

European Strategy Forum  
on Research Infrastructures

ESFRI

# Evaluation Report

ESFRI Evaluation  
Report 2011

## Foreword

### Evaluation of Research Infrastructures – why is it needed?

Research Infrastructures (RI) contribute to the implementation of the Europe 2020 strategy and its Innovation Union Flagship Initiative, especially in the multidisciplinary domains of the “Grand Challenges”. RIs enable research which could not be undertaken without access to these facilities and they provide environments for excellent researchers to do outstanding science at European and international level, contributing to benchmark frontier research. In addition, they also enable research not realisable because of a lack of capacities (e.g. lacking opportunities to obtain the necessary mouse mutants, to have access to research data or beam time at excellent instruments). Furthermore, RIs provide unique opportunities to train scientists and engineers while facilitating knowledge transfer and innovation. Therefore RIs create the basis for technological development which also supports the creation of jobs. RIs offer stimulating research environments that attract researchers from different countries, regions and disciplines. Thousands of researchers and students from universities, research institutions and industry, from Europe and from outside Europe, use RIs each year. About 55% are researchers from universities, 20% are from public laboratories, 20% are from non-European research institutions, and 5% are from industry.

To guaranty that these RIs are used in the best possible way, since demands normally exceeds availability, access has to be provided by a strict peer review process – also to sustain the high quality of the RI.

To make best use of limited financial and human resources, ESFRI has been asked by the Competiveness Council and the European Commission to develop an evaluation and prioritization scheme which will distinguish at least between RIs with a pan-European dimension and others which will remain important for regional and/or national needs.

ESFRI will therefore develop in collaboration with the relevant European Research Organisations a process on the one hand to evaluate new and existing RIs and on the other hand to develop a prioritisation scheme. Such an evaluation has to be based on national roadmaps and on national evaluation schemes but has to develop on top an evaluation methodology with criteria which could be used for pan-European RIs. ESFRI has set up a working group on evaluation which is developing such a methodology.

The working group has developed on the basis of a thorough analysis of existing evaluation systems in the different countries a set of criteria which could be used for evaluating excellence and strategic relevance of Research Infrastructures. These criteria will now be discussed with other European organisations dealing with evaluation with the aim to elaborate together a set of criteria which should ideally be used for the evaluation of RIs in all countries. Based on such a national evaluation scheme - harmonized by using the same criteria/indicators on a best practice basis - ESFRI could in a next step assess the pan-European dimension of these respective RIs in future up-dates of the ESFRI roadmap.

## REPORT 2011

### 1 INTRODUCTION

Research Infrastructures (RIs) 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.

ESFRI, the European Strategy Forum for Research Infrastructures, was established to support a coherent and strategy-led approach to policy-making on RIs in the ERA. Part of ESFRI's role is to help the Member States and the EC to develop the best policies and instruments to establish and support RIs of Pan-European and Global interest which can contribute to Europe being the most attractive and competitive research area in the world.

ESFRI has been asked by the Competitiveness Council and the European Commission to develop an evaluation and prioritization scheme to distinguish between RIs with a Pan-European dimension and those which remain important principally for regional and/or national needs. (Such a role for ESFRI was also proposed in the ECRI 2010 Conference<sup>1</sup> and in ESFRI's Vision 2020<sup>2</sup>.) Therefore ESFRI has set up a Working Group on evaluation in 2010. This report presents the initial findings and recommendations of the ESFRI working group established to take this task forward.

Evaluation goes beyond ESFRI's roadmap of new RIs; for the ERA to flourish, not only the founding of new pan-European Research Infrastructures is needed but also a coherent action to support the existing RIs in their operation and upgrade in order to create an effective and sustainable ERA. Several existing RIs might be of pan-European nature albeit initially designed with solely national or regional relevance.

ESFRI has already adopted a shared definition of the scope and criteria which should be met by those RIs which are of pan-European or global interest (see section 2), as well as a definition of Distributed RI facilities for different areas of research and of outreach to all interested Regions in the Member and Associate States (MS and AS)<sup>3</sup>. In addition, ESFRI has also elaborated a definition of Regional Partner Facilities (RPF), aiming at contributing to a more balanced development of the European Research Area, and to the "circulation of knowledge" throughout Europe.

The working group has explored and collected best practices in the evaluation of RIs on national levels and of other institutions dealing with evaluation (see Annex 2). On the basis of this assessment, the Working Group proposes a rigorous, independent evaluation scheme based on criteria which can enable the determination of the scientific quality, the strengthening of the ERA in strategic research areas that addressing the Grand challenges, as well as the potential socio-economic impact of RIs. Much attention has been paid to the understanding of the effectiveness

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<sup>1</sup> The European Conference on research Infrastructures, held in Barcelona April 2010.

<sup>2</sup> Inspiring Excellence, Research Infrastructures and the Europe 2020 Strategy, web site of ESFRI

<sup>3</sup> See also ESFRI Strategy Report and Roadmap 2010

of the RIs in serving the needs of their users and stimulating further integration of research in Europe. The criteria for evaluation of RIs are summarized in table 1.

The recommendations of the Working Group are presented in section 8 of this report. Key points are that the leading principle of any evaluation of RIs should be an assessment of its contribution to scientific excellence. Evaluation of RIs is typically a multi-step process which must begin on a national level, but all should use (as far as possible) a consistent and cohesive evaluation system for RIs, following recognized international standards for best practices. ESFRI, in partnership with Member States, Associated Countries and the European Commission, should develop a scheme capable of identifying those RIs that are of pan-European dimension and significance, that form a key pillar of the ERA, with the aim of implementation as appropriate.

An EU-level evaluation and assessment will need to be applicable to all different research areas, and permit the comparison of scientific excellence and impact which may be measured by different indicators in different disciplines, or may require the development of composite indicators for multidisciplinary RIs.

As the next step, the findings of this working group will be discussed both with European Research Organizations which already deal with evaluation schemes and with interested representatives of MS and AS.

## 2 SCOPE OF THE EXERCISE

The goal of this exercise was to survey and collect good practices in the evaluation and assessment of RIs, and to reach consensus on a set of recommendations to ESFRI, which could be used on a broader scale as voluntary guidelines.

### 2.1 WORKING GROUP OBJECTIVES<sup>4</sup>

The Working Group was invited to advise ESFRI on development of a framework for the evaluation and assessment of RIs (existing RIs or proposals for new or upgraded RIs), which could also, in due course, be used for benchmarking RIs of pan-European interest and impact. This report should include:

- Definition of feasible steps and procedures for the evaluation, which would also build trust and coherence between national policies, and bring about a more focused use of national and EU resources
- Identifying a methodology based on best practices in evaluating and benchmarking RIs in different fields.

It is desirable that the evaluation system described in this document will be applicable to national, regional and to Pan-European RIs. To achieve this, it is important to design an evaluation system

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<sup>4</sup> The Terms of Reference of this working group are in Annex 1

that addresses issues common to all RIs but is capable of responding also to the different priorities and considerations important to individual Member States and Associated Countries.

## 2.2 DEFINITION OF “RESEARCH INFRASTRUCTURE”

New knowledge and innovation are promoted through the availability of high-quality and accessible RIs. Moreover, RIs help to create a research environment in which all researchers - whether working in the context of their home institutions or in national or multinational scientific initiatives - have shared access to unique or distributed scientific facilities (instruments and services, also including data and their management), regardless of their type and location in the world. RIs foster knowledge and skills development by enabling research. These can, in turn, be disseminated to the research, education and enterprise communities, and thereby contribute to innovation.

RIs include knowledge-based and enabling resources, research facilities, equipment, materials and services. Human resources are strongly needed to develop and maintain them and to ensure their sustainability. These RIs support basic or applied research, and maintain and develop research capacity. RIs may be single-sited, or distributed, or “virtual”; they could also have a national, regional, pan-European or global dimension.

There are many definitions of the RIs, and for the purpose of this document we will list the following ones.

The Community Framework Programme, the “FP7” text states:

The term “Research infrastructures” in the context of the Community Framework Programme for Research and Technological Development refers to facilities, resources or services that are needed by the research community to conduct research in all scientific and technological fields. This definition covers, including the associated human resources:

- Major equipment or set of instruments used for research purposes;
- Knowledge-based resources such as collections, archives, structured information or systems related to data management, used in scientific research;
- Enabling Information and Communication Technology-based infrastructures such as Grid, computing, software and communications;
- Any other entity of a unique nature that is used for scientific research.

Only RIs or networks of RIs with clear interest for the European scientific community (academic, public and industrial), in terms of performance and access, can be considered for support. They must contribute significantly to the development of European research capacities.

ESFRI has developed a definition for RIs of pan-European dimension and additionally a definition for Distributed RIs to distinguish them from networks or collaborations:

Research Infrastructures are facilities, resources or services of a unique nature that have been identified by pan-European research communities to conduct top-level activities in all fields.

This definition of Research Infrastructures, including the associated human resources, covers major equipment or sets of instruments, in addition to knowledge-containing resources such as collections, archives and data banks. Research Infrastructures may be "single-sited", "distributed", or "virtual" (the service being provided electronically). They often require structured information systems related to data management, enabling information and communication. These include technology-based infrastructures such as Grid computing, software and middleware.

In all cases considered for the roadmap, these infrastructures must apply an "Open Access" policy for basic research, i.e. be open to all interested researchers, based on open competition and selection of the proposals evaluated on the sole scientific excellence by international peer review.

A European Distributed Research Infrastructure, as recognised by ESFRI, is a single Research Infrastructure with a common legal form and a single management board responsible for the whole Research Infrastructure, and with a governance structure including among others a Strategy and Development Plan and one access point for users although its research facilities have multiple sites. It must be of pan-European interest, i.e. shall provide unique laboratories or facilities with user services for the efficient execution of top-level European research, ensuring open access to all interested researchers based on scientific excellence thus creating a substantial added value with respect to national facilities. A European Distributed Research Infrastructure must bring significant improvement in the relevant scientific and technological fields, addressing a clear integration and convergence of the scientific and technical standards offered to the European users in its specific field of science and technology.

## 2.3 GENERAL PRINCIPLES OF EVALUATION<sup>5</sup>

Evaluation can have many different meanings, depending on the context and purpose of the activity. Historically, evaluation in scientific research (e.g. for investment in RIs) was described as a systematic and objective process for examining the performance, relevance, efficiency and impact (both expected and unexpected) of a major investment or other decision in relation to stated objectives. Evaluation reviewed what had happened as a result of a decision, distinct from the process for deciding which policies and projects to take forward, which was referred to as appraisal. The two processes are mutually dependent and, to reflect that, evaluation now describes both, with processes at the outset referred to as "ex ante evaluation", and those, once the facility is operational, called "ex post evaluation". The differences between the two and the links between them are explored further in section 3.

Successful evaluations involve collaboration between those carrying out the evaluation, the community whose work is being evaluated (usually the beneficiaries of funding), and the bodies that will consider and implement the recommendations.

Within ERA there are different aspects that must converge in the context of an evaluation process of RIs:

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<sup>5</sup> Derived from the UK Biotechnology & Biological Sciences Research Council's "Evaluation Framework 2010" (see [http://www.bbsrc.ac.uk/web/FILES/Reviews/bbsrc\\_evaluation\\_framework.pdf](http://www.bbsrc.ac.uk/web/FILES/Reviews/bbsrc_evaluation_framework.pdf))

Strategic aspects: The basic question is “Does the ERA need particular RIs to address adequately the “Grand Challenges” and to carry out excellent research? This strategic criterion would indicate what kind/how much access to RI of a given kind is necessary for the effectiveness of the ERA. Additionally, the need to ensure a more balanced distribution of facilities throughout Europe is a strategic issue of high importance for the optimisation of the ERA.

Specific aspects: The basic questions are: “What is the uniqueness of the RI (which should be built/upgraded/maintained in operation)? How competitive is it (even at a global level) in terms of capability and capacity? These aspects include the general conditions for operation and access, governance issues, the impact of research on education and skills, cost-effectiveness, the ability to sustain partnerships with industry and the promotion of knowledge transfer to economy and society. The capability of the RI to attract highly qualified scientists/ engineers/ managers from abroad over a sustained period is also a criterion.

Decisions should be based on both aspects, with all the different stakeholders involved.

Overall, effective evaluations should ensure that decisions are based on the best available evidence and expertise. They should also provide:<sup>6</sup>

- Quality assurance
- Analysis of potential or actual outputs, outcomes and impacts
- Identification of potential or actual highlights
- Accountability for the resources invested and justification for past and future investments
- Advice and feedback on value for money
- Advice on optimal support measures to maximize the investment and scientific return

Given the diversity of RI configurations, one evaluation framework (one fits all) which is applicable to all RIs may be quite complex. The complexity is also due to the fact that some of the RIs have different funding schemes. Nevertheless, the general principles of evaluation remain the same.

As ESFRI and the ERA encompasses RIs to support research across all disciplines, including physical sciences and engineering, life sciences, environmental sciences, social sciences, arts and humanities, the evaluation system must be able to cope with all these areas. It is also important that the system is flexible enough to be used in different disciplines according to the needs of different disciplines.

It is important to note that active RIs undergo a quite effective “in operando evaluation” through benchmarking with RIs of similar scope, and this applies to RIs serving a wide variety of scientific communities. User demands, as well as guidance from the international advisory committees of the RIs, provide continuous feedback to the management of the facilities and their stakeholders. Quality-assessment and ranking of comparable facilities is constantly updated. This “benchmarking” extends for specific aspects (data management for example) or for governance

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<sup>6</sup> See Research Councils UK, “Evaluation plan for final evaluation of cross-council priority themes: template”, available from RCUK (soon to be available on-line)

issues across most types of RI and it is important to realise that this aspect is more developed than in many other research activities, collaborations and programmes.

There should not be duplication in the evaluation done by the international scientific committees and other such evaluations of the RIs. The evaluation by international scientific committees is generally quite effective, so it is normally quite clear from its advisory and users reports, whether an existing RI is objectively obsolete or has limited contribution to the advancement of science.

## 2.5 SOCIO-ECONOMIC IMPACT OF RESEARCH

The fundamental reason for funding RIs of any kind is to support and extend high quality research carried out by highly motivated and excellent researchers, to create critical mass, to improve cooperation between scientists and scientific areas, to enhance training through research and to stimulate high-technology industry in developing advanced products and services of potentially broader application. With the growing need for research to address societal needs and challenges, and according to the goals of the “knowledge based economy”, the identification of relevant socio-economic impact indicators of RIs is necessary as well.

Investments in research have long been expected to support only the highest quality research. In recent years, these expectations have been extended to emphasize also the need to encourage and identify socio-economic impact from these investments. The definition and scope of this broader “research impact” has evolved over time and to some extent differs between countries; it currently encompasses identifiable benefits to or positive influences on the economy and society.

## 2.6 STRUCTURING THE SCIENTIFIC COMMUNITIES AT PAN-EUROPEAN LEVEL – OUTREACH AND SIGNIFICANCE

The outreach of an RI can be considered geographically as well as thematically. A RI can serve several countries, at the same time it can reach different research communities; it can also be single-sited or geographically-distributed, or virtual. The communities using a RI may be local, regional, national, European or global, and this can change during the lifetime of an RI, as research communities evolve or as more researchers become aware of the value of a given RI. The impact and outreach of an RI can also vary in time. A given RI may be unique worldwide, in which case its use is fundamentally important since research activities cannot be carried out elsewhere. On a geographically more restricted scale (for example, in Europe), where a number of RIs exist in a given field, there is significant potential to work together to improve coordination of resources, thereby offering the highest scientific quality to a wider scientific community, ultimately contributing to an overarching European vision.

### 3 EVALUATION PROCESSES: EX-ANTE AND EX-POST EVALUATION FOR RESEARCH INFRASTRUCTURES

For Research Infrastructures, decisions on which new projects to support will require ex-ante evaluation, whilst existing RIs, operating ones, will be subject to ex-post evaluation, to review and monitor how successful they are in reaching their objectives. In addition, decisions on major upgrades of existing infrastructures or reorientation will require a mix of ex-ante and ex-post evaluation. Interim evaluations or monitoring may also be used for projects or infrastructures which exist over a long time period and from which quantifiable results are only expected in the longer-term. Interim evaluations often focus primarily on the organisation and management of the projects or infrastructures being evaluated, quantitative information and research outputs not yet being available.

Ex-ante and ex-post evaluation are both very important for the development, implementation and refinement of research policy. Such evaluations provide expert views on the basis of decisions, and good evidence to demonstrate the effectiveness of those decisions. It is, however, important to be clear about the distinction between ex-ante and ex-post evaluation: while both are necessary and the two are closely connected, they are used for different purposes. For the purposes of this report, and based on dictionary definitions, ex-ante implies: “based on forecasts rather than actual results” while ex-post means “based on actual results rather than forecasts”.

But in principle the used criteria for ex-ante and ex-post evaluation should be as equal as possible, noting that ex-ante evaluation is based on planning and expectations, with some estimate of how well these expectations will be met, while ex-post evaluation should rely on factual information.

#### 3.1 EX-ANTE EVALUATION

As a first step, strategic aspects have to be evaluated. A proposal for a new RI or a major upgrade of an RI already in use should be carefully evaluated in the general context of the ERA. Some aspects are mentioned below, the criteria are provided in table 1.

- a) Does the new/ upgraded RI fill a gap/ have a strong and necessary role in the ERA?
- b) Does the new / upgraded RI represent the best / most convincing solution to the research needs that it addresses?
- c) Does the new / upgraded RI be the best possible solution for the needs of research at European/ national/ regional level according to the European relevance (uniqueness etc.)?
- d) Does the new / upgraded RI directly strengthen the global competitiveness of the ERA?
- e) Does the new / upgraded RI appear to be the optimal economic solution?
- f) Does the new / upgraded RI have direct and indirect benefits to society/ meeting grand challenges?
- g) What is the contribution of the new / upgraded RI to education and training?
- h) Does the new/ upgraded RI provide a convincing business plan (including governance issues, costing analysis, efficiency and risk analysis)?
- i) How does the new / upgraded RI integrate in the international RI landscape/ how does it cooperate on international level?

In a second step the specific project has to be evaluated, meaning that specific features, like single-sited vs. distributed, technical aspects, the overall capacity for access, scientific programme, the local impact on society and economy have to be considered (see also table 1).

The ex-ante evaluation should be the main input for the decision for a new RI or for major upgrades. The objectives of the evaluation, accompanied by criteria and measurable indicators, reflect the agreement/compromise between the different expectations of the stakeholders.

It is obvious that a more detailed definition and the specific weight of these different criteria will depend on specific circumstances, and may have different values during the preparatory, the construction and the operational phases.

In summary, ex-ante evaluation is necessary for a robust decision-making process leading to the setting up of a new infrastructure, and for major upgrades or reorientation of existing RIs.

### 3.2 EX-POST EVALUATION

The evaluation of an existing RI should in principle start with the same criteria as ex-ante evaluation but uses different indicators.

Substantial investments have been made over the years, so that quantitative information should be available in terms of budget figures, scientific outcomes (such as publications, patents, Ph.D. thesis). Further information should be available on the extent to which the RI meets the scientific community's expectations and requirements in terms of utilization and cooperation (international benchmarking results, as well as the data on user demand or e-surveys of users) and on economic returns (spin-off or start-up activities having developed directly from know-how produced at the RI). A major indicator for the evaluation of the objective "governance and management" in a running RI is cost efficiency

To some extent, methods for ex-post evaluation of RIs are comparable to existing methods used for the evaluation of research organizations, research units or universities.

A major criterion of the evaluation of RIs should be the user orientation of this specific RI. The success of a RI is based on its ability to attract researchers at regional, national or international level, on its capability for continuous improvement of available instrumentations/experiments, on its data performance and/or its accessibility.

RIs should enable research by providing the capacity and capabilities to conduct excellent science and they have substantial socio-economic impacts.

There is an objective, albeit indirect, role of catalyser of "joint programming" at all levels that is activated by research programmes making use of RI. This is a measure of the impact of the RI in structuring European research and of the optimization of complementary resources in highly relevant research fields. Also its capacity for technology transfer, including the development of patents and licenses, the start or support of successful spin-offs and other economic activities, are key factors in the success of a RI. Dependent on the scientific discipline RIs have different impacts on society in terms of health or environment. The analytical models for socio-economic impact assessment including the definition of indicators have to be developed at the beginning of the operational phases.

Special emphasis should be given to the development of appropriate criteria and indicators for the evaluation of RIs in the Social Sciences and Humanities since some of the usual indicators may not be adequate for evaluating the success of RIs in this field.

Thus, for an ex-post evaluation, the RI should develop tools to gather the information on bibliometrics, on patents, on cooperation with industry, etc. and be prepared to follow up with grant holders after they have left the RI.

In summary, ex-post evaluation is mostly based on facts and results. It is used to demonstrate the quality of the research output and achievements, to account for the resources invested and to monitor value for money and cost effectiveness, including appropriate management of the RI.

#### 4 NATIONAL EVALUATION SYSTEMS

Most European countries have a longstanding tradition in evaluating science related activities. Objects for evaluation can be, for example, a set of proposals competing for research grants as well as an examination of a research institution which will be scrutinised by focussing more on management and governance issues to investigate whether the investment made in such an institution is justified. In between these two lies the evaluation of research programmes.

Common to all of these examples is that, typically, the evaluation is carried out by internal or external experts on behalf of an administrative or political institution like the central administration of a university, a research organisation, a funding agency or a national ministry.

With the ongoing development of the European Research Area, the need for a joint approach to evaluation of RIs has become considerably more apparent. A first step in this direction was made with the creation of the roadmap for pan-European RIs by ESFRI, which is a prototype of ex-ante evaluation.

Having in mind a truly European Research Area, in which a great variety of RIs exists, common standards, criteria and indicators have to be defined to be used by the members of the European Research Area with general validity, i.e. fully applicable also when evaluating RIs owned by a single MS or institution, and designed originally with a national or regional mission.

A survey among the members of this Working Group revealed a high grade of commonality between the national evaluation systems of some European countries.

In all countries, the central motivation for initiating the evaluation of RIs is twofold. On one side, the ex-ante evaluation provides the facts to the decision makers for the potential participation in an international project or the construction of a national one. On the other side, ex-post evaluation carried out at the RI itself provides quality control of research and technical activities and seeks verification of compliance with national research policy. Some countries expect from their national (ex-post) evaluation activities answers about how well strategic long-term goals of their research policy are followed, for example evidence of progress in the facilitation of open access or insights into improvements in international networking of RIs and more strategic approaches to the development of human resources capabilities.

Typically a Ministry or a Funding Agency initiates the evaluation of RIs, in the first case often by mandating a national authority or institution to carry out the necessary action. In most cases a specific Committee will be established to execute the work.

The way in which an evaluation is executed depends on the level and type of existing structures to be involved. When the evaluation is carried out by a Ministry, the setting-up of an administrative body (usually with personnel from the authority being charged to organise the evaluation) is a typical step, assisted by a group of external experts, the composition depending on the specific needs for the evaluation to be undertaken. In most research funding agencies and research institutions an evaluation support structure is already in place. In some Countries there are Evaluation Agencies (e.g. in France) or other Bodies capable to set-up evaluations (as, e.g. the Wissenschaftsrat in Germany).

Most countries organise the evaluation of RIs as a two-stage process. The two stage process applies to both ex-ante and ex-post evaluation.

The first step is an evaluation, by an expert panel, based on the examination of the project and quantified indicators. The panel reports about the fulfilment of objectives and criteria based on the examination of the project and indicators. The second step is an assessment done by the Organizing Entity (Ministry or Agency), and is based on the findings of the first step.

Ex-ante evaluation is done before the project is awarded funds for implementation. Ex-post evaluation is a recurring exercise happening to a regular time schedule, perhaps every year, sometimes more in depth every 2-5 or more years (depending on the size and scope of the RI).

The expert panel members are selected usually by the organizing entity, in consultation with stakeholders. The criteria for evaluation are very often developed by the experts and only agreed upon by the organizing entity. Collection of information and monitoring for ex-post evaluation is done in different ways including hearings with the representatives of the projects, reports, web based questionnaires or field visits. The organizing entity will usually cover the cost of evaluation, but evaluation may also form part of the budget of the project or RI being evaluated. As a rule, external experts will be reimbursed only for their travel and subsistence expenses, although sometimes a small fee or honorarium will be paid as well. The duration of an ex-ante evaluation and assessment for RIs typically takes 18 months to 2 years. More details are to be found in Annex 2.

## 5 A POSSIBLE EVALUATION PROCESS

As the working group progressed through the examination of the national and European evaluation systems, a possible model for evaluation of RIs emerged. Such an evaluation model could be based on two steps:

- The first step includes a peer review by a panel of experts. This panel is provided with the project proposal or documents about the RI (e.g. mission statement, objectives, technical

design report) and relevant indicators. The proposal of the RI is evaluated relative to its accordance with the given objectives and criteria. In many cases, a rapporteur is needed to assist the panel. In case of existing RIs the Panel visits/interviews/acquires information by the Science Advisory and Technical Advisory panels, and all data of international benchmarking of the RI against RIs of similar scope or similar structure.

Sometimes an independent expert opinion in written form, in addition to the proposal is required. The panel writes an evaluation report containing findings and recommendations, accompanied by tables as appropriate illustrating how the project fulfils objectives and criteria and meets its target indicators.

- The second step is an assessment of the expert panel report by a (governmentally) appointed body comprised of policy makers and managers of RIs or organisations. In most cases this governmental body decides on the implementation of a new project, or the financing, reorientation, upgrade or terminating of a running project or infrastructure.

## 6 ESFRI AND ITS EXPERIENCE WITH EX-ANTE EVALUATION

ESFRI has gathered extensive experience on ex-ante evaluation during the work on the ESFRI Roadmap 2006 and its updates in 2008 and 2010. This experience concerns the methodology, as well as technical details of the evaluation process. See the procedure flowchart in Annex 3.

The Thematic Working Groups of ESFRI have elaborated detailed criteria for evaluation of proposals.

The experience of ESFRI is enlarged by the fact that many ESFRI delegates are active in setting up national Roadmaps and in the implementation of ESFRI and national projects of large RIs.

## 7 EVALUATION AND ASSESSMENT CRITERIA

Evaluation and assessment criteria of RIs depend very much on the purpose of the process. Many times criteria reflect the objective of the evaluation, and are accompanied by a quantified indicator. Although the same indicators should be used for ex-ante and ex-post as much as possible, partly different indicators will be required for the different processes. Different criteria may also apply for ex-ante analyses if the purpose is constructing, upgrading or decommissioning of a national RI or taking part in an international RI, or if the process is part of developing or updating a national RI policy.

### 7.1 INTERPLAY BETWEEN NATIONAL, EUROPEAN AND INTERNATIONAL LEVEL

Criteria applied for the evaluation and assessment of RIs are very similar at national, regional, European and international levels, apart from the obvious differences in their scales and scopes. That is why the kind and level of the added values expected (European, national, regional) play a central role in all evaluation and assessment processes: criteria for national, regional, or Pan-European added value can be identified in most RI evaluation and assessment schemes.

There are many benefits which can derive from harmonizing RI evaluation and assessment criteria from national to global level. At least a duplication of work can be achieved and in principle a better use of resources (human as well as financial) are possible.

## 7.2 COMMON FEATURES AND DIFFERENCES BETWEEN DIFFERENT SCIENTIFIC FIELDS

In considering the criteria most appropriate for the evaluation of RIs, it is important to understand how applicable such criteria may be in different circumstances, including which criteria will be relevant to all RIs and which will be applicable in only some situations, including different scientific disciplines. RIs in each discipline must be evaluated within that discipline's own context and structures, and it is important to ensure that the appropriate experts are involved. For RIs this means making sure that the appropriate scientific experts are invited to comment on the need for the RI and the added value it brings to the scientific discipline. Criteria and indicators may be the same in different disciplines but the weight given to them will vary in different scientific disciplines.

In some disciplines, mainly within the physical sciences and engineering, the importance of RIs is well established and the model of major science facilities in a fixed location is well understood. Therefore relevant indicators are existing.

For life sciences or the social sciences and humanities the concept of RIs has developed more recently and some of these RIs have significantly different characteristics. They may be based on specific skill sets, databases, and repositories of publications, data or other information, as collections of biomaterials, for example. Such RIs are often highly distributed and may be also virtual. Therefore specific criteria have to be elaborated.

## 8 RECOMMENDATIONS

- The leading principle of any evaluation of RIs is enabling scientific excellence through the RI.
- ESFRI, in partnership with Member States, Associated Countries and the European Commission, should develop a system capable of identifying those RIs that are of pan-European dimension and significance, that form a key pillar of the ERA,.
- Each MS/AC should aim to develop a consistent and cohesive evaluation system for RIs, following recognized international best practices.
- The national and international evaluation systems should be harmonized by following the same best practices.
- RIs designed primarily for a national mission or those dedicated mainly to the support of industry, may fulfil excellence criteria which differ from those associated with excellent science at a European level – it is necessary to consider the differences.
- Work is needed to further develop and gain experience of best international practices for evaluation methodologies for RI and especially for distributed RI.

- Cost effectiveness of the evaluation process should be considered.
- The evaluation process should start with a general set of criteria that apply to all RIs and then add specific criteria relevant to each scientific field and the phase in which the evaluation of the RI will take place.

Evaluation of European Research Infrastructures	
Objective	Criterion
<p>Scientific and technological excellence and impact Potential for promoting the ERA through strengthening the knowledge base to address the grand challenges</p>	<ul style="list-style-type: none"> <li>• Contribution to the advancement of Science and Technology                             <ul style="list-style-type: none"> <li>- Ability to perform excellent research</li> <li>- Potential to enhance interdisciplinarity</li> </ul> </li> <li>• Appropriateness of measures for the dissemination and/or exploitation of scientific and technological results.</li> <li>• Uniqueness: Complementarity or competitiveness with other RIs at national, regional, European or international level</li> </ul> <p>(What is the most appropriate scope of the facility (regional/ European/ global), how does it integrate/ replace existing RIs?)</p> <ul style="list-style-type: none"> <li>• Potential role in structuring the ERA                             <ul style="list-style-type: none"> <li>- The potential to strengthen the development of an efficient European Research Area.</li> <li>- Relevance of the RI to EUROPE 2020 (in particular the priorities of smart, sustainable and inclusive growth) and its Innovation Union flagship, and to Horizon 2020</li> <li>- The potential to address the grand societal challenges</li> </ul> </li> <li>• The contribution, at the European and/or International level to                             <ul style="list-style-type: none"> <li>- Knowledge generation in different areas</li> <li>- Knowledge transfer to industry and /or the wider society</li> <li>- Mobility of researchers</li> </ul> </li> <li>• Quality and relevant experience of the individual participants (Institutions, Labs) and thus the overall quality of the research infrastructure.</li> </ul>

<p>Socio – economic impact and competitiveness You have to differentiate between: Short-term outputs Middle-term outcomes Long-term impacts</p>	<ul style="list-style-type: none"><li>• Capabilities to generate impacts<ul style="list-style-type: none"><li>- Impact on European and/or regional competitiveness and economy</li><li>- Impact on society</li><li>- Impact on environment</li></ul></li></ul>
<p>Governance and financial management</p>	<ul style="list-style-type: none"><li>• Appropriateness of the management structure and procedures<ul style="list-style-type: none"><li>- Transparent and efficient management.</li><li>- Efficient research services.</li></ul></li><li>• Appropriateness of the allocation and justification of the resources to be committed</li><li>• Access management strategy</li></ul>

## Composition of the ESFRI WG on Evaluation

Czech Republic - Chair	Nadežda Witzanyová
Belgium	Jean Moulin
Czech Republic	Lenka Havlícková
Czech Republic	Jan Hrušák
Danmark	Peter Sloth
EC	Maria Douka
Estonia	Priit Tamm
Finland	Eeva Ikonen
France	Dany Vandromme
Germany	Hans - Juergen Donath
Germany	Heike Prasse
Hungary	Dénes Lajos Nagy
Hungary	Érika Jároli
Ireland	Eucharía Meehan
Italy	Carlo Rizzuto
Norway	Odd Ivar Eriksen
Poland	Marek Stankiewicz
Romania	Adrian STANICA
Spain	Joaquin Sanchez
Sweden	Lars Borjesson
Switzerland	Philipp Langer
UK	Mari Williams

## ANNEX 1

Terms of Reference of the ESFRI Working Group  
on Evaluation of Pan-EU RIsRationale for the WG

- The mandate of the European Strategy Forum on RIs is to support a coherent and strategy-led approach to policy making on RIs in Europe; and to facilitate multilateral initiatives leading to a better use and development of RIs
- So far ESFRI's major achievements are trust building and the development of the understanding on the various issues related to RI and in particular Pan-EU RIs. This has led to a shared definition of the scope and criteria which should be met by Pan-EU RIs, as well as the definition of Partner and distributed RIs for different areas of research and for the outreach towards all interested Regions in MS and Associated Countries.
- The publication of the ESFRI Roadmap has triggered a process in most MS and AS developing national roadmaps based on the evaluation and prioritization of existing and new RIs.
- However the ECRI<sup>7</sup> conference in Barcelona in April 2010 has requested a more active role of ESFRI in promoting the integration process of pan-EU RIs in an European Research Area. One important step will be assisting evaluation and assessment processes in Europe.

Objectives of the WG

- The main objective of this WG is to help ESFRI developing a system of evaluation and assessment processes and eventually benchmarking of RIs of pan – European interest and impact<sup>8</sup>.
- This includes:
  - Definition of possible steps and procedures, which could be successfully implemented while strengthening the trust and coherence between national policies in RIs and a more focussed use of national and EU resources.
  - Proposing a methodology for evaluation of RIs based on best-practice in the evaluation, and benchmarking of RIs in different fields.
  - Discussion about the proposed evaluation procedure with the main European players in evaluation of RIs like EUROForum, ERF, Research Councils in MS e.g., aiming at defining and selecting pan-EU RIs, and then ensuring their continuous quality and strategic impact

Creation of the WG

- Considering the above, ESFRI decided in its Forum meeting of March 25, 2010, to set-up a specific time-limited Working Group.

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<sup>7</sup> European Conference on Research Infrastructure

<sup>8</sup> This evaluation and assessment capability can build on the effective scientific/technical evaluation and strategic assessment which ESFRI has developed successfully in preparing and approving unanimously the Roadmap, as well as in the support to its implementation.

- According to its procedural guidelines, any WG set-up by ESFRI has to be chaired by an ESFRI member. During the above mentioned meeting ESFRI asked therefore Nadežda Witzanyová (Czech delegate) to act as Chair.
- The members of the Group are proposed and finally nominated after discussion with the chair through the national delegations.
- If the balance of the nominations is not correct the WG chair should alert the ESFRI chair, who in turn will alert the ESFRI delegations.

#### Activities and method of working

- The WG will first collect information on existing evaluation schemes and on procedures and criteria developed at national level by MS and AS. The evaluation procedures which will be developed have to be based on the national and EU-level Roadmaps and prioritization processes.
- The further activities of the WG will be to:
  - § Reflect on the appropriateness of quantitative and qualitative indicators for the purpose of evaluation and determine a set of indicators
  - § Reflect on the appropriateness of assessment criteria and determine a set of such criteria<sup>9</sup>
  - § Through ESFRI delegates and in discussion with the main players (see above) information on national RIs of pan- European interest and international RIs will be gathered
  - § Report to ESFRI and help developing the reflection on prioritisation procedures.
- The method of working should allow the group to communicate with the community in the most appropriate way, in order to gather all the necessary information and assure the effectiveness of the process.

#### Resources and time scale

- Resources to cover travel expenses of WG members will be covered by each delegation. In case of meetings taking place in Brussels, the meeting logistics can be covered by the EC.
- The WG Chair will be supported by its own secretariat but may be assisted by an EC official assigned to this group.
- The WG chair is responsible for the timetable and good organisation of the WG and related meetings.

#### Deliverables

- A first progress report about the setting up of the group and results of its first meeting(s) should be given in the September ESFRI Forum meeting
- A further progress report should be made available to ESFRI for the December 2010 meeting.

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<sup>9</sup> e.g. relevant to the realization of the ERIA (European Research & Innovation Area), to the fifth freedom etc.

- The final report on the elaborated set of criteria and the methodology of evaluation and prioritization procedures in June 2011
- an opinion about the possibility of setting up a test or pilot phase of a European Evaluation Committee<sup>10</sup>
- General information on the WG activities and the WG report(s) should normally be circulated through the ESFRI Secretariat.
  - It is reminded that only ESFRI is responsible for the final acceptance of the WG report which will be published in the ESFRI web site.

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<sup>10</sup> ESFRI should reflect during 2010/2011 the feasibility of setting up a European evaluation committee for prioritisation of RIs of pan-European interest which includes representatives of the main national and European research organisation.

## ANNEX 2

National system for evaluation of Research Infrastructures or  
comparable institutions

General issues			
Country	Aim/character of evaluation	Who mandates the Evaluation / what is the legal justification for the awarding authority	Structure of institution
ES (ex-ante)	<p>1.- Assessment and certification process of the national RIs.</p> <ul style="list-style-type: none"> <li>Creation of new facilities included in the Spanish Roadmap for Unique and Technological Infrastructures (ICTS).</li> <li>Request for "certification" as ICTS (for existing infrastructures)</li> </ul> <p>2.- Establishment of a list of priority for the participation of Spain in the ESFRI Roadmap for research infrastructures</p>	Ministry of Science and Innovation (MICINN) in both cases	<p>1.- Reports are evaluated by ANEP (National Evaluation and Foresight Agency) which is the Spanish institution responsible for the scientific evaluation of most of the R&amp;D activities applying for public funding, including proposals, researchers, groups and institutions and by CAIS (Advisory Committee for Unique Infrastructures) which is an advisory body of the Ministry of Science and Innovation set up by the former Inter-Ministerial Permanent Commission on Science and Technology. Both bodies will send a recommendation report to the MICINN.</p> <p>2.- Ministry appoints four expert panels (environment &amp; earth sciences, life sciences, social sciences, physics &amp; energy sciences), with a common chair and vice chair. A second step is carried by the chair, vice chair and one representative per panel. Later, the recommendation from the panel is presented to the Ministry's authorities, who ratify the final prioritization.</p>
ES (ex-post)	Assessment of the strategic plan of the "ICTS" already operational to evaluate quality and consistency, and interest of future activity plans. Additional funding could be provided on the basis of the results of the evaluation. This is used as a tool to maintain or not the "ICTS certification"	Minister of Science and innovation	Ministry appoints several expert panels. Report is also discussed by the Advisory Committee for Unique Infrastructures (CAIS)
FI (ex-ante)	<ul style="list-style-type: none"> <li>Prioritisation of future ESFRI projects</li> <li>National roadmap shows most important and urgent RI investments to be made</li> </ul>	Research and Innovation Council (formerly Science and Technology Policy Council)	n/a
FR (ex-ante)	A list of priority for the strategic research and innovation domains has been established. It has set up a French roadmap for very large facilities in 2008 which is being updated currently. It also evaluates the French participation to the ESFRI Roadmap infrastructures	Ministry of Higher Education and Research.	The Ministry has set up a National Strategy for research and Innovation throughout the reports of different disciplinary panels. Each working group has also had a specific mission on large facilities strategy on order to build up the French roadmap for RIs.
FR (ex-post)	<p>On the one hand, the scientific evaluation of programmes, research units and institutions has already been established</p> <p>Currently, a specific working group is</p>	The AERES is an independent administrative authority set up in 2007. It is tasked with evaluating research and higher education institutions, research organisations, research units, higher education programmes and degrees and with approving their staff evaluation	

General issues			
Country	Aim/character of evaluation	Who mandates the Evaluation / what is the legal justification for the awarding authority	Structure of institution
	dedicated to the definition of an evaluation process of research facilities, both on the scientific return but also on the evaluation of the service task, quality of governance, openness...	procedures. AERES is itself entering an external evaluation process conducted by peers to renew its full membership of the ENQA (European Association for Quality Assurance in Higher Education) and inclusion in the EQAR (European Quality Assurance Register for Higher Education).	
HU (ex-ante)	Trend analysis and ex-ante evaluation is part of the National RI Survey and Roadmap project NEKIFUT. As this is an ongoing process, only the ex-post evaluation process will be described in this paper.	n/a	n/a
HU (ex-post)	<p>Evaluation and assessing national RIs with the aim of</p> <ul style="list-style-type: none"> <li>identifying strategic RIs (SRIs) and, thereby, a pool of RIs that are candidates for future upgrade programmes,</li> <li>stimulating the formation of RI networks,</li> <li>identifying RIs, which may be part of the national RI register.</li> </ul> <p>Setting up an on-line register of all national RIs (starting with SRIs) with the aim of</p> <ul style="list-style-type: none"> <li>facilitating open RI access and partner search,</li> <li>supplying strategic and funding decision makers with actual information on RIs.</li> </ul> <p>Evaluating and assessing international RIs from the point of view of national relevance and national usage with the aim of</p> <ul style="list-style-type: none"> <li>setting up a priority list for the national roadmap,</li> <li>fostering the formation of links between national and international RIs,</li> <li>promoting (if necessary and appropriate) the formation of consortia and superconsortia to international RIs.</li> </ul> <p>Formulating a recommendation for a national RI strategy based on</p> <ul style="list-style-type: none"> <li>analysing national and international trends of science, research, technology and innovation with relevance for RIs,</li> <li>collecting stakeholders' proposals for RI construction, development and participation (national and international),</li> <li>performing a SWOT analysis of the stakeholders' proposals in terms of national and international trends.</li> </ul>	<p>The NEKIFUT project has been brought into being by the minister responsible for research (that time the minister without portfolio responsible for research and development, presently the minister for economics).</p> <p>The present awarding authority is the National Ministry for Economics; it mandates the National Office for Research and Technology, i.e., the evaluation organisation, which is directed by the ministry.</p>	<p>The National Office for Research and Technology is a coordination office and funding agency for research, development and innovation. The NEKIFUT project belongs to the Department of European Union Relations, the project leader is the deputy head of the department. The Core Group of the project consists of 11 people (3 internal and 8 external, altogether 4 FTE). One of the internal co-workers is responsible (among other duties) for the secretarial tasks of the project.</p> <p>Main bodies of the project are:</p> <ul style="list-style-type: none"> <li>3 Working Groups of ~ 20 members each <ul style="list-style-type: none"> <li>physical sciences and engineering (PSE),</li> <li>biological and medical sciences (BMS),</li> <li>social sciences and humanities (SSH).</li> </ul> </li> <li>Steering Board (SB) ~ 20 members including the WG Chairs.</li> <li>Project Management (PM, Core Group).</li> </ul>

General issues			
Country	Aim/character of evaluation	Who mandates the Evaluation / what is the legal justification for the awarding authority	Structure of institution
	<p>Final output of the project shall be a closing report and a recommendation for a submittal for the government including:</p> <ul style="list-style-type: none"> <li>• A recommendation for the national RI roadmap (including participation in or partnership with international RIs).</li> <li>• A recommendation for the national RI strategy.</li> </ul>		
RO (ex-ante)	<ul style="list-style-type: none"> <li>• At the level of each project: to monitor the deliverables / results of each project.</li> <li>• At the national level – to monitor the level of completion of national objectives regarding the RI development in correlation with the national and international programmes.</li> </ul>	<p>Romanian Government – through the National Authority for Scientific Research.</p> <p>The general evaluation of RIs at the national level is done by the Romanian Committee for RIs (CRIC), under the coordination of the National Authority for Scientific Research.</p>	<p>The Romanian Committee for Research Infrastructures (C.R.I.C.) was appointed by decision of the President of NASR (National Authority for Scientific Research) on 2 April 2007, being composed of 5 representatives of the scientific community and 4 representatives of financing agencies (ministries involved in research financing). The permanent secretariat (5 persons) is ensured by the National Authority of Scientific Research.</p> <p>C.R.I.C. is responsible for ensuring a solid basis for the evaluation of the long-term needs for the development of RIs. This body was constituted both as a scientific advisory council of NASR for the implementation of the programme "Capacities" of the 2nd National RDI Plan (2007 – 2013), and a strategic forum, that draws up reports and makes recommendations for the allocation of resources necessary to create, develop and use the RI, important to the Romanian scientific community .</p> <p>C.R.I.C. proposes the allocation of resources for the infrastructure to be developed partially or totally from Romanian public funds both on the territory of Romania and abroad. The main mission of C.R.I.C. is to establish the national priorities for RIs and to draw up a report regarding the stages to be followed in their construction and operation (Roadmap). This report addresses as main issues: purpose, definitions, categories, priorities, special potential fields.</p> <p>In establishing the priorities, the following categories of infrastructures have been considered:</p> <p>a) national:</p> <ul style="list-style-type: none"> <li>• research facilities of national interest, such as the National Network for Education and Research (RoEduNet), high-complexity laboratories and equipment;</li> <li>• large scientific and documentary databases for research, developed in Romania or for which it is necessary to purchase access licences ( ISI</li> </ul>

General issues			
Country	Aim/character of evaluation	Who mandates the Evaluation / what is the legal justification for the awarding authority	Structure of institution
			<p>databases, libraries);</p> <p>b) international:</p> <ul style="list-style-type: none"> <li>• infrastructures constructed or operated under international co-operation on the basis of agreements or within organizations and projects where Romania participates, such as: <ul style="list-style-type: none"> <li>○ ESA, CERN, ITER, IUCN Dubna;</li> <li>○ projects from the list of pan-European RIs established by ESFRI</li> </ul> </li> <li>• other infrastructures developed under national and / or international partnership.</li> </ul>
RO (ex-post)	<ul style="list-style-type: none"> <li>• At the level of each project: to monitor the deliverables / results of each project.</li> <li>• At the national level – to monitor the level of completion of national objectives regarding the RI development in correlation with the national and international programmes.</li> </ul>	Romanian Government – through the National Authority for Scientific Research.	n/a
SE (ex-ante)	<ul style="list-style-type: none"> <li>• National Roadmap established and regularly updated by the Swedish Research Council</li> </ul>	Evaluations are mandated and performed by the Research Council	The government has decided on formation of a Council of RIs within the Research Council
SE (ex-post)	<ul style="list-style-type: none"> <li>• Evaluation of research performed at RI is made by international panels</li> </ul>	Evaluation is mandated and performed by the funding organisations that fund the research	Evaluation of research at existing RIs is initiated by research funding organisations and performed with the help of international panels
I (ex-ante)	<ul style="list-style-type: none"> <li>• National Roadmap established and plans of regular updates by the Ministry of Education University and research (MIUR) Internationalization Division</li> </ul>	Direction general for Internationalization of Research of MIUR	Ministry, Directorate for Internationalization activating a Panel involving all Presidents of Public Research Bodies and Representatives
UK (ex-ante and ex-post)	<p>The aims of the evaluation are to:</p> <p>A Answer two key questions:</p> <ul style="list-style-type: none"> <li>• Is the institute an essential component of the UK research base?</li> <li>• If so, is it fit for purpose?</li> </ul> <p>B To provide detailed assessments of:</p> <ul style="list-style-type: none"> <li>• The excellence of the research carried out at the institute</li> <li>• The institute's contributions to national capability in its area of research</li> <li>• The systems in place for promoting knowledge exchange and commercialisation</li> <li>• The institute's strategic human resources capability</li> <li>• The institute's activities to support public engagement in research</li> </ul> <p>The overall performance of the institute across all its responsibilities</p>	<p>For A: Answers are required by the UK Department for Business, Innovation &amp; Skills (BIS: UK Ministry responsible for public funding of research)</p> <p>For B: Required by the BBSRC Council (which is responsible for the BBSRC as a whole) to meet its requirement for public accountability, and to inform its future funding decisions in relation to the institutes</p> <p>BBSRC is a Non-Departmental Public Body responsible for public funding of bioscience research in the UK; it reports to BIS.</p>	<p>The evaluations are run by the Corporate Policy &amp; Strategy Group in the BBSRC Office, and involve staff from across the BBSRC Office (BBSRC Office is responsible for the management and administration of BBSRC). Evaluations are coordinated by 1 full-time member of staff, with input from 6 other staff (c 2 full-time equivalent) and 2 part-time (1 full-time equivalent) administration staff, working over a period of 18 months, every five years. Many external experts are involved from the research and research user communities</p>

Country	Course of activities			
	One-stage or multi-stage process	One-time or recurring activity	Selection of panel	Definition of criteria
ES (ex-ante)	1.-Multi-stage process for national RIs (ICTS). Projects are evaluated by ANEP and CAIS who send their recommendations to MICINN. 2.- Three stages: specialist panel analysis, overall panel for balance, political panel for final strategic elements	1.-For the creation of new facilities, twice: before and once construction is complete. 2.- Only carried once in 2009, possible new review in 3-4 years	1.- Ministry appoints several expert panels. Report is also discussed by the Advisory Committee for Unique Infrastructures (CAIS) 2.- Panel members mainly Spanish, proposed by Ministry in consultation with the chair and vice chair (who were also appointed by the ministry)	1.- For the national RIs, criteria have been defined by MICINN and published on the Ministry's website. 2.-There was a template prepared by the Ministry
ES (ex-post)	Three stages: panel + CAIS + Ministry	Per project, on a periodic basis	Ministry appoints several expert panels. Report is also discussed by the Advisory Committee for Unique Infrastructures (CAIS)	Criteria have been defined by MICINN and published on the Ministry's website.
FI (ex-ante)	n/a	National level RIs – Present state and Roadmap: to be evaluated on a continuous basis and updated at approx. 3-year intervals	n/a	n/a
I (ex-ante)	Bottom-up process followed by classification according to ESFRI criteria, followed by Work-Group and Thematic-Panel discussion and ranking, followed by consensus conference and final roadmapping	Done first time in 2010, planned bi-annual recurrence	Appointed by Decree of MIUR, composed by all Presidents of Research Institutions, University Conference, Delegates to European Panels and ESFRI	On line template doe proposal submission, on-line grid of reference criteria/terms of reference of WG
HU (ex-ante)	n/a	n/a	n/a	n/a
HU (ex-post)	Two-stage, fully electronic, web survey and evaluation process.	All items of the NEKIFUT project will be revisited with a frequency of 2-5 years (the RI evaluation and assessment with a frequency of 2 years).	The panels consist of external experts nominated by the Hungarian Academy of Sciences, ministries, universities and major players of the industry with relevance to RIs. The experts are finally selected by the evaluation organisation without any feedback to the awarding authority (ministry). Nevertheless, members of the Steering Board (including the Working Group Chairs) are appointed by the minister while members of the Working Groups are appointed by the President of the National Office for Research and Technology.	The criteria are developed by the experience of the organisation and of the external experts without any feedback from the awarding authority, i.e., the ministry.
RO (ex-ante)	C.R.I.C. decides if one-stage or two-stage process will be used	Per project – the evaluation is made ex-ante and at the end of the project.  Per national system – first national roadmap was developed in 2007-2008 and the second one (including the evaluation of all RIs) is currently underway.	Generally all proposals are evaluated by panels of 2 or 3 experts, mainly external.	n/a
RO (ex-post)	n/a	Per project – the evaluation is made ex-ante and at the end of	Generally all proposals are evaluated by panels of 2 or	n/a

Country	Course of activities			
	One-stage or multi-stage process	One-time or recurring activity	Selection of panel	Definition of criteria
		the project.	3 experts, mainly external.	
UK	The procedures involve several stages, with separate assessments of 2B (i) – (v) (most of which involve two stages), brought together by the final stage at 2B(vi)	Every 5 years.	Separate panels of experts assess each of the elements at 2B. Panel members are mainly identified by BBSRC Office staff; the institutes may make suggestions, some of which may be used. Final decision on panel membership is made by the BBSRC Appointments Board, which reports to BBSRC Council.	Criteria are developed by BBSRC Office staff and agreed by BBSRC Council.

Country	Course of activities				
	Collection of information	Field visits foreseen	Meetings of panels	Mechanism of decision making	Who makes the last decision of acceptance
ES (ex-ante)	1.- Written dossier, using two different templates available on the Ministry's website, one for the new facilities, and the other one for the "certification" as ICTS. 2.- Written dossier for each project plus hearings with proponents/defendants of project	1.- Yes – when considered appropriate by experts 2.- No, as most of the ESFRI projects are in the developing phase	1.- Panels meet at least twice a year 2.- Panels meet at least twice. Overall panel meet once. In addition there was a meeting of the Chair and Vice chair with the upper management of the ministry	1.- Reports from the experts, ANEP y CAIS to the Ministry 2. Ranking by first panel with balance correction by overall panel. Later political decision (which in fact did not depart from that of the overall panel)	Minister of science and innovation
ES (ex-post)	WEB based input dossier for each facility plus hearings with management of the evaluated facilities	No	Panels meet at least twice.	Evaluation report from panel to CAIS and ministry. CAIS report to Ministry and final report drafted by the ministry	Minister of science and innovation
I (ex-ante)	WEB based submission template of RI proposals on dedicated site with enabling password access	Not implemented, Interviews by Work-Group panellists of proponents	WG and panels meet according to terms of reference, ((meetings and/or videoconferences)	Classification of non relevant, emerging and mature on objective criteria. Ranking of high priority as a consequence of WG and panel work and discussion.	Minister of Education, University and Research
FI (ex-ante)	n/a	n/a	n/a	n/a	Decisions must be approved at the ministerial level
HU (ex-ante)	n/a	n/a	n/a	n/a	n/a
HU (ex-post)	Both information collection and the evaluation process (including the work of external referees) are fully electronic and web-based.	No field visits took place so far.	The panels meet physically about 4 times per year. In exceptional cases, some decisions are met per e-mail voting.	In Stage #1, everyone is eligible to submit data of operated or used RIs and to submit suggestions.  Stage #2 is a more detailed survey by invitation based on the assessment of Stage #1.  Submitted data in Stage #2 are validated by the RI management.  Evaluation in Stage #1: <ul style="list-style-type: none"> <li>two independent referees (WG members or external national experts) or</li> <li>suggestion by the PM (in this case independent refereeing can be requested by any WG member).</li> </ul> Evaluation in Stage #2: <ul style="list-style-type: none"> <li>one rapporteur (as a rule, a WG member).</li> </ul> Assessment in Stage #1: <ul style="list-style-type: none"> <li>1st suggestion by the referees,</li> </ul>	All final decisions are made by the Steering Body (SB)

				<ul style="list-style-type: none"> <li>revised suggestion by the WGs,</li> <li>decision by the SB.</li> </ul> <p>Assessment in Stage #2:</p> <ul style="list-style-type: none"> <li>report by the rapporteur,</li> <li>1st suggestion by the PM,</li> <li>revised suggestion by the WGs,</li> <li>decision by the SB.</li> </ul>	
RO (ex-ante)	<p>Per project. For ex-ante evaluation – from the proposals.</p> <p>Per national system: materials are centralised by C.R.I.C. from all operators of RI's, data is analysed and centralised.</p>	Yes – when considered appropriate by experts.	At least once a year – physical meetings. Email contact between members –random in frequency.	C.R.I.C. evaluates and makes recommendations to NASR (National Authority of Scientific Research) – which takes the final decision.	The National Authority of Scientific Research, through a Govt. Decision.
RO (ex-post)	Per project: Ex-post – the project coordinators present the results of their projects.	Yes – when considered appropriate by experts.	At least once a year – physical meetings. Email contact between members –random in frequency.	n/a	The National Authority of Scientific Research, through a Govt. Decision.
UK	Information is collected from BBSRC institutes against set templates, including formal applications for future support of research programmes, and national capability. These are evaluated by external expert referees as well as by the appropriate panels.	Field visits are involved at stage 2B(vi)	The panels for 2B(i) – (iii), meet twice; those for 2B (vi) and (v) meet once. At stage 2B(vi), a separate panel for each institute meets once, and spends 1.5 days at the institute.	The reporting structures for the different parts of the exercise are shown at the end, after question 9.	Final decisions on future institute funding are made by BBSRC Council

Country	Who bears the costs of evaluation	What kind of activities will be reimbursed / will external experts be paid for their involvement	How much time will the evaluation typically take	Other
				How will the results be used
ES (ex-ante)	<p>1.-For the assessment and certification process of the national RIs (ICTS), costs are covered by the Ministry.</p> <p>2.- The cost were covered by the ministry</p>	<p>For both cases (ICTS assessment and 2.-2.- Spanish prioritization of ESFRI RIs) travel costs are reimbursed. In addition the Ministry provides the meeting logistics and the support (secretary, documentation handling final report publication...)</p>	<p>1.-Around 6 months</p> <p>2.- Spanish Prioritization of ESFRI RIs took two months because of the difficulty to find dates good for everybody. Real work only one week per participant</p> <p>Defendants of each project had to prepare the dossiers, which took also about one full week-person of</p>	<p>1.- The "ICTS" approved are included in the "Spanish Roadmap for Unique Scientific and Technological Infrastructures.</p> <p>2.-Projects were ranked in Very High, High, Medium, Low, very low priority. The results were made available in the publication, "Building the science of the 21st century", which was released during the ECRI 2010 Conference. They are also available on the Ministry's website.</p>

Country	Who bears the costs of evaluation	What kind of activities will be reimbursed / will external experts be paid for their involvement	Other	
			How much time will the evaluation typically take	How will the results be used
ES (ex-post)	Costs are covered by the ministry	Travel costs, visits when appropriate. The Ministry provides the meeting logistics and the support (secretary, documentation handling)	work per project It took two months because of the difficulty to find dates good for everybody. Real work only one week per participant Defendants of each project had to prepare the dossiers, which took also about two full week-person of work per project	The evaluation result is communicated to the facility and is used to maintain or not the "ICTS certification".
FI (ex-ante)	n/a	n/a	n/a	n/a
I (ex-ante)	The costs were supported by all participants to the procedure	no	It took 3 months in the collection of proposal stage and 6 months in the evaluation by the WG	Published national roadmap, referenced in the national plan of research (PNR)
RO (ex-ante)	The National Authority of Scientific Research	<ul style="list-style-type: none"> <li>in case of each individual project evaluation: experts are paid for each evaluated project from the programme.</li> <li>evaluation of the national RI system: experts from CRIC (Romanian Committee for RIs) are not specifically paid for this task.</li> </ul>	<ul style="list-style-type: none"> <li>for individual project evaluation: 1-2 days</li> <li>a one day evaluation session at least 1-2 times per year.</li> </ul>	<ul style="list-style-type: none"> <li>full description of RI projects are (and will be) included into the National Record of RIs. A second such National Report is now in progress –and it represents a key reference for existing infrastructures.</li> <li>the conclusions of CRIC debates constitute inputs for the formulation of national RDI policies including mainly those concerning the development of RIs.</li> </ul> <p>The report is open to public and is placed on the Website of the Romanian National Authority of Scientific Research. (first report is at <a href="http://www.mct.ro/img/files_up/1242293614cric_eng.pdf">http://www.mct.ro/img/files_up/1242293614cric_eng.pdf</a>)</p>
RO (ex-post)	The National Authority of Scientific Research	<ul style="list-style-type: none"> <li>in case of each individual project evaluation: experts are paid for each evaluated project from the programme.</li> </ul>	<ul style="list-style-type: none"> <li>for individual project evaluation: 1-2 days</li> <li>a one day evaluation session at least 1-2 times per year.</li> </ul>	<ul style="list-style-type: none"> <li>full description of RI projects are (and will be) included into the National Record of RIs. A second such National Report is now in progress – and it represents a key reference for existing infrastructures.</li> </ul>
HU (ex-ante)	n/a	n/a	n/a	n/a
HU (ex-post)	The National Fund for Research, Development and Innovation, a part of the state budget.	As a rule, external experts will be reimbursed only for their occurring costs (e.g., travel). Nevertheless, external experts	The first round of the evaluation and assessment project took about 2.5 years. Refereeing takes about 6 weeks in each	<p>A national electronic, searchable register is being set up for RIs. It will start with the strategic RIs, however, all significant RIs will be included in the extended register.</p> <p>Besides, the evaluation results will be included in the final report of the project that will be the basis of a recommendation for a submittal for the government.</p>

Country	Other			
	Who bears the costs of evaluation	What kind of activities will be reimbursed / will external experts be paid for their involvement	How much time will the evaluation typically take	How will the results be used
		working in the Project Management (Core Group) as well as those taking a special burden on themselves (e.g., leading ad hoc working groups) will be paid with a modest salary. The total costs of the project are about 100.000 € per year.	stage.	
UK	BBSRC Office.	Travel and subsistence are paid to all members of expert panels, and a day rate paid for attending panel meetings. No additional fees are paid.	The whole exercise takes about 18 months.	An overall report on each institute is published on the BBSRC website. Detailed feedback on each element used by BBSRC Office and by BBSRC Institute managers to develop the institute programme and, where appropriate to improve the running of the institute.

## ANNEX 3

Example of a procedure on preparing the 2<sup>nd</sup> update of the ESFRI Roadmap

Introduction

This process is designed to ensure that all initiatives to be reviewed by the TWGs for the update of the ESFRI roadmap have been assessed using the same transparent and fair procedure.

Methodology (modus operandi)

- Each ESFRI WG will follow the method of working defined in its ToR. In addition they will use the stage-gate methodology defined below in order to guarantee transparency and equality for the treatment of proposals:
  - First, preparation of a brief (update) survey of the given field as well as some possible foresight analysis;
  - Second, consideration of the scientific case for identified projects<sup>11</sup>;
  - Third, consideration of the concept case for identified new RIs, analyzing technical and financial issues.

The WG should work on the basis of written evidence (see template in annex); on 'maturing' proposals, the WG might hold consultation meetings, whenever appropriate; for 'less mature' proposals<sup>12</sup>, but scientifically valid, these should be indicated in a list of emerging ideas regularly updated;

- Whenever appropriate, the WG will also update the assessment of RIs now in the Roadmap, regarding their present technical and scientific development and their present degree of maturity.
- Apart of the final report, progress reports (enabling process tracking, according to the steps below) will be presented at every ESFRI plenary meeting, if possible with technical and financial information; these reports will also help revising the roadmap procedure, as necessary.

Basic requirements for consideration

It will be a prerequisite that each proposal is endorsed by an ESFRI delegation and/or by a Council of an EIROForum member organization<sup>13</sup>.

- Steps 1 & 2: The Executive Board will, beforehand, check whether a specific proposal meets the requirements for entering the ESFRI review process.
- The ESFRI secretariat will then send the proposal to the WG, which will assess if this proposal could be included in the update of the Roadmap as a potential (major upgrade / new) pan-European Research Infrastructure (RI) through the following steps:

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<sup>11</sup> It is not the role of a WG to create proposals; contacts with delegations having sent proposals are possible; those countries that have already produced roadmaps will need to ensure that proposals are consistent with these;

<sup>12</sup> In case an initiative is rejected, this should also be normally reported;

<sup>13</sup> This implies that, if the project is recognised as of pan-European interest at the end of the stage-gate process, the endorsing Country(ies) or Council of an EIROForum organisation will contribute to the process of implementing the project.

Step 3: To fulfill their tasks, and before analyzing specific initiatives, the WGs should review / update the global and EU scientific landscape in the field and its possible evolution in the next 10 to 20 years, using available information, and giving the overall frame for the user needs of RI's.

Step 4: The Scientific Case

- The specific RI should correspond to present and future needs of the scientific communities, demonstrate impacts on scientific developments, support new ways of doing science in Europe and contribute to the growth of the European Research Area.
- Accompanying documents, supported by the appropriate scientific community at European level, should demonstrate its pan-European value, setting the scene for the infrastructure in a European and an international context, as well as its relevance and quality.

Step 5: The Concept case

- The specific RI should be technologically and financially feasible and meet the necessary degree of maturity which is defined as (a) the existence of a technical concept for the realisation of the project, and of feasibility studies, including identification of technical challenges and risks, (b) the existence of a defined estimate about construction, operating and decommissioning costs, including a clear timetable.
- In addition, the ESFRI analysis requires relevant information on (c) an updated peer review of the project; (d) the potential for risks- and costs-sharing and for developing effective joint actions in Europe; (e) the mechanisms for other partners to join later on and (f) the mechanisms to ensure the human resources and the capability to use the RI in the most open and effective way.

Final deliverables:

Step 6: The final report of the WG is due in spring 2010, detailing which RI project is recommended to be included in the update of the ESFRI Strategic Roadmap<sup>14</sup>. This report should be accompanied by a review of the process followed by the Group to ensure that the recommendations are the result of a fair process, as well as supporting documents to help understanding the evolution of the field as well as where new areas are coming up.

Step 7: ESFRI will ultimately decide whether individual projects should be included in the Roadmap.

Reminders:

All information exchanged within the WG is meant for internal use only, unless explicitly stated and agreed otherwise by ESFRI. The ESFRI secretariat will ensure the traceability of every proposal to ESFRI.

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<sup>14</sup> In approving the list, the WG has the responsibility for assuring ESFRI that it has checked the already developed design studies and the availability of appropriate information on cost estimates and other financial aspects.

The process is described in the diagram below:

