI as to distributed ones.

Choosing the most appropriate **legal model** can take time. Even when partners agree early on the most appropriate legal model, there usually follows a lengthy and sometimes challenging process to actually develop and sign the aforementioned legal agreement. Whichever legal model is chosen, the negotiation of this between partners is usually fraught with difficulties. The process of getting approval to use the **ERIC** legal framework was cited by some RI as being time consuming, although this process is now faster. The European Commission has proposed an amendment to the ERIC Regulation which would further speed up the processes. The main content of the amendment is that, if adopted, Associated Countries contributions within the ERIC framework could be fully reflected in voting rights. The combined effect of any governance bottleneck typically results in delays to the planned construction and implementation of the Research Infrastructure.

For many of the first generation ESFRI RI, bridging the gap between the end of the Preparatory Phase and the formal implementation of the project is a critical issue (the so-called '**interim phase**'). It is in this period when many of the most important decisions regarding the negotiation of the legal framework and the contribution of Member State funding need to be agreed upon.

In some cases site issues have acted as a bottleneck. For single sited physical infrastructures there is often more of a discussion about the exact location of the site, especially when the site needs to be outside Europe as in the case of SKA. This can take many years to resolve. However, the Preparatory Phase provides the resources to projects to allow them to explore the various site options that exist and in the

majority of cases the site issue is not a bottleneck. Many RI will be located alongside existing sites and service providers and so the choice of site often comes down to a simple, practical decision.

All ESFRI RI have to face at least some **technical challenges** ranging from the physical construction of highly precise instruments and technologies to the establishment of fully operational e-infrastructures, which integrate a wide range of new and existing service providers. However, the technical challenges faced by ESFRI RI are not on the whole considered to be major bottlenecks. There exists within the RI enough expertise and experience so that technical issues are a surmountable challenge rather than a major bottleneck.

Where RI have reported major technical barriers, they tend to be **project-specific issues**. One challenge faced by HiPER, for example, is to demonstrate the scientific and technical feasibility of the concept. This is reliant on the outcome of the work being undertaken in the National Ignition Facility, Lawrence Livermore National Laboratory in U.S. to demonstrate net energy gain. Without the demonstration that such power production is commercially attractive, securing Member State commitment is challenging. Likewise, in the post-Fukushima world, the view of several MS towards the use of nuclear energy poses particular problems for MYRRHA in obtaining the necessary political support it needs.

Not all RI have reported facing bottlenecks. These are typically from the 2010 and 2008 updates of the ESFRI Roadmaps. The explanation for this is likely to be two-fold: some of the newer RI are not yet at the relevant stage of maturity to have encountered problems in securing funding or establishing their governance model and so are yet to face the bottlenecks; and the newer RI have the advantage of being able to adopt best practice from the first-generation ESFRI RI and consequently have been able to mitigate some of the bottlenecks before they have appeared.

A more detailed analysis of the bottlenecks related to the legal issues and governance, financial aspects and trans-national access policy follows.

2.1 Legal Issues and Governance

With regards to the governance of RI, it is concluded that 15 out of the 38 projects on page 22 of the 2010 ESFRI Roadmap have moved to the implementation phase by the end of 2012. These 15 (along with others) have chosen a legal entity and arranged their governance structure accordingly. 11 of the 38 RI have opted for an ERIC; others have opted for an international organisation or a corporate legal person under national law, such as a company, association or foundation.

The true challenge concerning the governance of the RI of the ESFRI Roadmap consists of the complex management ranging from solving daily operational problems constructing the RI up to aligning state interests in an international context: while the prior follows the concrete logic of the RI lifecycle management (preparation, construction, operation and decommissioning), the latter involves managing national politics, European supranational policy-making and/or international negotiations.

The diverse national funding cycles and decision-making processes concerning national roadmaps make it hard to synchronise solving operational problems and particularly to ensure sound mid- and long-term financial management.

- Establishing supervisory boards with representatives from national governments, international organisations and/or funding organisations - often called the General Assembly - is essential for the overall management structure.
- Positive experiences have been made with a clear distinction between and attribution of authority to a) an (executive) management board and b) a scientific (advisory) board.
- Using the support for policy coordination provided in the proposal of the European Commission for the next Framework Programme for Research and Innovation 'Horizon 2020' to align national road mapping and to synchronise national decision-making and funding cycles in concrete cases, is recommended.
- The provision of sustainable education and training for managers of pan-European or international RIs must be guaranteed and go beyond the management of science and the RI life-

cycle and project-based and multi stakeholder approaches, but should also involve programme and policy cycle management, international relations, law of international organisations and multi-level governance approaches.

Moreover, in these times of financial crisis and austerity, national governments seem to be reluctant to truly commit to the implementation of concrete selected projects thereby hampering the managerial impact of the operational management of RI.

- ESFRI should not only keep a strong focus on the implementation, but also get involved in 'silent diplomacy behind closed doors' directed towards providing political and practical support to the management of RI gaining the necessary commitment by their national authorities and funding bodies.
- Moreover, an urgent clarification within the national road mapping of first an (idealistic) long list of scientifically desirable projects and a latter (realistic) short list of politically feasible projects is desirable.

There is clear relationship between the ERIC legal status and good governance. However, while the global relevance of RIs is increasing, there is a perceived hesitation by governments from AC and third countries to commit to both funding and governance models to RI with the ERIC legal entity, e.g. with respect to nationally versus internationally owned instrumentation, conflict resolution or (majority) voting principles. Therefore the IG appreciates that the EC is preparing a change of the ERIC regulation in order to equate MS and AC as regards voting rights. As regards the third countries however such an equal treatment is not possible without losing the necessary European dimension of ERIC.

- RIs of international/global relevance are therefore advised to be ready for an international agreement – at least when there is no strong majority of European countries and not a site within the EC -and to choose a legal entity allowing for the flexible European and worldwide participation and the safeguarding of the governance interests of AC and third countries, e.g. a private enterprise or international organisation.
- It is advised to continue exploring and setting-up a global cooperation structure for global RIs safeguarding scientific and global relevance of the projects on the ESFRI Roadmap, also addressing the issue of governance.

Whilst it can be concluded that a strong and small group of committed initiators proved very effective in many cases it can also be seen that although the various (national) components 'scientifically feel' united and clearly see the added value, the negotiations around the establishment of the governance structures face tough questions in certain distributed facilities concerning setting up a new (international) legal entity network.

- Positive experiences have been made with phased approaches, e.g. setting-up a special project within the context of an international organisation and using existing governance structures or initially establishing a legal entity and corresponding governance structure and later proceeding to establishing an ERIC.
- Finally, it is clearly advised to set up a new legal entity and provide funding for a 'central' management sufficiently empowered to control all aspects of the projects. Such distributed facilities can of course consider 'seconding' existing staff to the new entity as in-kind contribution on the operational level.
- ESFRI should continue to support such projects developing an overall vision and strategy and concretely enable them to set up adequate governance structures providing managerial, administrative, financial and legal background, model agreements, and toolboxes. In this sense, it is time to move beyond simply identifying best practices.

In limited cases with a predominant national contribution and corresponding national organisation, a management that is not truly international is evident. The establishment of a high-level Advisory Board undertaking the necessary activities to involve more member states and to attract new participants has proven effective in other cases.

Site issues

In limited cases there is a perceived link between site issue and funding commitments by governments.

- The preparation of sound and complete bids and the execution of intense and fair negotiations have led to satisfactory agreements and solutions.
- ESFRI in general, and the Strategic Working Groups in particular, are encouraged to reassess the scientific validity of new insights if earlier scientific findings are challenged.

In summary, designing an appropriate governance model, which provides the required independence to the sites involved and yet still ensures an integrated and effective management of the RI as a whole, is a real challenge. This bottleneck seems to apply as equally to single-sited RI as it does to distributed ones.

2.2 Financial aspects

Any decision to go-ahead with the implementation and subsequent operation of a Research Infrastructure requires not only an agreement on the legal and governance framework of the future organisation, but also, of course, contributions up to a level to ensure sufficient financial sustainability for the reference period of activity commonly agreed by the contributors. For most RIs listed on the ESFRI Roadmap, securing the necessary financial investment from MS represents a genuine challenge due in particular to the lack of harmonisation and synchronisation in Europe in the national decision-making, roadmap processes and funding practices.

The RI of the ESFRI Roadmap rely on different funding models: some projects, in particular single-sited investment-intensive ones, require the pooling of all contributions in one “common pot”, whereas many distributed RI need the pooling of only limited financial needs for the central management and investment at country level in individual nodes, whose funding is not aggregated. Despite this diversity of funding structures, all RI of the Roadmap face a common challenge: they require the coordination of resources, be it in a common pot or not, to develop as single and coherent pan-European undertakings.

As seen in the status reports on the thematic domains, many of the ESFRI projects succeed in obtaining substantial individual commitments from MS, but the fact that decision-making and timeframes vary substantially from one country to another complicates – and delays in most cases – the pooling of resources up to a sustainable level. The economic climate adds to this and represents another significant obstacle.

- The conditions and schedule under which MS/AC make funding decisions can vary considerably. On the one hand, the decision-making process is governed by country-specific procedures and priorities with little coordination and synchronisation across countries. On the other hand, roadmapping still works according to different timescales: some MS already have well developed national roadmaps in place while these are still in process in other countries.
- The way in which national contributions are organised and processed varies in flexibility: in some MS/AC, a national contribution can be made relatively swiftly and at any time, while in other countries investment decisions are made at intervals of often up to two years following competitive calls for proposals. This may affect very much the capacity of RI to pool resources and plan their deployment. Several projects (in particular those RI relying on the long-term conservation of data) mention the growing importance of project-based funding as a major challenge to their long-term operational and financial sustainability.
- The economic crisis exacerbates this situation and in a climate where many governments have had to introduce austerity measures, competition for the access to funding is tougher. This situation affects the level of funding made available to RI, but brings also uncertainty, as funding authorities are more reluctant to give firm commitments.
- Many projects expressed their willingness to see ESFRI as a facilitator and an interface between the projects of the Roadmap and national funding agencies. It is also expected that ESFRI could further promote the coordination and harmonisation of national funding processes and practices. In general, given the difficulties described above, it was noted, in particular during the

Amsterdam workshop, that contacts with funding agencies should be anticipated as much as possible in the very early stage of development.

In this difficult context, success varies from one Research Infrastructure to another:

- Research Infrastructure projects managed under the umbrella of an existing international organisation (see E-ELT within ESO for instance) probably struggle less than other projects, because the organisation itself provides a well-established and regulated framework for negotiations and discussions on financial contributions.
- In general, RI note that it is easier to secure funding from a MS/AC for activities that will take place within that country, as it is then easier to demonstrate “*juste retour*” to the hosting country. This should naturally tend to benefit distributed RI, which rely in most cases on nodes funded as national investment projects and need the pooling of limited funding at the European level for central management and coordination. Yet, securing sufficient funding for the central hub remains challenging in some cases.
- For many distributed RI, one possible way to start implementation and operation – there is sometimes no evident boundary between the two – is to adopt a phased or “modular” approach to the development of the Research Infrastructure. In other words, the decision to start implementation may be taken even when only part of the funding needs have been committed, provided 1) that the contributions made available by the partners ensure an acceptable level of resources compared to the maximum scope of activities targeted initially and 2) that adequate mechanisms allow other contributors to join at a later stage.
- Given the economic climate, structural funds represent a remarkable opportunity that may potentially contribute significantly to the implementation of the Roadmap. In the current programming period (2007-2013), €10 billion are dedicated to the funding of RI, research facilities and R&D centres of excellence (75% of which is reserved for convergence regions) and this budget is likely to increase in the next programming period. Structural funds aim at supporting the socio-economic development of the less-developed regions of the EU to promote regional cohesion in Europe. They may cover investment as well as start-up costs (non-investment costs related to the implementation of Research Infrastructure projects). Projects like ELI provide a good example of how structural funds can be pooled with other resources (FP7 for the Preparatory Phase and national funding for the future operation). Yet, the use of structural funds is not without some challenging aspects, both in the practical application process (in particular the lack of application framework specifically adapted to the research field, and the lack of experience and knowledge of the national authorities managing the “operational programmes” in the RI field), as well as in the implementation of the grants (strict time constraints for the use of the funds, tougher public procurement rules, etc.). The services of the European Commission have already identified that the projects of the Roadmap could use structural funds to implement either a node or whole of the Infrastructures. At the national level, promoting better coordination and consistency between the RI roadmap and the strategic orientations of the “operational programmes” of the next programming periods would certainly be useful. Only if the ESFRI projects are incorporated in the partnership treaties, currently under discussion between MS and the European Commission, funding will be possible during the next funding period. At the European level, it should be secured that ESFRI projects are considered in the Position Papers the Commission works out for every Member State in preparation of the partnership treaties already mentioned above. Besides this some level of coordination would also be needed to improve the synchronisation between national operational programmes and thereby facilitate the use of structural funds by various countries in distributed Research Infrastructure projects. Additionally, it would be necessary to clarify under which conditions RI projects may use structural funds when their implementation activities overlap two programming periods (“phasing”).

2.3 Trans-National Access policy

RI are often the key to enable excellent researchers to tackle effectively complex or very fundamental questions, to gain new knowledge, to create innovation or to play an important role in education e.g. in

training of young scientists and technological personnel. These tasks could not be fulfilled without access to these RI.

The so far used term “transnational access” usually means supporting new opportunities for research teams or individual researchers to obtain access to specific pan-European, national or regional RI they require for their work.

Access may be made available to external users, either in person (“hands-on”) or remotely by suitable electronic communications or specific scientific services, such as the provision of reference materials or samples, the performance of sample analysis and of specific measurements.

For FP7 funded RI transnational access is one of the three mandatory components of the Integrating Activities (IAs). The FP7 access scheme provides grants for travel and subsistence to support the access of external users and pays for the use of the facility up to 10% of the operational costs. User groups are selected through “peer review” based on excellence. Special training and technical support offered by the RIs is also supported.

Analysis and bottlenecks of ESFRI projects

In analysing specific bottlenecks of the ESFRI projects during the implementation phase via the questionnaire, it turns out that many projects may be confronted with problems around the issue of transnational access. Access management for example plays an important role when defining the costs of the project or staff-policy in their statutes.

In particular, distributed RIs are faced with the challenges of how to define and establish a TNA policy. For instance, the current FP7 transnational access scheme is not fully applicable in fields such as social sciences and humanities (SSH). Access to digital data and services itself is not the problem but data processing in many cases needs additional extra expert support which is often not found in RI centres themselves (as they just take care of the technical operation).

It will be therefore a challenge for all RIs to establish appropriate costing which covers the running costs to guarantee access to their services for the scientific community.

So it is hardly surprising that the Competitiveness Council Conclusions from 11 December 2012 stress that transnational access to RI remains a priority for the research community across Europe and notes the need for common standards and harmonized access rules and conditions for the use of RI and for continued EU support to transnational access activities.

ESFRI will work on this issues through its IG based also on the report of the Assessment Expert Group. Examples of best practice in different fields will be published in the next report of the IG.

3 OVERVIEW OF STRATEGIC WORKING GROUP PROJECTS ON THE ROADMAP

3.1 Social Sciences and Humanities

DARIAH (Research Infrastructure for the Arts and Humanities) (www.dariah.eu) aims to enhance and support digitally-enabled research across the humanities and arts by developing, maintaining and operating an infrastructure in support of ICT-based research practices.

State of play: 10 countries have signed a Memorandum of Understanding formally stating their willingness to support the establishment of the DARIAH ERIC. The contributions from these countries will cover the minimum target budget for an initial set of activities. The host country of the DARIAH ERIC will be France. The future ERIC will be a distributed research infrastructure which, in compliance with the ESFRI definition, will have a 'common legal form' (the DARIAH-ERIC), 'a single Management Board' (Coordination Board) and represents pan-European interest (via the European Network of Virtual Competency Centres, VCCs). The DARIAH-EU Coordination Office (DCO) will coordinate DARIAH activities at the European level. It will be a virtual organisation based in France, Germany and The Netherlands.

CLARIN (Common Language Resources and Technology Infrastructure) (www.clarin.eu) is committed to establish an integrated and interoperable research infrastructure of language resources and its technology. It aims at lifting the current fragmentation, offering a stable, persistent, accessible and extendable infrastructure and therefore enabling eHumanities.

State of play: CLARIN became an ERIC on the 1st March 2012. It facilitates multilingual and multicultural education in schools, colleges and universities, provides easy access to language processing resources, turn existing, fragmented technology and resources into accessible and stable services and serves communities of linguists, humanities scholars and society as a whole, to enable lower thresholds to multicultural and multilingual content.

3.2 Environmental Sciences

COPAL (Heavy Payload long Endurance Tropospheric Aircraft) (www.eufar.net/cop-al) aims at providing the European scientific community in the field of Environmental- and Geo-sciences, with a unique research aircraft platform, capable of reaching and operating in any remote area in the world. It will offer an unprecedented opportunity to countries that are not yet operating research aircraft to develop expertise in airborne measurements and participate in international multidisciplinary experiments.

State of play: All the technical activities have been successfully completed, but in the critical economic trend of the year 2011, the consortium was not able to raise sufficient funds to initiate an industrial call for tenders. At the end of the COPAL Preparatory Phase contract (October 2011), the national research organizations participating in the project were invited to join the EUFAR consortium and signed a Memorandum of Understanding by which they commit themselves to participate in the EUFAR network for pursuing the development of the fleet, and implementing Open Access by contributing in kind to the operation of the existing fleet.

EISCAT_3D (The next generation European incoherent scatter radar system) (www.eiscat.se) will be a world-leading three-dimensional imaging radar using the incoherent scatter technique to study the atmosphere in the Fenno-Scandinavian Arctic and to investigate how the Earth's atmosphere is coupled to space. EISCAT_3D will provide an advanced tool for studying plasma physics phenomena in the atmosphere, a key atmospheric monitoring instrument for climate and space weather studies and an essential element in international global multi-instrument campaigns for studying the environment. It is currently planned that a core site will be located close to the intersection of the Swedish, Norwegian and Finnish borders and four receiving sites within approximately 50 to 250 km from the core.

State of play: The EISCAT_3D phased-array radar system will be operated by and will be an integral part of the EISCAT Scientific Association. The Association is already in charge of coordinating the Preparatory Phase of the project, which is due to end in September 2014. The project will transit smoothly into

implementation in 2014, provided that sufficient funds are allocated. Construction is expected to start in 2016 and first operations in 2018. Full implementation depends on the level of funding to be provided by the current EISCAT Associates (China, Finland, Japan, Norway, Sweden and the UK), by affiliated partners (France, Russia and the Ukraine) and by new members. The current estimate of the investment required by the project amounts € 135 million to be spent over 8 years of implementation. The envisioned contribution model is: € 30M from Norway, € 30M from Sweden, € 25M from Finland, € 15M from Japan and € 35M stemming from China, the UK, new members and additional sources. Users in Norway, Sweden, Finland and Japan are already working on applications to obtain funding for investment into EISCAT_3D.

EMSO (European Multidisciplinary Seafloor Observatory) (www.emso-eu.org) is a large-scale distributed European Research Infrastructure (RI) composed of several deep-seafloor and water-column observatories, which will be deployed at key sites in European waters, spanning from the Arctic, through the Atlantic and Mediterranean, to the Black Sea. The main scientific objective is the real-time/ long-term monitoring of environmental processes related to the interaction between the geosphere, biosphere, and hydrosphere.

State of play: The EMSO Preparatory-Phase will close at the end of September 2012. INGV, in Italy will host an interim office in order to carry out the necessary steps to submit the ERIC application which might be submitted before the end of 2012.

EPOS (European Plate Observing System) (www.epos-eu.org) will integrate the European RI for solid Earth Science, and will build new e-science opportunities to monitor and understand the dynamic and complex solid-Earth System.

State of play: The main objectives of the EPOS preparatory phase are the effective integration of the national RI (RI), the development of a prototype e-science platform upon which EPOS will rely and the creation of the EPOS administrative and legal body. After comparison between several possible legal vehicles, EPOS is heading towards a European Research Infrastructure Consortium (ERIC). What still needs to be refined is the exact perimeter of this future EPOS-ERIC.

EURO-ARGO (Research Infrastructure for ocean science and observations) (www.euro-argo.eu) is the European component of the international Argo program, a global array of profiling floats. Argo is the first-ever global, in-situ ocean-observing network in the history of oceanography, providing an essential complement to satellite systems.

State of play: The Euro-Argo research infrastructure will include a central infrastructure (initially hosted by France/Ifremer) (Euro-Argo ERIC) that will coordinate national distributed infrastructures. It is expected that the ERIC and its governance structure (council, management board, scientific and technical advisory group) will be in place by the end of 2012. 8 members (France, Germany, United Kingdom, Italy, Greece, Bulgaria, Netherlands) and 1 observer (Poland) will join the ERIC at its start. New members may be able to join the Euro-Argo ERIC later on (e.g. Spain, Ireland, Portugal, Turkey, Finland, and Norway).

IAGOS (In-service Aircraft for a Global Observing System) (www.iagos.org) is a research Infrastructure for high-quality observations of atmospheric composition at the global scale based on autonomous instrumentation installed on a fleet of passenger aircraft.

State of play: Being a comparatively small RI which is supported by several large research institutions, IAGOS is planned to be implemented as an International Association under Belgian law (AISBL), with the option of applying for an ERIC at a later stage. Negotiations of statutes and bylaws for the IAGOS-AISBL are almost completed and the founding of the IAGOS-AISBL is planned in 2013. Construction/Operation has already started. At present, the CARIBIC aircraft and two IAGOS-CORE aircraft are already operational. The next three aircrafts will be equipped in 2012/2013, and procedures for pilot operation are established.

ICOS (Integrated carbon observation system) (www.icos-infrastructure.eu) is a distributed research infrastructure which provides in-situ measurements of atmospheric greenhouse gas concentration, ecosystem fluxes, and air-sea fluxes that enables to quantify emissions and sinks of CO₂ and CH₄ and their variability, in order to quantify the GHG balance of the European continent and the North Atlantic ocean. ICOS Central Facilities: the Atmospheric Thematic Centre (ATC), Ecosystem Thematic Centre (ETC), Ocean Thematic Centre (OTC), Central Analytical Laboratory (CAL) and Carbon Portal (CP) are European level centres, which have the specific tasks of processing and distributing data from the network, ensuring that their calibration and precision is compatible with international standards, performing air sample analysis and providing access to ICOS data products.

State of play: ICOS ERIC statutes are expected to be submitted for EC pre-check in January 2013. The statutory seat of ICOS ERIC will be in Helsinki, Finland.

LIFEWATCH (Science and technology infrastructure for biodiversity data and observatories) (www.lifewatch.eu) is an e-science and technology infrastructure for biodiversity and ecosystem research to support the scientific community and other users. It is putting in place the infrastructure and information systems necessary to provide an analytical platform for the modeling and simulation of both existing and new data on biodiversity to enhance the knowledge of biodiversity functioning and management.

State of play: It is expected that the publication in the European Journal and establishment of the LifeWatch ERIC will be in April 2013. The statutory seat of LifeWatch will be hosted in Spain.

SIOS (Svalbard Integrated Arctic Earth Observing System) (www.unis.no/SIOS and www.forskningsradet.no/sios) is a Norwegian-initiated ESFRI project aiming to build up an international research infrastructure on the Svalbard archipelago in the European Arctic. SIOS will systematically develop and implement methods for how observational networks are to be construed and thus become a leader regarding observational systems in the Arctic and Polar regions.

State of play: The assessment of possible legal options for organizing the SIOS infrastructure has been completed. The European Research Infrastructure Consortium (ERIC) option is recommended. Alternative options are a set of Memorandums of Understanding including a Special Purpose Vehicle for the coordinating unit and a national Norwegian Limited Company.

3.3 Energy

ECCSEL (European Carbon Dioxide ND Storage Laboratory Infrastructure) (www.eccsel.org) is to become a distributed research infrastructure supporting research and development of Carbon Capture and Storage (CCS).

State of play: The Preparatory Phase (PP) started in January 2011 and is expected to finish at the end of 2014. The PP includes the development of a long-term Infrastructure Development Plan that will comprise all RI upgrades and new-builds required to meet the needs of the European CCS community. It will be based on a detailed identification of future infrastructure needs, a comprehensive mapping of existing infrastructure and planned developments and on a subsequent gap analysis. This work will be finalized by the end of 2012 and followed up by more detailed technical design, cost scenarios and discussions/negotiations on sitting and funding. There is close coordination between the European Energy Research Alliance Joint Programme on CCS (EERA JP CCS) and ECCSEL. The planned governance is in line with the ESFRI recommendation for distributed RIs.

EU-SOLARIS (The European Solar Research Infrastructure for Concentrating Solar Power) (http://www.eurosfair.prd.fr/7pc/documents/1291110300_eusolarisbrochure.pdf) is intended to become a distributed research infrastructure with a main site in Almeria, Spain, supporting research and development in concentrated solar power (CSP). It builds on major national facilities, which are already in place, and extensive coordinated research between the partners, who are also generally *Participants* in the EERA JP CSP. The existing national facilities have extensive cooperation with industry which exploits the public facilities and use the grounds and broader infrastructure for hosting industrial demonstrators.

State of play: The project is in negotiation with the EC for funding of the Preparatory Phase. The governance and legal model have not yet been chosen. Attracting sufficient funding is a challenge. Private funding is expected to play an important role. This leads to of challenges in dealing with intellectual property rights and coordination of research and industrial priorities.

HiPER (High power long pulse laser for fast ignition fusion) (www.hiper-laser.org) is intended to become a single site facility to explore and develop laser driven inertial confinement fusion.

State of play: The PP ends April 2013. Thereafter a period of technology development (interim phase) is required before construction can commence. Technology development is expected to last till 2022. The construction of a proof-of-principle power plant would commence thereafter when funding, estimated at 5 to 10 Bn Euro, becomes available. Contributions in kind for the technology demonstration phase (interim phase) have been secured from France, Greece, Spain, and the Czech Republic. In addition, the UK, through STFC, has secured direct funding for development of the advanced laser technology needed for HiPER. At

this stage there remains a gap in the resources required for the Technology Development phase, estimated at 300MEuro. Time to realisation is likely to be 30 years.

IFMIF (International fusion Materials Irradiation Facility) (www.ifmif.org) is intended to become a single site RI for testing materials under radiation of neutrons with an energy distribution corresponding to those of a fusion reactor. These investigations are central to the development and qualification of materials for the demonstration fusion reactor, DEMO, following ITER. As such IFMIF is an integral part of the roadmap to develop fusion power plants.

State of play: IFMIF is being developed in a collaboration between EU and Japan. Engineering Validation and Engineering Design Activities (EVEDA) aim at producing a detailed, complete and fully integrated [engineering design of IFMIF](#) and at validating continuous and stable operation of prototypes of each IFMIF subsystem. The EVEDA is expected to be completed in 2017.

MYRRHA (Multipurpose Hybrid Research Reactor for High-technology Applications) (<http://myrrha.sckcen.be>) is intended to become a single site accelerator driven sub-critical fission reactor to be located in Mol, Belgium.

State of play: The overall investment budget to design and build the MYRRHA project is 960 MEUR (2009). The Belgian government has committed to financing 40% (384 MEUR). The first phase of the project (2010-2014) amounts to 137.4 MEUR, 60 MEUR coming from the Belgian government, 17.15 MEUR from SCK-CEN, 7 MEUR expected from EU FP projects, 14 MEUR through in-kind contribution from partners, and about 39 MEUR to be found from potential new partners. This is a point of some concern. The governance and legal structure is intended to be ERIC like. European nuclear projects are governed by the EURATOM treaty for which ERICs do not apply.

Windscanner (The European Winder Scanner Facility) (www.windscanner.eu) is intended to become a distributed RI supporting the investigations and developments in wind energy focusing on complex air flow and turbulence.

State of play: The PP starts 1st of October 2012 and ends 2015. Governance is expected to be in line with ESFRI recommendations. Adequate funding for each of the national nodes is not in place yet and may prove challenging. Exploitation of the Windscanner is included in the EERA Joint Programme Wind work programme.

3.4 Health and Food Domain

The Health and Food domain, previously known as Biological and Medical Sciences, of ESFRI projects are fast moving towards implementation. As they belong to different roadmap updates (6 from 2006, 4 from 2008, 3 from 2010), their progress is at varying stages. The most common features of H&F domain RIs is that they have a “distributed nature” thus mostly there will be “hubs and nodes” structure. The governance models range from ERIC and ICA to EMBL special project and GmbH. Many have grown from former I3 activities or integrate existing service provision organisations, a condition which hints at smoother transition to operation. Overall good progress is being observed.

ANAEE (Infrastructure for Analysis and Experimentation on Ecosystems) (www.anaee.com) aims at developing a coordinated set of experimental platforms across Europe to analyse, detect and forecast the responses of ecosystems to environmental and land use change.

State of Play: ANAEE has not yet started the preparatory phase. If the financial commitments are confirmed, 41% of the construction costs of ANAEE will be covered as well as 37% of the total annual operational costs. ANAEE will define the Governance structure as a part of the Preparatory phase.

BBMRI (Bio-banking and Biomolecular resources Research Infrastructure) (www.bbmri.eu) will be a pan-European distributed infrastructure of existing and new bio-banks and bio-molecular resource centres. It will provide access to human biological samples that are considered as essential raw materials for the advancement of biotechnology, human health and research and development in Life Sciences.

State of Play: More than 80% of the expected construction costs of BBMRI have been committed (140 M €). BBMRI has submitted their applications for ERIC status. The major bottleneck for BBMRI has been to agree on the principles of determining the national contributions towards common ERIC budget. There is no site issue for BBMRI. BBMRI sees implementation of IT solutions and data protection as major challenges.

EATRIS (European Advanced Translational Research Infrastructure in medicine) (www.eatris.eu) will provide infrastructure allowing a faster and more efficient translation of research discoveries into new products to prevent, diagnose or treat diseases.

State of Play: The construction costs of EATRIS are to be financed by the national governments. EATRIS has submitted their applications for ERIC status. For EATRIS there were no real bottlenecks, rather challenges. There is no site issue for EATRIS.

ECRIN (European Clinical Research Infrastructures Network) (www.ecrin.org) is designed to bridge the fragmentation of clinical research in Europe through integration of national networks of clinical Research Infrastructures to provide 'one-stop shop' services to investigators and sponsors in multinational clinical research studies.

State of Play: ECRIN have submitted their applications for ERIC status. About 2/3 of the cost of the core of ECRIN are committed by the full members of the ERIC. The major bottle neck for ECRIN is a rather slow procedure for the decision to apply for ERIC. The statutory seat of ECRIN-ERIC will be in France.

ELIXIR (European Life-Science Infrastructure for Biological Information) (www.elixir-europe.org) aims to be a secure, rapidly evolving platform for collection, storage, annotation, validation, dissemination and utilisation of biological data comprising of a distributed and interlinked collection of core and specialised biological data resources.

State of Play: The construction costs of the ELIXIR hub have been met by the UK (M€ 12 in 2011 and M€ 74 in 2012). The development and operation of national ELIXIR Nodes are met by participating MS and several have already made new financial investments to cover the cost of operating their Nodes: Denmark (M€ 5), Sweden (M€ 1.7), Finland (M€ 6.85 million for a joint ELIXIR + BBMRI + EATRIS Node), Norway (M€ 6.5) and Spain (M€ 1.7 p. a. over 3 years). A challenge for ELIXIR has been securing the commitment of funding by MS for the activities of the central coordinating hub, although an operating budget for the hub for 2012 (M€0.5) and 2013 (M€1.4) has been approved by MS.

The legal model planned for ELIXIR is an EMBL Special Project. Negotiations with MS are progressing and the International Consortium Agreement is expected to be signed in the first half of 2013. There is no site issue for ELIXIR. The technical construction of ELIXIR has started ahead of plan, with five Pilot Projects currently underway to act as test-beds for the integration of the Hub and Nodes. Fourteen countries have signed the MoU to participate and all have submitted Applications to host an ELIXIR Node. These are being evaluated by the ELIXIR Scientific Advisory Board (SAB). In addition, the BioMedBridges cluster project will also play an important role in building the technical data links between ELIXIR and the other ESFRI bio medical sciences RI.

EMBRC (European Marine Biological Resource Centre) (www.embrc.eu) will comprise a consortium of key European marine biological and molecular biology laboratories. Access to resources will be provided both on site and remotely.

State of Play: Around 20% of the currently estimated construction costs are already covered by the founding partners. EMBRC will define the Governance structure as a part of the Preparatory phase. EMBRC has yet to encounter bottlenecks. There is no site issue for EMBRC.

ERINHA (European Research Infrastructure on Highly Pathogenic Agents) (www.erinha.eu) will be a pan-European distributed Research Infrastructure aiming to reinforce the European coordination and capacities for the study and the surveillance of highly pathogenic micro-organisms.

State of Play: ERINHA has not yet calculated the construction costs since it is in middle of preparatory phase. For ERINHA a bottleneck regarding governance is to find the right balance between the partners that have a national BSL-4 facility and those that have not. There is no site issue for ERINHA. ERINHA does not foresee any major technical problems for the construction phase if the committed funds are secured.

EU-OPENSREEN (European Infrastructure of Open Screening Platforms for Chemical Biology) (www.eu-openscreen.eu) will be an open-access infrastructure for the development of bioactive small molecules. This integrated infrastructure will meet the needs for new bioactive compounds in all fields of life sciences.

State of Play: Construction cost for EU-OPENSREEN is kept moderate, as EU-OPENSREEN builds on existing infrastructure. Upgrades for transnational access of sites need to be covered by the respective host countries. Cost for central facilities (e.g. database, central compound storage, office) will be co-financed by member countries (8.5 M€ in total). EU-OPENSREEN has defined its governance structure and will prepare an ERIC application. It is now at the end of its second year of preparatory phase project and is currently not foreseeing bottlenecks. There is no site issue for EU-OPENSREEN.

EURO-BIOIMAGING (European Infrastructure of Open Screening Platforms for Chemical Biology) (www.eurobioimaging.eu) will be a European Research Infrastructure for biomedical imaging stretching from basic biological imaging up to medical imaging of humans and populations. Consisting of a number of distributed and strongly coordinated biomedical imaging infrastructures (“nodes”), it will serve European scientists by providing access to, and training in, advanced imaging technologies across the full scale of biological and medical applications.

State of Play: Euro-BioImaging will have a supporting “hub” that will provide central services and coordinate its “nodes” hosted by research institutions in its member States. Euro-BioImaging will publish the 1st Open Call for future Euro-BioImaging Nodes in Spring 2013. Nodes are likely to be based on national financial commitments to imaging infrastructure in many MS (e.g. M€27 for France BioImaging, M€100 for France LifeImaging). Euro-BioImaging implementation is strongly endorsed and supported by national imaging initiatives it has established in more than 19 European countries. On this strong basis, Euro-BioImaging has successfully completed a 6-month proof-of-concept operation phase, which provided open access to more than 110 transnational users to more than 50 imaging facilities in all of Europe. A rough estimate for construction costs for Euro-BioImaging are M€ 350, and M€ 30 for operational costs p.a. Euro-BioImaging does not foresee any major technical problems for the construction phase if the committed and planned funds are secured and there is no site issue for Euro-BioImaging.

INFRAFRONTIER (European Infrastructure for phenotyping and archiving of model mammalian genomes) (www.infrafrontier.eu) will be a distributed Research Infrastructure offering access to systemic phenotyping, archiving and distribution of mouse models for human diseases to the biomedical research community. It will be composed of mouse clinics and mouse repository facilities.

State of Play: Over 70% of the construction costs have been committed by Germany, France, Italy, Czech Republic, Finland, Greece, Spain and Austria (136 Mio €). INFRAFRONTIER is a distributed research Infrastructure; some partners are already operating, while others are in the construction stage. INFRAFRONTIER will start with a German GmbH as legal entity with seat in Munich, Germany; founding members are DE, FR, CZ, FI, GR and EMBL. Other countries will join later. An ERIC application will follow as soon as the legal requirements have been created in all participating member states. The main challenge for INFRAFRONTIER is that partners have to work within their member states on different political levels.

INSTRUCT (Integrated Structural Biology Infrastructure) (www.instruct-fp7.eu) is a European distributed infrastructure that will promote integrative science by providing open access to state-of-the-art structural biology technologies to researchers in member countries.

State of Play: M€ 285 has been committed: UK M€ 31.7 for 2 years, France M€ 32, Germany M€ 32.1 for existing infrastructures plus M€ 3 for new instrumentation, Italy M€ 40 plus M€ 1.2 for new building by Region Toscana and M€ 5 by national government, Israel M€ 8.4 plus K€ 40 year for running costs and K€ 100K for Instruct subscription for 2 years. Spain M€ 0.5 /year. Portugal K€ 100 for 2 years, Czech Republic M€ 30 which includes a contribution towards the running costs. CEITEC is funded from EU European Regional Development Fund in the framework of the Operation Programme Research and Development for Innovations. The Netherlands is funding M€ 12.2 to setup of NeCEN and M€32 for investment in Utrecht NMR and M€ 5 in proteomics facilities. Belgium M€ 50 p.a. The day to day operations, administrative processes and services of INSTRUCT are undertaken by Instruct Academic Services Ltd (a not-for-profit company) and Members sign an International Consortium Agreement and a Centres Agreement to provide coordinated infrastructure access. For INSTRUCT it is the availability of

national funding to support the commitment of each member state that has declared their wish to participate, and the availability of EC funding to provide underpinning support for the core INSTRUCT operational tasks, which will enable a plan for sustainability beyond the current forecast of 4 years. The availability of funding to support a member state commitment for each that have declared their wish to participate in INSTRUCT is a major bottle neck, as well as the availability of EC funding to provide support for the core INSTRUCT operational tasks to enable a plan for sustainability beyond the current forecast of 4 years. There is no site issue for INSTRUCT.

ISBE (Infrastructure for Systems Biology-Europe) (www.erasysbio.net) will (i) interconnect hubs of technological excellence in Systems Biology, offering the best European research expertise, and experimental and modeling facilities, necessary for systems biology, (ii) establish and make available repositories of data and models, and (iii) enable real-time connections within and between components of (i) and (ii) and with external 'user' laboratories, through the provision of high performance connections to existing high capacity electronic network infrastructures.

State of Play: No information has been received.

MIRRI (Microbial Resource Research Infrastructure) (www.embarc.eu and www.gbrcn.org) will be a Pan-European distributed research infrastructure that provides microbiological services facilitating access to high quality microorganisms, their derivatives and associated data for research, development and application. It connects resource holders with researchers and policy makers to deliver the resources and services more effectively and efficiently to meet the needs of innovation in biotechnology.

State of Play: MIRRI has just begun its preparatory phase and has not yet fully calculated the construction costs of this distributed infrastructure. However, these are roughly estimated at around €200m mainly to be invested in national centres. Its governance structure and legal entity will take into consideration development in other RIs.

3.5 Material and Analytical Facilities

EMFL (European Magnetic Field Laboratory) (www.emfl.eu) will be a world-leading infrastructure in the production and scientific use of the highest possible fields (both continuous and pulsed) by European researchers. It will be operated as a single distributed Research Infrastructure, which will integrate and upgrade the four already existing major European high magnetic field laboratories: the Grenoble High Magnetic Field Laboratory (GHMFL), the Laboratoire National des Champs Magnétiques Pulsés (LNCMP) in Toulouse, the Hochfeld-Magnetlabor Dresden (HLD), and the High Field Magnet Laboratory (HFML) in Nijmegen.

State of Play: The Preparatory Phase of EMFL started in January 2011 and is scheduled to end in December 2013. One of the main challenges until then will be to clarify the legal and governance model of the future infrastructure as well as the level of integration and conditions of coordination of EMFL's constituent laboratories. Several legal options are being considered and benchmarked at the moment, one issue being the site of the future seat of the infrastructure. In any case, the future governance will comply with the ESFRI standards for distributed RI – i.e. a 'common legal form', 'a single Management Board' and a clear pan-European interest.

The research facilities already in place in the three laboratories represent a sufficient basis to establish EMFL and start operation. There is therefore no financial obstacle to the implementation of the infrastructure. A €100-million investment plan in new equipment and upgrade of the existing facilities is planned and there are funding commitments already secured in Germany (for HLD) and in the Netherlands (for HFML). It is expected that the legal and governance model will be approved by the end of 2013, thereby allowing the establishment of the infrastructure.

ESS (European Spallation Source) (<http://ESS-Scandinavia.eu>) will be the world's most powerful long-pulse source of neutrons at 5 MW. Its built-in upgradeability will make it the most cost-effective top tier source for the next 40 years. A genuine pan-European facility, it will serve a community of 5,000 researchers across many areas of science and technology.

State of Play: The ESS will be co-hosted by Sweden and Denmark and built in Lund with a Data Management Centre located in Copenhagen. Additionally, an important infrastructure site, an ESS Laboratory Test Facility and Accelerator Components Factory, will be located in Bilbao (Spain). ESS is under implementation.

EuroFEL (ex-IRUVX-FEL) (www.eurofel.eu) will integrate several national Free-Electron-Laser-based facilities currently in operation or emerging in Europe into a single, distributed and internationally open Research Infrastructure.

State of Play: It is estimated that EuroFEL may include 6-8 facilities, which are currently at various levels of development (planned, under construction, already in operation) and represent altogether a total investment cost of 1200-1600 M€. The Infrastructure will exploit in the best way the complementary specifications and instruments of each facility for wide-ranging studies of matter by a large science community. The Preparatory Phase (IRUVX-PP) did not succeed in bringing about sufficient consensus, let alone an agreement, on the legal and governance model for EuroFEL. There are still diverging views regarding the level of integration and legal framework of the future infrastructure. A coordinated strategy at the European level on the development and operation of FEL-based facilities is also missing. In May 2012, all EuroFEL partners (nine institutions from seven countries) signed a MoU confirming their willingness to continue in the long term the collaboration initiated during the Preparatory Phase, the establishment of a European legal entity for EuroFEL being still considered as an option.

3.6 Physical Sciences and Engineering

The ESFRI Roadmap includes five projects in the physical sciences and engineering domain. One of them (CTA) is still at the stage of the Preparatory Phase, working on the legal, governance and financial conditions for its future implementation. KM3NeT has recently completed its Preparatory Phase and obtained the signature of a Memorandum of Understanding between several funding agencies ready to commit funding.

Three other projects have achieved decisive progress towards implementation:

- A go-ahead decision has been taken for E-ELT and implementation is expected to start in 2013
- Two of the three facilities of ELI have their construction costs (structural funds) secured and are starting implementation, while the European legal entity for the implementation phase is about to be incorporated.
- The SKA has recently accomplished significant steps towards implementation with the establishment of the SKA Organisation in charge of the central coordination of the project in December 2011, the commitment of the members of this organisation to provide funding until the start of the construction (in 2016) and the choice of a dual-site approach in May 2012.

CTA (Cherenkov Telescope Array) (www.cta-observatory.org) will be an advanced facility for ground-based high-energy gamma-ray astronomy. With two sites, in both the southern and northern hemispheres, it will extend the study of astrophysical origin of gamma-rays at energies of a few tens of GeV and above. It will provide the first complete and detailed view of the universe in this part of the radiation spectrum and will contribute towards a better understanding of astrophysical and cosmological processes.

State of Play: The project is currently in the second year of its Preparatory Phase, which is due to end in September 2013. A resource board was established in July to help with the definition of the governance, legal and financial model of the future infrastructure. The governance of CTA will comply with the structures commonly used for open observatories and, as a distributed infrastructure; it will follow the requirements of ESFRI (common governance, one entry point for users, pan-European interest). A cost book is under definition and will serve as a basis for the future negotiations with potential contributors.

E-ELT (European Extremely Large Telescope for optical astronomy) (www.eso.org/projects/e-elt) will be the largest optical/near-infrared telescope in the world. Initiated in 2005 and coordinated under the umbrella of ESO, E-ELT will maintain and reinforce Europe's position at the forefront of astrophysical research by allowing detailed studies of subjects including planets around other stars, the first objects in the Universe, super-massive black holes, and the nature and distribution of the dark matter and dark

energy.

State of Play: E-ELT will be an ESO facility and will therefore be governed under the ESO Convention and protocols. In June 2012, the Council of ESO voted in favour of a resolution for the approval of the E-ELT project, paving the way towards the implementation of the telescope. Spending will commence when the contributions pledged by the ESO Member States will exceed 90% of the €1,083 million cost-to-completion of the project. On the current schedule, the first industrial contracts should be approved and major funding committed in 2013, which should leave sufficient time for four of the ten countries that have approved the June resolution *ad referendum* to confirm their votes and for other MS to join the project.

ELI (Extreme-Light-Infrastructure) (www.extreme-light-infrastructure.eu) will be a European research infrastructure dedicated to the various science and research applications of ultra-intense and ultra-short laser pulses. It will be based on a new generation of laser technologies producing sources of ultra-intense high-energy particle beams and ultra-bright radiations up to the attosecond timescale. ELI will be the first laser research infrastructure resulting from a truly international effort. It will provide high-quality access to the international research community for prospective applications in medicine, radiography, fusion energy, environment, material sciences, nanotechnologies, biochemistry, etc.

State of Play: ELI will be a distributed infrastructure based initially on three specialised facilities to be implemented by 2016 in the Czech Republic (ELI Beamlines), Hungary (ELI Attosecond) and Romania (ELI Nuclear Physics). A fourth facility based on an exawatt-class laser system and dedicated to ultra-high field science will be implemented at a later stage. The construction costs of the first three facilities will be co-funded with structural funds from the European Regional Development Fund. As of September 2012, the funding of the ELI Beamlines and ELI Nuclear Physics facilities has been approved, while the application for funds of the ELI Attosecond facility is about to be submitted to the European Commission.

The ELI facilities will be jointly operated under the umbrella of a single pan-European research infrastructure consortium. To coordinate the three host entities in charge of the implementation of ELI and carry out all preparation activities needed for the establishment of the consortium in charge of the future operation (an ELI-ERIC), an interim entity – ELI Delivery Consortium – is about to be established as an international non-profit association under Belgian law (AISBL).

KM3NeT (Kilometre Cube Neutrino Telescope) (www.km3net.org) will be a deep-sea Research Infrastructure in the Mediterranean Sea hosting a cubic-kilometre sized deep-sea neutrino telescope for astronomy based on the detection of high-energy cosmic neutrinos and giving access to long term deep-sea measurements. The goal of KM3Net is to investigate neutrino “point sources” (gamma ray bursts, supernovae or colliding stars) in the energy regime of 1-100 TeV. The telescope will also be a powerful tool for the indirect detection of dark matter.

State of Play: Following the end of the Preparatory Phase of KM3NeT, in February 2012, commitments of about €40 million are available to start the construction phase (from IT, FR, NL, RO, of which funding agencies have signed a MoU), which represents approximately 20% of the estimated total costs. There are three candidates for hosting the infrastructure (Toulon in France, Capo Passero in Italy, and Pylos in Greece) and the possibility to implement KM3NeT as a remotely controlled distributed infrastructure is currently under evaluation. Parts of the budgets are site dependent.

SKA (Square Kilometre Array) (www.skatelescope.org) will be the world’s largest and most sensitive radio telescope. With an operating frequency range of 70 MHz - 25 GHz and a collecting area of about 1.000.000 m², it will be 50 times more sensitive than current facilities. With its huge field-of-view it will be able to survey the sky more than 10,000 times faster than any existing radio telescope. SKA will give key insight into the formation and evolution of the first stars and galaxies after the Big Bang, the role of cosmic magnetism, the nature of gravity, etc.

State of Play: In December 2011, seven national governmental and research organisations established the SKA Organisation, an independent, not-for-profit company seated in Manchester (UK). The SKA Organisation will be in charge of formalising relationships with international partners and centralising the leadership of the project. The signatories plan to spend €69M (including in-kind contributions) to fund the project in the period leading up to the construction phase (with an expected cost of €1.5 billion) which

starts in 2016. In May 2012, the Members of the SKA Organisation agreed on a dual site solution (South Africa + Australia) for the SKA telescope.

4 CONCLUSIONS AND RECOMMENDATIONS

The 38 projects on the ESFRI roadmap 2010 are at very different stages of maturity. While 16 of them were highlighted as “facilities likely to be implemented by the end of 2012”, a further 6 are new facilities which were only added in 2010. The projects face diverse bottlenecks of different complexity that are delaying their progress towards implementation.

The main bottlenecks relate to financial, legal and governance issues and a combination of them can cause long delays. Choosing the most appropriate legal model can result in lengthy, challenging and difficult negotiations, as is also the case in securing the necessary financial commitments and developing a suitable funding model. The greatest difficulties arise over financial support for the coordinating activities e.g. the central hub in a distributed research infrastructure. The varying speed and processes of (political) decision-making amongst the MS/AC complicates the situation even further for the project coordinators. The design of an integrated and effective governance model can also prove to be difficult.

More mature projects have overcome these bottlenecks to reach the implementation phase. They have established a legal and governance structure and secured enough financial commitment to start implementation. Other projects are learning from their experience and are also making progress towards the implementation phase. In general it can be concluded that the ESFRI projects face many challenges but most do proceed towards implementation.

4.1 General conclusions

- Projects on the ESFRI roadmap are at very different stages of maturity.
- Governments are not sufficiently connected to ESFRI projects.
- Most projects start preparatory phase without (financial) commitment of governments.
- Transition from the Preparatory Phase to implementation sometimes involves major changes which have not been cleared with funding agencies (e.g. single sited RI changing to distributed RI).
- Transition from preparatory phase to implementation is problematic due to financial, legal and governance issues.
- The EU programs on RI have turned out to be very effective in providing access to (new and existing) infrastructures of (new) users. These access programs generate a continuous stream of research activities which form an important component in the constant renewal of research at facilities and of their improvement and upgrade. Nevertheless, the current TNA policy only serves part of the RI user community. In its present form TNA excludes without any clear reason, specific communities from using the I3 model because the TNA model does not fit these communities, whereas integration, another part of the I3 model, is essential for many distributed facilities.
- Transnational access to RI's is a priority for the research community. Distributed RI (that serve a non-technical audience) face specific challenges related to support to access of their services.

4.2 Recommendations

The following recommendations are addressed initially to ESFRI delegates and in a broader sense also to European Ministries. They are grouped by specific topics below.

General recommendations

- Projects should involve all stakeholders from an early stage. Funding organisations particularly need to be involved at an early stage of the project by the project leaders.
- MS should examine how to better link ESFRI projects with their national roadmaps and Operational Programmes for Structural Funds.

- MS/AC are encouraged to keep their Roadmaps up to date and those without Roadmaps are encouraged to develop them.
- All project proposals should be backed by three (or more) MS with firm commitments and at least one MS as a “champion” taking responsibility for the project, both financially and organisationally. It should lead the design of the legal and governance structure and support a sustainable financial plan (this would reduce the lead time in solving legal and governance issues).
- Transnational access is generally a good instrument but should be optional (not mandatory) to ensure the best use of available project funds dependent on the specific situation of the RI and its services.
- For distributed data infrastructures (serving a non-technical audience) a centrally managed budget for “supported access to services” should be added to the current Transnational Access model.
- ESFRI-delegates should support the roadmap projects by raising awareness among the MS/AC.
- Facilitation of knowledge sharing and experience between the RIs on the ESFRI roadmap should be continued.

Recommendations on Legal Issues and Governance

- Developing general models of agreements, statutes etc. in a standard form, with clauses on accountability, open access, governances, etc. that can be adapted to specific situations would greatly facilitate the process.
- The establishment of a high-level (international) Advisory Board, undertaking the necessary activities to involve more MS/ AC and to attract new participants.
- MS/AC should investigate measures to reduce legal and other barriers to cross border access to RI.

Recommendations on Financial issues

- Projects should prepare an integral investment and business plan showing the required investments over the next 5 to 10 years and the way this will be financed (a clear investment plan can reduce the time needed to convince funders).
- Projects and MS/AC should together explore the use of structural funds to finance ESFRI projects, including the national nodes of distributed pan-European facilities. The European Commission should clarify under which conditions projects may use structural funds to fund implementation activities overlapping two programming periods.
- MS /AC should solve the problems with shared financial activities (like the central hub) by creating special funds or budget lines and by making it easier to spend research money (partly) in another MS/AC for these activities.

Recommendations on Transnational access

- The current unit cost-based model used in EC funded projects is not ideal for calculating financial support for providing transnational access to digital RI. However, the travel and subsistence costs related to visits by *users* are essential. The possibility of including the costs for staff that receive and assist visiting scholars and are not based in the concerned RIs would be a very valuable addition to the model.

4.3 Follow-up

In its first year the ESFRI Implementation Group has focused on identifying and analysing the bottlenecks faced by the projects on their way to implementation. Based on this analysis the IG has made proposals to solve the problems regarding governance, legal issues and finance. Next year the IG will build on the knowledge gained to assist the projects in their efforts and try to reduce the bottlenecks. The IG will promote the communication between the scientific communities and funding agency by organising a

special in-depth session of the implementation group to look into specific issues (like investments plans) in more detail. The IG will work together with the Expert Group on Assessment to avoid overlap and work efficiently with the projects. Moreover, the IG will use the information of the workshop, together with the information we already gathered, to write a brochure on “lessons learned” for the ESFRI projects. The overall objective is to support the current projects and the ESFRI projects of the future with the implementation process of their pan-European projects, in line with the commitment within the Innovation Union that: “ by 2015 (...) have completed or launched the construction of 60% of the priority European RI currently identified by ESFRI (...)”.

ANNEX 1: ESFRI PROJECTS AND THEIR CURRENT STATUS

Disclaimer: This table shows the current status of the 38 projects on the ESFRI Roadmap 2010, that is: as determined in November 2012. It must be noted that this overview is a snapshot in time and that the status of the projects is subject to change over time.

<i>Project Acronym</i>	<i>Title</i>	<i>Status</i>	<i>Other Information</i>
Dariah	Digital Research Infrastructure for the Arts and Humanities	Under Implementation Phase	ERIC application is pending
CLARIN	Common Language Resources and Technology Infrastructure	Under Implementation phase	ERIC status reached.
COPAL	Heavy Payload Long Endurance Tropospheric Aircraft	Interim Phase	Changed to participation in EUFAR network
EISCAT_3D Upgrade	The next generation European incoherent scatter radar system	Under Preparatory Phase	Roadmap 2008
EMSO	European Multidisciplinary Seafloor Observatory	Under Implementation Phase	Roadmap 2006
EPOS	European Plate Observing System	Under Preparatory Phase	Roadmap 2008
EURO-ARGO	Global Ocean Observing Infrastructure	Under Implementation Phase	ERIC application is pending
IAGOS	In service aircraft for a global observing system	Under Implementation Phase	Roadmap 2006. Will start as an AISBL in 2013.
ICOS	Integrated carbon observation system	Under Implementation Phase	Roadmap 2008, ERIC application expected for 2013
Lifewatch	Science and Technology Infrastructure for Research on Biodiversity and Ecosystems	Under Implementation Phase	Roadmap 2008
SIOS	The Svalbard Integrated Arctic Earth Observing System	Under Preparatory Phase	Roadmap 2008
ECCSEL	European Carbon Dioxide and Storage Laboratory Infrastructure	Under Preparatory Phase	Roadmap 2010
EU-SOLARIS	European Solar Research Infrastructure for Concentrating Solar Power	Under Preparatory Phase	Roadmap 2010
HiPER	High Power Laser Energy Research Facility	Under Preparatory Phase	HiPER is awaiting for input of NIF (US DOE) in 2030
IFMIF (GLOBAL)	International Fusion Materials Irradiation Facility	Interim Phase	Engineering and design phase
MYRRHA	European Fast Spectrum Irradiation Facility	Under Preparatory Phase	Roadmap 2010
Windscanner	The European Windscanner Facility	Under Preparatory Phase	Roadmap 2010
ANAEE	Infrastructure for Analysis and Experimentation on Ecosystems	Will enter Preparatory Phase at the end of 2012	Roadmap 2010
BBMRI	Bio-banking and Biomolecular resources Research Infrastructure	Under Implementation Phase	Roadmap 2006. ERIC application received on 3 August 2012 (AT-

			host, BG, CZ, EE, FI, FR, GR, IT, LV, MT, NL, NO, ES, SE)
EATRIS	European Advanced Translational Research Infrastructure in medicine	Under Implementation Phase	Roadmap 2006. ERIC application on 1 June 2012 (NL-host, CZ, DK, FI, IT, NO, ES)
ECRIN	European Clinical Research Infrastructures Network	Under Implementation Phase	Roadmap 2006. ERIC application is pending. (FR-host, DE, ES, IT)
ELIXIR	European Life-Science Infrastructure for Biological Information	Under Implementation Phase	Roadmap 2006. Negotiations for an International Consortium Agreement (as Special Project of the EMBL)
EMBRC	European Marine Biological Resource Centre	Under Preparatory Phase	Roadmap 2008
EU-Openscreen	European Infrastructure of Open Screening Platforms for Chemical Biology	Under Preparatory Phase	Roadmap 2008
Euro-Bioimaging	European Research Infrastructure for Biomedical Imaging	Under Preparatory Phase	Roadmap 2008
ERINHA	European Research Infrastructure on Highly Pathogenic Agents	Under Preparatory Phase	Roadmap 2008
INSTRUCT	Integrated Structural Biology Infrastructure	Under Implementation Phase	Roadmap 2006. International Consortium Agreement signed, Instruct established as a UK Ltd. Company
Infrafrontier	European Infrastructure for phenotyping and archiving of model mammalian genomes	Under Implementation Phase	Roadmap 2006. Will start as a German GmbH, will then apply for ERIC with DE as host.
ISBE	Infrastructure for Systems Biology – Europe	Will enter Preparatory Phase before end of 2012	Roadmap 2010
MIRRI	Microbial Resource Research Infrastructure	Will enter Preparatory Phase before end of 2012	Roadmap 2010
EMFL	European Magnetic Field Laboratory	Under Preparatory Phase	Roadmap 2010
EUROFEL	Free electron lasers of Europe	Interim Phase	Ex-IRUVX-FEL
ESS	European Spallation Source	Under Implementation Phase	
CTA	Cherenkov Telescope Array	Under Preparatory Phase	2nd MoU is signed.
E-ELT	European Extremely Large	Under Implementation	Plan to start

	Telescope	Phase	Construction in 2013
ELI	Extreme Light Infrastructure	Under Implementation Phase	Funding of the ELI-ALPS facility still to be approved by the EC
KM3Net	Kilometre Cube Neutrino Telescope	Interim Phase	MoU is signed, further clarification needed on the future conditions of implementation and level of Financial commitments
SKA	Square Kilometre Array	Under Implementation Phase	
	Facilities likely to be under implementation by 2012 (as noted in the ESFRI Roadmap 2010)		

ANNEX 2: SUMMARY OF THE AMSTERDAM WORKSHOP



9 November, 2011

Summary of the Workshop Implementation of projects on the ESFRI Roadmap

**Monday 19 September 2011,
Royal Academy of Sciences, Amsterdam**

The realisation of a quite large number of ESFRI projects, forty eight (48), is now high on the EU and national political agendas for research and innovation. The Innovation Union Initiative set up a particularly challenging task: to make the 60% of the ESFRI projects a reality by 2015. In this context, ESFRI set up a new Working Group on Implementation, dedicated to following and supporting the realisation of the ESFRI projects.

This workshop was organised by the ESFRI NL Delegates in Amsterdam. This was an explanatory workshop to gather information from each of the ESFRI projects and discuss the bottlenecks of the implementation phase and in particular how close each project is to a "go-decision" by a group of countries or legal entities. To mark an efficient start of this Group, all the 38 coordinators of the projects on the page 22 of the 2010 ESFRI Roadmap, the facilities likely to be implemented by 2012, were asked to answer 6 questions related to their implementation. A consolidated document of the answers to these questions was available to the participants prior to the meeting.

Following the welcome and the opening remarks of Hans Chang, first ESFRI Chair, Robert Jan Smits, Director General Research and Innovation, welcomed the setting up of the "Implementation Group". He stressed its importance for reinforcing the realisation of the ESFRI projects. He saw indeed the work of this new group as a very useful input to the preparation of Horizon 2020 and in particular the Commission's proposal for support to the implementation phase of the ESFRI projects. Through the FP7 financial support to the preparatory phase and the establishment of the ERIC regulation, he noted that the Commission has played a quite instrumental role. The Member-States should play now their role in the implementation phase.

Some coordinators of the 38 projects then briefly presented their situation and made concrete suggestions about what kind of ESFRI assistance would be useful to their implementation. Many issues were addressed by the presentations and the discussions:

- **how to establish the ERIC;**
- **what the foreseen Governance structure is; is there a site issue;**
- **what is the level of the construction costs;**
- **which are the major technical problems;**
- **how can we define the configuration of distributed services;**
- **what kind of ESFRI assistance is needed;**
- **what will be the Commission's role in the implementation phase;**

The workshop marked a very efficient start of this Group and from the answers to the questions, the presentations and the extended discussions; we can highlight the following conclusions related to the assistance needed/requested by these projects:

- ✓ **Advice on best practices and play a role of interface with national funding organisations**
- ✓ **Help to develop a framework for a truly co-funding mechanism between the EU and Member States for RIs**
- ✓ **Help to define and make clear the roles of the parties involved from the start and the steps to be followed by all parties involved**
- ✓ **Stimulate Governments to get the things done and investigate possible support for some specific part of the implementation or operation by the European Commission**
- ✓ **Make a distinction between the different types of RIs and address common issues of concern, legal and IPR, to distributed facilities, notably those envisaging to set up an ERIC**
- ✓ **Advice on the implementation of the ERIC. Models of agreement, statutes etc. in a more general form, with clauses on accountability, open access, governance might facilitate the ERIC process**
- ✓ **Help to facilitate a pan-European distributed structure and secure financial support for the Coordination office (the Hub) to administer the coordinated activities of the distributed infrastructure, training programmes, networking, studentships**
- ✓ **Help to ensure more standardised national applications of various EU Directives, notably in the biomedical field.**
- ✓ **Support to make ERIC applicable to projects with links to the Euratom treaty (MYRRAH and Spiral 2)**

It was also proposed to raise the issue of implementation phase and Member – States' commitments at a Ministerial level during the Danish Presidency.

Summing up, it was a very interesting meeting, which provided a very useful insight into the current state of the Implementation of the 38 projects and addressed many issues related to the acceleration and improvement of the Implementation process and procedures. The Implementation Group will take into consideration all the above conclusions/remarks and will start soon, to support the implementation of the ESFRI projects.

ANNEX 3: TERMS OF REFERENCE ESFRI IG

Terms of Reference for the ESFRI Implementation Group (IG)

1. Preamble

The role of the European Strategy Forum on Research Infrastructures is the following:

- *To support a coherent and strategy-led approach to policy making on research infrastructures in Europe; and*
- *To facilitate multilateral initiatives leading to a better use and development of research infrastructures.*

To perform its tasks, the Forum may decide to set up Working Groups for assistance in specific topics which should report to the Forum. Every Working Group created by the Forum shall adhere to ESFRI's procedural guidelines and shall reflect the general ethos of the Forum.

2. Rationale for the IG

- Research Infrastructures (RIs) are a key instrument in bringing together researchers, funding agencies, policy makers and industry to act together. ESFRI has devoted considerable efforts in recent years to the identification of new or upgraded pan-European Research Infrastructures for the benefit of European research and innovation. In addition, ESFRI has given assistance to the different national prioritisation processes as well as to the Preparatory Phase of several projects.
- The ESFRI Roadmap for Research Infrastructures, published in 2006 and updated in 2008 and 2010, is a vital policy document and paves the way for the planning, implementation and upgrading of RIs for the coming decades. Research Infrastructures contribute to making the Europe 2020 Strategy and its Innovation Union Flagship Initiative⁵ a reality. Moreover, Research Infrastructures should help to realize the potential of the regions, to increase international cooperation and continue their opening to, and partnership with, industrial researchers to help address societal challenges as well as to support EU competitiveness.
- After the completion of its 2010 roadmap update, ESFRI needs to concentrate on the implementation of the different ESFRI projects in order to fulfill the commitment of the Innovation Union Flagship Initiative 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"*. The potential for innovation of these (including ICT) infrastructures should be increased.
- In the context of this general objective ESFRI, being aware of the current economic crisis, should be looking for innovative funding instruments in order to achieve the implementation of the projects, since they are the guarantee for producing new ideas and developments which turn into innovations and hence, in the longer term, into jobs.
- In addition, in May 2011 the EU Council invited ESFRI to contribute towards supporting the implementation and monitoring of progress of the Innovation Union initiative and to provide input, as appropriate, to the development of a proposal on the ERA Framework.

The main objective of the IG is to support the implementation of ESFRI Research Infrastructures.

3. Mandate of the IG

- ESFRI decides on the mandate of the Working Group.
- In accordance with ESFRI's procedural guidelines, the IG shall be chaired by an ESFRI member⁶.
 - The duration and composition of the IG, its field of activity, and its specific terms of reference are indicated by ESFRI⁷.
 - The members of the IG are proposed and finally nominated after discussion with the IG Chair through the national delegations.
- If the balance of the nominations is not appropriate the IG Chair should alert the ESFRI Chair, who in turn will alert the ESFRI delegations.

⁵ Council conclusions of 26 Nov. 2010 on Europe 2020 flagship initiative "Innovation Union".

⁶ The first elected chair is Leo Le Duc (NL) agreed during the 37th meeting of ESFRI.

⁷ These ToRs were ratified at the 38th meeting of the Forum.

4. Topics and activities of the IG

- Identification and analysis of the best practices as well as of the different bottlenecks for an efficient implementation process.
- Propose solutions to solve bottlenecks with relevant parties in view of ESFRI's incubator role.
- Continuous support of the implementation of the ESFRI projects, regarding:
 - Governance;
 - Legal issues (e. g elaborating statutes, facilitating the use of the ERIC regulation);
 - Access and data policy.
- Assess financial funding schemes (including Structural Funds).
- Report regularly on the above issues to ESFRI.
- Stimulate communication at an early stage between the scientific communities and funding agencies.
- Coordinate actions, as appropriate, with the ESFRI WG on Regional Issues and other WGs or Institutions (e.g. EIB).
- Summarize the lessons learned and provide recommendations on specific issues to the Forum.

5. Method of work.

- The method of work includes:
 - Regular meetings (normally up to 4 per year);
 - Organisation of Workshops (up to 2 per year);
 - Work in close relation with the PP coordinators/facility Directors.
- The IG may seek independent scientific, technical or socio-economic advice making use, as necessary, of existing bodies and/or specific experts. The work can be carried out also through specific workshops, to deepen the discussion in specific fields.
 - Potential recommendations to ESFRI should be discussed beforehand with the EB.
 - The IG shall report regularly to ESFRI via the IG Chair.
 - The IG Chair may be assisted by an EC official assigned to the IG.
 - The IG Chair is responsible for the timetable and the good organisation of the WG meetings (including meeting agendas, drafting of minutes and related emails to the IG members).
- The IG shall avail itself of a page on the ESFRI website and shall contribute to its content via the ESFRI Secretariat.

6. Deliverables

- Identification of bottlenecks and recommendations on how to overcome them.
- Actions for the implementation of the projects.
- Recommendations on governance issues (legal, financial, human resources, life-cycle management), on links with decision makers & funders, on access and data policy, and on training aspects.
- The IG may be requested to deliver a specific opinion whenever appropriate.
- General information on the implementation of the projects and the IG report(s) should normally be circulated through the ESFRI Secretariat.
- The IG shall report annually to ESFRI. The reports will be discussed at June meetings and be approved at the December meetings of ESFRI.
- Only ESFRI is responsible for the final acceptance of the IG report which will consequently be published on the ESFRI web site.

7. Resources, time scale and review

- Costs of travel expenses of IG members will be covered by the respective countries. In case of meetings taking place in Brussels, the EC may offer logistic support (e.g., meeting room and refreshments) subject to availability and advance notice.
- IG Chair must provide its own secretarial support.
- The work, rationale and composition of the IG are subject to review by ESFRI on a regular basis.

ANNEX 4: MEMBERS ESFRI IG

Leo Le Duc	Chair
Susana Gota-Goldman	Expert and Vice Chair IG
Gabriele Fioni	Chair Energy SWG
Murat Ozgoren	Chair Health & Food SWG
Adrian Dusa	Chair Social & Cultural Innovation SWG
Bjorn Henrichsen	Social & Cultural Innovation SWG
Henrik Bindslev	Chair Energy SWG (as of 2 nd half 2012)
Gelsomina Pappalardo	Chair Environment SWG (as of 2 nd half 2012)
Sally Chambers	Social & Cultural Innovation Domain
Janet Thornton	Health Domain
Florian Gliksohn	Physics Domain
Andrew Smith	Expert
Leif Laaksonen	e-IRG
Jean Moulin	Expert
David Bohmert	Expert
Juni Palmgren	Expert
Inmaculada Figueroa	Expert
Harry Tuinder	European Commission Representative
Beate Warneck	CoPoRI
Serçe Sahin	Assistant to the chair

ANNEX 5: TERMS OF REFERENCE EXPERT GROUP ON ASSESSMENT

INTRODUCTION

- Research Infrastructures are a key component of the European Research Area (ERA). They bring together a wide variety of stakeholders to search for solutions to the scientific problems being faced by society today, they offer unique research opportunities to users from different countries and from different disciplines, attract young scientists and help to shape scientific communities, and they play an increasingly important role in the advancement of knowledge and the development of technology to help Europe compete in an increasingly globalized knowledge economy.
- The ESFRI Roadmap for Research Infrastructures, published in 2006 and updated in 2008 and 2010, is a vital policy document and paves the way for the planning, implementation and upgrading of research infrastructures for the coming decades. Research Infrastructures contribute to making the Europe 2020 Strategy and its Innovation Union Flagship Initiative⁸ a reality. Moreover, Research Infrastructures should help to realize the potential of the regions, to increase international cooperation and continue their opening to, and partnership with, industrial researchers to help address societal challenges as well as to support EU competitiveness.
- To date, 38 facilities have been identified to be of pan-European (or global) relevance. Of these, 10 have been considered "under implementation" in the 2010 ESFRI Strategy Report and Roadmap update, and another 16 are likely to start their implementation by the end of 2012.

OBJECTIVES

- Implementation of the project on the ESFRI Roadmap is now a priority for ESFRI and the European Commission in order to fulfil the commitment of the Innovation Union Flagship Initiative 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"*.

IMPLEMENTATION

- In order to assess progress towards the Innovation Union objective of launching or completing the construction of 60 % of the ESFRI projects by 2015 and to assess the type and level of EU support which could be dedicated to the ESFRI projects under Horizon 2020 the European Commission (EC), together with ESFRI, has decided to set up a high level Expert Group.
- The primary objective of this group is not to assess the scientific merits of the projects, but to evaluate the financial and managerial maturity of all 38 projects of the ESFRI Roadmap. The report on each individual project should clearly identify specific bottlenecks and make recommendations on how to be best addressing them and indicate the feasibility for these projects to be implemented by 2015.
- Furthermore, the Expert Group should suggest further actions (e.g. clustering) to reinforce the coherence and synergy amongst the projects.
- The assessment should follow common rules for all projects to guarantee a fair process and allow projects to be compared. In particular, for each project the Expert Group should concentrate on the assessment of the current situation and appropriate progress in areas such as:
 - Appropriateness of the partners' contribution towards the realisation of the facility (including technical, managerial, leadership or siting issues);
 - Soundness, appropriateness and effectiveness of the financial commitments of the partners, including national and regional funding, funding from the EC structural funds and from H2020, as well as possible private funding;
 - Existence of appropriate management, governance and legal structures (are statutes already available even in draft state and accepted by funding agencies and ministries?);
 - Availability of a technical design report (if appropriate) or other necessary technical documentation;
 - Schedule for construction and operation (and decommissioning where relevant);

⁸ Council conclusions of 26 Nov. 2010 on Europe 2020 flagship initiative "Innovation Union".

- The policy for open access to the facility and to data (which does not necessarily mean free access), as well as for data management, storage, and dissemination;
- The IPR policy;

DELIVERABLES

- The Expert Group will deliver a written report on the state of implementation and recommendations for each of the 38 projects on the ESFRI Roadmap.

WORKING APPROACH

- The Expert Group will work mainly by email and through meetings, teleconferences and videoconferences, as preferable.
- The Expert Group will carry out its evaluation exercise based on the available documentation, by interviewing the project coordinators, project partners, and EC staff following the projects. In particular for obtaining up to date information on the foreseen level of funding they should refer directly to ESFRI Members and/or the Implementation Group.
- The EC Secretariat will maintain a record of the Expert Group meetings and discussions.
- Requests for data and information will be made through the Secretariat.
- One member of the Expert Group shall act as Rapporteur.
- The Expert Group will regularly inform the EC and ESFRI of progress in the conduct of its business, and when appropriate, will request direction and guidance.
- The Expert Group will present a preliminary report to ESFRI and the EC by the time of the ESFRI meeting of December 2012. The report should be finalised with a view to be published by spring 2013.

MEMBERSHIP

- Members of the Expert Group will be high level people with relevant experience in managerial and administration aspects of running large scale research infrastructures.
- There will be up to six members of the Expert Group. The Chair will be chosen amongst these.
- The Chair of the ESFRI Implementation Group will be an Adjunct Member⁹ of the Expert Group. He will act as liaison between the Expert Group and both ESFRI and the Strategic Working Groups.
- The member of the EC Secretariat will be an additional Adjunct Member.

CONFLICT OF INTEREST

- No member of the Expert Group shall be directly involved with any of the research infrastructures on the ESFRI Roadmap.
- Any further potential conflict of interest should be declared or identified immediately by candidate Expert Group Members. Any candidate Expert Group member with a conflict of interest may not be an Expert Group Member. If a serving Member identifies or develops a conflict of interest, it will be at the discretion of the Chair and remaining member to decide its gravity and if that Member should be replaced.

RESOURCES AND MEETINGS

The European Commission will:

- Provide the Secretariat for the Expert Group;
- Foresee the organisation of up to five two-day face-to-face meetings in Brussels, with the possibility of inviting project representatives (hearings). Meetings outside Brussels will be hosted and organised by the Expert Group member proposing the venue;
- Reimburse remote work (up to 17 non-consecutive days), travel and hotel expenses of the Members of the Expert Group for the face-to-face meetings. The Rapporteur will be reimbursed for remote work of up to 38 non-consecutive days.

⁹ An Adjunct Member participates in all Expert Group activities and provides advice to, and assists, the Expert Group in its deliberations, but does not have a say in reaching the final recommendations.

ANNEX 6: COPORI

CoPoRI is financed by the European Commission and is an accompanying measure to support ESFRI that does not have its own budget. The acronym **CoPoRI** stands for “**C**ommunication and **P**olicy development for **R**esearch **I**nfrastructures in Europe”. CoPoRI will undertake communication activities and organise workshops with subjects of specific interest for ESFRI. With its tasks, it is complementary to the ESFRI IG and the Expert Group on Assessment. It is a 2.5 year project with a budget of €450.000. CoPoRI is coordinated by DLR and its partner is DESY. The project has four work packages: coordination, socio-economic impact, exchange of experiences/best practice (EoE), and communication and dissemination. In the first semester of 2012 a workshop on EoE was organised by DESY, combining the former EC workshops on EoE with the first CoPoRI workshop and the ESFRI IG activities. CoPoRI itself has a sub group of twelve RI coordinators from the different domains that are involved and advise on what should be addressed in the workshops. The first workshop dealt with “the lessons learned” of the preparatory phase and of the preparation for ERIC applications in order to prevent a multitude of meetings addressing similar subjects. Another main focus of this EoE was transnational access policy and the difficulties arising from it. It was organised rather soon, since 10-15 projects were preparing for an ERIC. Three more workshops will be organised, of which one will deal with regional partner facilities. CoPoRI also developed an exhibition booth for ESFRI (which was exposed at the ICRI conference in March 2012), as well as a databank for journalists and a brochure for ESFRI with a choice of facilities likely to be implemented by the end of 2012. A website on CoPoRI went online in February 2012. CoPoRI also maintains the ESFRI website. CoPoRI will present its final report in March 2014.

ANNEX 7: LETTER TO THE COUNCIL

The logo for the European Strategy Forum on Research Infrastructures (ESFRI) features the acronym 'ESFRI' in white, bold, sans-serif capital letters on a dark blue rectangular background.

**European Strategy Forum
on Research Infrastructures**

Dear Minister,

As I am sure you agree, sustained investment in research and development is vital for Europe, especially in the current period of economic crisis, both to address the Grand Societal Challenges we face today, and to strengthen the competitiveness of the European industry and hence to create jobs. Nowhere are the benefits more evident than in the realisation of pan-European Research Infrastructures.

As you know, the Competitiveness Council mandated the European Strategy Forum on Research Infrastructures (ESFRI) in 2004 to develop a strategic roadmap for Research Infrastructures in Europe. The first roadmap was presented in 2006 and identifies new pan-European Research Infrastructures or major upgrades of existing ones. After two updates the 2010 edition of the roadmap contains 48 projects; 10 of these are already in the implementation phase. Sixteen more projects are proceeding sufficiently well that they may also be in the implementation phase by the end of 2012.

The success of ESFRI would not be possible without your continuous support and commitment, especially also your commitment and that of the European Commission to implement 60 % of the Research Infrastructures on the roadmap by 2015. The implementation of the ESFRI Roadmap projects remains the key priority for the Forum. In this respect ESFRI and its dedicated Working Groups provide advice and help the projects to overcome obstacles, be they legal, financial or technical.

The involvement of all countries and regions in large-scale research infrastructures continues to be a focus of our activities. The distributed nature of infrastructures in many domains offers a real opportunity for a true-Europe wide inclusiveness in pan-European research infrastructures. The objective of wide involvement will also be pursued through encouragement for cooperation between excellent national infrastructures and large scale single-sited ESFRI RIs. ESFRI will also continue to help Europe speak with one voice on the international stage. The global nature of the grand challenges such as climate change makes it essential that we cooperate with our research partners worldwide to tackle these challenges.

Taking into account the current economic and financial situation in Europe, ESFRI has concluded that it is now necessary to define priorities for the implementation of the projects on the roadmap.

The European Commission has therefore agreed to support this initiative by setting up an Expert Group which will evaluate the financial and managerial maturity of all the projects of the ESFRI Roadmap. The aim is to clearly identify specific bottlenecks and make recommendations on how to best address them and indicate the feasibility for these projects to be implemented by 2015. According to the outcome of that assessment, which will be complemented by an evaluation of the scientific content by the respective Strategic Working Group if

necessary, ESFRI will then have to prioritise the various projects. It might be finally appropriate to remove specific projects from the roadmap if there appears to be no likelihood of timely implementation. We believe that due to the developed cooperation and the built up trust in the Forum, ESFRI is the right organisation to do the implementation of the ESFRI Roadmap projects.

Unfortunately, follow-up of the implementation and prioritisation of the ESFRI Roadmap projects is currently not part of the present ESFRI mandate. To be able to follow this strategy, we would accordingly ask you to consider giving ESFRI a renewed and extended mandate. We aim to present to you at the end of 2012 the result of the assessment and the planned further actions to make possible the implementation of 60 % of the RIs on the roadmap.

Yours sincerely,

Beatrix Vierkorn-Rudolph
ESFRI Chair

ANNEX 8: ERIC TEMPLATE

The ERIC-template was created because of experiences of the EC Legal Service with the two established ERICs in which many editorial changes were required. It is not possible to provide a ready-made text for all projects, since every project and activity is very different and choices need to be made by the members on how to agree among themselves specific issues. The main message is to address all issues in the Statutes but not into detail, since amendments would need to be approved by the EC. Not many reactions were received to this template, but the most important remark was that the templates only would be useful in combination with the guidelines, that need to be updated. This would help to understand better how to use the template provisions and in what context. When approved by the ERIC committee the templates and updated guidelines will be verified by EC services, and published in a new booklet in 2013.