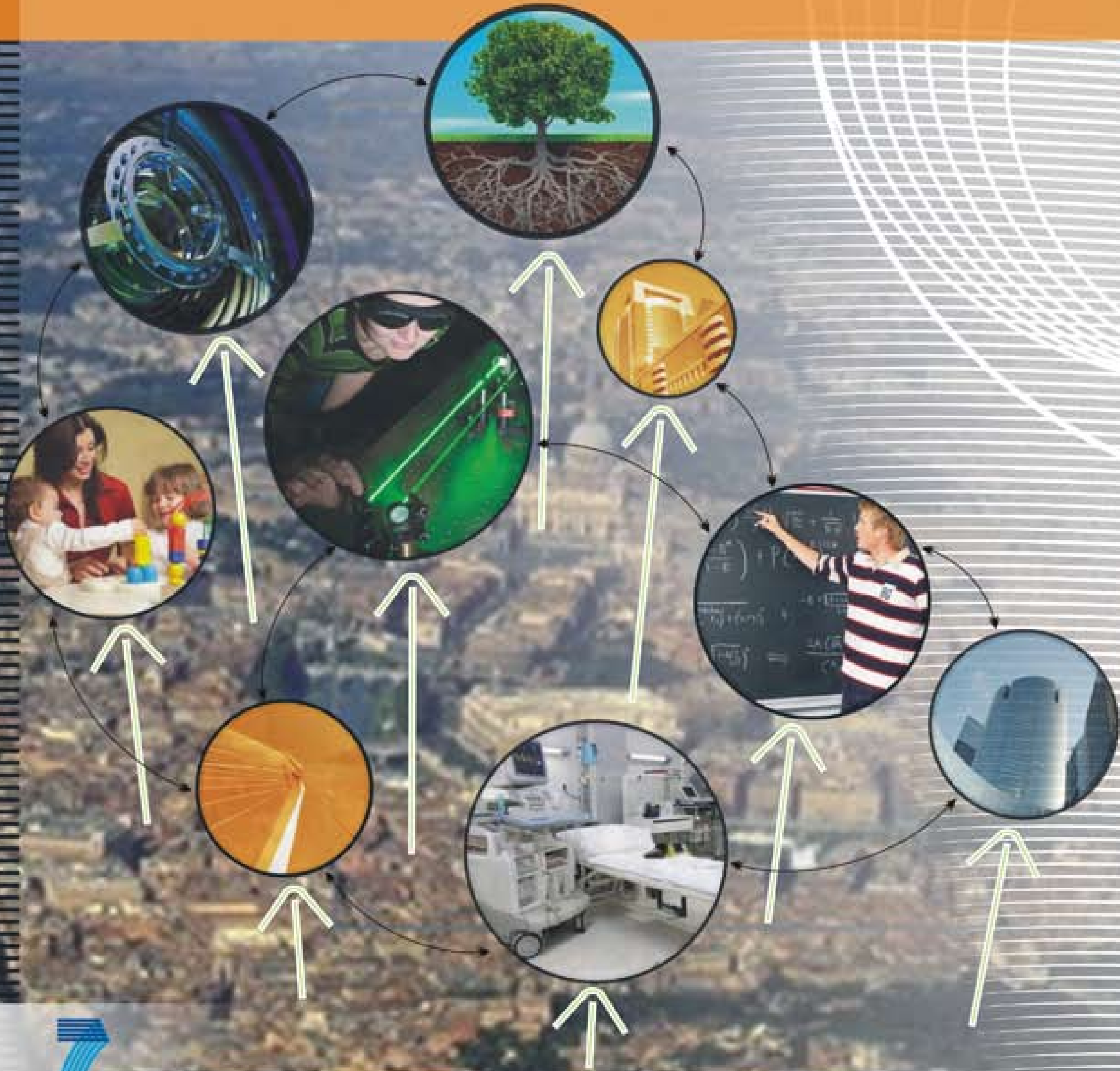
FenRiAM
full guide

Proposal for a Foresight-enriched Research Infrastructure Impact Assessment Methodology



EUROPEAN UNION

SEVENTH FRAMEWORK PROGRAMME

for smart development in Europe

Editors

Adrian Curaj & Katja Pook

Authors

Regina Rochow & Mickael Peró
Sincrotrone Trieste SCpA

Katja Pook
pook perspectives

Daniela Tchonkova & Denitsa Marinova
ARC Fund

Radu Gheorghiu & Viorel Niță
Institute of World Economy, Bucharest

graphic design: Constantin Marincea

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About this guide:

This guide has been produced within the European Commission funded project "Research Infrastructures: Foresight and Impact" (RIFI) aimed at developing a comprehensive methodological framework for assessing socio-economic (SE) impacts of future RI projects on hosting regions and communities. The final product of the project is the FenRIAM (Foresight enriched Research Infrastructure Impact Assessment Methodology) framework, presented in this guide.

Acknowledgements:

We would like to gratefully acknowledge Sarah Webb and Elisabeth Valle for contributing with their individual experiences. We also appreciate the helpful contributions of Franck Brottier and members of the Czech ELI RI project for conducting an extra pilot case for testing the draft RIAM methodology and providing valuable feedback. The participants in the Feedback Seminars in Sofia and Bucharest, as well as at the RIFI workshop in Tenerife, also provided very useful input. as did the participants of the final RIFI conference in Bucharest.

Legal Notice:

Foreword

Ten years after the first international conference on Research Infrastructures, which underlined their role in implementing the ERA vision, the 2010 edition of the conference in Barcelona emphasised the successes Europe has achieved in this field, as well as the fundamental importance of Research Infrastructures for European development and cohesion, as part of the strategies to strengthen the competitiveness of Europe's science base and overcome economic imbalances.

Apart from enabling cross-cutting scientific leaps and attracting the best researchers in the world, major Research Infrastructures have stimulated socio-economic development in the region where they are located. This includes education, safety, health, roads, water and energy supply, and many other areas of every-day life. Research Infrastructures fuel a continuous interplay between science and technical and societal development. They may play the role of knowledge-based innovation drivers, reaching beyond scientific excellence and acting as a driver for regional development. They can be used to overcome economic disparities, to improve the geographical balance of economic development and thus raise the potential rate of growth of the Union as a whole, setting trends towards a desired future.

Although, or even because, transparency in the Research Infrastructure landscape has been improved significantly since the establishment of the European Strategy Forum on Research Infrastructures (ESFRI) in 2002; it is fundamental to continue the enterprise "to support a coherent and strategy-led approach to policy making on Research Infrastructures in Europe and to facilitate European initiatives leading to a better use and development of Research Infrastructures."

But when we look to future investments, we have not had a coherent methodological framework and toolbox for evaluating Research Infrastructure projects. Decision makers and applicants for funding are left alone with a vast landscape of methods to choose from. Coherency and consistency are core principles for making good, fair and transparent decisions about future investments to build Europe's research backbone.

However it is perhaps even more important to be able to identify ways of maximising the positive and minimising the negative impacts of Research Infrastructures. And as no such infrastructure can exist in a vacuum, we have to sharpen our senses so as to include all of the different stakeholders that make RIs a success: scientists, water and electricity suppliers, teachers etc. They all benefit from an attractive RI, and the RI benefits from all of their services to make the RI an attractive magnet for research and living. Only if we consider the different interests and take them seriously will we be able to shape a sustainable future.

Probably the most important challenge is to identify ways of maximising the positive and minimising the negative impacts of Research Infrastructures and this is where the RIAM guide could be very valuable. What is now needed is an additional set of Case Studies where further empirical evidence can be gathered, so I would like to encourage those responsible for ESFRI listed projects to endeavour to take advantage of the approaches set out here and I look forward to learning about these experiences in due course.

Robert-Jan Smits

Director-General for Research & Innovation

Introduction

In 2010 the European Union had to face fundamental challenges resulting from the economic disparities across Europe. This led to debates about the resilience of the European Union as a whole. But long before these events, which held media attention, the EU Cohesion Policy was formulated to overcome – by mobilizing the growth potential of all regions – the economic disparities, to improve the geographical balance of economic development and thus raise the potential rate of growth of the Union as a whole.

Two of the key levers in the process of strengthening economic and political integration are building Business Support Networks and Research Infrastructures (RI). When looking at the geographical distribution of Research Infrastructures in Europe it becomes clear that Central, East, and South-East Europe do not play a significant role as host countries that either corresponds to, or reflects their capacity or potential. On October 6, 2010 a communication 3 on Regional Policy contributing to smart growth in Europe 2020, explicitly included the importance of research excellence networks of research facilities and Regional Partner Facilities as pillars for regional development in Europe (paragraph 3.4). Fostering smart specialisation of all regions according to their individual profile is in the basic interest of European citizens, as all will profit from European cohesion and sustainable, future-oriented, development.

The involvement of those countries that are not at the geographical centre of the EU as hosts or nodes of some of the new pan-European infrastructures could leverage their socio-economic impact and also alleviate unemployment and brain-drain; thereby promoting European and global cohesion, and ensuring security by sharing commitment and resources in order to reach common goals. But, which role do RIs play in addressing the socio-economic challenges of tomorrow? To answer this we need to address three vital questions:

- What basis exists for the claim that RIs (can) have a major impact on sustainable development?
- How can Foresight elements contribute to the evaluation of socio-economic impacts and even maximise the positive aspects?
- And what might a common European approach for Foresight enriched assessment of RIs' socio-economic impacts look like?

The RIFI project has endeavoured to contribute to the work being done within ESFRI on Research Infrastructure Impact Assessment by developing a web-based coherent methodological framework for socio-economic ex-ante impact assessment of research infrastructures www.fenriam.eu (which has been based on a thorough review of existing practices). As any ex-ante evaluation is oriented towards possible future developments, this framework includes Foresight elements, leading to the RI Impact Assessment Methodology introduced in this brochure: "Foresight enriched Research Infrastructure Assessment Methodology".

If and when the principles underpinning this methodology find their way into application and evaluation processes in Europe, we will be taking a significant step forward for integrating R&D and European cohesion, thereby making Europe more resilient for future challenges.

Adrian Curaj

[1]http://ec.europa.eu/enterprise/networks/index.htm (the Enterprise Europe Network contracted under the Competitiveness and Innovation Programme CIP http://www.enterprise-europe-network.ec.europa.eu/index_en.htm)

[2]Brussels, 6.10.2010, SEC (2010) 1183. Communication from the commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Regional Policy contributing to smart growth in Europe 2020

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What can be expected from this guide?

Carrying out the socio-economic impact assessment of Research Infrastructures (RIs) presents many complex challenges. Traditionally, a vast multitude of methods and indicators are used in singular assessments, lacking a common ground. The RIFI project set out to deliver a coherent methodological framework with clear procedures, instructions, recommendations and instruments to conduct such an assessment for RI projects: FenRIAM – Foresight enriched Research Infrastructure Impact Assessment Methodology.

This guide suggests when and how FenRIAM can be applied and what the potential benefits and limitations are. It enables you to consider which of the proposed FenRIAM methods address your specific requirements.

Additionally, the guide offers a step-by-step instruction on how to proceed and which indicators, data sources and instruments to use, as well as templates and examples. The relevant topics for assessment are grouped in modules and categories which embrace a list of indicators.

Assessing RIs in Europe – the policy context

Research Infrastructures (RIs) of pan-European significance are recognised as significant contributors to excellence, creativity, and innovative ideas. Therefore they are essential ingredients for the realisation of core objectives of regional, national, and European policies in the context of global competition. The necessity of new arrangements, improved coordination, and greater efficiency of RI related activities in order to respond adequately to the newly emerging needs of science and industry has been frequently addressed in recent years.

Key policy messages:

- World class large-scale RIs are widely acknowledged by European Member States (MS) and the European Commission (EC) as playing a key role in the implementation of the ERA (European Research Area) vision and the European Knowledge Society.
- In the Green Paper on ERA (EC 2007) the EC acknowledged world-class RIs in the form of joint European ventures as key features of a fully realised European Research Area.
- The European Strategy Forum on Research Infrastructures (ESFRI) and the joint effort of the MS to develop a common European Roadmap for RIs (ESFRI 2006), identifying key needs and priority areas for large-scale RIs, reflects the significance of this issue and is a first step on the way to a sound European RI landscape.
- The current Framework Programme FP7 contains in its specific programme "Capacities" a section on RI with a funding volume of more than € 1.8 billion over its duration up to 2013, with the aim to "optimise the use and development of the best RIs existing in Europe" and [...] "help to create new RIs of pan-European interest in all fields of science and technology." (EC 2009).
- The Commission outlined in the working document (EC 2001) priority actions towards:
  - creating mechanisms for EU-wide scientific advice and policy-making on RIs,
  - combining the resources of the MS for the development of new key RIs, and
  - optimising the exploitation of existing RIs in Europe.

Projects from the ESFRI Roadmap, with the financial support of FP7, have now entered the preparatory phase for construction. The implementation of a funding-mix approach would be of particular importance, linking national resources and European Structural Funds to support the poorer European MS in shouldering the immense financial burdens brought about by projects of this dimension. Key decisions on RI financing, location, management, and development, have to account for considerable social and economic disparities among regions since the EU enlargement and be in line with objectives of European Cohesion Policy, thus promoting smart regional development across all of its regions.

The European Cohesion Policy seeks to overcome the economic and social disparities and strengthen Europe's economic and political integration by:
(1) investing in areas of high growth potential,
(2) investing in the drivers of growth and employment, and
(3) developing synergies and complementarities with other Community policies.

What is a Research Infrastructure?

Example 1: Elettra

Elettra is an Italian synchrotron that offers scientists from various fields and companies the opportunity to conduct research with light of particular characteristics from infrared to X-rays. The multi-disciplinary laboratory is located close to the Slovenian border near Trieste. More than 1000 users from over 40 countries perform each year experiments at about 25 beamlines and experimental set-ups. Users gain access through research proposals evaluated by international review committees. The construction costs of the single-sited facility are estimated to be more than 250 M€, the annual operation costs are roughly 33 M€. Funding is mostly national, with some contributions from international partners. Currently a second light source, the free electron laser FERMI@Elettra is in commissioning on the Elettra site. It has been reviewed as one of the RIFI case studies.

Advancement of scientific knowledge, technology and innovation increasingly requires researchers to have access to particular scientific installations called research infrastructures (RIs).
They provide unique instrumentation, tools, artefacts, or data for scientific work at the cutting edge. In Europe, there are multiple facilities covering diverse scientific fields providing unique research opportunities to their users. Due to the large number of scientific communities and the complex research needs that RIs serve, a huge number of very different RI types with completely different characteristics can be distinguished. The European Research Infrastructure Portal differentiates between more than a hundred categories in nine main scientific domains.

RI types: Some examples

- Scientific collections & surveys
- Research vessels & aircraft
- Wind tunnels & wave channels
- Earthquake simulation laboratories
- Ocean observatory networks
- Astronomical telescopes
- Research satellites
- Clean rooms
- Ecological habitats & field stations
- Fusion test reactors (Tokomaks)
- Data archives & repositories
- Particle accelerators
- Supercomputers

Example 2: ENO

The ENO is the largest collection of telescopes in Europe. Sited at the Roque de los Muchachos and Teide Observatories of the Instituto de Astrofísica de Canarias on the Canary Islands of La Palma and Tenerife, it consists of instruments from more than 60 different institutions from 20 countries. The world's largest optical infrared telescope, the Gran Telescopio Canarias (shown above) was inaugurated in July 2009. An important part of the funding for this Spanish telescope came from the Regional Development funds and the societal reaction to the Observatory and this new telescope was the topic of one of the RIFI case studies.

A simple, but important distinction for RIs: Single-sited RIs such as the particle accelerator CERN, the European Northern Observatory ENO, the international experimental fusion reactor ITER, or the British Library offer their users a facility, resource, service, or tool in a single location. Distributed RIs consist of a network of facilities, resources, services or tools in different sites, which are managed in a co-ordinated way. Examples are the European ocean observing system Euro-ARGO, the European Mouse Mutant Archive EMMA, the international EGEE GRID computing facility, or the planned European Extreme Light Infrastructure ELI. Both, single-sited and distributed RIs, can be virtual RIs, which make their services electronically available to their users. Virtual RIs include the pan-European high-speed, high capacity communication network GEANT, the European Social Survey ESS, the European Bioinformatics Institute (EBI), or the International Medieval Bibliography. RIs can involve huge financial investments for construction and operation. A spread in construction costs from less than 20 M€ to more than 500 M€ has been observed in a recent survey of European RIs5, while the annual operation costs varied from 0.25 M€ to more than 10 M€ (including much higher amounts as well). The largest RIs are therefore often multi-national facilities funded in a joint effort by different countries. Multi-nationally funded RIs, but also many national large-scale RIs are of European relevance. They offer unique research possibilities to international user communities, are recognised centres of scientific excellence, employ and train scientists and students from many countries, attract young people to science, promote multi-national collaboration and networking, advance technology and contribute to innovation. They play a central role in creating the ERA,

Example 3: Euro-ARGO

ARGO is a project to set up a global ocean observing system with partners from all over the world. The objective to develop a global array of autonomous profiling floats spaced every 3° (~300 km) throughout the icefree areas of the deep oceans can only be reached through close international co-operation. The distributed RI offers the potential to greatly enhance the present capability to measure in real-time the temperature and salinity of the upper 2000 m of the oceans, which can sustain a better understanding of climate variability over space and time and underpin operational oceanographic applications. The European part Euro-ARGO has the aim to deploy, operate and maintain an array of 800 floats, of which 250 need to be substituted every year, and provide a world-class service to the climate research and environment monitoring communities. This requires investment costs of 4 M€ and annual operation costs of 8 M€. Euro-ARGO is one of the RIFI case studies.

Example 4: ELI

The Extreme Light Infrastructure ELI is a pan-European multi-site facility from the ESFRI Roadmap with locations in the Czech Republic, Hungary and Romania. The ELI project aims at providing the scientific communities with levels of power about 1,000 times higher than achieved in any laser facility worldwide today. This laser has many direct applications in cosmology and high-energy physics. The project is supported by fifteen partners from thirteen European countries. Each of the three host sites will be dedicated to a different application, namely the Czech site to beamline experiments, the Hungarian site to attoscience, and the Romanian site to laser-induced nuclear physics. For each of the ELI sites the construction costs are estimated to about 260 M€ and the operation costs to roughly 30 M€ per year. The Romanian project, ELI-Nuclear Physics, has been studied by the RIFI project, while the Czech project has conducted a limited study applying parts of the RIAM methodology.

making European companies competitive, and attaining economic growth and wealth in Europe.
The enormous importance of RIs and their huge construction and operation costs call for careful planning of investments and an efficient use of the available resources. FenRIAM has been developed as a toolbox for assessing the socio-economic impacts of RIs with the aim to support decision-makers and RI managers in this challenge. It has been designed in a flexible manner to permit its application to many different RI types in different situations. FenRIAM may e.g. be used to evaluate RI projects in advance and compare in particular future facilities in different host regions. It can also be applied to assess already existing laboratories or installations in the framework of stakeholder accountability or management optimisation processes.

The role of RIs beyond scientific impacts

Construction and operation of large-scale cutting-edge RIs, such as synchrotrons, global observatory networks or powerful lasers, requires huge funding and firm support, both by investors and RI project teams. Therefore, it is critical to carry out an assessment of possible future returns before committing to this endeavour. The returns sought are often related to the generation of scientific breakthroughs, their translation to innovative technologies and successful market application for economic growth and competitive development. The increasing role of society in policy- and decision-making processes requires convincing evidence and justification on RI public investments beyond their impacts on science, the innovation system and economy. Therefore a wider scope of socio-economic impacts for the hosting regions and their communities are to be taken into consideration by future RI projects: impacts on demography, education and employment, local infrastructure and services, quality of life, regional development and environment.
In addition to the categories above, RI socio-economic impacts can be further characterized as short-termed or delayed in time, direct or induced, desired or unexpected, easy to monitor or "below the radar".

The opportunity for shaping the future and creating desired socio-economic (SE) impacts on the hosting regions and communities, as well as on Europe as a whole, can make fundamental differences if used sensitively in accordance with strategic principles. An open view for the different possible impacts may lead to better decisions and mobilisation of resources for building large-scale RIs.

RI Socio-Economic Impacts: Some Examples	
S+T: ***Science, Technology & Innovation***	• New services and opportunities for users and customers • New knowledge and skills (scientific papers) • New methods, techniques, and applications • Mutual learning, knowledge exchange, spill overs • Intellectual Property Rights • New instruments and products • Joint R&D projects with industry • New science and innovation networks • Opportunities for spin-offs and start-ups
JOBS: ***Work & Population***	• New directly and indirectly created jobs • Increased economic activity by RI expenditure • Training and skill development (scientists, general staff) • Research training for students • Career opportunities and Life Long Learning • Support of gender balance • Highly-skilled workers for the labour market • Critical mass and synergy effects with other facilities
LIFE: ***Quality of Life***	• RI shaping cultural life and lifestyles • Increased cultural diversity affecting attitudes and behaviours • Better socio-cultural skills and language skills • New medical instruments, diagnostics, treatments • Improved community services (health care, education...) • More public awareness of benefits from science • Increased social cohesion
LIFE: ***Quality of Life***	• New ecological knowledge, technologies, standards and controls leading to improved sustainability • Better services for energy, water, materials and waste • Impacts on biodiversity of local habitats

FenRIAM: Why and when should we use it?

The enormous importance of RIs and their huge construction and operation costs call for careful planning of investments and an efficient use of the available resources. FenRIAM has been developed as a framework with procedures and tools for assessing the socio-economic impacts of RIs – with the aim of supporting decision-makers and RI managers. It has been designed in such a way as to provide guidance but also allow tailoring to various types of RIs in different regions and situations. It can be applied as a whole or in parts depending on the specific requirements of each case.

Decisions may need to be taken when there is only one RI project, or when more than one opportunity exist – different fields of research for the same host region or alternative host regions for the same RI (field of research). Three "use cases" (UCs) of FenRIAM address these situations:

- UC1. Ex-ante estimation for a single RI
- UC2. Ex-ante estimation of two or more competing host sites for the same RI
- UC3. Ex-ante estimation of two or more competing RI projects in the same host region

Moreover, FenRIAM can also be applied to assess already existing laboratories or installations in the framework of stakeholder accountability or management optimisation processes. We derive two other use cases:

- UC4. Ex-post evaluation of SE impacts for an existing RI
- UC5. Ex-ante estimation of SE impacts for an existing RI

The FenRIAM guide gives advice for these UCs, aiming at a balance between recommended procedure and the necessary flexibility for each singular case.
UC and additional specifications have significant implications for the methods to be selected and the data needed. For example, comparability in UC2 and UC3 is facilitated if standardised data bases are used (which is, nevertheless, also recommended for the other UCs) and imposes constraints on qualitative estimations.

More important than constraints, though, is the challenge in ex-ante estimation of future impacts of an RI. How can we predict the future? We cannot. FenRIAM provides guidelines of how to apply future-oriented methods to put estimations on solid ground. Intertwining Foresight elements and socio-economic impact assessment is the feature that makes FenRIAM special and particularly valuable for ex-ante evaluation.

Briefly, FenRIAM enables:

- Clarification over the scope of assessment and the roles and responsibilities of different actors in the process of evaluation.
- Analysis of stakeholder networks.
- Development of future scenarios (for ex-ante evaluation) for the RI in its environment, and thus creating more transparency about complex interactions.

- A structured exploration of the socio-economic implications of the RIs, including a broad spectrum of SE impacts which can be tailored to the specific case.
- Recommended methods, data sources and templates for assessment to be used.
- Concrete impact evaluation to be conducted by using templates provided in the toolbox inspired by case studies and good practices for many of the recommended methods.

Is FenRIAM the ultimate guide? As a comprehensive collection of instruments with guidance and recommendations, FenRIAM creates the premises of a solid SE impact assessment. However, a one-size-fits-all solution would fall short and ignore the complexity of the matter and disregard fundamental specific features. Tailoring of each assessment is an inseparable feature of the process, increasing its relevance to a particular use case. FenRIAM provides a flexible framework that owes certain flexibility to the complexity of the matter. New indicators, new methods or approaches could further expand its territory.

Who is involved?

Application of FenRIAM is, even with a guide, a complex challenge and requires the combination of multiple skills and competences. A look into the potential steps and the interactions of relevant actors shows that the assessment itself is embedded in a wider decision making environment with multiple influencing factors.
These include:

- an organisation that takes the relevant decisions (e.g. funding of an RI project) with the decision-maker itself and technical staff;
- someone conducting the Foresight enriched assessment (FenRIAM assessment coordinator);
- the RI project team or personnel from the RI; and
- stakeholders of the (future) RI.

Who is in charge of coordinating the FenRIAM assessment may vary from case to case. Sometimes the decision maker appoints the coordinator from her/his own entity, in other cases coordination is done by a person from the RI project team itself, or an external consulting company is contracted to coordinate. The reasons behind the different variances may be as diverse as is political reality.

Required depth of knowledge

While different entities fulfil different roles, the persons involved only need to have the depth of knowledge relevant for their role:

- The decision maker has to understand the kind of results a FenRIAM application may deliver and to specify the requirements for the final report of the individual assessment.
- The technical staff of the decision maker has to understand the entire methodology and specific limitations in order to elaborate a scoping document, which may include: specificities in the use case description, time horizon, the reference system for impact assessment, elements to be considered as input (e.g. strategic plans for ex-ante, previous plans for ex-post), requirements for the report on the assessment results, etc.

The scoping document is transformed into terms of reference for the applicants of the methodology.

- The FenRIAM assessment coordinator has to understand the entire methodology and, additionally, contribute the methodological (background) knowledge needed for practically applying the methods.
- The project team should have a generic understanding of a FenRIAM impact assessment.
- The RI stakeholders only need to understand the requirements for data or participation as formulated by the FenRIAM assessment coordinator.

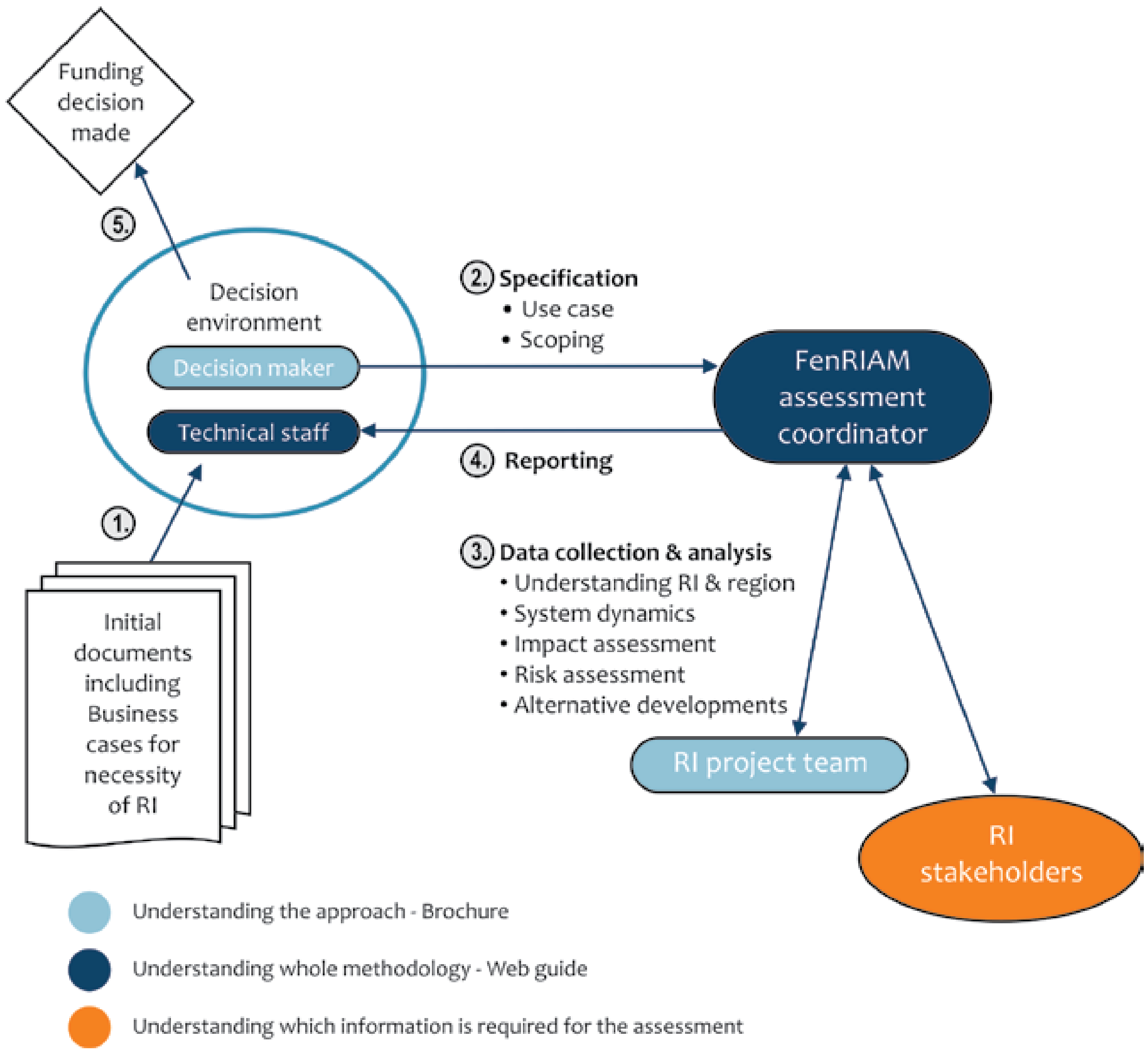

Figure 1: Roles and an example of their relations in the decision support process

Overview of steps

FenRIAM provides a step-by-step procedure that can be customised for different use cases, i.e. different kinds of decisions to be taken. There are eight major steps, where the first two are the responsibility of the decision maker, the rest of the assessment coordinator and team.

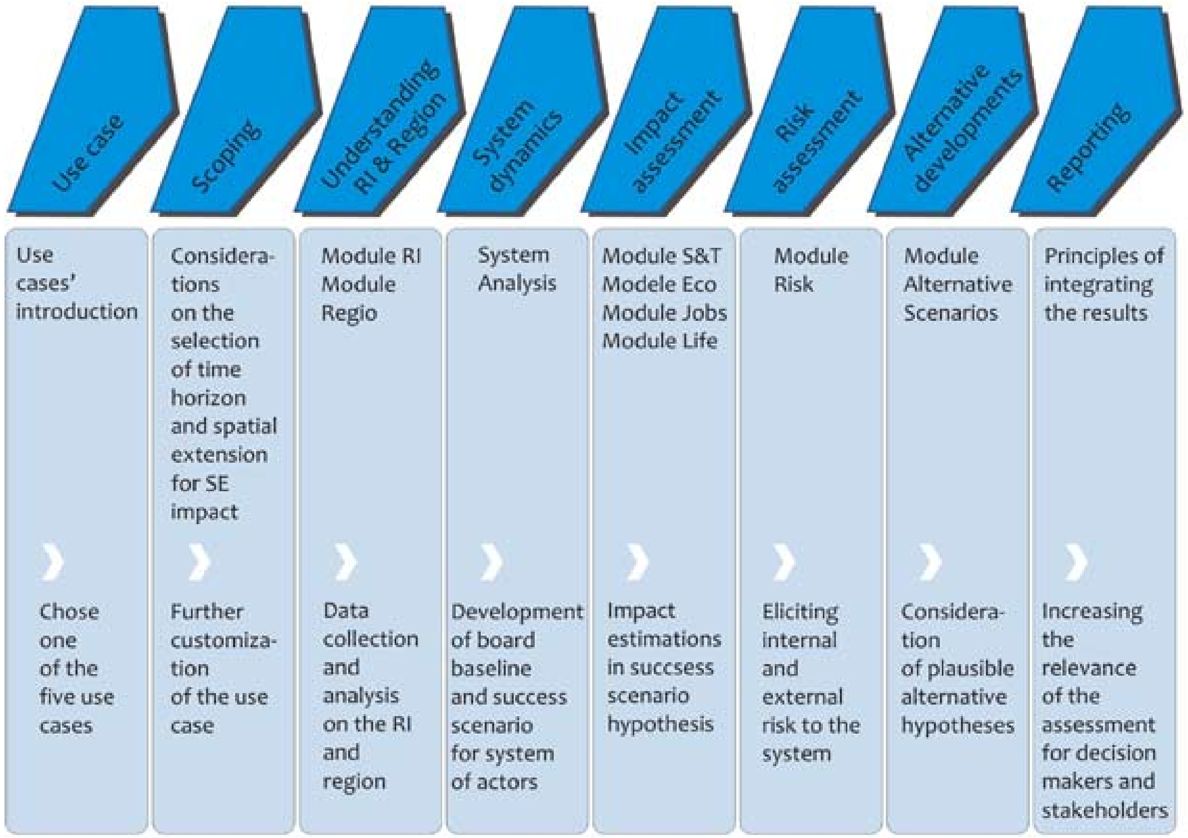

***Figure2 :** Basic structure of the FenRIAM procedure*

Three of the steps (understanding the RI and the Region, impact assessment and risk assessment) are structured as modules to cover all relevant areas to be analysed.

FenRIAM consists of eight modules covering different areas of assessment, plus Foresight elements. Each module is comprised of several categories which specify the topics covered by the module. A leading question for each category makes the meaning easily understandable.

Each category offers a list of indicators for assessment, (qualitative or quantitative). The description of an indicator includes instructions for its use, and (if applicable) definitions or explanations of relevant terms, recommendations for data acquisition and data analysis methods, and related resources, e.g. statistical data repositories or acknowledged papers. Recommended data sources cover a broad spectrum including: project plan, reviews of similar cases, regional statistical data, stakeholder's information and expert opinion. Data analysis includes calculations (simple or using econometric tools) and synthesis of stakeholders' views and expert opinions.

Given the diversity of RIs (e.g. distributed libraries, observatories, marine laboratories) and of availability of resources for the assessment, each case will have its own shape in Foresight enriched socio-economic impact assessment, with a specific selection of indicators and variances in their use.
Templates for data collection and analysis support conducting the assessment. They are provided as proposals, can be applied as they are, modified to, or substituted by, existing templates and in this way be tailored to the requirements of the particular case study.

Three of the steps (understanding the RI and the region, impact assessment and risk assessment) are structured by modules to cover all relevant areas to be analysed.

First of all, the organisation with decision/financial authority will decide which use case best describes the decision to be taken.
Scoping refers to the spatial and time wise specification of the use case.
System dynamics embrace the foresight elements that lead to a better understanding of the actors involved in the RI project and their interactions (system). This step provides broad perspectives of the evolution of the system with and without the RI. The former (with RI) is developed as a success scenario, in comparison to the baseline scenario (without RI).
These scenarios feed the impact assessment, which enables an estimation of the difference between the baseline and success scenario on/in four areas: science & technology, ecological environment, jobs/work and population and quality of life. For each area a module for assessment is provided, with respective assessment indicators, methods and templates.
Risk assessment is also supported by a module. It considers both the risks associated with the RI itself and also the risks associated with the involvement/reactions of stakeholders, thus exploring the hypothesis of not reaching the success scenario.
The outcomes of the Impact and the Risk Assessments feed the next step on developing a Set of Alternative Scenarios, including an upgraded refinement of the initial success scenario.

Finally, FenRIAM includes recommendations for reporting that are meant to enable an adequate presentation of the assessment results.

Every RI and every impact assessment study is different. FenRIAM does not prescribe, but offers the framework for your impact assessment study, enriched with Foresight. You select yourself which are the modules, indicators and methods you want to use in the specific study. This decision is, among other factors, influenced by the type of RI, the kind of decision to be taken, available resources, etc. The modules are described in a way that every single one can be used without necessity to use the others. Nevertheless, some cross-references exist where it is appropriate for assessment or interpretation of results.

Selecting a Use Case

As described above, FenRIAM can be applied for addressing different interests in the assessment. In general, assessment results shall support one or more decision(s) to be taken, in this guide denominated by use cases. It is crucial to be very clear about the UC that describes your case to provide the best decision support possible.

Please select your use case!

Then select, throughout the document, the sections for your UC. In some sections you will not find a specification; in this case the section applies to all UCs.

UC1. Ex-ante estimation for a single RI
UC2. Ex-ante estimation of two or more competing host sites for the same RI
UC3. Ex-ante estimation of two or more competing RI projects in the same host region
UC4. Ex-post evaluation of socio-economic impacts for an existing RI
UC5. Ex-ante estimation of SE impacts for an existing RI

In the following chapters, the steps of the FenRIAM procedure are described, for the different use cases. The sections are written in a way that the description is comprehensive for each UC without having to read sections on other UCs. This implies redundancies between the descriptions. Please use the navigation in the left frame to navigate to the sections that apply to your use case.

Scoping

Scoping – UC1

The two most important dimensions for the scoping exercise are the time horizon and the reference system; considering the spatial/regional extension and relevant sectors.
When comparing two or more contexts for the same RI, the time horizon for the SE impact estimation has to be the same, while the extensions of the regions should envisage the same level of direct and indirect impact causalities.
The selection of the time horizon needs to be correlated with the life cycle of the RI: from the construction phase, over an intense operational phase (where the RI is a world-class leader in its research field), to the period when it is expected to start fading out as a top RI, and until the end of operation and closing down.
The methods to be used are determined to a large extent by the specific time horizon, i.e. the longer the time horizon, the greater the uncertainty. Whereas in many cases forecasts and other non-disruptive assumptions can be used as reliable tools for short and medium term cycles, on longer time horizons, the continuation of current trends is less probable; requiring another kind of prediction of future events and the consideration of alternative scenarios. The longer the time horizon to be considered, the more important the Foresight elements in FenRIAM become.
Apart from the specification in time, we also need a specification in space. Spatial scope may refer to a small region as reference, a larger region, a coun-

try or the European Union as whole. In general the area of impact to be considered should be relevant for the authorities investing in the RI. A larger area of reference (e.g. country, EU) may simplify the analysis in certain terms (e.g. considering total jobs created), but may also dilute the RI impact (e.g. the multiplication effect may become insignificant at EU level).

Physical space (locality) can impact different types of stakeholders depending on their specific size, products, community, for example local companies who serve mainly the local communities will have a very narrow geographical spread, while the scientific community tends, by its very nature, to be international.

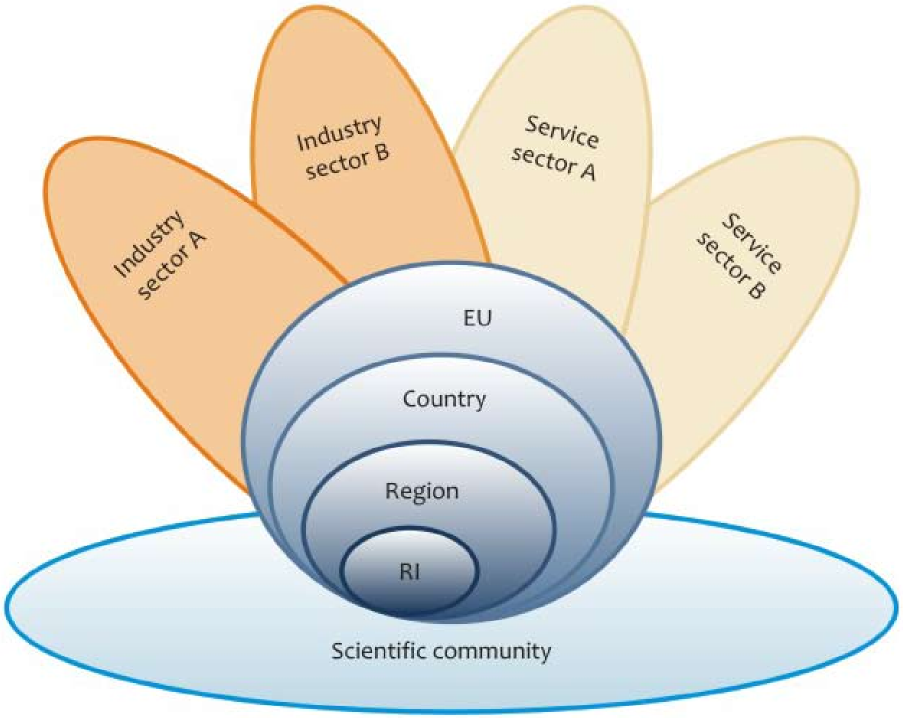

Figure 3: Spatial and sectorial system of reference – UC1

Scoping – UC2

The two most important dimensions for the scoping exercise are the time horizon and the reference system; considering the spatial/regional extension and relevant sectors.

When comparing two or more contexts for the same RI, the time horizon for the SE impact estimation has to be the same, while the extensions of the regions should envisage the same level of direct and indirect impact causalities.

The selection of the time horizon needs to be correlated with the life cycle of the RI: from the construction phase, over an intense operational phase (where the RI is a world-class leader in its research field), to the period when it is expected to start fading out as a top RI, and until the end of operation and closing down.

The methods to be used are determined to a large extent by the specific time horizon, i.e. the longer the time horizon, the greater the uncertainty. Whereas in many cases forecasts and other non-disruptive assumptions can be used as reliable tools for short and medium term cycles, on longer time horizons, the continuation of current trends is less probable; requiring another kind of prediction of future events and the consideration of alternative scenarios. The longer the time horizon to be considered, the more important the Foresight elements in FenRIAM become.

Apart from the specification in time, we also need a specification in space. Spatial scope may refer to a small region as reference, a larger region, a country or the European Union as whole. In general the area of impact to be considered should be relevant for the authorities investing in the RI. A larger area of reference (e.g. country, EU) may simplify the analysis in certain terms (e.g. considering total jobs created), but may also dilute the RI impact (e.g. the multiplication effect may become insignificant at EU level).

Physical space (locality) can impact different types of stakeholders depending on their specific size, products, community, for example local companies who serve mainly the local communities will have a very narrow geographical spread, while the scientific community tends, by its very nature, to be international.

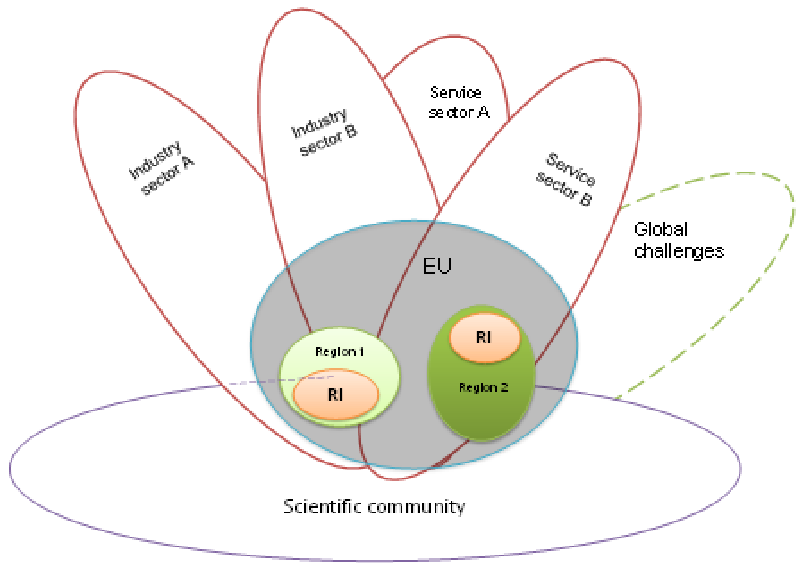

Figure 4: Spatial and sectorial system of reference – UC2

Scoping – UC3

The two most important dimensions for the scoping exercise are the time horizon and the reference system; considering the spatial/regional extension and relevant sectors.
The selection of the time horizon for an ex-ante estimation should be correlated with the life cycle of the RI: from the construction phase, over an intense operational phase (where the RI is a world-class leader in its research field), to the period when it is expected to start fading out as a top RI, and until the end of operation and closing down.
If the life cycles of the RIs envisaged for the same region have different lengths, a decision is to be taken whether the impact assessment is to have different time horizons or a median solution, having in mind the challenges for comparing the results.
The methods to be used are determined to a large extent by the specific time horizon,i.e., the longer the time horizon, the greater the uncertainty. Whereas in many cases forecasts and other non-disruptive assumptions can be used as reliable tools for short and medium term cycles, on longer time horizons, the continuation of current trends is less probable; requiring another kind of prediction of future events and the consideration of alternative scenarios. The longer the time horizon to be considered, the more important the Foresight elements in FenRIAM become.
Apart from the specification in time, we also need a specification in space. Spatial scope may refer to a small region as reference, a larger region, a country or the European Union as whole. In general the area of impact to be considered should be relevant for the authorities investing in the RI. A larger area of reference (e.g. country, EU) may simplify the analysis in certain terms (e.g. considering total jobs created), but may also dilute the RI impact (e.g. the multiplication effect may become insignificant at EU level).
Physical space (locality) can impact different types of stakeholders depending on their specific size, products, community, for example local companies who serve mainly the local communities will have a very narrow geographical spread, while the scientific community tends, by its very nature, to be international.
Although competing RIs may act in the same region they may have a different set of stakeholders, both at regional level and at larger scales such as international. Therefore, it is important to identify the commonalities and differences in this respect in order to prepare the final assessment.

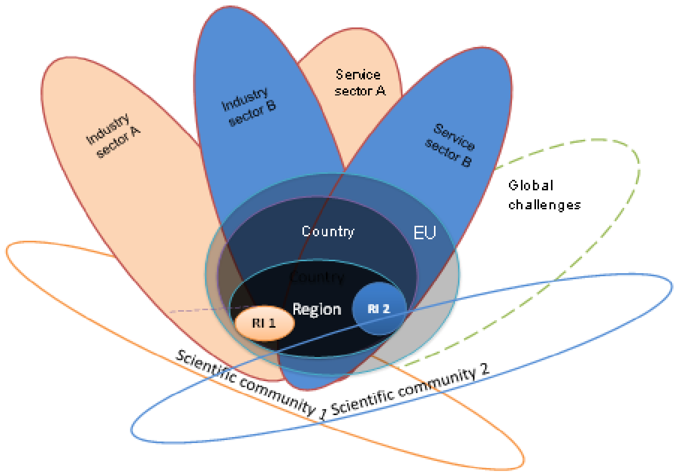

Figure 5: Spatial and sectorial system of reference – UC3

Scoping – UC4

In the case of ex-post impact estimation of an existing RI, the scoping needs to clarify the reference period and the area of impact.
The most obvious reference moment for the impact assessment is the initiation of the work around the development of the RI. However, one should consider that previous effects (e.g. change in land price in the area) may occur from a previous period (e.g. announcement of the RI development). Also, some may distinguish between the impact in the construction phase and the operation phase.
The extension of area/region for which SE impact is estimated is to be determined taking into account the envisaged users of the assessment (e.g. local community leaders, national politicians), by the operational environment of the RI and the level of disaggregation of the statistical data available. The larger the area, the larger the measured impact of the RI, as more indirect impact lines are considered.

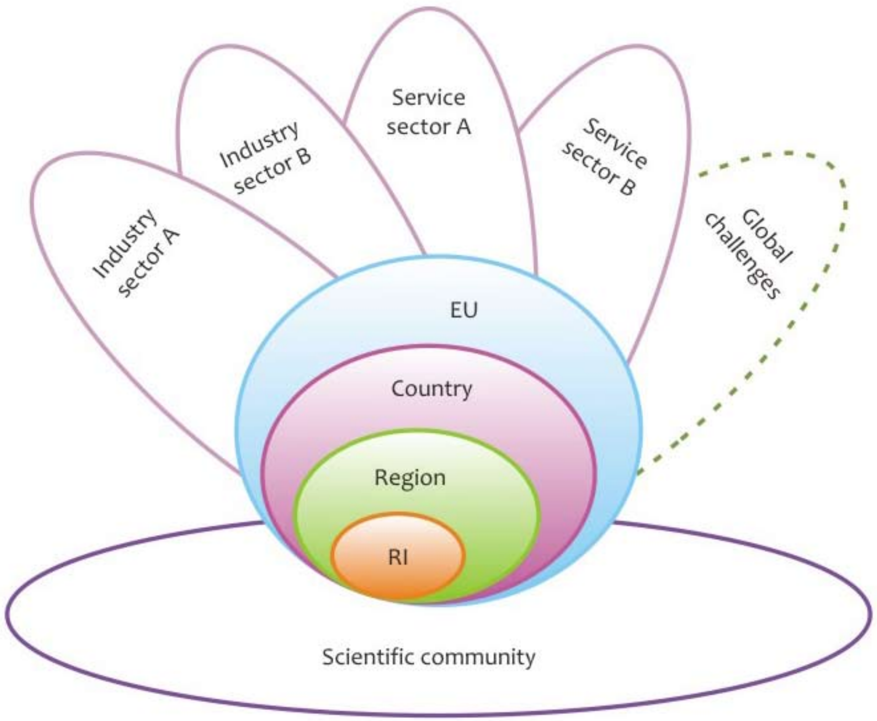

Figure 6: Spatial and sectorial system of reference – UC4

Scoping – UC5

The ex-ante estimation of SE impacts for an existing RI (UC5) represents in fact a succession of the applications of UC4 (ex-post evaluation) and UC1 (ex-ante evaluation). In UC5 some historical information on the stakeholder's reactions may be very useful for building future scenarios, but the changes in regional SE conditions and in the project plan should not be ignored.
For the ex-post (see UC4) the SE assessment requires the comparison of two situations:

- The current development of the region
- The contra-factual scenario of the region without an RI

For the ex-ante (see UC1) the object of socio-economic impact assessment is the comparison of two future alternative situations:

- The future development of the regional system without the RI (baseline scenario)
- The future development of the regional system without the RI (success scenario)

The following figure describes the representation of the RI impact as difference between success and baseline scenario, in the simplified form of unifactorial evolutions.

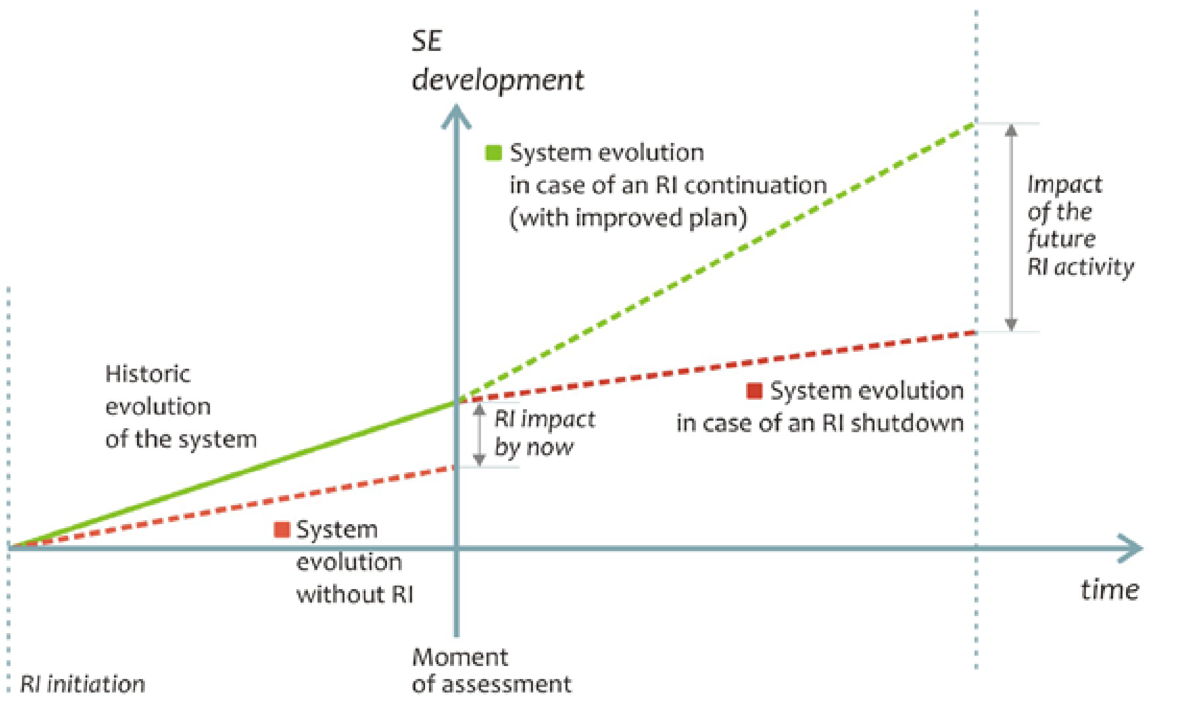

Figure 7: Spatial and sectorial system of reference – UC5

The two most important dimensions for the scoping exercise are the time horizon and the reference system; considering the spatial/regional extension and relevant sectors.
While the selection of the time frame in ex-post is highly dependent of the date of project initialisation, the time horizon for ex-ante estimation should be considered in view of the RI life cycle. When information from the ex-ante assessment will be used for the extrapolation into the future, one should also consider the natural effect of acceleration.

The most likely finding is that the area/region of impact are the same in ex-ante and ex-post, unless new important stakeholders have different interests (e.g. the RI development is supported by other regions/countries).

For further scoping information please visit the same section for **UC4** and **UC1**.

Understanding the RI and the region

Module RI: Project Profile

This module supports the collection, analysis and presentation of basic facts and figures about the studied RI project, which are relevant to understand the possible socio-economic (SE) impacts. There are nine categories in total covering data about facility type, project motivation, scientific and technical framework, challenges associated with the project, investor consortium, funding, as well as other aspects of the general governance model adopted by the proposing consortium. The required information is mainly collected through an analysis of the project documents and face-to-face interviews with scientific and technical experts, preferentially those involved in the preparation of the project proposal and/or construction of the facility. The majority of information is descriptive and helps to identify potential impacts and opportunities as well as risks and threats (scientific benefits, community interactions, governance strategies and how these lead to commercialisations etc). It is also used to prepare a description of the RI project as an introduction to the SE impact report in order to help external readers to understand the SE impact analysis.

Categories	Methods
RI.1: Scientific Background and Motivation RI.2: Technical Performance and Challenges RI.3: Competing and Complementary Facilities RI.4: Investor Consortium and Site Selection RI.5: Project Budget and Costs RI.6: Scientific Activities and User Services RI.7: Procurement and Commercialisation RI.8: Public Relations RI.9: Human Resources	CoM.1 : Document Analysis CoM.2: Expert Interviews CoM.5: Observations AnM1 : Descriptive Analysis AnM7: Gap Analysis

[3] CoM refers to methods for collection of data or information.
[4] AnM refers to methods for analysis of data or information

What type of facility is the proposed RI and why do we need it?

This category explores the overall science and in particular the scientific motivation of the project, which is the first and most important determinant for the possible impacts. Information about the type of research infrastructure (RI), the scientific relevance of such RIs, the key scientific domains and industrial sectors for its use, the scientific motivation for constructing a new RI and the potential scientific opportunities are mainly gathered through qualitative (descriptive) indicators.

Indicators:

RI.1.1: Type of facility and scientific relevance
RI.1.2: Key scientific fields for use / application
RI.1.3: Scientific motivation for the new facility and new scientific opportunities offered

RI.1.1: Type of facility and scientific relevance

Relevance:
The indicator describes the type of research infrastructure and the significance of the research infrastructure for scientific R&D activities. These factors directly determine the possible impacts, which may be expected from the facility.

Compilation:

- Identify and report the type of research infrastructure, its type of siting and its geographic relevance (see below).
- Report the significance of such research infrastructures for scientific R&D activities in general.
- Types of RIs: e.g. synchrotron, GRID, archive, telescope, bio-bank, research vessel, historical collection, supercomputer, etc.
- Types of siting: single-sited, distributed, virtual
- Geographic relevance: European (global), national, regional

Definitions and explanations:
Research Infrastructure (RI): RIs are essential or unique facilities, resources, services, or tools used by the scientific community in order to conduct research in any field of science or technology.
Single-sited RIs provide a facility, resource, or service at a single site.
Distributed RIs consist of a network of facilities, resources, or services in different sites that is managed in a co-ordinated way.
Virtual RIs make a service electronically available to their users.
RIs of European (global) relevance have a clear European (global) dimension and added value. They should satisfy several of the following criteria:

- Multinational or European funding (construction and/or operation)
- Open access to international users based on proposal evaluation by international review committees; international user community
- Involvement in relevant international networks and collaborations
- Attraction of international staff, PhD students and guest scientists from various countries
- Internationally recognised centres of excellence in their domain, providing rare or unique services and research opportunities at the cutting edge as documented by highly cited papers and publications in high impact journals authored or co-authored by their users and their own R&D staff.
- All others are considered as RIs of national or regional relevance.

Data sources and collection methods:

- Analysis of documents such as the project proposal, annual reports etc.
- Interviews with scientific experts, e.g. those involved in preparing the project proposal, RI scientists / manager (if already operating)

Data analysis methods:

- Descriptive content analysis

References:
None

RI.1.2: Key scientific fields for use

Relevance:
The indicator describes the most important scientific fields interested in using the new research infrastructure. The specific fields affect the types of impacts, which may be expected from the facility.

Compilation:
- Identify and report the most important scientific fields interested in using the new research infrastructure. This may be done by coarse or more detailed scientific areas that suit the particular case. The use of more detailed, case specific domains can facilitate the understanding of possible impacts.
- If detailed information is not available, specify at least one key domain, e.g. using the categories of the European Portal on Research Infrastructures Database.

Definitions and explanations:
EU Database Scheme: Humanities and behavioural sciences; socio-economic sciences; environmental, marine, and earth sciences; energy; life sciences; physics and astronomy; material sciences, chemistry and nanotechnologies; engineering; information and communication technologies, mathematics.
Examples for coarse categories: material science, life sciences, chemistry, astrophysics, social sciences, archaeology, history, arts, etc.
Examples for detailed classes: chemical reaction dynamics, biomaterials, cancer research, byzantine research, seismic monitoring and risk mitigation, climate history research, disease epidemiology and control, etc.
Main scientific domains: Most important scientific and technological areas that benefit from using the facility for their R&D activities.
Main scientific domains depend on the strategic choices made by the facility management (e.g. technical performances, experimental instrumentation) and may therefore differ between two infrastructures of the same type. An RI can serve several scientific domains.
Since scientific domains are seldom well-defined, research can be multi-disciplinary, and new application fields can emerge, RIAM does not propose a specific classification scheme or a unified definition of scientific and technological areas.

Data sources and collection methods:
- Analysis of documents such as the project proposal, annual reports etc.
- Interviews with scientific experts, e.g. those involved in the preparation of the project proposal, scientific managers of the RI (if already operating)
- Secondary data analysis from reference facilities (e.g. SE impact reports, annual reports, publication databases)
- Observations of comparable laboratories as reference facilities e.g. through expert interviews of scientists from such facilities

Data analysis methods:
- Descriptive content analysis

References:
European Portal on Research Infrastructures Database, on http://www.riportal.eu/public/index.cfm?fuseaction=ri.search#

RI.1.3: Scientific motivation for the new facility and new scientific opportunities offered

Relevance:
The indicator describes the scientific motivation for constructing the new research infrastructure and the most important new scientific opportunities offered. Both aspects are strongly related to the possible scientific impacts and thus the benefits for the user community and other affected stakeholders.

Compilation:
- Identify and report descriptively the scientific motivation for constructing the new research infrastructure.
- Identify and report descriptively the most important new scientific opportunities offered by the planned research infrastructure.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of documents such as the project proposal, annual reports etc.
- Interviews with scientific experts, in particular those involved in the preparation of the project proposal, scientists from the RI (if already operating) or comparable facilities (e.g. scientific manager)

Data analysis methods:
- Descriptive content analysis

References:
None

Which technical challenges are associated with the desired technical performance of the facility?

In this category the technical aspects, challenges and possible threats of the project are investigated. The required information is collected primarily through qualitative indicators, which can be supported by numerical data. It should however be kept in mind that usually only readers with high technical expertise understand such quantitative information.

Indicators:

RI.2.1: General operation principle and specific concept (if any) of the facility
RI.2.2: Technical performance of the facility
RI.2.3: Technical and technological challenges of the project

RI.2.1: General operation principle of the facility

Relevance:
The indicator describes the general operation principle of the new RI. Together with the other indicators in this category it clarifies how the new facility can make progress beyond the current state-of-the-art and lead to new technical or technological developments and scientific opportunities from which the diverse stakeholders might benefit.

Compilation:

- Identify and report the general operation principle of the new RI.
- Verify whether a specific concept has been selected / developed in order to realise the general operation principle (e.g. if the operation principle can be implemented in different ways). In this case report also the specific concept.

Definitions and explanations:
None

Data sources and collection methods:

- Analysis of documents such as the project proposal, annual reports etc.
- Interviews with technical and scientific experts, in particular those involved in the preparation of the project proposal (e.g. chief project engineer, scientific manager), RI technicians / scientists such as scientific manager or chief engineer(if the RI is already operating)

Data analysis methods:

- Descriptive content analysis

References:
None

RI.2.2: Technical performance of the facility

Relevance:
The indicator describes the technical performance, which the new RI achieves or is planned to achieve. Together with the other indicators of this category it clarifies, how the new facility can make progress beyond the current state-of-the-art and lead to new technical or technological developments and new scientific opportunities from which the diverse stakeholders might benefit.

Compilation:
- Identify and report the (desired) technical performance of the (new) facility.
- Identify and report, how this technical performance compares to those of other existing RIs of the same or a comparable type.

Since numeric values have limited use to many readers, try to illustrate, with case studies or text.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of documents such as the project proposal, annual reports, technical publications etc.
- Interviews with scientific and technical experts, such as those involved in the preparation of the project proposal or scientists / engineers of an already operating facility (e.g. chief project engineer, chief facility engineer, scientific manager)

Data analysis methods:
- Descriptive content analysis

References:
None

RI.2.3: Technical and technological challenges of the project

Relevance: The indicator describes the technical and technological challenges, which stem from the high technical performance requirements for the new facility (it is expected that these will cross the current technological frontiers). It clarifies the intended progress beyond current state-of-the-art, as well as the requirements in terms of skills and expertise and possible risks that derive from this endeavour. Compilation: • Identify and report the technical and technological challenges of the new facility. • Identify and report briefly the possible risks resulting from the high technical performance requirements. The issue can be discussed in more detail in the risk and impact analysis parts (scientific, technical, or economic impacts as adequate) Definitions and explanations: None Data sources and collection methods: • Analysis of documents such as the project proposal, annual reports etc. • Interviews with technical experts, e.g. those involved in the preparation of the project proposal (e.g. chief project engineer) Data analysis methods: • Descriptive content analysis	References: None

Which other facilities and projects of this type exist worldwide, and how does the proposed RI fit into this "landscape"?

This category analyses the state of other operating or planned facilities of the same type worldwide. Other facilities of the same kind might either offer complementary opportunities to the user communities or compete for the same potential users, which could affect their impacts. Coordination of the activities and collaboration between facilities may lead to supplementary benefits in some cases, while competition may stimulate scientific excellence and innovation capacity in other situations. The required information is collected through prevalently qualitative indicators.

Indicators:

RI.3.1: Operating facilities of the same kind, location and technical performance
RI.3.2: Planned facilities of the same kind, location, timescale, and technical performance
RI.3.3: Benefits (opportunities) and threats from other facilities and projects of the same kind

RI.3.1: Operating facilities of the same kind, location and technical performance

Relevance:
The indicator describes the most significant facilities of the same kind, which are currently operating. Synergies and supplementary benefits may be created through coordination of activities and collaboration between such facilities. Comparable facilities could compete for resources, users, and customers, which could negatively affect their impacts.

Compilation:
- Identify and report the most significant research infrastructures of the same kind, which are currently in operation. If not obvious, report also their locations (country, if required region or city).
- Identify and discuss briefly the main features of their technical performances in comparison to the facility studied here.

Definitions and explanations:
Research Infrastructure (RI): RIs are essential or unique facilities, resources, services, or tools used by the scientific community in order to conduct research in any field of science or technology.
Examples: synchrotron, GRID, archive, telescope, bio-bank, research vessel, historical collection, supercomputer, polar station, etc.

Data sources and collection methods:
- Analysis of documents such as the project proposal, annual reports etc.
- Interviews with technical experts (e.g. chief project engineer, chief engineer of an already operating RI, RI scientists)
- Retrieval of relevant European RIs in the European Portal on Research Infrastructures Database and analysis of RI websites
- Retrieval of relevant RI websites through web-based search engines and analysis of RI websites

Data analysis methods:
- Descriptive content analysis

References:
European Portal on Research Infrastructures Database, on http://www.riportal.eu/public/index.cfm?fuseaction=ri.search#

RI.3.2: Planned facilities of the same kind, location, time scale and technical performance

Relevance:
The indicator describes the most significant other facilities of the same kind, which are currently under construction or in planning. Synergies and supplementary benefits may be created through a coordination of activities and collaboration between such facilities. Comparable facilities could however compete for resources, users, customers, collaboration partners or R&D opportunities, which could affect their impacts. Different time scales may affect the possible mutual benefits or lead to competitive advantages / disadvantages.

Compilation:
- Identify and report the most significant research infrastructures of the same kind, which are currently under construction or in planning. If not obvious, report also their locations (country, if required region or city).
- Identify and discuss briefly the main features of their technical performances in comparison to the facility studied here.

Definitions and explanations:
Research Infrastructure (RI): RIs are essential or unique facilities, resources, services, or tools used by the scientific community in order to conduct research in any field of science or technology.
Examples: synchrotron, GRID, archive, telescope, bio-bank, research vessel, historical collection, supercomputer, polar station, etc.

Data sources and collection methods:
- Analysis of documents such as the project proposal, annual reports, websites of relevant RI networks etc.
- Interviews with technical experts (e.g. chief project engineer, chief engineer of an already operating RI, RI scientists)
- Retrieval of relevant European RIs in the European Portal on Research Infrastructures Database and analysis of RI websites
- Retrieval of relevant RI websites through web-based search engines and analysis of RI websites

Data analysis methods:
- Descriptive content analysis

References:
European Portal on Research Infrastructures Database, on http://www.riportal.eu/public/index.cfm?fuseaction=ri.search#

RI.3.3: Benefits (opportunities) and threats from other facilities and projects of the same kind

Relevance:
The indicator describes the benefits and threats expected from other facilities of the same kind, which are operating, under construction or in planning. A coordination of activities and collaboration between such facilities may lead to synergies and supplementary benefits. Comparable facilities could compete for resources, users, customers, collaboration partners or R&D opportunities, which could affect their impacts. Different time scales may affect the possible mutual benefits or lead to competitive advantages / disadvantages.

Compilation:
- Identify, report, and comment on the most significant benefits or threats that can be expected from other research infrastructures of the same kind, which are currently operating, under construction or in planning.

Definitions and explanations:
Research Infrastructure (RI): RIs are essential or unique facilities, resources, services, or tools used by the scientific community in order to conduct research in any field of science or technology.
Examples: synchrotron, GRID, archive, telescope, bio-bank, research vessel, historical collection, supercomputer, polar station, etc.

Data sources and collection methods:
- Analysis of documents such as the project proposal, annual reports etc.
- Interviews with scientific and technical experts, such as those involved in the preparation of the project proposal (e.g. chief project engineer, scientific project manager), scientists and engineers from an already operating RI or comparable facilities and projects

Data analysis methods:
- Descriptive content analysis

References:
None

Who is funding the new facility and why?

In this category information is collected about the – usually political – motivation to fund the project, the different investors, their contributions, and the proposed siting of the facility. For large projects the investigation includes typically the regional (host region), national, and European perspectives. For multi-national consortia, different national perspectives might be required. The information is collected through quantitative and qualitative indicators.

Indicators:

RI.4.1: Investor consortium
RI.4.2: Facility site
RI.4.3: Motivations and expectations of investors from host country
RI.4.4: Motivations and expectations of international investors from non-hosting countries
RI.4.5: Expectations and support of European stakeholders

RI.4.1: Investor consortium

Relevance:
The indicator describes the investor consortium, which provides the financial resources and other support for the construction and operation of the new facility. While the funding itself is fundamental for the setup and existence of the RI, the motivations and objectives of the investors are a crucial factor for the impacts that can be achieved.

Compilation:
- Identify and report the investors and how they work together in order to support the construction and operation of the new facility.

Definitions and explanations:
none

Data sources and collection methods:
- Interviews with the project coordinator / CEO responsible for the negotiations and relationships with the investors or equivalent experts involved in the proposal preparation or management and, if required, with suitable representatives of the investors / shareholdersInterviews with the project coordinator responsible for the negotiations and relationships with the investors or equivalent experts involved in the proposal preparation and, if required, with suitable representatives of the investors; in the case of an operating facility interviews with the CEO, other top managers, or shareholders / investors

Data analysis methods:
- Descriptive content analysis

References:
None

RI.4.2: Facility Site

Relevance:
The indicator describes the (planned) facility site. This site and its characteristics affect the possibilities for impact creation. While the characteristics of the host region as vicinity of potential collaboration partners, type of enterprises at hand, the availability of services, are subject of module Regio, this indicator assesses the relevant features of the project site itself, as e.g. site accessibility, the local ecological environment, or particular geological or meteorological conditions.

Compilation:
- Identify and describe the project site and its major features, which can influence construction, operation or create impacts.
- Identify the major project requirements concerning the site.

Definitions and explanations:
Major characteristics and requirements can include e.g. :
- Siting in science and technology parks or university campuses
- Particular topological, geological / geotechnical, hydrological, or meteorological conditions
- General accessibility and accessibility with respect to dimensions and weights of shipped components
- Supply of specific local services or infrastructures (IT, security, scientific, ...)
- Natural or man-made hazards
- Characteristics of the ecological environment, as siting in or near protected area, special habitats etc.
- Access to resources such as cooling water from lakes / rivers
- Special regulations and required permissions

Natural hazards can be e.g. wind, thunderstorm, seismic activity, landslides, rain, flooding, snow, ice, ...
Man-made hazards can be e.g. aircraft routes, industrial plants, ...

Note: The characteristics of the wider host region are investigated in more detail using module Region.

Data sources and collection methods:
- Analysis of project documents or internal RI documents (e.g. civil engineering documents); brief information about the proposed site should be contained in the project proposal
- Expert interviews with suitable persons involved in the proposal preparation (e.g. the project coordinator or director) or civil engineers of the facility (if it is already operating)
- Observation of the (proposed) site

Data analysis methods:
- Descriptive content analysis

References:
None

RI.4.3: Motivations and expectations of investors from the host country

Relevance:
The indicator describes the motivations and expectations of a key stakeholder group, namely the investors from the region and country hosting the new RI to whom the facility managers are accountable. Their motivations and expectations are of crucial importance for the impacts that can be created, as they are an essential factor in defining the desired results and thus affect the management strategies for the facility.

Compilation:
- Identify and describe the motivations and expectations of the different investors from the region and country hosting the new RI

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of documents from national ministries, regional administrations and other investing parties, speeches of relevant policy makers and investor representatives, newspaper articles and other suitable publications related to the RI (project)
- Interviews with the project coordinator / CEO responsible for the negotiations and relationships with the investors or equivalent experts involved in the proposal preparation or management and, if required, with suitable representatives of the investors / shareholders

Data analysis methods:
- Descriptive content analysis

References:
None

RI.4.4: Motivations and expectations of international investors from non-hosting countries

Relevance:
The indicator describes the motivations and expectations of a further key stakeholder group, namely the investors from non-hosting countries, to whom the facility managers are also accountable. Also their motivations and expectations are essential for the impacts that can be created, as they are a further decisive factor in defining the desired results and affect thus the management strategies for the RI.

Compilation:
- Identify and describe the motivations and expectations, the different investors from non-hosting countries have with respect to the new facility.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of documents from foreign ministries, administrations, and other investing parties, speeches of relevant policy makers and investor representatives, newspaper articles and other suitable publications related to the RI project
- Interviews with the project coordinator / CEO responsible for the negotiations and relationships with the investors or equivalent experts involved in the proposal preparation or management and, if required, with suitable representatives of the foreign investors / shareholders

Data analysis methods:
- Descriptive content analysis

References:
None

RI.4.5: Expectations and support of European stakeholders

Relevance:
The indicator describes the motivations and expectations of a third key stakeholder group, namely the European Commission and other European institutions, to whom the facility managers may also be accountable. Their motivations and expectations can be important for the potential impacts, as they may define additional desired effects and influence the management strategies for the RI.

Compilation:
- Identify and describe the motivations and expectations, which the European stakeholders have with respect to the new facility.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of documents from European administrations and other investing / supporting parties, speeches of relevant policy makers and representatives, newspaper articles and other suitable publications related to the RI project
- Interviews with the project coordinator / CEO responsible for the negotiations and relationship with the relevant European institutions or equivalent experts involved in the proposal preparation or facility management and, if required, with suitable representatives of the European institutions

Data analysis methods:
- Descriptive content analysis

References:
None

How does the consortium guarantee the financial resources required for construction and operation?

This category explores the financial aspects, challenges and possible funding risks of the project. The required information is collected through qualitative and quantitative indicators.

Indicators:

RI.5.1: Estimated construction costs
RI.5.2: Available construction funds by source
RI.5.3: Estimated operation costs and expected trend
RI.5.4: Available operation funds by source and expected trend
RI.5.5: Financial strategy and contingency plans

RI.5.1: Estimated construction costs

Relevance: The indicator describes the construction costs over time estimated for the new facility and the amount of supplementary financial resources that can be attracted to the host region for setting up the new RI. The estimated construction costs determine the spending on supply contracts and human resources considered necessary and thus the size of certain types of impacts that can be achieved during the construction phase. Compilation: • Identify and report the estimated construction funds of the new facility in K€ in total and broken down by year (if available). Definitions and explanations: None Data sources and collection methods: • Analysis of project proposal and/or financial project documents • Interviews with the project coordinator or CEO and the financial experts of the RI (project) and, if needed, with representatives of the investors / shareholders Data analysis methods: • Descriptive content analysis	References: None

RI.5.2: Available construction funds

Relevance:
The indicator describes the available construction funding for the new facility over time, which has been confirmed by the investors and will be available in the host region for setting up the new RI. The available construction funds determine the real spending on supply contracts and human resources that is possible and thus the potential size of certain types of impacts as generated economic activity that can be achieved during the construction phase. Construction funds largely below the assessed construction costs indicate a risk for the implementation of the project.

Compilation:
- Identify and report the confirmed construction funds for the new facility in K€, in total and broken down by year (if available), including the in-kind contributions. If in-kind contributions are planned, describe them and try to estimate their monetary value.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of project proposal and/or financial project documents
- Interviews with the project coordinator or CEO and the financial experts of the RI (project)

Data analysis methods:
- Descriptive content analysis

References:
None

RI.5.3: Estimated operation costs and expected trend

Relevance: The indicator describes the operational costs over time estimated for the new facility and the amount of supplementary financial resources that can be attracted to the host region for operating the new RI. The estimated operation costs determine the spending on management, user services, supply contracts, investments, human resources, etc. necessary for the RI to function and the potential size of the impacts that can be achieved from the RI's activities. Compilation: • Identify and report the estimated operation funds of the new facility in K€ in total and the expected trend over the operation period (e.g. 5 years intervals; if available). Definitions and explanations: None Data sources and collection methods: • Analysis of project proposal and/or financial project documents • Interviews with the project coordinator or CEO and/or the financial experts of the project and, if needed, with representatives of the investors or shareholders Data analysis methods: • Descriptive content analysis	References: None

RI.5.4: Available operation funds and expected trend

Relevance:
The indicator describes the available operation funding for the new facility, which has been confirmed by the investors and will be available in the host region for running the new RI. If data are available, it describes also the expected operational profile over the lifetime of the facility. The available operation funds determine the real spending on management, user services, contracts, investments, human resources, etc. that can be made for operating the RI and the size of the impacts that can be achieved from the RI's activities. Operation funds largely below the assessed operation costs indicate a risk for the implementation of the project.

Compilation:
- Identify and report the confirmed operation funds for the new facility in K€, in total and the expected trend over the operation period (e.g. 5 years intervals; if available), including the in-kind contributions. If in-kind contributions are planned, describe them and try to estimate their monetary value.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of project proposal and/or financial project documents
- Interviews with the project coordinator or CEO and the financial experts of the RI (project)

Data analysis methods:
- Descriptive content analysis

References:
None

RI.5.5: Financial strategy and contingency plans

Relevance:
The indicator describes the financial strategy of the project proposers or the potential facility managers and contingency plans concerning the financial risks, as e.g. the retraction of an investor, the reduction of investor contributions, political changes, or increasing costs beyond initial estimates. Such developments may have negative consequences for the operation of the facility and for its impacts.

Compilation:
- Identify and report the financial strategy for the facility.
- Determine the financial gap between estimated construction costs and available / confirmed construction funds as well as estimated operation costs and available/ confirmed operation funds.
- Identify and report the contingency plans for the facility management concerning the financial risks. Indicate in particular reported measures to deal with a financial gap for construction and /or operation, if such a gap has been determined.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of project proposal and/or financial project documents
- Interviews with the project coordinator or CEO, financial (project) manager and/or other involved financial experts involved (e.g. from investors, stakeholders, banks etc.)

Data analysis methods:
- Descriptive content analysis
- Gap analysis

References:
None

How will the facility be operated to achieve the scientific and technical objectives?

Category RI.6 explores the framework conditions and measures to reach the scientific and technical objectives, provide a high-quality service to its users and create the most benefits. The required information is collected through qualitative and quantitative indicators.

Indicators:

RI.6.1: Time planning
RI.6.2: R&D strategy and strategic activity fields
RI.6.3: Measures to ensure scientific and technical excellence
RI.6.4: Strategy and resources for scientific relationships, networking and collaboration
RI.6.5: User access strategy and procedure
RI.6.6: Strategy and resources for user relations
RI.6.7: Measures to ensure user service quality

RI.6.1: Time planning

Relevance:
The indicator describes the time planning of the project, i.e. key points in time such as the expected start of construction and operation, major project upgrades and the assumed total operation period and closure. These dates decide, in which period what kinds of impacts can be expected. The total operation period is also required to assess the total financial component of the project and the overall breadth of certain impacts that may be generated.

Compilation:
- Identify and report the key time-points of the project, namely the expected start of construction, the expected start of operation, the supposed intervals between major upgrades, and the assumed total operation period.
- Identify and describe the related uncertainties.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of documents such as the project proposal, annual reports, strategic plans etc.
- Interviews with the project coordinator or CEO and other suitable RI managers or experts involved in the project

Data analysis methods:
- Descriptive content analysis

References:
None

RI.6.2: R&D strategy and strategic activity fields

Relevance:
The indicator describes the R&D strategy for the facility and the strategic activity fields. These determine the key stakeholder groups that may benefit from the new RI such as interested scientific communities, industrial sectors, or societal sectors and the type of impacts that can be generated. The R&D strategy affects also the probability of accomplishing the primary objectives.

Compilation:
- Identify and report the strategic activity fields for the new facility.
- Identify and describe the R&D strategy adopted for the new facility in order to achieve the R&D objectives.

Definitions and explanations:
Strategic activity field refers to a scientific domain, which is considered to be of strategic importance for the facility. This can affect the facility performance and whether instrumentation are specifically tailored to the needs of this domain.
Scientific community refers to the scientists and technicians working in a specific scientific domain, e.g. material science, life sciences, arts, chemistry, astrophysics, social sciences, archaeology, history, etc.
Industrial sector refers here to a class of companies with comparable products, e.g. chemicals, automotive, pharmaceuticals, electronics, precision instrumentation, semiconductors, food, oil, software, etc.
Societal sector refers here to a part of society dedicated to a certain aspect of social life, education, health care, culture, leisure.

Data sources and collection methods:
- Analysis of documents such as the project proposal, annual reports, strategic plans etc.
- Interviews with the project coordinator or CEO and other suitable experts involved in the project or the RI management (e.g. scientific manager)

Data analysis methods:
- Descriptive content analysis

References:
None

RI.6.3: Measures to ensure scientific and technical excellence

Relevance: The indicator describes the measures adopted by project coordinators or facility managers in order to ensure the desired scientific and technical excellence during construction and operation. The degree of achieved scientific and technical excellence directly influences the results and possible benefits that can be generated. Compilation: • Identify and report the measures adopted in order to ensure scientific and technical excellence for the construction and operation of the facility. Definitions and explanations: None Data sources and collection methods: • Analysis of documents such as the project proposal, annual reports, strategic plans etc. • Interviews with the project coordinator or CEO and other suitable experts involved in the project or the facility management (e.g. HR manager, scientific manager, chief engineer) Data analysis methods: • Descriptive content analysis References: None	

RI.6.4: Strategy and resources for scientific relationships, networking and collaboration

Relevance:
The indicator describes the facility's strategy for scientific relations, networking and collaboration, which are important channels to encourage impacts enabled through mutual learning, joint R&D activities and the transfer of knowledge, know-how, or technologies. It also describes the invested human and financial resources that determine how far the defined strategic goals can be accomplished.

Compilation:
- Identify and report the strategy of the facility for scientific relations, networking, and collaboration.
- Identify and report the financial resources (in k€ or % of budget) devoted to scientific relations, networking, and collaboration.
- Identify and report the human resources devoted to scientific relations, networking, and collaboration – if possible quantitatively (persons or person-months) and qualitatively (skills).

Definitions and explanations:
None

Data sources and collection methods:
- Interviews with the project coordinator and/or other suitable experts involved in the project or the facility management (e.g. the project's scientific manager, HR manager, financial manager)
- Analysis of project proposal and/or other relevant project documents such as annual reports or strategic plans

Data analysis methods:
- Descriptive content analysis

References:
None

RI.6.5: User access strategy and procedures

Relevance:
The indicator describes the facility's strategy for user access and the relevant procedures. These are important in order to assess which user communities and users (e.g. regional, national, European, ...) may benefit from the new RI, what users and user institutional impacts can be expected, and what effects the users can have on the facility and the quality of the R&D activities conducted there.

Compilation:
- Identify and report the user access strategy of the new RI, distinguishing between non-proprietary and proprietary research
- Identify and report the relevant user access procedures for proprietary and non-proprietary research.

Definitions and explanations:
User: A user is a scientist, who uses the facility and the offered instrumentation in order to perform scientific research. Users can either be from public or from private institutions. They can conduct non-proprietary or proprietary research.
Non-proprietary refers to scientific research for which the research results are published in the open scientific or technical literature. The research results are thus accessible to other interested parties.
Proprietary refers to research for which the knowledge, technical data and inventions generated during the scientific work are treated as proprietary by the user. Results are not published in the open literature.

Data sources and collection methods:
- Analysis of project proposal, other relevant project documents such as user information materials or strategic plans, facility website
- Interviews with the project coordinator, scientific manager, responsible person for user relations, or other suitable experts involved in the project or the facility management

Data analysis methods:
- Descriptive content analysis

References:
None

RI.6.6: Strategy and resources for user relations and support

Relevance:
The indicator describes the facility's strategy for user relations as well as financial and human resources dedicated to this topic in order to ensure that the defined objectives can be met. These factors have influence on the user service quality and on the user satisfaction, the attractiveness of the facility, and the quality of the generated results.

Compilation:
- Identify and report the strategy of the new RI for user relations (non-proprietary and proprietary) and the support services offered for users.
- Identify and report the financial resources (in k€ or % of budget) devoted to user relations.
- Identify and report the human resources devoted to user relations, if possible quantitatively (persons or person-months) and qualitatively (skills).

Definitions and explanations:
User: A user is a scientist, who uses the facility and the offered instrumentation in order to perform scientific research. Users can either be from public or from private institutions. They can conduct non-proprietary or proprietary research.
Non-proprietary refers to scientific research for which the research results are published in the open scientific or technical literature. The research results are thus accessible to other interested parties.
Proprietary refers to research for which the knowledge, technical data and inventions generated during the scientific work are treated as proprietary by the user. Results are not published in the open literature.

Data sources and collection methods:
- Analysis of project proposal, other relevant project documents such as user information materials or strategic plans, facility website
- Interviews with the project coordinator, scientific manager, responsible person for user relations, or other suitable experts involved in the project or the facility management

Data analysis methods:
- Descriptive content analysis

References:
None

RI.6.7: Measures to ensure user service quality

Relevance:
The indicator describes the facility's instruments and measures that ensure the quality of its user services. The user service quality is of key importance since it affects the user satisfaction, the attractiveness of the facility, and the quality of the generated results.

Compilation:

- Identify and report the instruments and measures of the new RI that ensure the quality of its user services for proprietary and non-proprietary users.

Definitions and explanations:
User: A user is a scientist, who uses the facility and the offered instrumentation in order to perform scientific research. Users can either be from public or from private institutions. They can conduct non-proprietary or proprietary research.
Non-proprietary refers to scientific research for which the research results are published in the open scientific or technical literature. The research results are thus accessible to other interested parties.
Proprietary refers to research for which the knowledge, technical data and inventions generated during the scientific work are treated as proprietary by the user. Results are not published in the open literature.

Data sources and collection methods:

- Interviews with the project coordinator, scientific manager, responsible person for user relations, or other suitable experts involved in the project or the facility management
- Analysis of project proposal, other relevant project documents such as user information materials or strategic plans, facility website

Data analysis methods:

- Descriptive content analysis

References:
None

How will the facility interact with the markets?

Category RI.7 explores the framework conditions for the facility's interaction with the markets through procurement activities, joint development projects with suppliers and the commercialisation of services, intellectual property rights, and products. The required information is collected through qualitative and quantitative indicators.

Indicators:

RI.7.1: Strategy for supplier relations and joint development projects
RI.7.2: Procurement process and procedures
RI.7.3: Strategy for the commercialisation of knowledge, scientific services, and innovations
RI.7.4: Industrial sectors and markets potentially interested in commercialisation
RI.7.5: Resources dedicated to procurement and commercialisation

RI.7.1: Strategy for supplier relations and joint development projects

Relevance:
The indicator describes the facility's strategy for supplier relations and development projects for high-tech equipment conducted jointly with the respective supplier. This strategy can have an important effect on the opportunities to create mutual benefits for supplier companies and the facility itself through high-tech contracts.

Compilation:

- Identify and report the strategy of the new RI for its supplier relations and in particular for joint development projects of high-tech equipment with supplier companies.

Definitions and explanations:
High-tech equipment refers in particular to scientific and technical instrumentation and components of the new RI with a high content of cutting edge technology.

Data sources and collection methods:

- Interviews suitable experts involved in the project or the facility management (e.g. project coordinator, CEO, procurement manager, dedicated person for supplier relations, industrial liaison officer, technology transfer manager, etc.)
- Analysis of project proposal and other relevant documents such as strategic plans, website of industrial liaison or technology transfer office, etc.

Data analysis methods:

- Descriptive content analysis

References:
None

RI.7.2: Procurement process and procedures

Relevance:
The indicator describes the facility's procurement process and procedures, which can impact on whether certain types of enterprises (e.g. SMEs, foreign companies) will participate in a call.

Compilation and analysis:
- Identify and report the procurement processes and procedures of the new RI.

Definitions:
None

Data sources and collection methods:
- Interviews suitable experts involved in the project or the facility management (e.g. project coordinator, procurement manager, dedicated person for supplier relations, industrial liaison officer, technology transfer manager, etc.)
- Analysis of project proposal and other relevant documents such as information documents for suppliers / contractors, procurement activities website etc.

Data analysis methods:
- Descriptive content analysis

References:
None

RI.7.3: Strategy for the commercialisation of knowledge, scientific services, and innovations

Relevance:
The indicator describes the facility's strategy for commercialising the newly created knowledge and innovations from its scientific activities, which can benefit firms (e.g. in the form of knowledge transfer and spill-overs, IPRs etc.) and new economic activities.

Compilation:
- Identify and report the strategy of the new RI for commercialising its new knowledge, scientific services and innovations.

Definitions and explanations:
IPR: Intellectual Property Rights protect a number of intangible assets by granting exclusive rights to their owners. Examples for IPRs are patents and licences, copyrights, trademarks, trade secrets, industrial design rights, or geographic indications.
IP: Intellectual Property refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce. IP is divided into two categories: Industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source; and Copyright, which includes literary and artistic works such as novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs. Rights related to copyright include those of performing artists in their performances, producers of phonograms in their recordings, and those of broadcasters in their radio and television programs [WIPO 2011].

Data sources and collection methods:
- Interviews with the project coordinator and/or other suitable experts involved in the project or the facility management (e.g. the project's / facility's technology transfer manager or industrial liaison officer)
- Analysis of project proposal and/or other relevant (project) documents such as strategic plans, documents and websites of industrial liaison or technology transfer offices etc.

Data analysis methods:
- Descriptive content analysis

References:
WIPO 2011, World Intellectual Property Organisation on (last access on 15/02/11): http://www.wipo.int/about-ip/en

RI.7.4: Industrial sectors and markets potentially interested in commercialisation

Relevance:
The indicator describes the most important industrial sectors interested in the activities and results of the new RI and the related markets for commercialising scientific services and outcomes from the activities. Prevalently firms operating in these markets are likely to benefit from the new RI, e.g. in the form of knowledge transfer and spill-overs, IPRs, opportunities for new economic activities etc. The potential benefits for these sectors, as e.g. an increased turnover due to a new product, are a part of the created economic impacts. These benefits may lead to further indirectly created socio-economic benefits, as e.g. better health of the population due to a new medical treatment that could be developed by a pharmaceutical company based on scientific results obtained using the RI.

Compilation:
Identify and report the most important industrial sectors interested in the new RI and the most important markets for commercialising new knowledge generated at the RI, scientific services, and created innovations.

Definitions and explanations:
Companies might be interested e.g. as applicants of the created knowledge, as facility users, as suppliers of high-tech equipment, as partners in joint development projects, as licensee of patents from the facility's activities, as manufacturers for new products or instruments developed at the facility, or as customers for facility services.
Industrial sector refers here to a class of companies with comparable products.
Examples: chemicals, automotive, pharmaceuticals, semiconductors, food, precision instrumentation, optical instruments, oil, software, electronics, medical instrumentation, home appliances, etc.

Data sources and collection methods:
Interviews with the project coordinator and/or other suitable experts involved in the project or the facility management (e.g. the project's / facility's technology transfer manager or industrial liaison officer, chief engineer, scientific manager) or managers of comparable facilities.
Analysis of project proposal and other relevant documents such as strategic plans, website of industrial liaison or technology transfer office, annual reports etc.

Data analysis methods:
Descriptive content analysis

References:
None

RI.7.5: Resources dedicated to procurement and commercialisation

Relevance:
The indicator describes the human and financial resources dedicated to procurement and commercialisation. These resources can be an important factor for the quality of the interactions and for the impacts that may be achieved through contracts and commercial activities.

Compilation:

- Identify and report the financial resources (in k€ or % of budget) devoted to supplier and customer relations.
- Identify and report the human resources devoted to supplier and customer relations, if possible quantitatively (persons or person-months) and qualitatively (skills).

Definitions and explanations:
None

Data sources and collection methods:

- Interviews with the project coordinator and/or other suitable experts involved in the project or the facility management (e.g. the project's / facility's technology transfer manager or industrial liaison officer, CEO, etc.)
- Analysis of project proposal and/or other relevant project documents such as strategic plans, financial documents, internal management reports

Data analysis methods:

- Descriptive content analysis

References:
None

How will efficient, productive and sustainable relationships with society be established?

Category RI.8 investigates how the facility will manage its public relations in order to reach its strategic objectives and maximise the socio-economic benefits. The required information is collected through qualitative and quantitative data.

Indicators:

RI.8.1: Strategy and resources for public relations

RI.8.1: Strategy and resources for public relations

Relevance: The indicator describes the facility's public relations strategy and the financial and human resources required for public relations, which ensure that the defined public relations objectives can be met. These factors influence the interaction of the facility with crucial stakeholder groups such as policy makers, media and general public, the knowledge and opinions of these groups about the facility, and their recognition of the activities. This affects their support for the new RI and the financial means and the benefits that can be achieved. Compilation: Identify and report the facility's strategy for public relations Identify and report the financial resources (in k€ or % of budget) devoted to public relations. Identify and report the human resources devoted to public relations, if possible quantitatively (persons or person-months) and qualitatively (skills). Definitions and explanations: None Data sources and collection methods: Interviews with the project coordinator and/or other suitable experts involved in the project or the facility management (e.g. the project's / facility's public relations officer) Analysis of project proposal and/or other relevant project documents such as strategic plans, financial documents, internal management reports Data analysis methods: Descriptive content analysis	References: None

How will human resources be attracted, ensured and developed

Category RI.9 explores how the facility will ensure and manage the required human capital and contribute to the further development of knowledge and skills. The required information is collected through qualitative and quantitative indicators.

Indicators:

RI.9.1: Human resources and skills
RI.9.2: HR planning and recruitment strategy
RI.9.3: Scientific attractiveness of the facility
RI.9.4: Mean salary levels by occupation, responsibility or sector compared to national / EU levels
RI.9.5: Strategy for training, skill development, and further education

RI.9.1: Human resources and skills

Relevance:
The indicator describes the estimated needs of human resources (HR) and skills over time during construction and operation of the new RI.

Compilation:

- Identify and report briefly the requirements in terms of skills and expertise for constructing the new facility.
- Identify and report the estimated HR (persons or person-months) for the different occupational categories over time (e.g. year by year) during the construction phase.
- Identify and report briefly the requirements in terms of skills and expertise for the operation of the facility.
- Identify and report the estimated HR (persons or person-years) for the different occupational categories over time (if changes are expected) for the operation phase.

Note: A more detailed discussion of the required skills is part of the impact analysis concerning HR / working places. Also a deeper analysis of the created working places / required HR (by education, occupation, gender, nationality etc.) will be made in module Demo.

Definitions and explanations:
Occupational categories: Scientists, engineers, technicians, support workers (e.g. administrative staff), where scientists and engineers are workers with a scientific or technical university degree, technicians have a scientific or technical vocational degree, and support workers include all staff with other specialisation (also lawyers, economists, ...)

Data sources and collection methods:

- Interviews with the project coordinator and/or other suitable experts involved in the project or the facility management (e.g. the project's / facility's HR manager)
- Analysis of project proposal and/or other relevant project documents such as strategic plans and internal management reports

Data analysis methods:

- Descriptive content analysis

References:
None

RI.9.2: HR planning and recruitment strategy

Relevance:
The indicator describes how the required skills for construction and operation of the new RI are distributed to ensure deadlines are met. A timely availability of expertise and skills is of high importance for a successful construction and productive operation of the facility and for an efficient use of the allocated resources. It is thus fundamental for achieving the best results and impacts.

Compilation:

- Identify and report how the expertise and skills requested for the construction of the facility are planned to meet deadlines, e.g. through the use of already available staff, personnel to be recruited from comparable facilities, collaborations with external partners, or contracts with companies or research centres.
- Identify and report how the expertise and skills requested for the operation of the facility are planned to be ensured.

Definitions and explanations:
None

Data sources and collection methods:

- Interviews with the project coordinator and/or other suitable experts involved in the project or the facility management (e.g. the project's / facility's HR manager)
- Analysis of project proposal and/or other relevant project documents such as strategic plans and internal management reports, analysis of facility website (employment opportunities)

Data analysis methods:

- Descriptive content analysis

References:
None

RI.9.3: Scientific attractiveness of the facility

Relevance: The indicator describes the scientific attractiveness of the RI project and/or the new RI as perceived by the project proposers and the scientific community. A high scientific attractiveness can make it easier to attract scientists and technical staff with the required specialist skills and expertise even if the contractual conditions or other factors are not the most outstanding. Compilation: Identify and report the project proposers' perception of the scientific attractiveness. Identify and report the scientific attractiveness as perceived by the interested scientists or technicians. Definitions and explanations: None Data sources and collection methods: Interviews with the project coordinator and/or other suitable experts involved in the project or the facility management (e.g. the project's / facility's HR manager, facility scientists) Interviews with scientists and technicians from the communities interested by the project or RI (e.g. from comparable facilities) and/or scientists / technicians already recruited for the project / RI Analysis of project proposal and/or other relevant project documents, such as scientific reports Data analysis methods: Descriptive content analysis	References: None

RI.9.4: Mean salary level by occupation, responsibility or sector compared to national / EU levels

Relevance:
The indicator describes the mean salary levels by occupation and education at the new RI as compared to the mean national and EU salaries. Although not the most important motivation in a scientific environment, high salary levels can be a further incentive to attract highly-skilled staff. Low salary levels relative to international comparison can hinder recruitment of foreign experts.

Compilation:

- Identify and report the mean salary levels (in K€ / year) by type of occupation (scientists, engineers, technical staff, support staff) at the new RI and the respective national and EU salary levels (or, if assumed more relevant for the recruitment, mean salaries of particular EU member states).
- Identify and report the mean salary levels (in K€ / year) by responsibility level (top management / directors, executives, employees, workers) at the new RI and the respective national and EU mean salaries (or, if assumed more relevant for the recruitment, mean salaries of particular EU member states).
- If these data are not available, identify and report mean salaries (in K€ / year) paid in comparable institutions (e.g. public R&D or a comparable industrial sector) in the country or region with those paid in the EU and relevant EU member states.

Definitions and explanations:
Salary level refers to gross salaries.

Data sources and collection methods:

- Interview with the project's / facility's HR manager
- Analysis of statistical databases (OECD, national statistical office, Eurostat)
- Analysis of other documents (economic studies, report from statistical offices or ministries, newspapers, etc.)

Data analysis methods:

- Descriptive content analysis

References:
None

RI.9.5: Strategy for training, skill development and further education

Relevance:
The indicator describes the project's / facility's strategy for skills development, training and continued education of the staff. This strategy influences the opportunities of creating new skills and capabilities among the scientific, technical and administrative workers of the project / facility. The generation of new skills and capabilities can be seen as one of the most important benefits from the project and potential impacts as a consequence of the increased level of skills.

Compilation:
Identify and report the project's / facility's strategy for training, skill development, and further education of its staff.

Definitions and explanations:
None

Data sources and collection methods:
Interview with the project's / facility's HR manager or other experts involved in the HR management
Analysis of strategic plans and internal documents concerning HR

Data analysis methods:
Descriptive content analysis

References:
None

Module Regio – Regional Profile

Divided into 7 categories, this module supports the elaboration of the regional profile of a target region if set out in the RI project profile or the elaboration of regional profiles of candidate regions to be used in the site selection process for large-scale European RIs in case of competing sites. The regional profile, being an input to the impact assessment that follows, is described by a set of factors rather than indicators. The module is devised to be applicable to a large variety of regional environments with very different characteristics that may be found in Europe, regions that can offer completely different opportunities for new developments and the creation of benefits, but that show also differences in the availability of information and require the use of distinct information sources. For this reason the methodology has been designed comprehensive enough in order to account for various possible developments and benefits and flexible enough in the use of methods and data sources to ensure availability of and access to relevant information in studies on different regions. The required information is mainly collected through document analysis and face-to-face interviews with experts. For the most part the collected information is presented in a descriptive way and could be supported by quantitative data.

Categories	Methods
Reg.1: Geographic and ecological environment Reg.2: Political environment Reg.3: Legal framework conditions Reg.4: General infrastructures and services Reg.5: Labour market Reg.6: Regional Economy Reg.7: Regional Innovation System	CoM.1: Document Analysis CoM.2: Expert Interviews AnM1: Descriptive Analysis

What are the geographical and ecological features of the (proposed) host region?

This category explores the geographical parameters of the region such as geographical location and its relation to the RI domain, geographical area of the region, or connectedness to other regions and countries. It also tackles the ecological footprint of the region at the starting point of the RI project whereas socio-economic impact of the RI on environment will be assessed at a later stage, in the module Eco. This category is presented in a descriptive way and information is gathered prevalently through document analysis and expert interviews.

Factors & Indicators:

Reg.1.1: Centrality, borders, and connectedness
Reg.1.2: Natural resources and ecological footprint of the region

Reg.1.1: Centrality, borders, and connectedness

Relevance:
The indicator describes the geographical features of the (proposed) host region, such as site location, borders, neighbouring regions, and connectedness to neighbouring or other regions. These factors determine the environment in which the RI will operate, and are to be viewed from the system perspective and diverse geographical level, e.g. at supranational, national, international (regional), EU level.

Compilation:
- Define the geographical boundaries of the RI hosting site. These could be below nation-state level, national level, or trans-regional level in case the RI site is cross-border.
- Define the relevance of the hosting site to the RI domain (e.g. RI in seismographic sciences located in South Europe, or RI in physics, located in Central Europe where the critical mass is).
- Describe the neighbouring regions, and the level connectivity of the host region with the neighbouring ones.

Definitions and explanations:
Region is the area of the RI hosting site as set in the RI project. It could be an administrative region directly below nation-state level, or a country, or a region comprising neighbouring regions form different countries.

Data sources and collection methods:
- Publicly available information
- Document analysis of the RI project
- Interviews with regional/local authorities

Data analysis methods:
- Descriptive content analysis

References:
None

Reg.1.2: Natural resources and ecological footprint of the region

Relevance:
The indicator describes the natural resources of the hosting region and its ecological footprint for illustrating the regional sustainability. This information can serve as a background when assessing different socio-economic and environmental impacts in the further modules.

Compilation:

- Identify and summarise the biotic and abiotic resources of the re¬gion forming the natural environment of which the RI will operate.
- Analyse the ecological footprint of the region by comparing the hu¬man demand on nature with the biosphere's ability to regenerate resources and provide services. It does this by assessing the bio¬logically productive land and marine area required to produce the resources a population consumes and absorb the corresponding waste, using prevailing technology

Definitions and explanations:
Per capita ecological footprint (EF) is a means of comparing con¬sumption and lifestyles, and checking this against nature's ability to provide for this consumption. The tool can inform policy by examining to what extent a nation uses more (or less) than is available within its territory, or to what extent the nation's lifestyle would be replicable worldwide.
Natural resources are derived from the environment. On the basis of origin, resources may be divided into biotic (obtained from the bio¬sphere, such as forests, animals, birds, marine organisms, as well as mineral fuels such as coal and petroleum) and abiotic (include non-living things such as land, water, air and ores such as gold, iron, copper, silver etc.)
Ecological Footprint: is defined by Wackernagel et al. as "the area of productive land and water ecosystems required producing the resources that the population consumes and assimilate the wastes that the population produces, wherever on Earth the land and water is located." It compares actual throughput of renewable resources relative to what is annually renewed. Non-renewable resources are not assessed, as by definition their use is not sustainable.

Data sources and collection methods:

- Employ an environment expert for this indicator.
- Document analysis
- Statistical data sources
- Interviews with environment experts – from public authorities, the research community, individual experts.

Data analysis methods:

- Descriptive content analysis

References:
Wackernagel, Mathis and W. Rees. Our Ecological Footprint. Gabriola Island, BC: New Society Publishers, 1996, on:
http://www.sustainablescale.org/conceptualframework/understandingscale/measuringscale/ecologicalfootprint.aspx
Global footprint network, on
http://www.footprintnetwork.org/en/index.php/GFN/page/basics_introduction/

Which political factors impact the RI project?

This category describes the current status of the region's political situation as reflected by the factors and indicators, which includes the perception of the population. It tackles issues such as political stability, democracy, administrative organisation, social dialogue and security. This category also supports the risk analysis that is to be made at a later stage. The set of indicators allows understanding the trend of the stability of governments, the administrative organisation of the region and the country and the social dialogue between different stakeholder groups in the region. The required information is collected through document analysis and expert interviews.

Factors & Indicators:

Reg.2.1: Political stability
Reg.2.2: Administrative organisation
Reg.2.3: Social dialogue

Reg.2.1: Political stability

Relevance:
The indicator describes the main characteristics of the national political system, which is closely interlinked with the economic situation and perspectives of the region. Together with the other indicators this allows to understand and assess investment risks and risks related to the political environment in which the RI shall be operative.

Compilation and analysis methods:
- Identify the trend observed in the stability of governments (Average survival time Vs Time)
- Assess the perception of democracy by (i) citizens and by (ii) international organisations

Definitions and explanations:
Trend for the stability of governments: The trend accounts for the number of governments that resigned before the end of the legislative period since the establishment of a democratic system (but maximum period: last 50 years), the average survival time of a government compared to normal legislative period. It may also take into consideration recent relevant struggles between political parties as well as politically motivated attacks or riots over the last 10 years.
Democracy: a government in which the supreme power is vested in the people and exercised by them directly or indirectly through a system of representation usually involving periodically held free elections.

Data sources and collection methods:
- Document analysis of political and governance analyses
- Interviews with independent experts in political sciences, sociology, democracy.

Data analysis methods:
- Descriptive content analysis

References:
None

Reg.2.2: Administrative organisation

Relevance:
The indicator describes the administrative organisation of the country in regions and smaller units, as well as the division of the country in NUTS. It allows understanding the degree of (de-)centralisation and autonomy of regions and the administrative unit within the RI shall operate.

Compilation and analysis methods:

- Describe the administrative organisation of the country into regions and smaller units. Take into account the administrative division of both regional and local authorities.
- Describe the division of the country in NUTS.
- Assess the degree of (de-)centralisation and autonomy of the region, its competences and its cooperation with other EU regions.

Definitions and explanations:
NUTS: Nomenclature of territorial units for statistics. The NUTS classification is a hierarchical system for dividing up the economic territory of the EU for the purpose of a collection, development and harmonisation of EU regional statistics and socio-economic analyses of the regions.

- NUTS 1: major socio-economic regions
- NUTS 2: basic regions for the application of regional policies
- NUTS 3: as small regions for specific diagnoses

Regional vs local authorities: Regional authorities are perceived herein as the decentralised divisions of the central government of a country, e.g. regional governments, and are elected or appointed as result f general elections. Local authorities are in many countries the municipal administrations, and are elected through local elections.

Data sources and collection methods:

- Document analysis of the administrative structure of public authorities (regional and local).
- Interviews with representatives of national (central), regional and local authorities.

Data analysis methods:

- Descriptive content analysis

References:
European Commission, Eurostat, on:
http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/history_nuts

Reg.2.3: Social dialogue

<table>
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Relevance:
The indicator describes the relevant social stakeholder groups and the dialogue between them and the public (regional, local) authorities dealing with regional policies.

Compilation and analysis methods:
• Identify the social stakeholder groups. Determine which ones are “primary” and which are “secondary” stakeholder groups. Describe the relevance of each stakeholder group to the RI project.
• Assess the influence of each social stakeholder group on regional policies, e.g. level of participation in public consultations on regional policies, etc.

Definitions and explanations:
Stakeholder groups are perceived as social groups who hold some kind of “stake” or interest in the domain under analysis, i.e. the RI. For the purposes of management and decision-making analysts need to identify the stakeholder groups. “Primary” stakeholder groups are the ones with a direct interest in the RI project. Secondary are the ones with an indirect interest in the RI or who depend at least partially on wealth or business generated by the RI.

Data sources and collection methods:
• Analysis of documents, such as the project proposal, annual reports, etc.
• Interviews with representatives of the different stakeholder groups identified.

Data analysis methods:
• Descriptive content analysis
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References:
None
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What are the legal rules and regulations for establishing and operating an RI of international dimension?

This category analyses the legal framework conditions in the host region that affect the RI (project). It tackles legislation, rules and regulation related to employment, work conditions, efficiency of the juridical system, IPR protection, and tax policy. It allows assessing the legal framework conditions for establishing an RI of international management and research teams, and the conditions for protection of intellectual property on RI key breakthroughs or innovations created by collaborators or (regional or national) users. This influences the attractiveness for firms to engage in activities with the RI as well as the attractiveness for cluster formation, the set-up of spin-offs in the region etc. The required information is collected through qualitative and quantitative indicators and is presented in a descriptive content analysis.

Factors & Indicators:

Reg.3.1: Foreign workers and international mobility
Reg.3.2: Effectiveness/efficiency of the juridical system
Reg.3.3: Intellectual Property Rights
Reg.3.4: Taxation and fees

Reg.3.1: Foreign workers and international mobility

Relevance:
The indicator describes the legal framework conditions related to a foreigner's work and residence in the RI host region. It tackles the rules and regulations related to the recruitment of foreign workers by the facility, such as work permits, residence permits, permits for family members, health insurance and pension rights.

Compilation and analysis methods:
- Identify and describe the most important legal regulations related to international mobility – rules, costs and time period for obtaining stay permit, work permit, residence permit; regulations on acquisition of real estate property by foreigners, specifics (if any) on bank accounts and credits for foreigners.
- Identify social security regulations for native people and foreigners (if different), e.g. organisation of the health and pension systems, unemployment insurance, legal protection of pregnant women in the working place, etc.

Definitions and explanations:
International mobility is perceived as migration of skilled workers towards the new RI.

Data sources and collection methods:
- Document analysis of the relevant legal framework
- Interviews with legal experts.

Data analysis methods:
- Descriptive content analysis

References:
None

Reg.3.2: Effectiveness/efficiency of the juridical system

Relevance:
The indicator describes the main features of the juridical system, its organisation and efficiency.

Compilation and analysis methods:
- Identify the level of harmonisation of the local juridical system with the EU one.
- Assess the average length and costs of court proceedings. The length of court proceedings is one of the most essential indicators to evaluate the performance of the judiciary.
- Identify the average rate of attorney's fees (compared to the average income) to illustrate the affordability and access to justice.
- Estimate the average number of incoming vs number of handled commercial, fiscal and labour cases to give an impression on the stock of the cases and their success rates.

Definitions and explanations:
None

Data sources and collection methods:
- Document review of analyses on the performance of a juridical system of a country of region
- Statistical data sources
- Interviews with legal experts, analysts of the legal framework of a country or region

Data analysis methods:
- Descriptive content analysis

References:
European Database on judicial systems

Reg.3.3: Intellectual property rights (IPR)

Relevance:
The indicator tackles the legislation on IP protection for knowledge management and transfer to other parties, as well as the existing regional strategies/ implications on this issue which the RI might benefit.

Compilation and analysis methods:

- Identify the local institution in charge of patenting, and review its procedures and regulations for patenting at national level, on the territory of another country, at EU level, or on world scale. Assess the timing and costs of these procedures.
- Identify existing regional/national strategic efforts to IPR promotion for economic growth and management of the local intellectual assets.

Definitions and explanations:
Intellectual property (IP) refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce. IP is divided into two categories: industrial property and copyright.
Intellectual property rights (IPR): the set of exclusive rights for the IP. Under Intellectual property law owners of IP are granted certain exclusive rights to a variety of intangible assets, e.g. discoveries and inventions.

Data sources and collection methods:

- Document analysis of public reports on IPR
- Interviews with IPR experts, representatives of the Patent Office, and independent experts.

Data analysis methods:

- Descriptive content analysis

References:
World Intellectual Property Organisation (WIPO), on:
http://www.wipo.int/about-ip/en/

Reg.3.4: Taxation and fees

Relevance:
This indicator tackles the relevant taxation policy of the country/region where the RI is operating such as taxation on Public-Private Partnerships, tax preferences for R&D activities, company registration fees and company taxation (when creating start-ups), taxes and fees related to the attractiveness of the region for the RI staff such as revenue taxes, car registration fees, local community services taxes, etc.

Compilation and analysis methods:

- Review the fiscal policy of the country – identify if there are any tax preferences for activities related to research and innovation
- Identify relevant taxes for workers – national, regional, local.
- Identify employer's contributions to health insurance, to unemployment insurance, to pension.
- Identify company taxes – e.g. on income, turnover, VAT, etc.

Definitions and explanations:
None

Data sources and collection methods:

- Document analysis of public information on fiscal policy
- Interviews with public officers, independent experts in taxation.

Data analysis methods:

- Descriptive content analysis

References:
None

What are the existing general infrastructure conditions at the starting point of the RI project?

This category collects information on the general infrastructures and services in the host region such as water and energy supply, IT infrastructure, transport infrastructure. They outline the start-up conditions of the RI project and allow assessing what (if any) infrastructural investments will be needed in addition to building the RI in the host region. The information is collected through qualitative and quantitative indicators and is presented in the form of descriptive analysis.

Factors & Indicators:

Reg.4.1: IT infrastructures and services
Reg.4.2: Real estate / lodgings market
Reg.4.3: General supplies
Reg.4.4: Transport infrastructure

Reg.4.1: IT infrastructures and services

Relevance:	References:
This indicator collects information and reports about the existing IT infrastructure and the IT services offered by the host region, which affect the project. This covers, but is not limited to, phone networks, internet providers, IT research infrastructures, free and charged IT services, etc. Compilation and analysis methods: • Identify and describe the existing phone network providers and their performance (coverage / features / technology standards / speed / quality / stability). • Identify and describe available internet access and internet performance (coverage / features / technology standards / speed / quality / stability). • Identify types of IT infrastructures in the host region (supercomputers, grids, public areas with Wi-Fi internet access, etc.), their performance and access regulations. Definitions and explanations: ICT is a collective notion for unified communications and the integration of telecommunications (telephone lines and wireless signals), intelligent building management systems and audio-visual systems in modern information technology (IT). ICT consists of IT as well as telephony, broadcast media, all types of audio and video processing and monitoring functions. Data sources and collection methods: • Analysis of information on internet. Data analysis methods: • Descriptive content analysis	None

Reg.4.2: Real estate / lodgings market

Relevance:
This indicator collects information on the real estate market which, on the one hand is an indicator of the economic development of the region, and on the other hand is an issue determining the scale of investment in the new RI (construction of the new RI, its impact on the real estate market in close vicinity to the RI, etc.).

Compilation and analysis methods:
- Describe the real estate market – situation, typical real estate objects and their availability, demand and supply, prices (of purchase and of rent).
- Identify typical lodgings and prices.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis

Data analysis methods:
- Descriptive content analysis

References:
None

Reg.4.3: General supplies

Relevance:
This indicator collects information on general services and supplies such as water supply and sewage, energy supply, waste management. The indicator allows assessing the general infrastructure and services related to the functionality of a building in a particular location in the host region, the needs of the RI and possible improvements of supply services.

Compilation and analysis methods:

- Describe the regional water processing & sewage, identify reported problems in water supply as well as initiatives for water savings
- Describe the organisation of energy supply and identify reported problems as well as initiatives for energy savings and energy efficiency. Assess the perspectives for use of renewable energy sources (RES).
- Describe the "environment" of energy-supply services – is there a possibility to chose from a pool of energy suppliers (is there one or several energy suppliers?); review availability of RES; analyse possibilities for using RES in the RI buildings as main or complementary energy source, possibilities for self-production of energy from RES and for ensuring energy independence of the RI, etc.
- Identify if there are special waste management requirements, initiatives for waste reduction or special waste processing

Definitions and explanations:
Renewable energy : Energy which comes from natural resources such as sunlight, wind, rain, tides, and geothermal heat, which are renewable, i.e. naturally replenished.

Data sources and collection methods:

- Document analysis
- Interviews with experts participating in the initiatives identified (water savings, energy savings, RES)

Data analysis methods:

- Descriptive content analysis

References:
None

Reg. 4.4. Transport infrastructure

Relevance:
This indicator describes the existing transport infrastructure and related services offered by the host region, which affect the RI project e.g. accessibility of the RI by road, rail, waterborne and air transport, existing public transport networks and services (car-rental, bicycle and car-sharing services, other eco-transport alternatives), traffic anti-congestion measures, etc. Accessibility is also important with regards to the attraction of new enterprises to the region.

Compilation and analysis methods:
- Identify and describe the existing transport networks (road, rail, waterborne and air) in the hosting region which will benefit the RI and will ensure its wide accessibility.
- Identify and describe the local (urban) public transport network and existing alternative services – car-rentals, opportunities for greener transportation modes – bicycle and car-sharing schemes, electric vehicles, pedestrian zones, etc.
- Analyse the traffic congestion rates and the existing measures to alleviate them.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of information on internet.
- Interviews with local experts in transport

Data analysis methods:
- Descriptive content analysis

References:
None

What are the labour market conditions in the RI host region?

This category collects information and reports about the situation of the regional labour market and the relevant legislation, as well as the local environment for human resources development. It describes the attractiveness of the hosting region for the RI staff and the regional potential on providing skilled work force. The information is collected through qualitative and quantitative indicators and is presented in the form of descriptive analysis.

Factors & Indicators:

Reg.5.1: Employment and working population
Reg.5.2: Wages, pension policy
Reg.5.3: Vocational education and training (VET), lifelong learning (LLL)

Reg.5.1: Employment and working population

Relevance:
This indicator collects information on the regional employment policy, unemployment rates, age distribution of active population, etc. The information gathered by this indicator helps to evaluate available skilled human resources in the region, capacity to attract to the RI highly skilled local and foreign researchers and workers. Data about trends are baseline information that can serve also for the creation of scenarios on possible development induced by the RI project that concern population and labour market.

Compilation and analysis methods:
- Describe the public institutions dealing with employment and unemployment (e.g. labour bureaus, state agencies on employment, etc). Identify initiatives (if any) in support to employment of researchers.
- Identify the age distribution of active population (trend, last 25 years or more and projection; year-by-year or 5-year cohorts); identify open positions by type and sector (trend, last 25 years or more).
- Identify regional overall unemployment rate as well as its structure – unemployment rate by level of education, educational background (structure by educational specialisation/domain/discipline), age, gender, etc.
- Identify existing stimulation mechanisms for employing researchers – financial/fiscal, support mechanisms for international research projects, opportunities for mobility of researchers, etc.

Definitions and explanations:
Employment rate: the percentage of the working age population (ages 15 to 64 in most OECD countries) who are currently employed.

Data sources and collection methods:
- Document analysis (statistics, scientific studies, reports from regional, national and EU statistical offices and administrations, documents from labour unions)
- Expert interviews with managers from relevant public administrations, policy makers, representatives from labour unions, scientific experts

Data analysis methods:
- Descriptive content analysis

References:
Organisation for Economic Cooperation and Development
http://www.oecd.org

Reg.5.2: Wages, pension policy

Relevance:
This indicator reviews the wage levels and trends in the RI host region as well as the pension policy of the host country. It indicates a number of features of the labour force in the region and helps compare them to analogue features of possible "imported" labour force. It is linked to assessing the labour costs for the operation of the RI upon the starting of the RI project as well as to assessing its dynamics in time during the operation of the RI.

Compilation and analysis methods:

- Identify the average wage in the region and compare it to average EU wage. If possible, diversify average wage by professional profile and by sector. Identify typical wages of public and private researchers (PhD students, post-docs, senior researchers, university professors). Elaborate the trend in average regional wages compared to average EU wage.
- Identify average pensions compared to pensions in other EU countries, and compared to average income. Identify regulations and requirements of additional private unemployment insurance, opportunities for workers to choose additional pension insurances.
- Identify the most common incentive mechanisms supplementary to the wages – e.g. bonus mechanisms. Identify the influence and level of the "grey" economy in the region.

Definitions and explanations:
None

Data sources and collection methods:

- National / regional statistics, public reports
- Expert interviews (relevant public administrations, representatives from employers' associations, representatives from labour unions)

Data analysis methods:

- Descriptive content analysis

References:
None

Reg.5.3: Vocational education and training (VET), lifelong learning (LLL)

Relevance:
The indicator gives information on the existing market of VET and LLL services – the demand and supply sides of this marketing. This is strongly linked to the availability of skilled work force in the host region – researchers, managers, workers, as well as availability of services for continuant upgrade of practical skills.

Compilation and analysis methods:
- Identify and describe existing services and initiatives related to VET and LLL in the host region – services and initiatives by training centres, consultancy companies, NGOs, EU projects, etc. Identify people's perception of VET and LLL.

Definitions and explanations:
Vocational training and education (VET) prepares trainees for jobs that are based on manual or practical activities, traditionally non-academic, and totally related to a specific trade, occupation, or vocation. VET focuses on practical applications of skills learned, and is generally unconcerned with theory or traditional academic skills. A large part of the education in vocational schools is hands-on training. It is sometimes referred to as technical education as the trainee directly develops expertise in a particular group of techniques or technology. It is usually provided either at the high school level or in a postsecondary trade school.
Lifelong learning (LLL) is the continuous building of skills and knowledge throughout the life of an individual.

Data sources and collection methods:
- Document analysis
- Interviews with managers, relative NGOs and training centres, trainers and trainees

Data analysis methods:
- Descriptive content analysis
- Interviews with providers of VET and LLL services, interviews with trainees.

References:
Europa – gateway to the European Union. Summaries of EU legislation on education and training:
http://europa.eu/legislation_summaries/education_training_youth/index_en.htm

What are the key features of regional economy and its competitiveness?

This category collects and presents information on the regional economy in terms of sectoral diversity, distribution and specialisation, structure of the enterprises, regional performance and competitiveness compared to other EU regions. It describes the attractiveness of the hosting region for investments and development of new businesses. The information is collected through qualitative and quantitative indicators and is presented in the form of descriptive analysis.

Factors & Indicators:

Reg.6.1: Diversity and distribution of economic sectors
Reg.6.2: Economic performance and competitiveness of the region

Reg.6.1: *Diversity and distribution of economic sectors*

Relevance:
The indicator outlines the profile of the regional economy – its structure by economic sectors and size of companies. The information helps assessing the attractiveness of the region to new high-tech companies, spin-offs, and start-ups. The indicator accounts for the current specialisation of the regional economy as well as for the priority sectors set out in the long-term regional development policy.

Compilation and analysis methods:

- Identify the key economic sectors in the region and main features (employment, business units, output, turnover, markets, workforce, skills, capacities), (OSLO Manual).
- Describe the current specialisation of the regional economy; identify main regional markets, main players and market share. Identify the priority sectors in regional development policy, and the innovative ones among them (high-tech industrial sectors, service sectors). Use Herfindahl index and Location Quotients to describe the competition in the most important markets and employment specialisation pattern of major industrial sectors.
- Describe the structure of the regional economy by type and size of companies – regional companies by turnover and number of employees, regional high-tech companies (total number and number in the RI relevant fields), private R&D expenditure and intensity by sector.

Definitions and explanations:
The *Herfindahl index* is an indicator for the competition in a market.
Location Quotients compare the employment in a local economy to the employment of a reference economy to identify specialisations patterns

Data sources and collection methods:

- Document analysis – statistical data, websites, reports from public administration, chambers of commerce.

Data analysis methods:

- Descriptive content analysis
- Micro-model "Region"

References:
Organisation for Economic Cooperation and Development, on:
http://www.oecd.org
OSLO Manual: Guidelines for Collecting and Interpreting Innovation Data, on:
http://www.oecd.org/document/33/0,3343,en_2649_34273_35595607_1_1_1_37417,00.html

Reg.6.2: *Economic performance and competitiveness of the region*

Relevance:
This indicator illustrates factors that contribute to regional competitiveness. Most of the information used herein is already collected in the previous indicators under the Regional Profile Module. Here it is integrated and structured to present the economic performance of the host region and to compare it to other regions of the host country and to other EU regions.

Compilation and analysis methods:

- Collect information on GDP, GDP/capita, GRP, GRP/capita, foreign direct investments and foreign R&D investments in the region – compare by these indicators the RI host region to the other regions in the host country and to other EU regions.
- Compare these indicators over the last 10 years and assess the growth of regional productivity.

Definitions and explanations:
Gross Domestic Product (GDP) is the market value of all final goods and services produced within a country in a given period. It is often considered as an indicator of the size of the economy or of the standard of living.
Gross Regional Product (GRP) is defined as the market value of all final goods and services produced within a region (a metropolitan area, an administrative region) in a given period of time.
Foreign Direct Investment (FDI) is any form of investment that earns interest in enterprises which function outside of the domestic territory of the investor.

Data sources and collection methods:

- Document analysis – statistical data, public reports and assessments.
- Interviews with experts in macro-economics, experts from public institutions (relevant ministries and agencies).

Data analysis methods:

- Descriptive content analysis

References:
European Commission, Regional Policy – Inforegio, on:
http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/p141_en.htm
European Commission, Enterprise and Industry, Industrial Competitiveness:
http://ec.europa.eu/enterprise/policies/industrial-competitiveness/index_en.htm

What are the key features of regional innovation system?

This category collects and presents information on the national/regional research environment and the effectiveness of the regional innovation system in terms of mapping the existing research institutions/facilities, exploring local education system and its capacity for providing skilled staff, and analysing the overall effectiveness of the regional innovation system concerning the strengths of its collaboration structures. It describes the potential of the hosting region for creating, developing and spreading innovations. The information is collected through qualitative and quantitative indicators and is presented in the form of descriptive analysis.

Factors & Indicators:

Reg.7.1: Existing research facilities and R&D performing companies
Reg.7.2: Networking / clustering / collaboration opportunities
Reg.7.3: Educational system

Reg.7.1: Existing research facilities and R&D-performing companies

Relevance:
This indicator outlines a snap-shot of the research facilities already existing in the region which may have relevance to the RI project. It illustrates the knowledge base of the region and its potential for inter- and multidisciplinary partnerships.

Compilation and analysis methods:
- Identify and map the existing research facilities and R&D-performing companies in the host region of the RI project that may have relevance to the RI operation. This includes facilities in the same field as the new RI, facilities in complementary fields, service providing facilities, etc.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis
- Interviews with scientific managers of the research facilities

Data analysis methods:
- Descriptive content analysis

References:
None

Reg.7.2: Networking / clustering / collaboration opportunities

Relevance:
This indicator outlines main opportunities to collaborate with or join existing networks as well as the existing demand in the region for establishing new network structures. It illustrates interlinks between the actors in the regional innovation system and its capacity to create and absorb innovations.

Compilation and analysis methods:

- Identify existing networks, business clusters and technology alliances in fields relevant to the RI project. Identify opportunities for joining them.
- Identify European initiatives (EC-funded) in support of networks and clusters, e.g. networks of centres of excellence, business clusters, research-driven clusters, and associations of clusters. Identify opportunities for collaborating with them.
- Identify regional gaps, opportunities or demand for establishing new networks, business clusters or technology alliances.

Definitions and explanations:

Business Cluster is a concentration of interconnected businesses, suppliers, and associated institutions in a particular field. Clusters are considered to increase the productivity with which companies can compete, nationally and globally. There are four major types of clusters: geographical (geographical concentration of interconnected businesses), sectoral (a concentration of businesses operating together within the same commercial sector, e.g. marine, photonics), horizontal (interconnections between businesses at a sharing of resources level, e.g. knowledge management), and vertical clusters (businesses interoperating along the supply chain).

Data sources and collection methods:

- Document analysis
- Survey of regional R&D performing actors (companies, universities and R&D institutes)

Data analysis methods:

- Descriptive content analysis
- Network analysis

References:
European Commission, Enterprise and Industry, Industrial Competitiveness, on:
http://ec.europa.eu/enterprise/policies/industrial-competitiveness/index_en.htm

Reg.7.3: Educational system

Relevance:
This indicator gathers information about education and educational system in the region, which has an effect e.g. on regional attractiveness and availability of skilled staff and which can be influenced by the RI. It also assesses the quality of the education system.

Compilation and analysis methods:

- Describe the organisation of the educational system – age and duration of compulsory education, national/regional spending on primary, secondary and tertiary education in total, per GDP, per student. To assess education quality, identify average duration of university studies by type of course, and the success rate in tertiary education. Identify number of students continuing to post-graduate research studies.
- Describe the number and profile of the institutes providing tertiary (higher) education – levels/degree (bachelor, master, etc.), duration of the studies for each degree, state-funded vs private, structure by scientific domains, degrees, share of foreign vs local students, etc.
- Describe regional distribution of relevant R&D / higher education institutions, international schools, relevant R&D performing / high-tech companies.

Definitions and explanations:
None

Data sources and collection methods:

- Document analysis

Data analysis methods:

- Descriptive content analysis

References:
None

System Analysis

System Analysis – UC1

In the case of ex-ante estimation for a single RI, the object of socio-economic impact assessment is the comparison of two future alternative situations:

» The future development of the regional system without the RI (baseline scenario)
This should not be confused with the situation at the moment of the project initiation, as some evolutions in the system during the analyzed period are assumed in the absence of the RI.

» The future development of the regional system without the RI (success scenario)
The evaluation of the impact is made according to a success scenario, a realistic picture of the system (RI & stakeholders) at the time horizon specified. Realism is based on

Realism is based on
- the project's envisaged activities and interactions
- experience from other similar cases
- balanced estimation of stakeholders' interests
- a set of accepted assumptions about future trends and events.

For comparison, the alternative developments should rely on
- a common representation of the present socio-economic development
- similar sets of assumptions of future events and transformations.

The following figure describes the representation of the RI impact as difference between success and baseline scenario, in the simplified form of unifactorial evolutions.

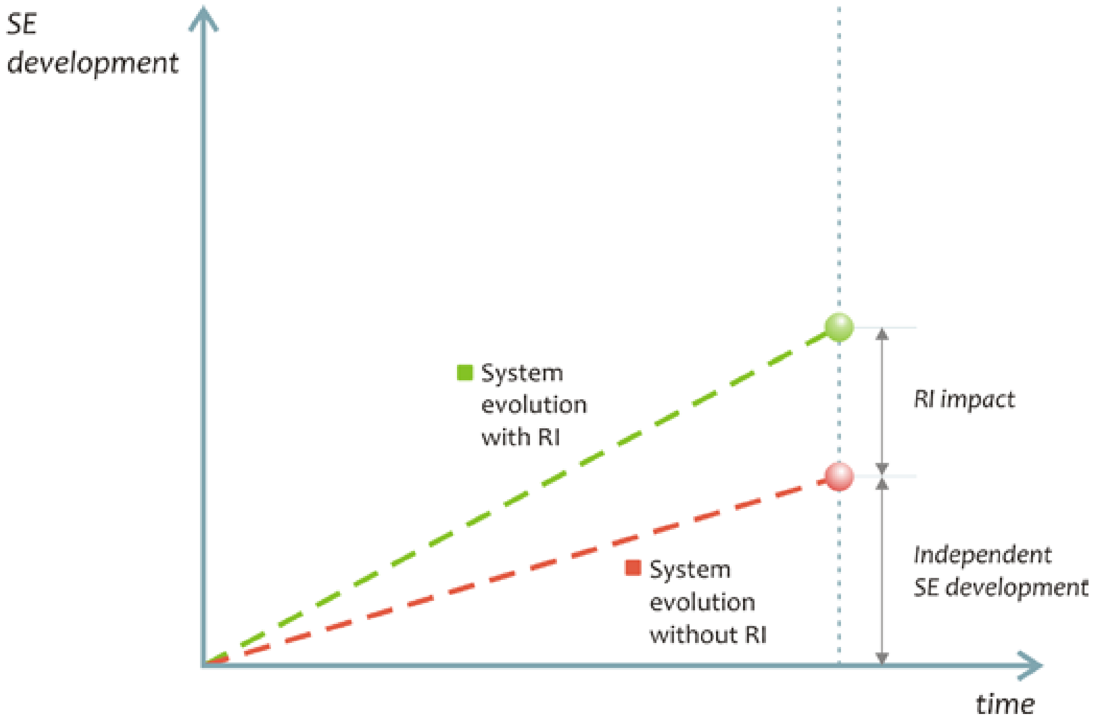

Figure 8: The RI impact as a difference between success and baseline scenarios

The scenario development builds on and combines the information from the Regional and RI modules, but it explores a broader spectrum of interactions, integrating the interest and strategies of the different stakeholders. While not mainly intended to provide quantitative estimations, the scenarios serve for the identification of socio-economic impact lines that are assessed later in the impact modules. Moreover, the success scenario serves as benchmarking of the risks not associated with the project itself, but with the stakeholders' reactions.

The baseline scenario could be developed as part of the assessment or simply can be used as an already exiting one if available. The elements of the baseline scenario are later used as a starting point for the success scenario, which considers a set of additional interactions and possible new stakeholders.

Suggested procedure for success scenario development

1. Mapping the stakeholders
Objective: Identification of the stakeholders based on their interest and relevance.
Methods: documentation, snowball surveys and co-nomination, skill-will matrix.

2. Identification of possible successful collaborations
Objective: Identification of the possible interactions, from the point of view of the stakeholders and their objectives.
Methods: interviews, actor-objective analysis, role playing

3. Identification of enablers and bottlenecks in developing success relations
Objective: Estimation of the current capacity of the stakeholders to develop the success relations with the RI.
Methods: interviews, SWOT

4. Identification of the drivers of change for stakeholders
Objective: Identification of the drivers of trends or new events that could impact the key stakeholders on medium and long term, changing their potential interaction with the RI.
Methods: horizon scanning (trends, week signals and wild cards), STEEPV, Delphi.

5. Scenario development
Objective: Development of the success scenario.
Method: scenario workshop.

System Analysis – UC2

In the case of ex-ante estimation of competing host regions for the same RI, an assessment of socio-economic impact is to be carried out for each of the situations (i.e. the RI in region context) to enable a comparison.

For each of the host regions, the object of the socio-economic impact assessment is again a comparison, between two future alternative situations:
» The future development of the regional system without the RI (baseline scenario)
This should not be confused with the situation at the moment of the project initiation, as some evolutions in the system during the analyzed period are assumed to occur in the absence of the RI.

» The future development of the regional system without the RI (success scenario)
The evaluation of the impact is made according to a success scenario, a realistic picture of the system (RI & stakeholders) at the time horizon specified.

Realism is based on

- the project's envisaged activities and interactions
- experience from other similar cases
- balanced estimation of stakeholders' interests
- a set of accepted assumptions about future trends and events.

For comparison, the alternative developments should rely on

- a common representation of the present socio-economic development
- similar sets of assumptions of future events and transformations.

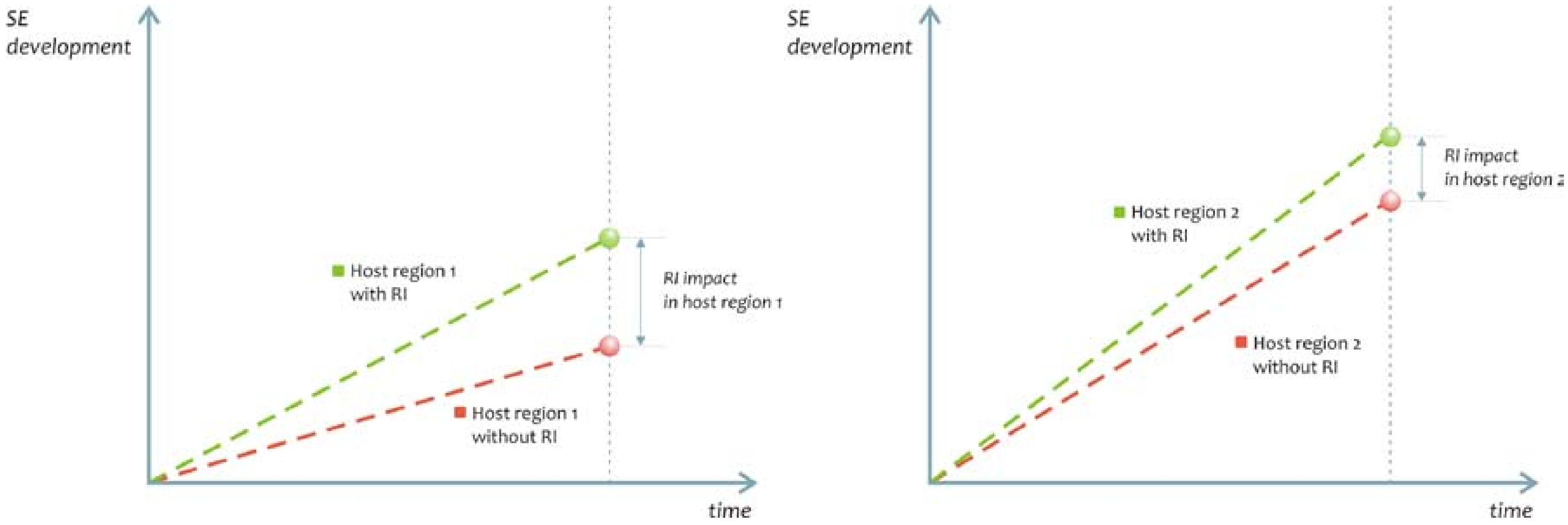

Figure 9: The RI impact as difference between success and baseline scenarios (unifactorial representation)

The premises of the scenarios should be also comparable between the host regions, both for the baseline and the success dimension. Therefore the assumptions regarding for instance European and global developments should be quite similar, while the assumptions closely connected with the region needs to be correlated in the scale of uncertainty and impact amplitude.

The scenario development builds on and combines the information from the Regional and RI modules, but it explores a broader spectrum of interactions, integrating the interest and strategies of the different stakeholders. While they are not specifically intended to provide quantitative estimations, the scenarios serve for the identification of socio-economic impact lines that are later assessed in the impact modules. Moreover, the success scenario serves to benchmark the risks not associated with the project itself, but with the stakeholders' reactions.

Suggested procedure for success scenario development

1. Mapping the stakeholders
Objective: Identification of the stakeholders based on their interest and relevance.
Methods: documentation, snowball surveys and co-nomination, skill-will matrix.

2. Identification of possible successful collaborations
Objective: Identification of the possible interactions, from the point of view of the stakeholders and their objectives.
Methods: interviews, actor-objective analysis, role playing.

3. Identification of enablers and bottlenecks in developing success relations
Objective: Estimation of the current capacity of the stakeholders to develop the success relations with the RI.
Methods: interviews, SWOT.

4. Identification of the drivers of change for stakeholders
Objective: Identification of the drivers of trends or new events that could impact the key stakeholders on medium and long term, changing their potential interaction with the RI.
Methods: horizon scanning (trends, week signals and wild cards), STEEPV, Delphi.

5. Scenario development
Objective: Development of the success scenario.
Method: scenario workshop.

System Analysis – UC3

In the case of two competing RIs for the same host region, the object of socio-economic impact assessment is the comparison of three future alternative situations:

» The future development of the regional system without the RI (baseline scenario)
This should not be confused with the situation at moment of the project initiation, as some evolutions in the system during the analyzed period are assumed to occur even without the RI.

» The future development of the regional system with the first RI (success scenario 1)

» The future development of the regional system with the second RI (success scenario 2)

The evaluation of the "with RI" situation is made according to a success scenario, a realistic picture of the system (RI & stakeholders) at the time horizon specified.

Realism is based on

- the project's envisaged activities and interactions
- experience from other similar cases
- balanced estimation of stakeholders' interests
- a set of accepted assumptions about future trends and events.

While the system of actors may vary between the two or more RIs, when comparing the success scenarios, it is important that they drew similar assumptions from the baseline scenario, they use non-contradictory assumptions about global events and the specific assumptions and the assumptions about the specific evolution of their industries, markets and communities are correlated in the scale of uncertainty and impact amplitude.

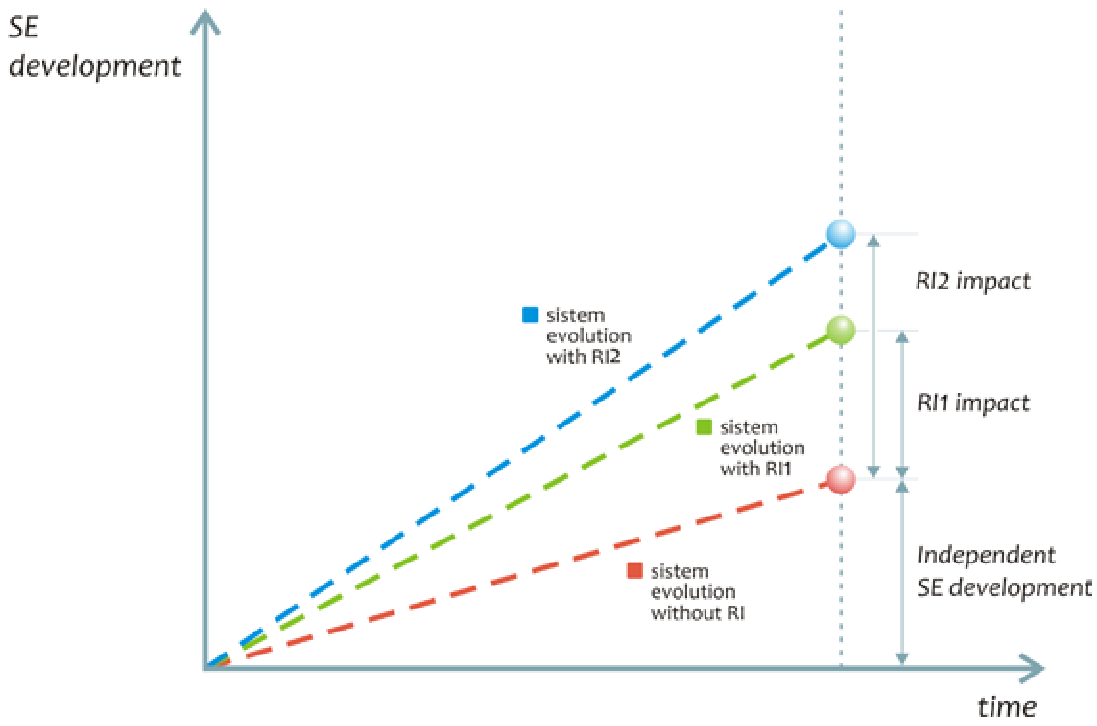

Figure 10. The RI impact as difference between the baseline scenario and the success scenario for each project (unifactorial representation)

The scenario development builds on and combines the information from the Regional and RI modules, but it also explores a broader spectrum of interactions, integrating the interest and strategies of the different stakeholders. While not mainly intended to provide quantitative estimations, the scenarios serve for the identification of socio-economic impact lines that are later assessed in the impact modules. Moreover, the success scenario serves to benchmark the risks not associated with the project itself, but with the stakeholders' reactions.

The baseline scenario could be developed as part of the assessment or simply can be used on an already exiting one if available. The elements of the baseline scenario are then used as a starting point for the success scenario, which considers a set of additional interactions and possible new stakeholders.

Suggested procedure for success scenario development (one for each RI):

1. Mapping the stakeholders
Objective: Identification of the stakeholders based on their interest and relevance.
Methods: documentation, snowball surveys and co-nomination, skill-will matrix.

2. Identification of possible successful collaborations
Objective: Identification of the possible interactions, from the point of view of the stakeholders and their objectives.
Methods: interviews, actor-objective analysis, role playing.

3. Identification of enablers and bottlenecks in developing success relations
Objective: Estimation of the current capacity of the stakeholders to develop the success relations with the RI.
Methods: interviews, SWOT.

4. Identification of the drivers of change for stakeholders
Objective: Identification of the drivers of trends or new events that could impact the key stakeholders on medium and long term, changing their potential interaction with the RI.
Methods: horizon scanning (trends, week signals and wild cards), STEEPV, Delphi.

5. Scenario development
Objective: Development of the success scenario.
Method: scenario workshop.

In the case of ex-post estimation of the SE of an existing RI, the assessment requires the comparison of two situations:

» The current development of the region

» The contra-factual scenario of the region without an RI.
The following figure describes the representation of the RI impact as the differences between the two situations, in the simplified form of unifactorial evolutions.

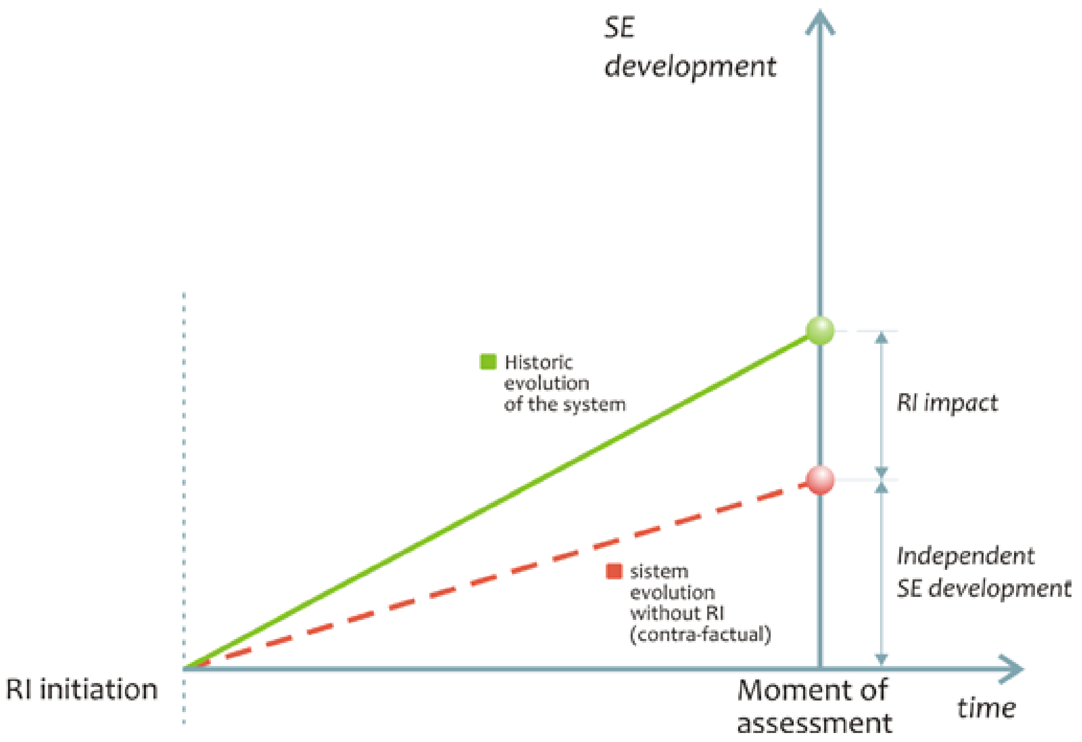

Figure 11: RI impact as difference between historic evolution and contra-factual non-RI scenario (unifactorial representation)

Suggested procedure for the development of the contrafactual scenario:

1. Mapping the stakeholders
The stakeholders refer to the actors that have been influenced by the RI, either in a positive or a negative way. Their identification refers mostly to the present, but other actors which are no longer present in the region should also be envisaged, if their success or failure has been influenced by the RI.
Methods: snowball surveys and co-nomination.

2. These refer to the events and transformations at the stakeholder level over the analysed period
The anamnesis process should cover
o Recollection of events and transformations
o Selection of events and transformations based on perceived impact
o Separation between RI induced events and transformation and the rest
Methods: documentation, interviews.

3. The "no RI scenario"
This scenario is to be developed under the assumptions of historic events independent of the RI and describes a contrafactual present situation.
Methods: scenario workshop.

Module S+T: Science and Technology

Templates for this module are provided in **Annex I**

Module S+T supports the collection, analysis and presentation of information about the RI project's impacts in the domain of science, technology and innovation. There are seven categories covering data about user services, scientific and innovation outcome, networking and collaboration, effects on suppliers and other industrial stakeholders as well as new firms as spin-offs or other types of start-up companies resulting from the RI's activities. As listed below, a large variety of methods are proposed for data collection and analysis, which include case studies of reference laboratories for ex-ante assessments and techniques as network analysis, bibliometric analysis and micro-models.

Categories	**Methods**
• S+T.1: User Services • S+T.2: Scientific Outcome • S+T.3: Innovation • S+T.4: Networking & Collaboration • S+T.5: Impact on Suppliers • S+T.6: More Impacts on Firms and Customers	• CoM.1: Document Analysis • CoM.2: Expert Interviews • CoM.3: Questionnaires and Surveys • CoM.4: Secondary Data Analysis • AnM.1: Descriptive Content Analysis • AnM.2: Case Studies of Reference Laboratories • AnM.3: Narratives • AnM.5: Network Analysis • AnM.6: Bibliometric Analysis • AnM.7: Micro-model on "experimental shadow value" • AnM.8: "CERN" model on utilities for high-tech suppliers

Which benefits for its users does the new facility create?

This category explores user services offered by the proposed RI and the associated benefits created for users. Data are collected mostly through face-to-face interviews with relevant experts from the RI project and project documents. Secondary data from comparable operating reference facilities may complete the information. A micro-model is used to estimate the monetary value of the offered user access time.

Indicators:

S+T.1.1: Services and opportunities for users
S+T.1.2: User proposals
S+T.1.3: Access and maintenance time
S+T.1.4: Users by country, field and sector
S+T.1.5: Monetary value of offered access time

S+T.1.1: Services and opportunities for users

Relevance, compilation and analysis methods, definitions and explanations	Data sources and collection methods, data analysis methods, references
Relevance: This indicator describes the (new) services and research opportunities for proprietary as well as non-proprietary users offered by the (new) RI. These services and research opportunities are core benefits expected from the facility for the scientific community and, where applicable, industrial users. Compilation and analysis methods: • Identify and report the user services offered by the (new) RI. Distinguish between proprietary and non-proprietary users (ex-post and ex-ante). • Identify and report also the particular (newly created) research opportunities (ex-post and ex-ante). Definitions and explanations: *User*: A user is a scientist, who uses the facility and the offered instru¬men¬ta¬tion in order to perform scientific research. Users can either be from public or from private institutions. They can conduct non-proprietary or proprietary research. This includes also internal users. *Non-proprietary* refers to scientific research for which the research results are published in the open scientific or technical literature. The research results are accessible to other interested parties. *Proprietary* refers to research for which the knowledge, technical data and inventions generated during the scientific work are treated as proprietary by the user. Results are in particular not published in the open literature. *Reference facility* refers to operating facilities comparable to the new RI with respect to a specific indicator. The analysis of data from such facilities may give hints about what can be expected from the new RI.	Data sources and collection methods: • Document analysis, e.g. project documents, websites, annual reports • Interviews with suitable experts from the project, e.g. scientific project manager, technology transfer or industrial liaison officer, project coordinator • Analysis of documents or websites from reference facilities (ex-ante studies) • Interviews with external experts from reference facilities (e.g. CEO, scientific manager, industrial liaison officer) Data analysis methods: • Descriptive content analysis • Narrative analysis • Case studies of reference laboratories References: Information about existing reference RIs may be e.g. found on the European Portal on Research Infrastructures Database, on http://www.riportal.eu/public/index.cfm?fuseaction=ri.search#

S+T.1.2: User proposals

Relevance:
This indicator describes the number of user proposals received by the facility every year and the number of user proposals that get access to the facility. They provide information about the demand for access to the facility and the facility's possibilities to satisfy the demand.

Compilation and analysis methods:
- Identify and report the annual number of received (expected) user proposals (ex-post and ex-ante).
- Identify and report the number of user proposals to which access can be allocate each year (ex-post and ex-ante).
- If a year is not a suitable time period for the considered RI, choose a suitable one (e.g. ten years) and indicate this clearly. Use the same time period for the expected and the benefitting proposals.

Definitions and explanations:
If access to the facility is not based on user proposals, use the number of annual access requests and the number of requests that can be satisfied in a year.
User: A user is a scientist, who uses the facility and the offered instrumentation in order to perform scientific research. Users can either be from public or from private institutions. They can conduct non-proprietary or proprietary research. This includes also internal users.
Reference facility refers to operating facilities comparable to the new RI with respect to a specific indicator. The analysis of data from such facilities may give hints about what can be expected from the new RI.

Data sources and collection methods:
- Document analysis, e.g. project documents, websites, annual reports
- Interviews with suitable experts from the project, e.g. scientific project manager, project coordinator, responsible manager for user relations
- Secondary data analysis from reference facilities, e.g. SE impact reports, annual reports (ex-ante studies)
- Interviews with external experts from comparable reference facilities, e.g. CEO, scientific manager, responsible manager for user relations (ex-ante studies)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories

References:
Information about existing reference RIs may be e.g. found on the European Portal on Research Infrastructures Database, on
http://www.riportal.eu/public/index.cfm?fuseaction=ri.search#

S+T.1.3: Access and maintenance time

Relevance:
This indicator describes the time for which users (will) have access to the (new) RI and the time that is (will be) dedicated to maintenance or further development activities of the facility or its components. This indicator is also required in order to perform the calculations for indicator S+T.1.5, monetary value of the offered access time.

Compilation and analysis methods:
- Identify and report the (planned) number of hours per year, for which the users will have access to the new RI (ex-post and ex-ante).
- Identify and report the (planned) number of annual hours for maintenance or further development activities of the facility or its components (ex-post and ex-ante).

Definitions and explanations:
If no estimates for the new RI are available yet, try to estimate the number of user and maintenance hours on the basis of those from reference facilities.
User: A user is a scientist, who uses the facility and the offered instru¬mentation in order to perform scientific research. Users can either be from public or from private institutions. They can conduct non-pro¬prietary or proprietary research. This includes also internal users.
Reference facility refers to operating facilities comparable to the new RI with respect to a specific indicator. The analysis of data from such facilities may give hints about what can be expected from the new RI.

Data sources and collection methods:
- Document analysis, such as e.g. project documents, project / facility websites, annual reports
- Interviews with suitable experts from the project or facility, e.g. scientific project manager, project coordinator, responsible manager for user relations
- Secondary data analysis from reference facilities, e.g. SE impact reports, annual reports (ex-ante studies)
- Interviews with external experts from comparable reference facilities, e.g. CEO, scientific manager, responsible manager for user relations (ex-ante studies)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories

References:
Information about existing reference RIs may be e.g. found on the European Portal on Research Infrastructures Database, on http://www.riportal.eu/public/index.cfm?fuseaction=ri.search#

S+T.1.4: *Users by country, field and sector*

Relevance:
This indicator describes the number of users that (will) benefit from the new RI and their provenience by geography, scientific domain and sector. This provides information about geographic areas, scientific fields, and sectors that may benefit from the RI.

Compilation and analysis methods:
- Identify and report the (expected) number of annual users by geographic area. Distinguish between broad areas: Host country, other EU member states, further European countries, non-European countries. If a more detailed break-down provides significant information, use that (ex-post and ex-ante).
- Identify and report the (expected) number of annual users by scientific areas. Use a break-down in scientific areas that is significant for the RI under investigation (ex-post and ex-ante).
- Identify and report the (expected) number of annual users by sector. Distinguish between private companies, universities and public R&D institutes, or simply between private companies and public institutions, including universities (ex-post and ex-ante).

Definitions and explanations:
If no estimates for the new RI are available yet, try to estimate the numbers of users on the basis of data from reference facilities.
User: A user is a scientist, who uses the facility and the offered in¬stru¬mentation in order to perform scientific research. Users can be from public or from private institutions. They can conduct non-pro¬prietary or proprietary research. This includes also internal users.
Reference facility refers to operating facilities comparable to the new RI with respect to a specific indicator. The analysis of data from such facilities may give hints about what can be expected from the new RI.
Examples for scientific area breakdown (synchrotron): condensed matter, life and medical sciences; atoms, molecules & plasmas; environment, instrumentation & technology; cultural heritage

Data sources and collection methods:
- Document analysis (as e.g. project documents, project / facility websites, annual reports)
- Interviews with suitable experts from the project / facility (e.g. scientific project manager, responsible manager for user relations)
- Secondary data analysis from reference facilities, e.g. SE impact reports, annual reports (ex-ante studies)
- Interviews with external experts from comparable reference facilities, e.g. manager for user relations (ex-ante studies)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories

References:
Information about existing reference RIs may be e.g. found on the European Portal on Research Infrastructures Database, on http://www.riportal.eu/public/index.cfm?fuseaction=ri.search#

S+T.1.5: Monetary value of offered access time

Relevance:
This simple statistical indicator aims to estimate the cost of the user time at the facility, calculating its "experimental shadow value". Since facilities usually have an "open access" policy, they do not charge external non-proprietary users for the use of the equipment. The cost of the access time is paid by the facility itself, which transfers value to its users. The aim is to measure the benefit for the user institutions.

Compilation and analysis methods:

- Calculate and report the monetary value of the access time provided to the users in Euros per hour (€/h). Use the formulas provided below and explained in detail in the methods datasheet for the micro-model on "experimental shadow value".
- For this purpose collect the following data:

(1) estimated lifetime of the RI in years
(2) estimated construction costs of the RI (if desired, also available estimates for upgrading and decommissioning can be included)
(3) estimated average annual operation costs of the RI to calculate the total operation costs over the RI's lifetime
(4) total staff costs during construction (available estimates for upgrading and decommissioning can be included)
(5) average annual staff costs during operation to calculate the total staff costs for operation over the RI's lifetime
(6) total number of user access hours per year (summed up for all equipments)
(7) average functioning coefficient α (as a fraction of 1) of the experimental equipments

Definitions and explanations:

Data

$$\text{Cost1} = \frac{\text{Construction costs} + \text{Operation costs}}{\alpha(\text{Total number of user access hours})}$$

$$\text{Cost2} = \frac{\text{Operation costs}}{\alpha(\text{Total number of user access hours})}$$

$$\text{Cost3} = \frac{\text{Construction costs} + \text{Operation costs} - \text{Staff costs}}{\alpha(\text{Total number of user access hours})}$$

Data sources and collection methods:

- Document analysis (as e.g. project documents, project / facility websites, annual reports)
- Interviews with suitable experts from the project / facility (e.g. project coordinator, CEO)

Data analysis methods:

- Descriptive content analysis
- Micro-model on "experimental shadow value" (insert link)

References:
None

Which scientific results are created by the new RI?

This category investigates the scientific results which are created by the activities of the new facility. For this purpose quantitative and qualitative indicators are proposed. An analysis of project documents, internal and external databases, or secondary data from already operating comparable facilities as well as expert interviews may provide information about the scientific outcome that can be expected or has been achieved. The presentation occurs mostly in a descriptive or narrative way.

Indicators:

S+T.2.1: Publications (all types)
S+T.2.2: New scientific methods, experimental techniques, and software applications
S+T.2.3: New standards and procedures
S+T.2.4: Developed metadata

S+T.2.1: Publications (all types)

Relevance:
This indicator describes the scientific and technical outcome of the facility in the form of publications, which is usually regarded as a measure for the newly created scientific and technical knowledge. Publication in high-impact journals and high citation counts indicate a significant impact on the scientific community.

Compilation and analysis methods:

- Identify and report the (expected) annual number of scientific and technical publications in peer reviewed scientific journals.
- Identify and report the (expected) annual number of scientific and technical publications in high-impact journals.
- Identify and report the (expected) number of highly cited papers published in the previous (future) five years, their average citation count per year and their total citations. Identify and report also the average citation count per year and the total number of citations of the top ten papers published by facility researchers.
- Identify and report the (expected) annual number of other publications (e.g. technical notes, books, grey literature) by type.

Definitions and explanations:
High-impact journal refers to the journals with the top ten impact factors in a specific field. Since impact factors differ considerably between research fields, a suitable selection must be made for each study based on the relevant research fields. Please explain your selection.
Highly-cited paper refers to papers with more than 10 citations / year.
The impact factor of a journal for the year 2010 IF2010 is the number of citations C2010 achieved in 2010 of articles published in 2009 and 2008 divided by to the number of articles $A_{2009+2008}$ published in that journal during the years 2009 and 2008: $IF_{2010} = C_{2010}/A_{2009+2008}$.
Top ten papers are the ten papers published by facility researchers that received the highest total numbers of citations.

Data sources and collection methods:

- Analysis of internal databases or documents such as annual reports (mostly in ex-post studies)
- Analysis of secondary data from reference facilities such as annual reports or websites (mostly in ex-ante studies)
- Bibliometric analysis of external databases such as the ISI web of knowledge, Scopus, online scientific journals, etc. (ex-ante and ex-post - in the latter case for reference facilities)
- Expert interviews - e.g. scientific manager (ex-ante and ex-post)

Data analysis methods:

- Descriptive content analysis
- Case studies of reference RIs

References:
ISI Web of Science on http://thomsonreuters.com
Scopus Database on http://www.scopus.com/home.url

S+T.2.2: New scientific methods, experimental techniques, and software applications

Relevance:
This indicator describes the scientific and technical outcome of the facility in the form of new scientific methods, experimental techniques, and applications (e.g. software). These usually benefit the scientific community as they can lead to the opening of new research domains, advance the state of the art in existing domains, and promote thus the creation of new knowledge. They can also be used as the basis for developing innovative products.

Compilation:
- Identify and report the (expected) new research methods over a suitable time period (e.g. one or five years). Provide a description of the methods and their relevance (ex-post) or examples of possible new methods and their relevance (ex-ante).
- Identify and report the (expected) new experimental techniques over a suitable time period (e.g. one or five years). Provide a description of the techniques and their relevance (ex-post) or examples of possible new techniques and their relevance (ex-ante).
- Identify and report the (expected) new applications (e.g. software) over a suitable time period (e.g. one or five years). Provide a description of the applications and their relevance (ex-post) or examples of possible new applications and their relevance (ex-ante).

Definitions and explanations:
Research method refers to a framework of procedures applied in (theoretical or empirical) scientific research for a systematic investigation of phenomena in order to create new knowledge.
Experimental technique refers prevalently to scientific tools that include the application of technical scientific instrumentation. The development of new experimental techniques requires also the development of dedicated, new or improved scientific instrumentation.
Software application refers to methods such as mathematical models or simulations involving the use of specifically developed software.

Data sources and collection methods:
- Analysis of internal databases or documents such as annual reports (mostly in ex-post studies)
- Analysis of secondary data from reference facilities such as annual reports or websites (mostly in ex-ante studies)
- Expert interviews - e.g. scientific manager (ex-ante and ex-post)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference RIs
- Narratives

References:
None

S+T.2.3: New standards and procedures

Relevance:
This indicator describes new standards and procedures created by the facility. Better standards and procedures can raise the quality in area such as e.g. safety, health, sustainability or technical product performance and lead to benefits for internal workers and society in general.

Compilation:
- Identify and report the (expected) new standards and procedures over a suitable time period (e.g. one or five years). Provide a description of the standards and procedures and their relevance (ex-post) or examples of possible new standards and procedures and their relevance (ex-ante).

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of internal databases or documents such as annual reports (mostly in ex-post studies)
- Analysis of secondary data from reference facilities such as annual reports or websites (mostly in ex-ante studies)
- Expert interviews - e.g. scientific manager (ex-ante and ex-post)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference RIs
- Narratives

References:
None

S+T.2.4: New developed metadata

Relevance:
This indicator describes new metadata created by the facility. Efficient and well-structured metadata can facilitate the retrieval and use of existing information, lead to a better dissemination and application of new knowledge, improve the user service, create more efficiency and increase thus the impacts.

Compilation:
- Identify and report the (expected) newly developed metadata over a suitable time period (e.g. one or five years). Provide a description of the metadata and their relevance (ex-post) or examples of possible new metadata and their relevance (ex-ante).

Definitions and explanations:
Metadata refers to structured information that explains and supports the retrieval of data in data sources.

Data sources and collection methods:
- Analysis of internal databases or documents such as annual reports (mostly in ex-post studies)
- Analysis of secondary data from reference facilities such as annual reports or websites (mostly in ex-ante studies)
- Expert interviews - e.g. IT manager (ex-ante and ex-post)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference RIs
- Narratives

References:
None

How does the new facility contribute to innovation?

This category investigates, which intellectual property rights, new products and instrumentation, and new companies have been created due to the activities of the new facility and which future opportunities for the creation of innovations and innovative companies exist. Quantitative and qualitative indicators are suggested for this study. Project documents, internal and external databases, or secondary data from already operating comparable facilities as well as expert interviews may provide relevant information for this analysis of the facility's innovation outcome. The results are reported mostly in a descriptive or narrative way.

Indicators:

S+T.3.1: Intellectual property rights (IPR)
S+T.3.2: Instruments and products
S+T.3.3: Spin-offs and start-ups

S+T.3.1: Intellectual Property Rights (IPR)

Relevance:
This indicator describes intellectual property rights created by the facility. IPRs shows potential for innovations that can be developed and commercialised either by the facility itself or by potential industrial licensees.

Compilation:
- Identify and report the intellectual property rights owned by the facility and new applications submitted. Provide a description of the type of IPRs, their year of creation (grant or application), and their possible application (ex-post).
- Indicate also which IPRs are exploited by the facility itself and which IPRs are exploited by industrial licensees. In the latter case indicate also the obtained annual and total royalties (ex-post).
- Identify and report the intellectual property rights expected by the new facility. Provide a description of the type of IPRs, the expected quantity in a five years period, and their possible application areas (ex-ante).
- Indicate how possible IPRs are going to be exploited by the facility itself or by licensees and which royalties are expected (ex-ante).

Definitions and explanations:
Intellectual Property Right: Intellectual property refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce. IP is divided into two categories: Industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source; and Copyright, which includes literary and artistic works such as novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs... (WIPO)

Licensing occurs when a licensor grants exploitation rights over a patent to a licensee. A license is also a legal contract, and so it will set out the terms upon which the exploitation rights are granted, including performance obligations that a licensee must comply with (WIPO).

Data sources and collection methods:
- Analysis of internal databases or documents such as annual reports (mostly in ex-post studies)
- Analysis of secondary data from reference facilities as annual reports or websites (mostly in ex-ante studies)
- Expert interviews - e.g. industrial liaison officer (ex-ante, ex-post)
- Interviews with experts from reference facilities (ex-ante)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference RIs
- Narratives

References:
World Intellectual Property Organisation WIPO, on
http://www.wipo.int/about-ip/en
European Patent Office Database, on
http://t1.espacenet.com/advancedSearch?locale=en_T1

S+T.3.2: *Instruments and products*

Relevance:
This indicator describes new instruments and products developed as a result of the RI's activities. Innovative instruments and products are economic impacts from which the manufacturer - e.g. a collaborating company - and the applicant / customer benefit.

Compilation:
- Identify and report new instruments and products that have been developed as a result of the RI's activities during a suitable time period (e.g. one year, five years). Describe the instruments and products and explain how and by whom they are commercialised (ex-post; ex-ante if applicable). Include also instruments and products created in co-development activities with other R&D partners, suppliers or industrial collaborators.
- Identify and report new instruments and products that are expected to be developed as a result of the RI's activities during a suitable time period (e.g. one year, five years). Describe the instruments and products and explain how and by whom they are going to be commercialised (ex-ante). If no concrete ideas exist yet, identify and report which kinds of instruments and products might be developed by a RI of this type and how they might be commercialised in view of the relevant strategy of the facility.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of internal databases or documents such as annual reports (mostly in ex-post studies)
- Expert interviews - e.g. industrial liaison officer or technology transfer manager (ex-ante and ex-post)
- Analysis of secondary data from reference facilities as annual reports or websites (mostly in ex-ante studies)
- Interviews with suitable experts from reference facilities - e.g. industrial liaison officer or technology transfer manager (ex-ante and ex-post)

Data analysis methods:
- Descriptive content analysis
- Narratives
- Case studies of reference RIs

References:
None

S+T.3.3: Spin-offs and start-ups

Relevance:
This indicator describes the spin-offs or start-ups already created as well as the opportunities for creating further spin-offs or start-ups resulting from the facility's activities.

Compilation:
- Identify and report, which spin-offs and start-ups have already been created due to the activities of the (planned) RI (ex-ante and ex-post).
- Provide information about the activity field, number of created working places, annual turnover and trends, as well as growth perspectives of the spin-offs and start-ups (ex-ante and ex-post).
- Identify and report, which opportunities for the creation of further spin-offs and start-ups associated with the activities of the (planned) RI exist (ex-ante and ex-post).

Definitions and explanations:
Spin-off refers to a new company created by the (new) facility out of one of its activities and based on IPRs, new technologies, or products created by the (new) RI. The spin-off can involve also external partners.
Start-up refers to all other types of new companies created as a consequence of the (new) facility's activities, as e.g. new companies founded by employees of the (new) RI to exploit independently new knowledge and skills or by industrial partners to commercialise jointly owned IPRs or jointly developed innovations.

Data sources and collection methods:
- Interviews suitable experts involved in the project or the facility management (e.g. project coordinator, scientific manager, technology transfer / industrial liaison officer, etc.)
- Documents analysis, e.g. project proposal or annual reports
- Interviews with suitable experts from reference facilities (e.g. CEO) and/or managers from their spin-off / start-up companies
- Analysis of documents from reference facilities, as annual reports or reports of their spin-offs / start-ups

Data analysis methods:
- Descriptive content analysis
- Narratives

References:
None

How does networking and collaboration add to the creation of benefits?

This category explores the RI's networking and collaboration activities and the benefits obtained from networking and collaboration. The proposed techniques for this section are the analysis of internal documents and websites, interviews with internal and external experts, case studies of reference facilities based on an analysis of secondary data and expert interviews, a survey of (potential) networking partners, network analysis, descriptive content analysis, and narratives.

Indicators:

S+T.4.1: Strategy for networking and collaboration
S+T.4.2: Attracted research contracts & project funds
S+T.4.3: Guest scientists
S+T.4.4: Organised scientific events and participants
S+T.4.5: Major scientific networks
S+T.4.6: Major networks with industries
S+T.4.7: Regional R&D network

S+T.4.1: Strategy for networking and collaboration

Relevance:
This indicator describes the RI's general strategy for networking and collaboration, which influences the effects that may be obtained from this type of activities as well as the stakeholders who can benefit.

Compilation:
- Identify and report major aspects of the facility's strategy for networking and collaboration.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of internal documents such as strategic plans (ex-post studies) or project proposal (ex-ante)
- Expert interviews - e.g. CEO, project leader, scientific manager, industrial liaison officer (ex-ante and ex-post)

Data analysis methods:
- Descriptive content analysis

References:
None

S+T.4.2: Research contracts & project funds

Relevance:
This indicator describes the research contracts and project funds that have been attracted or are expected to be attracted by the RI. The attracted funds create general economic benefits by generating supplementary economic activities and working places. By funding new scientific activities they create also scientific benefits as e.g. new knowledge. Moreover they create benefits for the collaboration partners by fostering knowledge interaction, mutual learning and the joint use of capacities and capabilities.

Compilation:

- Identify and describe the research contracts awarded to the facility and projects funded or co-funded by external parties, the type of funding, the involved partners, and the budget. Report also the geographic provenience and type of the partners, the total monetary volume of the contracts and the volume of funds for the RI (mostly ex-post).
- Identify and describe what is expected by the project proposers or can be expected by examining similar projects with respect to research contracts and project funds concerning monetary volume, funders and possible project partners (ex-ante).

Definitions and explanations:
Geographic provenience: Distinguish between host region, host country, EU, other European countries, non-European countries. If required to understand the impacted regions better, use a more detailed description of the geographic provenience (e.g. name major collaboration countries)
Funding: Distinguish between regional, national, EU and industrial funding.
Types of partners: Distinguish between universities public R&D centres, industries, others.

Data sources and collection methods:

- Analysis of internal documents such as strategic plans, annual reports (ex-post studies) or project proposal (ex-ante)
- Expert interviews - e.g. CEO, project leader, scientific manager, industrial liaison officer (ex-ante and ex-post)
- Analysis of secondary data from reference facilities as annual reports or websites (mostly in ex-ante studies)
- Expert interviews at reference facilities - e.g. CEO, project leader, scientific manager, industrial liaison officer (ex-ante)

Data analysis methods:

- Descriptive content analysis
- Narratives
- Case studies of reference RIs

References:
None

S+T.4.3: Guest scientists

Relevance:
This indicator describes guest scientists hosted or expected at the facility. Longer-termed work visits are among the most efficient instruments for the transfer of skills and mutual learning, from which both involved parties benefit. These are initially guest scientist and their collaborators in the hosting facility, however through further steps of mutual learning also other scientists in the two collaborating institutions are likely to benefit on the longer term.

Compilation:

- Identify and report the number, provenience, and – if possible – the field of research of guest scientists hosted by the facility in a suitable period, e.g. one year or five years (mostly ex-post).
- Identify and report the number, host area, and – if possible – the field of research of facility scientists hosted by other institutions in a suitable period, e.g. one year or five years (mostly ex-post).
- Identify and describe how the exchange of scientists will be handled at the new RI and which countries or institutions might be involved. Describe also how many guest scientists can be expected at the RI in a suitable period (e.g. one year, five years) and how many scientists of the facility are likely to be hosted by other institutions (ex-ante).

Definitions and explanations:
Guest scientist refers to a scientist who is involved in the host institution's activities and stays there for a longer time period, indicatively between some months and a year, or alternatively several times for a couple of weeks. Users are not considered guest scientists.

Data sources and collection methods:

- Analysis of internal documents such as strategic plans, annual reports (ex-post studies) or project proposal (ex-ante)
- Expert interviews - e.g. CEO, project leader, scientific manager, industrial liaison officer (ex-ante and ex-post)
- Analysis of secondary data from reference facilities such as annual reports or websites (mostly in ex-ante studies)
- Expert interviews at reference facilities - e.g. CEO, project leader, scientific manager, industrial liaison officer (ex-ante)

Data analysis methods:

- Descriptive content analysis
- Narratives
- Case studies of reference RIs

References:
None

S+T.4.4: Organised scientific event and participants

Relevance:
This indicator describes the scientific events organised by the facility and the participants in these events. Such events are platforms to exchange, discuss, and validate scientific results and knowledge, develop new ideas and future projects, identify possible collaboration partners, and train scientists or students. They affect the possible impacts and are beneficial for internal and external scientists and technicians.

Compilation:

- Identify and report the number and type of organised scientific events in a suitable time period (e.g. one year, five years), the addressed audience, the number of participants, and their geographic provenience (ex-post).
- Identify and report the amount of funds (in €) annually invested in the organisation of scientific events.
- Identify and describe the RI project's approach concerning the organisation of scientific events. Report also the planned or expected frequency, type and size of events, their geographic impact and the addressed audience (ex-ante).
- Identify and report the amount of funds (in €) planned to be invested in the organisation of scientific events each year.

Definitions and explanations:
Types of events: Distinguish e.g. between conferences (different topics, many participants), workshops (a single specific topic, less participants), collaboration meetings, seminars (usually one speaker, local), schools (training purposes), others (if required, explain).
Audience: Distinguish e.g. between scientists, technical experts, and students and, if relevant, between participants from public research and industries.
Geographic provenience: Distinguish between internal / local events and events dedicated to participants from host region, host country, EU, other European countries, non-European countries. If required, use a more detailed description of the geographic provenience (e.g. name major participant countries)

Data sources and collection methods:

- Analysis of internal documents, e.g. annual reports, websites (ex-post studies) or project proposal (ex-ante)
- Expert interviews - e.g. CEO, project leader, scientific manager (ex-ante and ex-post)
- Analysis of secondary data from reference facilities such as annual reports or websites (mostly in ex-ante studies)
- Expert interviews at reference facilities - e.g. CEO, project leader, scientific manager (ex-ante)

Data analysis methods:

- Descriptive content analysis
- Narratives
- Case studies of reference RIs

References:
None

S+T.4.5: Major scientific networks

Relevance:
This indicator describes the facility's impacts on scientific networks. Important scientific networks to be considered can e.g. be the RI's user network, the network of similar RI facilities, and the RI's network of scientific partners. The impact may include the creation of new networks or effects of the facility on existing networks.

Compilation:
- Identify and describe the most important scientific network, in which the facility is involved and major effects of the facility on these networks and their impacts (ex-post).
- Identify and describe the most important existing scientific networks, in which the RI project might be involved in the future and the major effects that it is expected to have on these networks and their impacts (ex-ante).
- Identify and describe the most important new scientific networks that might be created by the RI project in the future and the major impacts expected from these networks (ex-ante).

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of internal documents, e.g. annual reports, websites (ex-post studies) or project proposal (ex-ante)
- Expert interviews - e.g. CEO, project leader, scientific manager, (potential) networking partners (ex-ante and ex-post)
- Bibliometric analysis of scientific publications (e.g. co-authorships, acknowledgements) from internal and external databases
- Survey of existing networks and networking possibilities based on questionnaire sent to potential networking partners (ex-ante and ex-post)
- Analysis of secondary data about existing networks and possible impacts from reference facilities such as annual reports or websites (mostly in ex-ante studies)
- Expert interviews at reference facilities about existing networks and possible impacts - e.g. CEO, project leader, scientific manager (ex-ante)

Data analysis methods:
- Network analysis
- Descriptive content analysis
- Narratives
- Case studies of reference RIs

References:
None

S+T.4.6: Major networks with industries

Relevance:
This indicator describes the facility's impacts on its industrial partners and other benefits from networking activities with companies. Important networks to be considered might be e.g. the RI's network of high-tech suppliers, the network of its spin-off companies, or the network of industrial R&D collaborators.

Compilation:
- Identify and describe the most important networks with industrial partners, in which the facility is involved, major effects of the facility on these networks, the most important impacts of the networks and the RI's contribution to these impacts (ex-post).
- Identify and describe the most important existing networks with companies (e.g. technology alliances), in which the RI project might be involved in the future, major impacts of these networks, and the most important effects that the RI is expected to have on these networks and on their impacts (ex-ante).
- Identify and describe the most important new scientific networks that might be created by the RI project in the future and the major impacts expected from these networks (ex-ante).

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of internal documents, e.g. annual reports, websites (ex-post studies) or project proposal (ex-ante)
- Interviews with internal experts - e.g. CEO, project leader, scientific manager, (ex-ante and ex-post)
- Bibliometric analysis of industrial patents and scientific papers (e.g. co-authorships, acknowledgements) from internal and external databases
- Expert interviews with potential industrial networking partners such as spin-offs or high-tech suppliers (ex-ante and ex-post)
- Analysis of secondary data about existing networks with companies and possible impacts from reference facilities (mostly in ex-ante studies)
- Expert interviews at reference facilities about existing networks and possible impacts - e.g. CEO, project leader, scientific manager (ex-ante)

Data analysis methods:
- Network analysis
- Descriptive content analysis
- Narratives
- Case studies of reference RIs

References:
None

S+T.4.7: Regional R&D network

Relevance:
This indicator describes the facility's impacts on the regional network of relevant R&D actors and other benefits from its (potential) networking activities with these partners.

Compilation:
- Identify and describe the network of the facility with the relevant R&D actors in the host region, major effects of the facility on this network, the most important impacts of this network and the RI's contribution to these impacts (ex-post).
- Identify and describe the network of the facility with the relevant R&D actors in the host region,, in which the RI project might be involved in the future, major impacts of this network, and the most important effects that the inclusion of the RI in this network is expected to have (ex-ante).

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of internal documents, e.g. annual reports, websites (ex-post studies) or project proposal (ex-ante)
- Expert interviews - e.g. CEO, project leader, scientific manager, (potential) regional networking partners (ex-ante and ex-post)
- Bibliometric analysis of scientific papers (e.g. co-authorships, acknowledgements) from internal and external databases
- Survey of existing regional networks and networking possibilities based on questionnaire sent to (potential) regional networking partners (ex-ante and ex-post)
- Analysis of secondary data about existing networks with companies and possible impacts from reference facilities (mostly in ex-ante studies)
- Expert interviews at reference facilities about existing networks and possible impacts - e.g. CEO, project leader, scientific manager (ex-ante)

Data analysis methods:
- Network analysis
- Descriptive content analysis
- Narratives
- Case studies of reference RIs

References:
None

What benefits does the RI create for its suppliers?

This category explores the benefits, which high-tech and low-tech suppliers obtain from the facility. Data collection is mostly based on the analysis of facility documents and secondary data from reference facilities as well as expert interviews with facility staff, staff from reference facilities, and representatives from suppliers involved in awarded supply contracts. Data analysis tools include descriptive content analysis, narratives, case studies of reference facilities and a micro-model ("CERN" model) to estimate the economic utilities for high-tech suppliers from contracts awarded by the facility.

Indicators:

S+T.5.1: Relevant industrial sectors and markets
S+T.5.2: Joint development with suppliers
S+T.5.3: High-tech contracts and utilities
S+T.5.4: Other benefits for high-tech suppliers
S+T.5.5: Low-tech contracts
S+T.5.6: Other benefits for low-tech suppliers

S+T.5.1: Relevant industrial sectors and markets

Relevance:
This indicator describes the industrial sectors and markets, which are relevant for the RI activities. These the sectors and markets that may e.g. benefit from the scientific and technological outcomes of the RI, the created research opportunities, the RI's high-tech contracts, the networking and collaboration activities, the scientific and analytical services, the creation of spin-offs, or the formation of highly-skilled workers.

Compilation:
- Identify and describe the relevant industrial sectors and markets, their characteristics and, if possible, their sizes in terms of turn-over and / or working places.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of project documents such as annual reports (ex-post) or project proposal (ex-ante)
- Interviews with the internal experts such as e.g. scientific manager, industrial liaison officer, or project manager
- Market analysis reports from external data sources such as e.g. European databases
- Analysis of secondary data from reference facilities (mostly ex-ante)
- Interviews with external experts from reference facilities (mostly ex-ante)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference facilities

References:
None

S+T.5.2: Joint development with suppliers

Relevance:
This indicator describes the joint development activities with high-tech supplier companies, which yield benefits in terms of mutual learning, a joint use of resources, capacities and skills, time savings, and others for both parties.

Compilation:
- Identify and describe the (planned) joint development activities conducted in a certain time period (e.g. five years) with high-tech suppliers (ex-ante and ex-post).
- Identify and describe the perceived benefits for both parties as reported by the collaborators.

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of facility documents such as annual reports (ex-post) or the project proposal (ex-ante)
- Interviews with experts from the collaborating partners involved in the (planned) joint development activities (ex-ante and ex-post)
- Analysis of secondary data such as annual reports from reference facilities (mostly ex-ante)
- Interviews with external experts from both parties involved in joint development activities at reference facilities (mostly ex-ante)

Data analysis methods:
- Descriptive content analysis
- Narratives
- Case studies of reference facilities

References:
None

S+T.5.3: High-tech contracts and utilities

Relevance:
This indicator describes the contracts awarded to high-tech suppliers during the construction and operation of the facility and further utilities from these contracts for the supplier companies.

Compilation:

- Identify and report the (expected) number and monetary volume (in €) of high-tech contracts – if possible by geographic location of the supplier – during the construction phase. If available, identify and report also the number of benefitting high-tech suppliers by geographic provenience (ex-ante and ex-post).
- If the "CERN" model for supplier utilities is assumed applicable for the considered RI type, estimate and report the total economic utilities in terms of increased turnover that may be achieved by the RI's high-tech suppliers according to this model (ex-ante and ex-post).
- If available, provide some examples in the form of narratives of benefits achieved by high-tech suppliers that contribute to the additional economic utilities, as e.g. penetration into new markets, higher quality standards, more marketing success, new or improved products, new skills etc. (mostly ex-post).
- Repeat the same procedure as explained above also for the high-tech contracts awarded during the operational phase and - if feasible - for major facility upgrades and RI decommissioning.

Definitions and explanations:
High-tech refers to supplies that use cutting edge technologies.
Geographic location: Distinguish between main areas such as host region, host country, EU countries, European non-EU countries, non European countries. If a more detailed break-down provides significant information, use that.

Data sources and collection methods:

- Analysis of internal documents and databases such as e.g. project proposal, financial documents, annual reports, contract database
- Interviews with internal experts such as e.g. purchasing manager or project coordinator, technical or scientific contact persons to specific high-tech suppliers
- Interviews with managers from high-tech suppliers involved in the contracts

Data analysis methods:

- Descriptive content analysis
- CERN model
- Narratives

References:
None

S+T.5.4: Other impacts on high-tech suppliers

Relevance:
This indicator describes other impacts on high-tech suppliers that have been identified during the assessment process and are not covered by the proceeding indicators.

Compilation:

- Report further (expected) impacts of the RI on its high-tech suppliers that have been distinguished during the impact evaluation process (ex-ante and ex-post).

Definitions and explanations:
High-tech refers to supplies that use technologies at the cutting edge.

Data sources and collection methods:

- Interviews with internal experts involved in high-tech supplier relationships such as purchasing managers, scientists or engineers
- Interviews with representatives from high-tech suppliers involved in contracts awarded by the facility
- Analysis of documents such as e.g. annual reports or project proposal

Data analysis methods:

- Descriptive content analysis
- Narratives

References:
None

S+T.5.5: Low-tech contracts

Relevance:
This indicator describes the contracts awarded to low-tech suppliers during the construction and operation of the facility and further utilities from these contracts for the supplier companies.

Compilation:
- Identify and report the (expected) number and monetary volume of low-tech contracts – if possible by geographic provenience of the supplier – during the construction phase. If available, identify and report also the number of benefitting low-tech suppliers by geographic provenience (ex-ante and ex-post).
- Identify and report the (expected) number and monetary volume of low-tech contracts – if possible by geographic provenience of the supplier – during the operational phase. If available, identify and report also the number of benefitting low-tech suppliers by geographic provenience (ex-ante and ex-post).
- If feasible, identify and report the (expected) number and monetary volume of low-tech contracts – if possible by geographic location of the supplier – for upgrading and/or decommissioning. If available, identify and report also the number of benefitting low-tech suppliers by geographic provenience (ex-ante and ex-post).

Definitions and explanations:
Low-tech refers to all types of supplies, which are not high-tech.
High-tech refers to supplies that use cutting edge technologies.
Geographic location: Distinguish between main areas such as host region, host country, EU countries, European non-EU countries, non European countries. If a more detailed break-down provides significant information, use that.

Data sources and collection methods:
- Interviews with internal experts involved in low-tech supplier relationships e.g. purchasing managers
- Interviews with representatives from low-tech suppliers involved in contracts awarded by the facility
- Analysis of documents such as e.g. annual reports or project proposal

Data analysis methods:
- Descriptive content analysis
- Narratives

References:
None

S+T.5.6: Other impacts on low-tech suppliers

Relevance:
This indicator describes other impacts on low-tech suppliers that have been identified during the assessment process and are not covered by the proceeding indicators.

Compilation:
- Report further (expected) impacts of the RI on low-tech suppliers that have been distinguished during the impact evaluation process (ex-ante and ex-post).

Definitions and explanations:
Low-tech refers to all types of supplies, which are not high-tech.
High-tech refers to supplies that use technologies at the cutting edge.

Data sources and collection methods:
- Interviews with internal experts involved in low-tech supplier relationships e.g. purchasing managers
- Interviews with representatives from low-tech suppliers involved in contracts awarded by the facility
- Analysis of documents such as e.g. annual reports or project proposal

Data analysis methods:
- Descriptive content analysis
- Narratives

References:
None

What additional economic impacts does the facility create?

Category S+T.6 explores other impacts of the facility on companies. The required information is collected through qualitative and quantitative indicators.

Indicators:

- S+T.6.1: Scientific and analytical services
- S+T.6.2: Customers and contracts
- S+T.6.3: Industrial use
- S+T.6.4: Revenues
- S+T.6.5: Joint R&D projects with industries
- S+T.6.6: Scientific papers cited in industrial patents
- S+T.6.7: Benefits from improved general services and infrastructures

S+T.6.1: Scientific and analytical services

Relevance:
This indicator describes the scientific and analytical services offered by the facility and their benefits for the customers.

Compilation:
- Identify and describe the scientific and analytical services offered by the facility to external customers and the benefits from these services for the customers. Examples in the form of narratives may be used to illustrate services and benefits (ex-ante and ex-post).

Definitions and explanations:
None

Data sources and collection methods:
- Analysis of facility documents (as e.g. annual reports, information materials about such services, project proposal) and websites
- Interviews with internal experts involved in such services, such as e.g. the industrial liaison officer or scientific and technical staff

Data analysis methods:
- Descriptive content analysis
- Narratives

References:
None

S+T.6.2: Customers and contracts

Relevance:
This indicator describes the facility's industrial customers and the contracts awarded to the facility by these customers.

Compilation:
- Identify and report the number and type of customers awarding or expected to award contracts to the facility in a suitable time period such as e.g. one year or five years (ex-ante, ex-post).
- Identify and report the (expected) types of contracts and their monetary volume (in €).
- Identify and report the number and type of customers awarding contracts to reference facilities in a suitable time period such as e.g. one year or five years (ex-ante).

Definitions and explanations:
None

Data sources and collection methods:
- Interviews with the project coordinator and/or other suitable experts involved in the project or the facility management (e.g. the project's scientific manager, HR manager, financial manager)
- Analysis of project proposal and/or other relevant project documents

Data analysis methods:
- Descriptive content analysis

References:
None

S+T.6.3: Industrial use

Relevance:
This indicator provides information about proprietary and non-proprietary industrial users and their firms.

Compilation:
- Identify and report the numbers and of (expected) proprietary and non-proprietary industrial users of the facility and the number of user firms involved in proprietary and non-proprietary research (ex-ante and ex-post).
- If possible, identify also the types of firms (SMEs or large enterprises) involved in such research activities, the large sectors in which they are operating, and their geographic provenience.

Definitions and explanations:
Industrial sector refers here to a class of companies with comparable products, e.g. chemicals, automotive, pharmaceuticals, electronics, precision instrumentation, semiconductors, food, oil, software, etc.
SME refers to companies with up to 250 employees / workers.
Large enterprise refers to companies with more than 250 employees / workers.

If significant for the discussion of the impacts, also a further breakdown and/or other classifications may be used.

Data sources and collection methods:
- Analysis of facility documents (e.g. annual reports, internal reports of involved facility departments, project proposal) and internal databases (e.g. user or proposal database)
- Interviews with internal experts (e.g. responsible of user office, industrial liaison officer, scientific manager)

Data analysis methods:
- Descriptive content analysis

References:
None

S+T.6.4: Revenues

Relevance:
This indicator describes the (expected) revenues from the commercial activities of the (new) RI. Revenues indicate that customers benefit from proprietary access, IPRs (licensing), products and technologies and/or other services of the facility to such an extent that they are willing to pay for them. The extra income achieved by the facility can support further activities and lead to additional benefits.

Compilation:

- Identify and describe major sources of revenues obtained or expected by the (new) RI (ex-ante and ex-post).
- Identify and report the revenues (in €) obtained or expected by the (new) RI, distinguishing between major categories such as proprietary use, scientific and analytical services, royalties from IPRs, and sales of products or components (ex-ante and ex-post).

Definitions and explanations:
Proprietary use or access refers to research for which the knowledge, technical data and inventions generated during the scientific work are treated as proprietary by the user. Results are not published in the open literature.
Intellectual Property Right: Intellectual property refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce. IP is divided into two categories: Industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source; and Copyright, which includes literary and artistic works such as novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs... (WIPO)
Licensing occurs when a licensor grants exploitation rights over a patent to a licensee. A license is also a legal contract, and so it will set out the terms upon which the exploitation rights are granted, including performance obligations that a licensee must comply with (WIPO).

Data sources and collection methods:

- Analysis of documents, e.g. project proposal or annual / financial reports
- Interviews with suitable experts involved in the project or the facility management (e.g. project coordinator, CEO, industrial liaison officer, etc.)
- Analysis of documents from reference facilities, e.g. annual or financial reports
- Interviews with suitable experts from reference facilities, e.g. CEO or industrial liaison officer

Data analysis methods:

- Descriptive content analysis
- Case studies of reference facilities

References:
World Intellectual Property Organisation WIPO, on
http://www.wipo.int/about-ip/en

S+T.6.5: Joint R&D projects with industry

Relevance:
This indicator describes joint R&D projects with industrial partners and their benefits.

Compilation:

- Identify and describe major (planned) research projects with companies. If data are available, report also about their funding, budgets, geographic provenience and types (SMEs or large enterprises) of involved industrial partners (ex-ante and ex-post).
- Report also the impacts of such projects. In order to illustrate the impacts, examples in the form of narratives about the perception of the project partners may be used (ex-ante and ex-post).
- In order to illustrate possible projects, major joint research projects of reference facilities with companies can also be used. If data are available, report also for such projects the details listed above (ex-ante).
- Report also the perceived / expected impacts of such projects, providing examples in the form of narratives (ex-ante).

Definitions and explanations:
Geographic provenience: Distinguish between host region, host country, EU, other European countries, non-European countries. If required, use a more detailed break-down.
Funding: Distinguish between funding by the industrial partner, the facility, and third parties. If required, make further distinctions (e.g. EC, regional, national).
SME refers to companies with up to 250 employees / workers.
Large enterprise refers to companies with more than 250 employees / workers.

If significant for the discussion of the impacts, also a further break-down and/or other classifications may be used.

Data sources and collection methods:

- Analysis of facility documents, e.g. annual reports, internal project reports, and project proposals, and internal databases, e.g. project database (ex-post studies)
- Expert interviews with internal staff and staff from industrial project partners (ex-post studies)
- Secondary data analysis of documents from reference facilities, e.g. annual reports, internal project reports, and project proposals, and internal databases, e.g. project database (ex-ante studies)
- Expert interviews with internal staff and staff from industrial project partners of reference facilities (ex-ante studies)

Data analysis methods:

- Descriptive content analysis
- Narratives
- Case studies of reference laboratories

References:
None

S+T.6.6: Scientific papers cited in industrial patents

Relevance:
This indicator describes the number of scientific papers published by researchers of the facility that have been cited in industrial patents. Such citations indicate that new knowledge created at the facility has been transferred to industries and used there in order to generate innovations.

Compilation:
- Identify and report the numbers of scientific papers published by researchers of the RI that have been cited in industrial patents during the last five years and in total since the RI project has been started, including the construction phase (ex-post; if relevant also in ex-ante studies, e.g. if construction has already started).
- Identify and report the numbers of scientific papers published by researchers of a suitable reference facility that have been cited in industrial patents during the last five years and in total since the project for the reference RI has been started, including the construction phase (ex-ante). Estimate on this basis how many citations in industrial patents may be expected from the new RI.

Definitions and explanations:
None

Data sources and collection methods:
- Interviews with suitable experts such as e.g. the facility's technology transfer manager or industrial liaison officer
- Bibliometric analysis of patents (databases of national patent office, EPO, WIPO etc.)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories

References (examples):
EPO, European Patent Office, on
http://www.epo.org
WIPO, World Intellectual Property Organisation, on
http://www.wipo.int/portal/index.html.en
USPTO, United States Patent and Trademark Office, on
http://www.uspto.gov
JPO, Japanese Patent Office, on
http://www.jpo.go.jp/index.htm

S+T.6.7: Benefits from improved general services and infrastructures

Relevance: This indicator describes the benefits that companies have from general services and infrastructures improved in the framework of the RI project. This includes e.g. IT services, financial services, waste treatment, transportation, and supply with energy of water. Compilation: • Identify and report the benefits for companies from better general services and infrastructures, which have been or will be improved in the framework of the RI project (ex-ante and ex-post). Definitions and explanations: None If significant for the discussion of the impacts, also a further breakdown and/or other classifications may be used. Data sources and collection methods: • Interviews with suitable experts involved in the project or the facility management (e.g. project coordinator, CEO, head of civil engineering, scientific manager, etc.) • Interviews with suitable experts from service providers (IT, energy, water, waste, private transportation, etc.) or public administrations (public transportation) Data analysis methods: • Descriptive content analysis • Narratives References: None	

Module Jobs: Work & Population

Module *Jobs* explores the potential socio-economic (SE) impacts of the RI project on the regional labour market and population, in each life stage of the RI – i.e. construction, operation, and decommissioning. It is divided into eight categories, covering data on issues such as general economic effect, directly and indirectly created working places, training, labour market and population. The necessary data are mainly collected through the analysis of documents and expert interviews. Further insight can be gained by examining the impacts of already operating facilities of a comparable type. For long-term impacts, also foresight techniques such as expert panels or trend analysis may be used.

Categories	**Methods**
• Jobs.1: Generated Economic Activity • Jobs.2: Directly Created Working Places • Jobs.3: Indirectly Created Working Places • Jobs.4: Training of Students • Jobs.5: Training of Scientists and Technicians • Jobs.6: General Staff Training • Jobs.7: Labour Market • Jobs.8: Population	• Document Analysis • Expert Interviews • Questionnaires / Surveys • Secondary Data Analysis • Descriptive Content Analysis • Trend analysis • Expert panel

How high is the economic activity generated by the RI through the purchase of goods and services?

This category explores the monetary value of the economic activity, which the RI generates by spending financial resources for the purchase of goods and services in the regional or national economy. A simple input-output (I/O) analysis is performed in order to assess the direct and indirect economic effects of the RI's purchases on the different sectors of the economy. In this analysis the indirect effect stems from the additional demand created by the RI's suppliers. Direct and indirect economic effects can be estimated for different phases of the project, as e.g. construction, operation, and decommissioning.

Indicator:

Jobs.1.1: Generated economic effect

Jobs.1.1: Generated economic effect

Relevance:
By spending money for goods and services, the RI is creating direct economic activity at the locations of its suppliers. Further indirect economic activity is created along the value chain by the increased demand of the suppliers, which need to purchase materials and goods from their suppliers in order to satisfy the RI's demand.
To estimate the economic effect achieved by a new economic actor in a given economy, "Input-Output tables" (I/O tables) are a common method. This model enables to assess the monetary flows between economic sectors to link the additional demand created by the new actor with its suppliers. This model can be used to estimate the economic effects of a (new) RI in a given region.

Compilation:

- Collect the national I/O tables for the host country. If most of the purchases are done in the host region and regional I/O tables are available, use the regional I/O tables.
- Collect the requested financial data, using the template Jobs.1.1.
- Perform the I/O analysis as described in the method fiche AnM.4 on input-output analysis, using the provided Excel template.
- Report the generated annual and total economic activity on the various sectors of the economy for the different project phases in monetary units (€). Calculate the sum of all phases, too. To assess the limitations of the results, explain also, which I/O tables have been used and which further assumptions have been made.

Definitions and explanations:
Since the model is based on the assumptions that the national and regional economic structures are equal, that the economic structure remained unchanged since the reference year of the applied tables, and that the economic fallouts occur at the regional or national level, the estimated effects have to be taken with care. They can however highlight the size of the effect.

Data sources and collection methods:

- National I/O tables: OECD on http://www.oecd.org/sti/inputoutput/; or: regional I/O tables (statistical offices, regional research institutes).
- Analysis of documents and internal databases, as financial documents, internal reports, procurement databases
- Interviews with internal purchasing or financial experts or project coordinator

Data analysis methods:

- I/O analysis (include link to Excel template here)
- Descriptive content analysis

References:
Miller R. and P.D. Blair, Input Output analysis: foundations and extensions, second edition, Cambridge University Press, 1985

Which jobs are directly created by the RI's activities?

Within the framework of this category the structure, quality and evolution of directly created jobs by the RI activities, as well as RI's spending on human resources involved in RI's activities and attractiveness of the working places created by RI, are investigated. For this purpose selected quantitative and qualitative indicators are proposed.

Indicators:

Jobs.2.1: HR by occupation category and gender
Jobs.2.2: HR by level of formal qualification
Jobs.2.3: Recruitment markets by occupation category
Jobs.2.4: Sectors of recruitment by occupation category
Jobs.2.5: Type of contract by gender and nationality
Jobs.2.6: Expected staff development (trend)
Jobs.2.7: Spending on HR by type of cost (€, % of budget)
Jobs.2.8: Attractiveness of working places and compensation

Jobs.2.1: HR by occupation category and gender

Relevance:
The indicator describes the occupation and gender structure of the HR involved in the RI's activities.

Compilation:
- Gather and report information about the RI staff by occupational category and gender. Use international standard occupational classifications (e.g. International Standard Classification of Occupations – ISCO, Frascati Manual) or updated national occupational classifications for this purpose.
- Report the number of monthly and annually created new jobs.
- Identify and report the evolution of the staff by occupational category in the near future as expected by the facility management.

Definitions and explanations:
The Frascati Manual distinguishes for R&D personnel between the occupation categories researchers, technicians and equivalent staff, and other supporting staff, defining them in the following way:
Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.
Technicians and equivalent staff are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences or social sciences and humanities. They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers. Equivalent staff performs the corresponding R&D tasks under the supervision of researchers in the social sciences and humanities.
Other supporting staff includes skilled and unskilled craftsman, secretarial and clerical staff participating in R&D projects or directly associated with such projects. (Remark: This includes also all managers and administrators dealing with financial and personnel matters)

Data sources and collection methods:
- Human Resources Department Reports
- Occupational structure simple forecasting

Data analysis methods:
- Human Resources Department Reports Analysis
- Estimation of occupational structure future evolution

References:
Eurostat, EU LFS User Guide,
http://circa.europa.eu/irc/dsis/employment/info/data/eu_lfs/lfs_main/lfsuserguide/EULFS_Database_UserGuide_2010.pdf
International Labour Organisation, ISCO-08,
http://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm
Frascati Manual, Proposed standard practice for surveys on research and experimental development, OECD, Paris 2002

Jobs.2.2: HR by level of formal qualification

Relevance:
The indicator describes the formal education attainment of the HR involved in the RI's activities.

Compilation:

- Gather and report information about the formal education level of the RI's personnel. Use the educational categories of ISCED 97 classification scheme (i.e. UNESCO's International Standard Classification of Education System).
- Report the educational structure of the annually created new jobs according to the ISCED 97 classification.
- Identify and report the evolution of the HR by educational level as expected by the facility management for the near future.

Definitions and explanations:
None

If significant for the discussion of the impacts, also a further breakdown and/or other classifications may be used.

Data sources and collection methods:

- Document analysis (reports of the HR department, internal databases on staff)
- Interviews with internal experts (such as the HR manager)

Data analysis methods:

- Descriptive analysis

References:
UNESCO, ISCED 97 classification scheme, on:
http://www.uis.unesco.org/TEMPLATE/pdf/isced/ISCED_A.pdf

Jobs.2.3: Recruitment markets by occupation category

Relevance:
The indicator describes the recruitment markets (geographic regions) on which the RI has searched for its staff for the different occupation categories.

Compilation:
- Group the RI's occupational categories according to the geographic areas on which the corresponding staff is recruited. Use international standard occupational classifications (e.g. International Standard Classification of Occupations – ISCO, Frascati Manual) or updated national occupational classifications for this purpose.
- Estimate how much further personnel must be recruited by the RI on the different markets in the future according to the planned personnel development scheme.

Definitions and explanations:
The Frascati Manual distinguishes for R&D personnel between the occupation categories researchers, technicians and equivalent staff, and other supporting staff, defining them in the following way:
Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.
Technicians and equivalent staff are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences or social sciences and humanities. They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers. Equivalent staff performs the corresponding R&D tasks under the supervision of researchers in the social sciences and humanities.
Other supporting staff includes skilled and unskilled craftsman, secretarial and clerical staff participating in R&D projects or directly associated with such projects. (Remark: This includes also all managers and administrators dealing with financial and personnel matters)
Recruitment markets: If possible, distinguish between recruitment on the regional, national, European and international (non-European) markets.

Data sources and collection methods:
- Document analysis (reports from the HR department, strategic documents)
- Occupational categories already compiled for the calculation of indicator Jobs.2.1
- Interviews with internal experts (such as the HR manager)

Data analysis methods:
- Descriptive analysis

References:
International Labour Organisation, ISCO-08,
http://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm
Frascati Manual, Proposed standard practice for surveys on research and experimental development, OECD, Paris 2002

Jobs.2.4: Sectors of recruitment by occupation category

Relevance:
The indicator describes the sectors from which the RI's personnel in the relevant occupation categories has been recruited.

Compilation:
- Group the RI's personnel by occupational categories and sector of provenance. Use international occupational classification schemes (ISCO-08, Frascati Manual) and a simple sectoral classification (see below) or the NACE rev.2 scheme for the sectors.

Definitions and explanations:
The Frascati Manual distinguishes for R&D personnel between the occupation categories researchers, technicians and equivalent staff, and other supporting staff, defining them in the following way:
Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.
Technicians and equivalent staff are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences or social sciences and humanities. They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers. Equivalent staff performs the corresponding R&D tasks under the supervision of researchers in the social sciences and humanities.
Other supporting staff includes skilled and unskilled craftsman, secretarial and clerical staff participating in R&D projects or directly associated with such projects. (Remark: This includes also all managers and administrators dealing with financial and personnel matters)
Sectoral provenance: If possible, distinguish between industries, universities, R&D institutes, and others. If a more detailed breakdown is desired the NACE Rev.2 classification may be used.

Data sources and collection methods:
- Document analysis (reports from the HR department, strategic documents)
- Occupational categories already compiled for the calculation of indicator Jobs.2.1
- Interviews with internal experts (such as the HR manager)

Data analysis methods:
- Descriptive analysis

References:
International Labour Organisation, ISCO-08,
http://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm

Frascati Manual, Proposed standard practice for surveys on research and experimental development, OECD, Paris 2002

Eurostat NACE rev. 2 classification scheme, on:
http://ec.europa.eu/eurostat/ramon/nomenclatures

Jobs.2.5: Type of contract by gender and nationality

Relevance:
The indicator describes the RI personnel by type of employment contract, broken down separately by gender and nationality.

Compilation:
- Gather information about the number of male and female workers by type of employment contract and report the results.
- Gather information and report about the number of national, EU, European (non-EU), and international (non-European) workers by type of employment contract. If relevant, highlight single countries from which an important number of staff members has been attracted or is going to be attracted.

Definitions and explanations:
Employment contract: Distinguish between main contract types that exist in the RI, such as permanent, fixed-term, project collaboration contract, scholarship. If a further classification (such as for example full-time / part-time or other working-time models) adds important insights, use (also) that.

Data sources and collection methods:
- Document analysis (reports from the HR department, strategic documents)
- Interviews with internal experts (such as the HR manager)

Data analysis methods:
- Descriptive analysis

References:
None

Jobs.2.6: Expected staff development (trend)

Relevance:
The indicator estimates the future evolution of the RI's HR based on the existing personnel and the RI's planning.

Compilation:
- Collect information about the staff development planned by the RI during the next years and on the long term. If relevant, distinguish between different phases such as construction, operation, upgrading, and decommissioning.
- If no detailed HR planning exists yet, collect the opinions of internal experts about the staff and skills that will be required during the next years and on the long term and the possibilities to recruit the necessary staff, taking into account the different factors that may influence the recruitment (such as availability on the market, financial resources, etc.).
- Aggregate the information to estimate the expected staff development and report the results.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (project proposal, reports from the HR department, strategic documents)
- Information about HR already collected before
- Interviews with internal experts (such as the HR manager, project coordinator)

Data analysis methods:
- Descriptive analysis
- Trend analysis

References:
None

Jobs.2.7: Spending on HR by type of cost (€, % of budget)

Relevance:
The indicator describes the RI's total and projected spending on HR by cost types in Euros and as a percentage of the RI's budget.

Compilation:
- Collect and report information about the RI's spending on HR by type of cost in Euros and as a percentage of the RI's budget.
- Use the data obtained for indicator Jobs.2.6 in order to project the future spending on HR. The distribution by cost type is computed as an extrapolation of the current HR spending structure, adjusted by the expected staff development trends. Report the results.

Definitions and explanations:
Personnel costs: According to OECD Glossary of Statistical Terms, "personnel costs are defined as the total remuneration, in cash or in kind, payable by an employer to an employee in return for work done by the latter during the reference period. Personnel costs also include taxes and employees' social security contributions retained by the unit as well as the employer's compulsory and voluntary social contributions".

Data sources and collection methods:
- Document analysis (project proposal, reports from the HR department, strategic documents, internal database on HR)
- Data on HR already collected before
- Interviews with relevant experts involved in the RI project or management (e.g. HR manager, project coordinator, etc.)

Data analysis methods:
- Descriptive analysis
- Trend analysis

References:
OECD Glossary of Statistical Terms,
http://stats.oecd.org/glossary/detail.asp?ID=2048

Jobs.2.8: Attractiveness of working places and compensation

Relevance:
The indicator describes the attractiveness of the working places and the specific compensations offered by the RI, in terms of recruitment administrative rules, employment contract conditions, comparative level of wages and other allowances, health insurance, unemployment compensation, pension scheme contribution, taxation, etc. Important non-financial factors of making the RI's working places more attractive are maintaining and enhancing employee competences.

Compilation:
- Gather data on average gross earnings for the relevant occupation categories at the RI and in the national and international average (EU or relevant member states). Collect also other information about the employment conditions at the RI that affect the attractiveness of the working places, such as other financial or non-financial benefits (contributions to social security and pension schemes, opportunities for skill development, career possibilities, job security, family support, etc.).
- If possible, gather data about the attractiveness of the working places as perceived by the RI staff and managers
- Compare the gross average earnings for all relevant occupation categories of the RI's personnel to the national and international averages.
- Analyse and discuss the collected information with respect to the attractiveness of the working places and report the results.

Definitions and explanations:
Attractiveness of working places offered by RI can be determined by examining both financial and non-financial factors.

Data sources and collection methods:
- Document analysis (such as project proposal, reports from the HR department, strategic documents, internal database on HR, etc.)
- Data on HR already collected before
- National and international statistical databases, such as Eurostat or OECD
- Interviews with relevant internal experts (e.g. HR manager, financial manager, project coordinator, employees etc.)

Data analysis methods:
- Descriptive analysis

References:
Eurostat (database on earnings), on:
http://epp.eurostat.ec.europa.eu/portal/page/portal/labour_market/earnings/database

How many jobs are indirectly created by the RI's activities?

The number of jobs, which are indirectly created or supported by the RI activities, is investigated in this category. Quantitative and qualitative indicators are proposed for this purpose. Generally I/O analysis can be applied in order to estimate the number of jobs in supplier companies created or ensured by the increased economic activity due to the RI's procurement. While the number of jobs created in spin-offs and start-ups can be assessed quantitatively, a more qualitative discussion is suggested to estimate the number of jobs created or ensured through the increased competitivity of high-tech companies.

Indicators:

Jobs.3.1: Jobs created by increased economic activity
Jobs.3.2: Jobs created in spin-offs or start-ups
Jobs.3.3: Jobs created or ensured through increased competitivity of high-tech companies

Jobs.3.1: Jobs created by increased economic activity

Relevance:
The indicator describes the number of jobs created or ensured by the supplementary economic activity, which is generated by both RI's procurement activities and employees' consumption. These jobs are an important benefit for the host region.

Compilation:

- Gather information about the total national economic employment by sector (OECD).
- Calculate the employment multiplier and the number of indirectly created jobs using the national I/O tables for the host country as described in the method fiche AnM.4 on input-output analysis, using the provided Excel template.
- Report the employment multiplier as well as the number of indirectly created or ensured jobs.

Definitions and explanations:
A better estimate might be achieved by including the employment explicitly in the I/O analysis. It is planned to upgrade the current I/O analysis tool of FenRIAM for this purpose at a later stage.
The limitations discussed for indicator Jobs.1.1 and in the method fiche for the I/O analysis refer also to this indicator.
Note however that the aim of applying this indicator in FenRIAM is to highlight the order of magnitude of the achieved effect on jobs and not an exact quantification!

Data sources and collection methods:

- National I/O tables:
- OECD on http://www.oecd.org/sti/inputoutput/;
- Eurostat on http://epp.eurostat.ec.europa.eu/portal/page/portal/esa95_supply_use_input_tables/data/workbooks
- or: regional I/O tables (statistical offices, regional research institutes)
- Total national economic employment by sector: OECD on http://stats.oecd.org/index.aspx?queryid=24862; or: regional I/O tables (statistical offices, regional research institutes).
- Generated economic activity as calculated by indicator Jobs.1.1.

Data analysis methods:

- I/O analysis (include link to Excel template here)
- Descriptive content analysis

References:

Miller R. and P.D. Blair, Input Output analysis: foundations and extensions, second edition, Cambridge University Press, 1985

Jobs.3.2: Jobs created in spin-offs and start-ups

Relevance:
The indicator describes the number of newly created jobs in spin-offs or start-ups, which have been set-up or are expected to be set-up due to the RI's activities. These jobs are an important benefit for the host region.

Compilation:
- Identify and report the number of jobs, which have already been created in spin-offs or start-ups as a consequence of the (planned) RI's activities.
- Identify and report, which opportunities for the creation of further jobs in spin-offs and start-ups associated with the activities of the (planned) RI exist (ex-ante and ex-post).

Definitions and explanations:
Spin-off refers to a new company created by the (new) facility out of one of its activities and based on IPRs, new technologies, or products created by the (new) RI. The spin-off can involve also external partners. *Start-up* refers to all other types of new companies created as a consequence of the (new) facility's activities, as e.g. new companies founded by employees of the (new) RI to exploit independently new knowledge and skills or by industrial partners to commercialise jointly owned IPRs or jointly developed innovations.

Data sources and collection methods:
- Interviews with suitable experts involved in the project or the facility management (e.g. project coordinator, scientific manager, technology transfer / industrial liaison officer, etc.)
- Interviews with suitable external experts (e.g. CEOs of spin-offs or start-ups)
- Documents analysis, e.g. project proposal, annual reports, reports of spin-offs and start-ups.
- Interviews with suitable experts from reference facilities (e.g. CEO) and/or managers from their spin-off / start-up companies
- Analysis of documents from reference facilities, as annual reports or reports of their spin-offs / start-ups

Data analysis methods:
- Descriptive content analysis
- Narratives

References:
None

Jobs.3.3: Jobs created or ensured through increased competitiveness of high-tech companies

Relevance:
The indicator describes the creation or increased security of jobs through more competitiveness of high-tech companies as a consequence of the activities of the (planned) RI.

Compilation:
- Collect and report examples for an increased competitivity of high-tech companies as a consequence of the RI's activities. Identify and report also the effects of the increased competitivity on the jobs in the companies.
- Collect and report examples for expected increases of the competitivity of high-tech companies as a consequence of the RI's activities in the future. Identify and report also the expected effects of the increased competitivity on the jobs in the companies.

Definitions and explanations:
OECD has two different approaches to high tech classification: sectoral and product (industry) ones. The sector approach classifies industries according their technology intensity, product approach according to finished products.

Data sources and collection methods:
- Interviews with internal experts (e.g. chief engineer, scientific manager, industrial liaison officer / technology transfer manager, project coordinator)
- Interviews with external experts (e.g. managers of high-tech suppliers, collaborating high-tech companies, user companies)
- Document analysis (e.g. stakeholder reports of high-tech suppliers, collaborating high-tech companies, user companies or annual reports of the RI)

Data analysis methods:
- Descriptive content analysis
- Narratives
- Competitiveness indexes

References:
OECD Sectoral High-tech Classification, in OECD Handbook on Economic Globalisation Indicators, 2005

Which possibilities for scientific training does the RI offer and who benefits?

This category explores the volume and target groups (i.e. master and PhD students and researchers) of training provided by the RI and the resources which the RI's invests in scientific training. For this purpose selected quantitative and qualitative indicators are proposed.

Indicators:

Jobs.4.1: Theses completed at the RI
Jobs.4.2: Nationality of trained students
Jobs.4.3: Scholarships for research training
Jobs.4.4: Resources for research training (staff, spending)
Jobs.4.5: Students participating in user experiments
Jobs.4.6: Events for students
Jobs.4.7: Teaching in universities

Jobs.4.1: Theses completed at the RI

Relevance:
The indicator describes the number and types of theses completed with research conducted at the RI.

Compilation:
- Gather information about the (expected) number of completed theses that include research conducted at the RI, broken down by type of thesis. Consider all types of theses for national and international higher education degrees.
- Report the results.

Definitions and explanations:
The indicator includes all theses based on research conducted at the RI, for example theses completed by RI staff members, students holding a scholarship from the RI, theses of RI users, theses of RI collaborators, theses of visiting scientists etc.
Higher education degree refers to graduations from ISCED 5 or higher levels.
Types of thesis can be for example bachelor theses, master theses, PhD theses or theses leading to comparable national degrees.

Data sources and collection methods:
- Document analysis (such as project proposal, annual reports, strategic documents, internal databases, etc.)
- Interviews with suitable internal experts (scientific manager, mentors of theses, beamline scientists, HR manager)
- Analysis of secondary data from reference facilities (such as annual reports or websites)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories

References:
UNESCO, ISCED 97 classification scheme, on:
http://www.uis.unesco.org/TEMPLATE/pdf/isced/ISCED_A.pdf

Jobs.4.2: Nationality of trained students

Relevance:
The indicator quantifies the distribution of the students trained at RI by nationality.

Compilation:

- Gather and report information about the number of students participating in the RI's training programmes grouped on nationality. Include all students in higher education programmes, such as bachelor, master and PhD students.
- To classify by nationality, use the large geographic areas home country, other EU countries, other European (non-EU) countries and non-European countries. If relevant, classify in a more detailed manner by single country or report nationalities with a high number of trained students separately.

Definitions and explanations:
Higher education refers to ISCED 5 or higher levels.

Data sources and collection methods:

- Document analysis (such as project proposal, reports from the HR department, strategic documents, internal database on HR, etc.)
- Interviews with suitable internal experts (scientific manager, mentors of theses, beamline scientists, HR manager)

Data analysis methods:

- Descriptive content analysis

References:
UNESCO, ISCED 97 classification scheme, on:
http://www.uis.unesco.org/TEMPLATE/pdf/isced/ISCED_A.pdf

Jobs.4.3: Scholarships for research training

Relevance:
The indicator describes the number and type of research training scholarships offered by the RI.

Compilation:
- Gather and report information about the number and type of scholarships for research training offered by the RI. Distinguish between scholarships for students at the pre-doctoral level, PhD students, post-docs, and senior researchers.

Definitions and explanations:
Research training: The primary objective of research training is to promote high quality training-through-research, both pre- and post-doctoral level, within the framework of high quality international research collaborations.

Data sources and collection methods:
- Document analysis (such as project proposal, annual reports, strategic documents, internal databases, etc.)
- Interviews with suitable internal experts (scientific manager, mentors of theses, beamline scientists, HR manager)

Data analysis methods:
- Descriptive content analysis

References:
None

Jobs.4.4: Resources for research training (staff and spending)

Relevance:
The indicator quantifies the human and financial resources allocated by the RI to research training activities.

Compilation:
- Gather information about the number of the RI personnel involved in research training activities, broken down by occupational category.
- Collect data on the volume of the RI's spending on research training activities by cost category.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (such as project proposal, annual reports, strategic documents, internal databases, etc.)
- Interviews with suitable internal experts (project coordinator, scientific manager, mentors of theses, beamline scientists, HR manager, financial manager)

Data analysis methods:
- Descriptive content analysis

References:
None

Jobs.4.5: Students participating in user experiments

Relevance:
The indicator aggregates the number of students participating in user experiments hosted by the RI.

Compilation:
- Gather and report information about the number and type of scholarships for research training offered by the RI. Distinguish between scholarships for students at the pre-doctoral level, PhD students, post-docs, and senior researchers.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (such as annual reports, internal databases, etc.)
- Interviews with suitable internal experts (scientific manager, beamline scientists, staff of the user office, etc.)
- Analysis of secondary data from reference facilities (such as annual reports or websites)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference facilities

References:
None

Jobs.4.6: Events for students

Relevance:
The indicator aggregates the number and type of events organised by the RI for university and upper secondary school students, the number of participants in these events, and their estimated impact.

Compilation:
- Gather and report information about the number and type of events for students from universities and upper secondary schools organised by the RI and the number of participating students.
- Collect information about the potential impact of these events as perceived or expected by the RI management. If possible collect and report also the perception of participating students and their teachers / professors.

Definitions and explanations:
Events are intended to popularise the RI's main achievements, to attract upper secondary school students to scientific disciplines and to attract university students from relevant disciplines to embrace R&D activities for their theses at the RI.
Estimating the potential impact of events means attempting to quantify the potential number of school students attracted to scientific studies and the potential number of university students attracted to conduct R&D activities for their theses at the RI.

Data sources and collection methods:
- Document analysis (such as annual reports, internal databases, PR documents, etc.)
- Interviews with suitable internal and external experts (scientific manager, beamline scientists, PR manager, HR manager, etc.)
- Analysis of secondary data from reference facilities (such as annual reports or websites)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference facilities

References:
None

Jobs.4.7: Teaching in universities

Relevance:
This indicator quantifies the number of staff members of the RI involved in teaching activities at universities. Staff teaching at universities is an important instrument to foster a high quality of education, supply students with knowledge about cutting edge research and inform them about research opportunities, popularise the RI's research results, and attract young researchers to the RI.

Compilation:
- Gather information about the number of employees from the RI involved in teaching activities at universities, according to formal contracts agreed with universities.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (such as annual reports, internal databases, HR documents, etc.)
- Interviews with suitable internal and external experts (project coordinator, scientific manager, HR manager, etc.)
- Analysis of secondary data from reference facilities (such as annual reports or websites)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference facilities

References:
None

How does the RI contribute to the scientific and technical skill development?

The indicators of this category capture the main features of the RI's strategy for scientific and technical skills development, describe to whom it is targeted and explore the expected impact from the scientific and technical training activities. Quantitative as well as qualitative indicators are proposed.

Indicators:

Jobs.5.1: Strategy for scientific and technical skill development
Jobs.5.2: Scientific and technical skill development activities
Jobs.5.3: Participants in scientific and technical skill development activities
Jobs.5.4: Expected impacts of scientific and technical skill development activities

Jobs.5.1: Strategy for scientific and technical skill development

Relevance:
This indicator captures the main features of the RI' strategy for a permanent scientific and technical skill development, which concerns both, the internal staff and the external academic community (such as fellow researchers, university faculty, users, etc.). Highly skilled workers for the labour market are an important output of the RI's activities from which companies as well as other scientific institutions may benefit.

Compilation:
- Gather and report information about the main objectives and priorities set for the scientific and technical skill development, the target groups of the activities and the expected results and impact.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (project proposal, strategic documents)
- Interviews with internal experts (such as project coordinator, CEO, HR manager, scientific manager, chief engineer, etc.)

Data analysis methods:
- Descriptive content analysis

References:
None

Jobs.5.2: Scientific and technical skill development activities

Relevance:
This indicator identifies the RI's specific training and skills development activities subsumed to the general objective of continuous scientific and technical skill development. The RI's scientific and technical training and skills development activities are the concrete specification of its scientific and technical skill development strategy described by indicator Jobs 5.1. They determine whether the defined objectives and the expected societal benefits can be achieved.

Compilation:
- Collect and report information on the taxonomy of the activities undertaken or planned within the RI for developing the scientific and technical skills (such as e.g. periodic training, specialised seminars, training of users, workshops and conferences, etc.).

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (project proposal, annual reports, internal reports on HR)
- Interviews with internal experts (such as project coordinator, CEO, HR manager, scientific manager, chief engineer, etc.)

Data analysis methods:
- Descriptive content analysis

References:
None

Jobs.5.3: Participants in scientific and technical skill development activities

Relevance:
This indicator quantifies the overall number of internal and external participants in the RI's scientific and technical skill development activities for each activity category.

Compilation:
- Collect and report the number of internal and external participants in the RI's scientific and technical skill development activities. Distinguish between the major training activities offered at the RI, such as periodically held training courses, specialised seminars, workshops and conferences, user training, etc. Count participants separately by skill development activity type and participant provenance (i.e. internal or external).

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (project proposal, annual reports, internal reports on HR)
- Interviews with internal experts (such as project coordinator, CEO, HR manager, scientific manager, chief engineer, etc.)

Data analysis methods:
- Descriptive content analysis

References:
None

Jobs.5.4: Expected impact of scientific and technical skill development activities

Relevance:
This indicator estimates the (expected) impact of the RI's scientific and technical skill development activities. This includes for example an increased scientific and technical competence of trained internal and external experts as well as the benefits for companies and other scientific institutes due to mobility of the trained persons.

Compilation:
- Collect and report information about the achieved or expected impacts of the RI's activities for scientific and technical skill development as reported or perceived by trainees, trainers, and employers. Consider the increased skills of internal staff as well as external experts, such as users, guest scientists, or external participants in training activities. Consider also the impact on current or future employers of the trained persons.

Definitions and explanations:
None

Data sources and collection methods:
- Interviews with internal and external experts (such as HR manager of the RI and potential other employers, coordinator of training activities, trainers, scientific manager, chief engineer, trained persons).

Data analysis methods:
- Descriptive content analysis
- Narratives

References:
None

How does the RI contribute to the skill development of its general staff?

Through the indicators of this category the main characteristics of the RI’s programmes of general staff training are captures, such as types of training programme, degree of involvement, annual costs of general training and expected impacts of the programmes. Selected quantitative and qualitative indicators are proposed.

Indicators:

Jobs.6.1: General training programmes
Jobs.6.2: General staff training intensity (hours, persons)
Jobs.6.3: Annual spending on general staff training
Jobs.6.4: Expected impact of general staff training

Jobs.6.1: General training programmes

Relevance:
This indicator describes the RI's general training programmes intended to enhance the specific competences of its staff or external participants.

Compilation:
- Collect and report information about the general training programmes of the RI divided by general purpose (type of skills to be developed) and target group.

Definitions and explanations:
General purpose of a programme may include the development of skills related to management, application of specific software, foreign or national languages, communication, project management, organisation, teamwork, teaching and training, multi-cultural issues, safety, work or activity related legislation, ecological issues, etc.
Target groups for general training programmes can be management staff, administrative staff, clerical staff, other support staff, trainers, scientists, technicians, foreign workers, users, industrial customers, etc.

Data sources and collection methods:
- Interviews with internal experts (such as project coordinator, HR manager, coordinator of training activities, trainers, trained persons).
- Document analysis (annual reports, internal reports on HR, etc.)

Data analysis methods:
- Descriptive content analysis

References:
None

Jobs.6.2: General staff training intensity

Relevance:
The quantitative indicator measures the training intensity of the general training programmes organised by the RI in a reference year (or period) expressed in person-hours per worker.

Compilation:
- Calculate and report the annual training activity in person-hours per worker. For this purpose divide the total number of person-hours of training dedicated to internal staff during the reference year by the total number of the RI's staff.
- Calculate and report also the percentage of the RI staff that participated in training programmes. For this purpose divide the total number of trained internal persons during the reference year by the total number of staff members.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (annual reports, internal reports on HR, etc.)
- Interviews with internal experts (such as project coordinator, HR manager, coordinator of training activities, trainers, trained persons).

Data analysis methods:
- Descriptive content analysis

References:
None

Jobs.6.3: Annual Spending on General Staff Training

Relevance:
This quantitative indicator computes the annual spending on general staff training. The indicator expresses the RI's financial effort to enhance and upgrade the general (not scientific and technical) competences of its staff.

Compilation:
- Gather and report information about the annual spending of the RI on general staff training (in €).

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (financial documents, internal databases, internal reports on HR, etc.)
- Expert interviews (project coordinator, HR manager, financial manager, etc.)

Data analysis methods:
- Descriptive content analysis

References:
None

Jobs.6.4: Expected Impact of General Staff Training

Relevance:
This indicator assesses the achieved or expected impacts of training programmes aimed at developing the general skills of the RI's staff.

Compilation:
- Collect and report information about the impacts of general training programmes as perceived or expected by the organisers (HR manager, coordinator of training programmes), managers of (potentially) benefitting departments or areas, and (potential) internal trainees.
- If impact evaluations of former equivalent training programmes are available, the results can be used to assess the impact of current or future programmes, taking changes into account.

Definitions and explanations:
Impacts include improved skills of workers as reported by the workers themselves or by their superiors, which can lead to an increased performance of a department or area and to improved outcomes from its activities.

Data sources and collection methods:
- Expert interviews (project coordinator, HR manager, coordinator of training programmes, managers of departments, trainees, etc.)
- Document analysis (internal evaluation reports of training programmes, strategic documents, etc.)

Data analysis methods:
- Descriptive content analysis

References:
None

What is the long-term impact of the RI on the regional labour market?

The objective of this category is to collect and present information about ling-term impacts of the RI project on the regional labour market. More specifically the selected indicators capture the long-term impacts on career possibilities, jobs and employment, quality of jobs and retributions. Due to the demographic impact of both, directly and indirectly created working places, this category is closely related to the categories Jobs.2 and Jobs.3. In order to obtain meaningful results it is highly important to investigate the labour market impact created by already operating facilities of a comparable size, type and structure. As an additional information source, a questionnaire - based survey can be carried out. Interviewees have to be selected from all stakeholder groups relevant to the long-term impact of the RI – such as e.g. national and regional public authorities, labour unions, associations of employers, etc. Also, the use of suitable foresight-based research methods is highly recommendable.

Indicators:

Jobs.7.1: Impact on career possibilities
Jobs.7.2: Long-term impact on jobs and employment
Jobs.7.3: Long-term impact on the quality of jobs
Jobs.7.4: Long-term impact on salaries

Jobs.7.1: Impact on career possibilities

Relevance:
This indicator estimates the long-term impact of the RI on the career possibilities of internal and external workers.

Compilation:

- Identify and report the career possibilities offered by the (new) RI as indicated by documents or databases of the facility itself and / or suitable reference facilities.
- Identify and report the career possibilities as perceived or expected by the RI management and staff of the facility itself and / or suitable reference facilities.
- Identify and report the career possibilities as perceived or expected by relevant external stakeholder groups.

Definitions and explanations:
Reference facility refers to already operating facilities comparable to the investigated RI with respect to a specific indicator. The analysis of data from such facilities may give hunts about what may be expected from the new RI.

Data sources and collection methods:

- Document analysis (project documents, internal reports about HR, internal databases, strategic documents, website: e.g. announced employment opportunities and news about newly appointed staff)
- Analysis of secondary data from reference facilities (annual reports, stakeholder accountability reports, internal databases, websites, etc.)
- Expert interviews (relevant RI executives, such as CEO or HR manager, staff members)
- Expert interviews with relevant executives from reference facilities
- Questionnaire-based survey of all relevant stakeholder groups, such as e.g. national and regional public authorities, local labour offices, labour unions, associations of employers, external scientists in relevant fields, etc.
- Foresight-based research methods (such as expert panels).

Data analysis methods:

- Descriptive content analysis
- Narratives
- Case studies of reference facilities.
- Foresight-based research methods (such as expert panels)

References:
None

Jobs.7.2: Long-term impact on jobs and employment

Relevance:
This indicator estimates the long-term impact of the RI on jobs and employment in the region.

Compilation:
- Review the collected data on directly and indirectly created jobs and their future development (categories Jobs.2 and Jobs.3).
- If not yet available, collect information about the expected development of the HR on the long term (year-by-year or whole operation period), considering also possible facility upgrades.
- If not yet available, assess the number of new jobs in the future created through the growth of existing and the set-up of new spin-offs / start-ups and through an increased competitivity of companies as a consequence of the RI's activities.
- Collect information about the expected future development of the RI's spending on supplies and services or make reasonable assumptions about it. Use these data and the employment multiplier (see category 3) to assess the number of indirectly created or supported jobs through the RI's future economic activity (year-by-year or whole operational phase).
- Combine the different estimates in order to achieve an estimation of the expected long-term impact of the RI on jobs and employment and report the results.

Definitions and explanations:
Reference facility refers to already operating facilities comparable to the investigated RI with respect to a specific indicator. The analysis of data from such facilities may give hunts about what may be expected from the new RI.

Data sources and collection methods:
- Data about directly and indirectly created working places already collected before; employment multiplier calculated before
- Document analysis (project documents, strategic documents about future HR development)
- Analysis of secondary data from reference facilities (reports, internal databases, websites, etc.)
- Expert interviews (e.g. CEO, HR manager, financial manager)
- Expert interviews with relevant executives from reference facilities
- Foresight-based research methods (such as expert panels).

Data analysis methods:
- Descriptive content analysis
- Case studies of reference facilities.
- Trend analysis
- Foresight-based research methods (such as expert panels)

References:
None

Jobs.7.3: Long-term impact on the quality of jobs

Relevance:
This indicator estimates the long-term impact of the RI on the quality of jobs in the region.

Compilation:

- Collect and report information about the RI's personnel by occupation category expected in the future and / or about the occupation structure of suitable reference facilities over time. Use international classification schemes (ISCO-08, Frascati Manual).
- Collect and report information about the RI's personnel by formal education expected in the future and /or about the education level of the staff of suitable reference facilities over time. Use the ISCED 97 classification scheme.
- Additional you may conduct a questionnaire-based survey or a foresight exercise to assess the RI's long-term impact on the quality of jobs expected by relevant external stakeholder groups.

Definitions and explanations:
The Frascati Manual distinguishes for R&D personnel between the occupation categories researchers, technicians and equivalent staff, and other supporting staff, defining them in the following way:
Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned.
Technicians and equivalent staff are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences or social sciences and humanities. They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers. Equivalent staff performs the corresponding R&D tasks under the supervision of researchers in the social sciences and humanities.
Other supporting staff includes skilled and unskilled craftsman, sec¬retarial and clerical staff participating in R&D projects or directly asso¬ciated with such projects. (Remark: This includes also all managers and administrators dealing with financial and personnel matters)

Data sources and collection methods:

- Document analysis (e.g. strategic documents on HR)
- Analysis of secondary data from reference facilities (annual reports, internal documents and databases, website)
- Interviews with internal experts (relevant RI executives, such as CEO, HR manager, scientific manager, chief engineer, etc.)
- Interviews with external experts from reference facilities (e.g. CEO, HR manager, scientific manager, chief engineer, etc.)
- Questionnaire-based survey of relevant stakeholder groups
- Foresight-based research methods (such as expert panels)

Data analysis methods:

- Descriptive content analysis
- Narratives
- Foresight-based research methods (such as expert panels)

References:
Frascati Manual, Proposed standard practice for surveys on research and experimental development, OECD, Paris 2002
UNESCO, ISCED 97 classification scheme, on:
http://www.uis.unesco.org/TEMPLATE/pdf/isced/ISCED_A.pdf

Jobs.7.4: Long-term impact on salaries

Relevance:
This indicator estimates the long-term impact of the facility on the structure (by occupation) and average level of salaries in the region. Consider that the level of incomes may be expected to change even without an RI being present in a region (baseline extrapolation). This indicator should be interpreted together with Life.4.2.

Compilation:
- Describe the average level of income in the region or local area before the construction of the RI and the variance if available.
- Use statistical data to estimate changes in the level of income of the population due to the introduction of the RI in the region. Consider the new population attracted by the RI as well as effects of the RI on the formerly existing incomes.
- Collect and report information about the long-term development of the structure and average salary level (by occupation) at the facility as expected by the management and the workers. Collect also their perception about how the facility influences the structure and level of salaries in the region on a longer term.
- If relevant information from reference facilities is available, use it to assess the possible long-term impact of this type of facility on the salary level and structure (by occupation) of the local population.
- A questionnaire-based survey or a foresight exercise may be used to gather the expectations of relevant external stakeholder groups concerning the RI's long-term impact on the salary level of the regional population.
- Compare the current and expected future salaries to those in the country and European Union and assess the results in terms of national and European cohesion.

Definitions and explanations:
Use international classification schemes of occupations (ISCO-08, Frascati Manual).
Reference facility refers to already operating facilities comparable to the investigated RI with respect to a specific indicator. The analysis of data from such facilities may give hints about what may be expected from the new RI.
Relevant external stakeholder groups are e.g. regional policy makers, labour unions, employer associations, regional research institutes and universities, regional companies etc.

Data sources and collection methods:
- Interviews with internal experts (such as HR manager)
- Interviews with external experts from reference facilities
- Questionnaire-based survey of relevant stakeholder groups
- Foresight-based research methods (such as expert panels).
- National and international statistical databases (Eurostat, OECD)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories
- Narratives
- Trend analysis
- Foresight-based research methods (such as expert panels)

References:
See next page!

Jobs.7.4: Expected trend in income and spending power

References: Frascati Manual, Proposed standard practice for surveys on research and experimental development, OECD, Paris 2002 Eurostat, Labour Force Statistics, on: http://epp.eurostat.ec.europa.eu/portal/page/portal/employment_unemployment_lfs/data/database Eurostat, Disposable income of private households by NUTS 2 regions: http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?p_product_code=TGS00026 Eurostat, Income and living conditions in Europe, on: http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-31-10-555 OECD, Labour Statistics, on: http://www.oecd.org/std/labour OECD, General Statistics, on: http://www.oecd-ilibrary.org/statistics OECD, Gross domestic income: http://stats.oecd.org/Index.aspx?DataSetCode=NAAG OECD, Gross domestic product: http://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE1 OECD, Household spending at constant US dollar: http://www.oecd-ilibrary.org/economics/household-spending-at-constant-us-dollars_2074384x-table15	

What is the long-term regional demographic impact of the RI?

The general objective of this category is to collect and present information about long-term impacts of the RI project on the regional population applying foresight techniques. The selected indicators capture the long-term regional population impact of the planned RI, in terms of age distribution, educational structure, wealth, and nationality composition of the regional population. Due to the demographic impact of the directly and indirectly created working places, this category is closely related to the categories Jobs.2 and Jobs.3. Important insights in demographic changes can be obtained by investigating the effects on the regional population of comparable existing facilities, which are already operating for a longer time. Additional information sources can be document analysis, expert interviews, surveys and foresight-based research methods.

Indicators:

Jobs.8.1: Long-term impact on age distribution
Jobs.8.2: Long-term impact on educational structure
Jobs.8.3: Long-term impact on wealth / social structure
Jobs.8.4: Expected population trend by nationality

Jobs.8.1: Long-term impact on age distribution

Relevance:
This indicator estimates the long-term impact of the RI on the age structure of the regional population. New jobs, high-quality education opportunities and better future perspectives may lead to a prospective inflow of people and counteract a migration of young people, changing the regional age distribution and the projected population trends.

Compilation:
- Collect information about the current and future age distribution of RI workers and other persons that live in the region or local environment (city, province) as a consequence of the RI activities.
- Estimate and report the effects of these persons on the age distribution of the local or regional population, using population data from national or international databases (e.g. Eurostat).
- If studies or relevant information from reference facilities are available, use these secondary data to assess the possible long-term impact of this type of facility on the age distribution of the population in the host region or local environment.
- A questionnaire-based survey or a foresight exercise may be used to gather the expectations of relevant external stakeholder groups concerning the RI's long-term impact on the age distribution of the regional population.

Definitions and explanations:
Use the geographic reference area most convenient in your case.
Other persons that live in the region (city, province) as a consequence of the RI's activities include workers with jobs indirectly supported or created by the RI, students attracted to local universities due to the RI, and potential migrants that remain in the region (city) due to the RI. They include also the family members of these persons.
Reference facility refers to already operating facilities comparable to the investigated RI with respect to a specific indicator. The analysis of data from such facilities may give hints about what can be expected from the new RI.

Data sources and collection methods:
- Document analysis (internal documents and databases, regional or local population statistics and projections, scientific studies)
- Secondary data from reference facilities (e.g. impact studies)
- Interviews with local experts (e.g. CEO, HR manager, experts from local administrations, affected employers)
- Interviews with experts from reference facilities (e.g. HR manager)
- Questionnaire-based survey (relevant stakeholder groups)
- Foresight-based research methods (such as expert panels)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference facilities
- Foresight-based research methods (such as expert panels)

References:
Eurostat (ageing characteristics and the demographic perspectives):
http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-SF-08-072
Eurostat (demography, migration, census population projections):
http://epp.eurostat.ec.europa.eu/portal/page/portal/population/data/database
Eurostat (population structure):
http://epp.eurostat.ec.europa.eu/portal/page/portal/income_social_inclusion_living_conditions/data/database

Jobs.8.2: Long-term Impact on Educational Structure

Relevance:
This indicator estimates the long-term impact of the RI on the educa¬tion structure of the regional population. New jobs requiring high ex¬pertise, high-quality education opportunities and good future per¬spec¬tives for highly skilled workers may cause an inflow of people and counteract a migration of young people with a high edu¬ca¬tion level, changing the education structure of the regional population.

Compilation:

- Collect information about the formal qualification of RI workers and other persons that live in the region (city, province) as a consequence of the RI activities.
- Estimate and report the effects of these persons on the education structure of the local or regional population, using population data from national or international databases (e.g. Eurostat).
- If relevant information from reference facilities is available, use it to assess the possible long-term impact of this type of facility on the education structure of the local or regional population.
- A questionnaire-based survey or a foresight exercise may be used to gather the expectations of relevant external stakeholder groups concerning the RI's long-term impact on the education structure of the regional population.

Definitions and explanations:
Use the geographic reference area most convenient in your case.
Other persons that live in the region (city, province) as a consequence of the RI's activities include workers with jobs indirectly supported or created by the RI, students attracted to local universities due to the RI, and potential migrants that remain in the region (city) due to the RI. They include also the family members of these persons.

Reference facility refers to already operating facilities comparable to the investigated RI with respect to a specific indicator. The analysis of data from such facilities may give hints about what can be expected from the new RI.

Data sources and collection methods:

- Document analysis (internal documents and databases, regional or local population statistics, scientific studies)
- Secondary data from reference facilities (stakeholder accountability reports, internal databases, impact studies)
- Interviews with local experts (e.g. CEO, HR manager, experts from local administrations, affected employers)
- Interviews with experts from reference facilities (e.g. HR manager)
- Questionnaire-based survey (relevant stakeholder groups)
- Foresight-based research methods (such as expert panels)

Data analysis methods:

- Descriptive content analysis
- Case studies of reference facilities
- Foresight-based research methods (such as expert panels)

References:
Eurostat, Regional data on regional educational attainment and other non-finance regional data relation to education
http://epp.eurostat.ec.europa.eu/portal/page/portal/education/data/database
Eurostat, Population structure,
http://epp.eurostat.ec.europa.eu/portal/page/portal/income_social_inclusion_living_conditions/data/database

Jobs.8.3: Long-term impact on wealth

Relevance:
This indicator estimates the long-term impact of the RI on the regional (local) average level and distribution of income by age group. New jobs with a high retribution level, an inflow of people with high exper¬tise and a lower migration of highly educated residents may change the wealth of the regional population.

Compilation:

- Collect information about the average level and distribution of income by age group of the RI workers and other persons that live in the region (city, province) as a consequence of the RI activities.
- Estimate and report the effects of these persons on the wealth distribution of the local or regional population, using population data from national or international databases (e.g. Eurostat).
- If relevant information from reference facilities is available, use it to assess the possible long-term impact of this type of facility on the wealth of the population in its host region or local environment.
- A questionnaire-based survey or a foresight exercise may be used to gather the expectations of relevant external stakeholder groups concerning the RI's long-term impact on wealth in the region.

Definitions and explanations:
Use the geographic reference area most convenient in your case.
Wealth: In the OECD glossary of statistical terms (see references), "National wealth is the sum, for the economy as a whole, of non-financial assets and net claims on the rest of the world." This definition can be transferred to the regional level.
Other persons that live in the region (city, province) as a consequence of the RI's activities include workers with jobs indirectly supported or created by the RI, students attracted to local universities due to the RI, and potential migrants that remain in the region (city) due to the RI.

They include also
Reference facility refers to already operating facilities comparable to the investigated RI with respect to a specific indicator. The analysis of data from such facilities may give hints about what can be expected from the new RI.
Data sources and collection methods:

- Document analysis (internal documents and databases, regional or local population statistics, scientific studies)
- Secondary data from reference facilities (e.g. impact studies)
- Interviews with local experts (e.g. CEO, HR manager, experts from local administrations, affected employers)
- Interviews with experts from reference facilities (e.g. HR manager)
- Questionnaire-based survey (relevant stakeholder groups)
- Foresight-based research methods (such as expert panels)

Data analysis methods:

- Descriptive content analysis
- Case studies of reference facilities
- Foresight-based research methods (such as expert panels)

References:
OECD on national wealth (see Definitions and explanations):
http://stats.oecd.org/glossary/detail.asp?ID=1743
Eurostat, Data on population structure,
http://epp.eurostat.ec.europa.eu/portal/page/portal/income_social_inclusion_living_conditions/data/database
Eurostat, Data on distribution of income and living conditions,
http://epp.eurostat.ec.europa.eu/portal/page/portal/income_social_inclusion_living_conditions/data/database
Other Eurostat statistics can be used to indicate wealth:
http://epp.eurostat.ec.europa.eu/guip/themeAction.do

Jobs.8.4: Expected population trend by nationality

Relevance:
This indicator estimates the long-term impact of the RI on the regional or local population structure by nationality. New jobs requiring high expertise, high-quality education opportunities and good future perspectives for highly skilled workers may cause an inflow of people from other countries and change the population structure by nationality.

Compilation:
- Collect information about the nationality of the RI workers and other persons living in the region (city, province) as a conse¬quence of the RI activities.
- Estimate and report the effects of these persons on the distribution of the local or regional population by nationality, using population data from national or international databases (e.g. Eurostat).
- If relevant information from reference facilities is available, use it to assess the possible long-term impact of this type of facility on the distribution of the regional or local population by nationality.
- A questionnaire-based survey or a foresight exercise may be used to gather the expectations of relevant external stakeholder groups concerning the RI's long-term impact on the composition of the regional or local population by nationality.

Definitions and explanations:
Use the geographic reference area most convenient in your case.
Other persons that live in the region (city, province) as a consequence of the RI's activities include workers with jobs indirectly supported or created by the RI, students attracted to local universities due to the RI, and potential migrants that remain in the region (city) due to the RI. They include also the family members of these persons.
Reference facility refers to already operating facilities comparable to the investigated RI with respect to a specific indicator. The analysis of data from such facilities may give hints about what can be expected from the new RI.

Data sources and collection methods:
- Document analysis (internal documents and databases, regional or local population statistics, scientific studies)
- Secondary data from reference facilities (e.g. impact studies)
- Interviews with local experts (e.g. CEO, HR manager, experts from local administrations, affected employers)
- Interviews with experts from reference facilities (e.g. HR manager)
- Questionnaire-based survey (relevant stakeholder groups)
- Foresight-based research methods (such as expert panels)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference facilities
- Foresight-based research methods (such as expert panels)

References:
Eurostat data on
i) national and regional demography;
ii) international and regional migration;
iii) national and regional census; national and regional population projections
http://epp.eurostat.ec.europa.eu/portal/page/portal/population/data/database
Eurostat, Regional migration statistics,
http://epp.eurostat.ec.europa.eu/portal/page/portal/population/data/database

Module Life: Quality of Life

This module supports the collection, analysis and presentation of indicators to describe the impacts of the RI on essential features of quality of life in the region. The module consists of four categories: health (services), education, regional culture, and wealth and social cohesion of the regional population. The required information is mainly collected through interviews with experts and general population as well as through reference samples. Interview partners may be regional administrators, medical doctors, sports club managers, teachers, parents, management of concert halls, etc.; and the general population.
The majority of information is descriptive and helps to identify potential impacts and opportunities as well as risks and threats. This may be of importance for the management of the RI project and/or the RI itself as negative processes can be avoided by an early detection of risks and adequate responses to potentially negative developments in society.

Categories	**Methods**
• Life.1: Health • Life.2: Education • Life.3: Culture • Life.4: Wealth, Lifestyle, and Social Cohesion	• CoM.1: Document Analysis • CoM.2: Expert Interviews • CoM.4: Secondary Data Analysis • AnM.1: Descriptive Content Analysis • AnM.2: Case Studies of Reference Laboratories • AnM.3: Narratives / Stories • AnM.13: Trend Analysis

Which influence does the RI have on provision of health services?

This category explores the possible impacts of the RI on health care services provided to citizens. It includes a change in the demand and service quality as well as new possibilities to improve health care services, benefits for society in general and impacts on health care workers. Even if research conducted in the RI does not – directly or indirectly – refer to health care, there may be impacts on this sector by other means, e.g. increased demand in quantity or quality. Health care services include hospitals, pharmacies, consultancies, etc. The information is mainly gathered by qualitative methods.

Indicators:

Life.1.1: New or improved medical instrumentation, diagnostics, and treatments
Life.1.2: Benefits for society
Life.1.3: Significant additional demand on health care
Life.1.4: Impact on health care workers (skills, working conditions, patient security, ...)
Life.1.5: Changes in health care infrastructures and service quality

Life.1.1: New or improved medical instrumentation, diagnostics, and treatments

Relevance:
The indicator describes the contribution of the RI to improvements or new developments of instrumentation, diagnostics or treatments in health care.

Compilation:
- Identify and report research conducted or to be conducted in the RI that is directly related to health care.
- Identify and report research conducted or to be conducted in the RI that may have direct or indirect impacts onto health care, even if not primarily conducted with this purpose.
- Describe application scenarios of research results in health care.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (RI project proposal, annual reports, scientific publications etc.)
- Interviews with scientists and/or scientific managers of the RI (if already operating) or scientific staff involved in the project proposal
- Secondary data analysis from reference facilities (e.g. SE impact reports, annual reports, publication databases)

Data analysis methods:
- Descriptive content analysis

References:
None

Life.1.2: Benefits for society

Relevance:
The indicator explores benefits in health care for society, generated by the RI, using also quantitative measures. The quantitative description of health care benefits may include numbers of concerned patients, saved days of sick leave, saved health costs, or increased life expectancy.
Remark: These impacts may often be indirect. The logic behind estimation and description of impacts needs to be outlined.

Compilation:
- Identify and report activities of the RI that support or have lead to the application of research results in health care.
- Outline how the wider society benefits from the RI activities. For a quantitative assessment, report for example, how many patients are affected each year by an illness and will benefit from the obtained improvements in instrumentation, diagnostic and treatments. Collect expert opinions on how many days of illness and sick leave from work can be saved per patient. Collect statistical data about the cost-of-illness for each day of disease and calculate on this basis the health costs that can be saved. If expert estimations are available report also the increase in life expectancy of the patients that may be obtained.

Definitions and explanations:
Society here refers to citizens in general, independent of their relationship to scientific communities.

Data sources and collection methods:
- Document analysis (impact studies on relevant health issues, statistical information on health, e.g. from WHO or Eurostat, scientific publications)
- Interviews with scientists and/or scientific managers of the RI (if already operating) or scientific staff involved in the project proposal
- Secondary data analysis from reference facilities (e.g. SE impact reports, annual reports, publication databases)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories
- Narratives

References:
WHO Global Health Observatory, on
http://www.who.int/gho/en/
Eurostat Health Statistics, on:
http://epp.eurostat.ec.europa.eu/portal/page/portal/health/public_health/data_public_health/database

Life.1.3: Significant additional demand on health care

Relevance:
The indicator describes the demand on health care services generated by the RI, directly or indirectly. It refers to quantitative (more, less) as well as qualitative (new services) demand.

Compilation:
- Identify and report demand on the quantity of health care services, e.g. more beds required in hospitals, an increased need for out-patient visits, or an increases regional spending on health care due to an increase in population generated by the RI.
- Identify and report qualitative demand, e.g. multi-language personnel in hospitals.

Definitions and explanations:

If possible, the quantitative evaluations should be based on the estimated total increase of the population, which includes also family members, workers on indirectly created working places, and students attracted to the region.

The quantities may be calculated by multiplying the statistical average per capita by the number of persons attracted to the region or local environment (province, city).

Data sources and collection methods:
- Analysis of documents such as the project proposal
- Analysis of regional or national health care statistics (e.g. from national databases, OECD, WHO, or Eurostat)
- Interviews with RI management or RI project staff
- Secondary data analysis from reference facilities (e.g. SE impact reports)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories

References:
WHO Global Health Observatory, on
http://www.who.int/gho/en/
Eurostat Health Statistics, on:
http://epp.eurostat.ec.europa.eu/portal/page/portal/health/public_health/data_public_health/database

Life.1.4: Impact on health care workers

Relevance:
The indicator describes effects the RI has on health care workers, e.g. on required skills, on the provision of training programmes, working conditions, patient security, etc.

Compilation:
- Use results from indicator Life.1.3 to identify and report requirements for health care services.
- Describe how the requirements on services translate into requirements for health care workers (capabilities, skills, availability, etc.).
- Describe the implications of those requirements on training, working hours, selection of personnel in health care, etc.

Definitions and explanations:
None

Data sources and collection methods:
- Interviews with health care managers, workers, and other suitable experts in the field
- Secondary data analysis from reference facilities (e.g. SE impact reports)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories
- Narratives

References:
None

Life.1.5: Changes in health care infrastructure

Relevance:
The indicator describes effects the RI has on health care infrastructures, e.g. on provision of training facilities, architecture, communication, data handling, etc.

Compilation:
- Use results from indicator Life.1.3 to report requirements for health care services
- Use results from indicator Life.1.4 to report requirements for health care workers
- Describe how the requirements on services and workers translate into requirements for health care infrastructure (provision of training facilities, communication facilities, etc.).

Definitions and explanations:
None

Data sources and collection methods:
- Interviews with health care management and workers
- Secondary data analysis from reference facilities (e.g. SE impact reports)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories

References:
Use Eurostat statistics, e.g. practicing dentists, etc. for baseline description, on:
http://epp.eurostat.ec.europa.eu/portal/page/portal/product_results/search_results?mo=containsall&ms=health+care&saa=&p_action=SUBMIT&l=us&co=equal&ci=,&po=equal&pi=,

How do educational institutions and services need to change with the RI?

The effect of the RI on education in schools and other educational organisations is investigated in this category. It includes demand for education in amount and quality, and impacts of RI activities on education. Data acquisition is mainly done by interviews and document analysis. Statistical data on existing educational services may serve as a baseline.

Indicators:

Life.2.1: Significant additional demand for education
Life.2.2: Changes of education infrastructures and services
Life.2.3: Particular challenges for the education system
Life.2.4: Challenges on the skills of teachers
Life.2.5: RI activities for schools, and expected impacts

Life.2.1: Significant additional demand for education

Relevance:
The indicator describes increased demand on education, in the quantitative and qualitative aspects. It refers to schools, educational institutes, but not Universities or other institutions where education is closely linked to research. (Those are covered in the module on Science and Technology.)

Compilation:
- Identify and report the (quantitative) demand for education generated by the RI, e.g. more children in schools due to concentration of young and middle-aged adults, working in the RI.
- Identify and report qualitative demand for education, e.g. more language skills, availability of English schools and national language courses for foreign RI workers.

Definitions and explanations:
If possible, the quantitative evaluations should be based on the estimated total increase of the population, which includes also family members, workers on indirectly created working places, and students attracted to the region.

Data sources and collection methods:
- Analysis of documents such as the project proposal or documents and databases of the HR department
- Expert interviews (HR manager, other staff of the HR department)
- In case of ex-post evaluation: Interviews with directors of schools, education experts in public administration
- Secondary data analysis from reference facilities (e.g. SE impact reports)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories

References:
Use Eurostat statistics (or comparable), e.g. number of foreign languages learnt per pupil, on:
http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?p_product_code=TPS00056

Life.2.2: Changes of education infrastructures and services

Relevance:
The indicator describes the need to adapt existing education infrastructure and services to the requirements generated by the RI. It is based on the description of demand from indicator Life.2.1.

Compilation:
- Deduce requirements for education infrastructure and services from results of Life.2.1. Consider quantitative and qualitative changes or a combination, e.g. one more international school in the town where the RI is located or additional English-speaking classes in an already existing international school, the possibilities to get international high-school diplomas, offer of English-speaking music or physical education, etc.
- Identify and report gaps between the existing and needed education infrastructure and services.

Definitions and explanations:
None

Data sources and collection methods:
- Results from Life.2.1
- Document analysis of information on existing education infrastructure and services
- Interviews with education experts, such as directors of schools, with mayors, etc.

Data analysis methods:
- Descriptive content analysis
- Gap analysis

References:
None

Life.2.3: Particular challenges for the education system

Relevance:
The indicator describes particular challenges for the education system that are not covered with other indicators (e.g. Life.2.2). This may be due to very special requirements from the RI.

Compilation:
- Identify and report particular challenges for the education system that have not been described in Life.2.2 or specify special aspects of the required changes reported there.

Definitions and explanations:
None

Data sources and collection methods:
- Results from Life.2.1
- Interviews with RI (project) managers and education experts (such as directors of schools), education experts from public administrations, etc.
- Analysis of secondary data from already operating reference facilities (or other institutions with relevant experiences) in comparable situations

Data analysis methods:
- Descriptive content analysis
- Case studies of reference facilities or other institutions with relevant experiences

References:
None

Life.2.4: Challenges on the skills of teachers

Relevance:
The indicator describes the need to adapt the skills of teachers to the new requirements resulting from the RI, directly or indirectly.

Compilation:
- Deduce requirements for the skills of teachers from results of Life.2.1, e.g. language skills, skills on integration of children with different cultural backgrounds, and different educational backgrounds.
- Identify and report gaps between the existing skills and (future) challenges resulting from the RI.

Definitions and explanations:
None

Data sources and collection methods:
- Results from Life.2.1
- Interviews with RI (project) managers and educational experts, such as directors of schools, and teachers
- Analysis of secondary data from already operating reference facilities (or other institutions with relevant experiences) in comparable situations

Data analysis methods:
- Descriptive content analysis
- Gap analysis
- Case studies of reference facilities or other institutions with relevant experiences

References:
None

Life.2.5: RI activities for schools, and expected impacts

Relevance:
The indicator describes the activities of the RI for schools, institutes, and other educational institutions, as well as the expected impacts of those activities.

Compilation:
- Identify and report the activities the RI plans to do or already does for schools, institutes, etc.
- Report the achieved or expected impacts.
- Identify and report pre-conditions for the activities to be successful, e.g. cooperation of local administration.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (project proposal and/or related documents, action plans on activities, annual reports, newspaper articles, etc.)
- Expert interviews (RI staff or the RI project team members, public relations officer, marketing manager, teachers and students of participating schools, etc.)

Data analysis methods:
- Descriptive content analysis

References:
None

How does the RI change cultural life and diversity in a community

This category takes a look at the cultural life in the zone of influence of the RI. Introducing people with different cultural background or cultural interests may lead to new demand, changes, fears, diversity, etc. The category includes the cultural infrastructure as well as socio-cultural changes; attitudes as well as fears and behaviour.

Indicators:

Life.3.1: Changes in cultural diversity
Life.3.2: Effects on socio-cultural skills, language skills, fears, attitudes and behaviours
Life.3.3: Activities to foster public awareness
Life.3.4: Significant additional demand on cultural institutions and services
Life.3.5: Changes of cultural infrastructure and services

Life.3.1: Changes in cultural diversity

Relevance:
The indicator describes the (anticipated) changes in cultural diversity, introduced by the RI. Researchers from all over the world may stay for a while or long time in the community where the RI is located, bringing their backgrounds, interests, etc.

Compilation:

For RI projects:

- Describe the current cultural diversity of homogeneity in the area where the RI is or will be located. If useful, consider statistics on migration.
- Collect and report information about the direct and indirect, national and international immigration expected as a consequence of the new RI and the cultural origin of the expected immigrants.
- Collect and report information about the effects of these changes on the local or regional culture as expected by different stakeholder groups (such as project proposers, scientific experts, and local population)

For existing RI:

- Identify and report changes in cultural diversity that have been introduced with the RI. For this purpose collect data about the direct and indirect, national and international immigration that occurred as a consequence of the RI, the cultural origin of the immigrants, and their integration in the local society.
- Identify and report experiences and attitudes of different stakeholder groups (such as project proposers, RI staff, scientific experts, and local population) concerning cultural diversity associated with the RI.

Definitions and explanations:
Diversity refers to the dimensions of race, ethnicity, gender, sexual orientation, socio-economic status, age, physical abilities, religious beliefs, political beliefs, or other ideologies. It is mostly used with a positive connotation, in the sense of understanding that each individual is unique, and recognising individual differences, and exploring these differences in a safe, positive, and nurturing environment.
Note: To describe changes in cultural diversity, it is recommended to use a neutral understanding of diversity

Data sources and collection methods:

- Document analysis (statistics on cultural diversity or migration)
- Interviews (scientific experts; samples of relevant stakeholder groups, such as project proposers, RI management; RI staff, general population in the community of the host region).
- Secondary data analysis from reference facilities (e.g. SE impact reports, scientific studies)

Data analysis methods:

- Descriptive content analysis

References:
OECD statistics on migration, on
http://www.oecd.org/document/0,3746,en_2649_201185_46462759_1_1_1_1,00.html; http://stats.oecd.org/Index.aspx?DataSetCode=MIG

Life.3.2: Effects on socio-cultural skills, language skills, fears, attitudes and behaviours

Relevance:
The indicator describes effects of the RI on socio-cultural skills, emotional reaction, attitudes, which shall find the way into behaviour in the population. It includes also activities planned or undertaken in order to influence the skills, attitudes, and emotions and related behaviour mentioned above. Although it refers mainly to activities conducted by the RI, it may also include those of other stakeholders.

Compilation:

- Identify and report challenges for socio-cultural and language skills. This can be based on results from Life.3.1.
- Collect and report information about the effects of the RI on socio-cultural and language skills as perceived by different stakeholder groups (such as project proposers or RI management, RI staff, and local population)
- Identify and report expectations, fears and attitudes of the population concerning new people coming into the community with the RI.
- Identify and report activities the RI plans to do or already does to raise awareness about cultural diversity. Identify and report also activities planned or done by stakeholders, e.g. schools.
- For an already operating RI identify and report the changes in expectations, fears and attitudes of the local population that occurred in the course of the time as perceived by different stakeholder groups (such as project management, RI staff, and local population). Please mind that self-reported changes need be interpreted with care.

Definitions and explanations:
None

Data sources and collection methods:

- Interviews (samples of relevant stakeholder groups, such as project proposers or RI management, RI staff, general population in the community of the host region).
- Secondary data analysis from reference facilities (e.g. SE impact reports, scientific studies)

Data analysis methods:

- Descriptive content analysis

References:
None

Life.3.3.: Activities to foster public awareness

Relevance:
The indicator describes activities to foster public awareness about science in general, its cultural and economic significance for society, as well as the specific scientific and technological activities of the RI and their different types of impacts on the community.

Compilation:
- Identify and describe initiatives of the RI aiming at fostering public awareness about science in general and / or about the specific activities and related benefits of the (planned) facility.
- Collect and report quantitative data about the obtained or expected impacts of these initiatives, such as organised events by type, participants (by geographic provenance, age, or gender), press releases, newspaper articles and other media mentions about the RI's activities, laboratory visits and visitors (by type, provenance, age, gender), visits of the website etc.
- Collect and report information about the impact of the initiative as perceived or expected by the involved RI staff and the management as well as the addressees of the events.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis (project proposal and/or related documents, action plans, strategic documents, annual reports, press communications, press reviews, etc.)
- Interviews with internal personnel involved in the initiatives (RI staff or RI project team members, RI managers, public relations officer, etc.)
- Interviews with addressees of the initiatives in the community.

Data analysis methods:
- Descriptive content analysis

References:
None

Life.3.4: Significant additional demand on cultural institutions and services

Relevance:
The indicator describes increased demand on cultural institutions and services due to the RI and people related to the RI. Cultural institutions and services include museum, theatres, historical tours, radio channels, etc.

Compilation:
- Estimate the cultural interests of the new people in the community due to the RI.
- Deduce the demand on cultural institutions and services. Include increased demand on existing institutions and services as well as qualitatively new interests that cannot be addressed with the existing institutions and services.

Definitions and explanations:

If possible, the quantitative evaluations should be based on the estimated total increase of the population, which includes also family members, workers on indirectly created working places, and students attracted to the region.

Data sources and collection methods:
- Interviews with staff attracted from outside the region to the RI (if possible)
- Secondary data analysis from reference facilities (e.g. SE impact reports)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories

References:
None

Life.3.5: Changes of cultural infrastructure and services

Relevance:
The indicator describes the need to adapt existing cultural infrastructure and services to the requirements generated by the RI. It is based on the description of demand from indicator Life.3.4.

Compilation:
- Deduce requirements for cultural infrastructure and services from results of Life.3.4. Consider quantitative and qualitative changes or a combination, e.g. longer opening hours of a museum, English or Italian movies in cinemas, etc.
- Identify and report gaps between the existing and needed cultural infrastructure and services.

Definitions and explanations:
None

Data sources and collection methods:
- Results from Life.3.4
- Document analysis of information on existing cultural infrastructure and services
- Interviews with local administration, mayors, directors of cultural institutions, etc.
- Secondary data analysis from reference facilities (e.g. SE impact reports)

Data analysis methods:
- Descriptive content analysis
- Gap analysis
- Case studies of reference laboratories

References:
None

How may financial power change society in the region?

This category explores impacts in financial power and its effects on society and quality of life. It includes information about changes in lifestyle when the population of the region changes due to an RI. Lifestyle here denominates recreational facilities like parks, sports clubs, as well as shops, restaurants, hotels, etc. As lifestyle may vary considerably among regions or communities, this category shall be well tailored. The information is collected via qualitative methods and includes statistical data.

Indicators:

Life.4.1: Expected trend in the cost of living
Life.4.2: Development of lifestyle, availability of goods and services
Life.4.3: Impact on social cohesion (regional, national, EU)
Life.4.4: Long-term effect on the quality of life

Life.4.1: Expected trend in the cost of living

Relevance:
The indicator describes changes in the cost of living due to the new facility being present in the region. Consider that a baseline inflation is not caused by the RI.
This indicator is mainly relevant for RI projects, a retrospective (ex-post) evaluation of an operating RI, or changes in an RI that may affect the cost of living in a region.

Compilation:
- Describe the cost of living in the region or local area before the construction of the RI and estimate the assumed trend of the region without RI.
- Estimate the difference in trend with an RI introduced into the region or with changes in an existing RI that may affect the cost of living.
- Collect information about changes in the cost of living (such as e.g. the cost of land, real estate property, or housing in the local area around the RI or in specific quarters of the city where RI staff resides) as reported, perceived or expected by local stakeholders (citizens, policy-makers etc.)

Definitions and explanations:
Please note that this indicator needs to be interpreted in relation to the indicator “Jobs.7.4: Long term impacts on salaries”.

Data sources and collection methods:
- Analysis of regional statistics on different types of costs
- Secondary data analysis from reference facilities (e.g. SE impact reports)
- Expert interviews with local testimonies (project team, RI managers and staff, citizen, real-estate agents, policy makers etc.)

Data analysis methods:
- Case studies of reference laboratories
- Descriptive content analysis
- Trend analysis

References:
Eurostat annual inflation rates (for estimating the baseline), on:
http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&language=en&pcode=tsieb060&tableSelection=1&footnotes=yes&labeling=labels&plugin=1

Life.4.2: Development of lifestyle, availability of goods and services

Relevance:
The indicator describes changes in lifestyle, opportunities for hotels, restaurants, shops, sports facilities, etc. for development and/or expansion, and the effects on lifestyle in the population It includes the availability of goods and services, their variety and quality.

Compilation:

- Describe the situation of availability of goods, leisure facilities, gastronomic services, shops, etc. in the region or local area before the construction of the RI
- Estimate the desire for lifestyle facilities and services of the new population introduced by the RI into the region. This includes the demand for the availability of goods, their variety and quality. Consider an estimated income of the new population in comparison with the current average income.
- Identify and report the potential for growth and development of providers of goods, lifestyle facilities and services in the area.
- Collect information about changes in lifestyle and availability of goods and services as reported, perceived or expected by local stakeholders (citizens, policy-makers etc.)

Definitions and explanations:
Lifestyle is expressed in both work and leisure behaviour patterns and (on an individual basis) in activities, attitudes, interests, opinions, values, and allocation of income. It also reflects people's self image or self concept; the way they see themselves and believe they are seen by the others.

Data sources and collection methods:

- Secondary data analysis from reference facilities (e.g. SE impact reports)
- Site inspections of supermarkets, shops of all kinds for goods and services of daily living
- Expert interviews with local testimonies (project team, RI managers and staff, citizen, policy makers etc.)
- Analysis of statistical data

Data analysis methods:

- Descriptive content analysis
- Case studies of reference laboratories

References:
Examples for useful statistics: OECD
taxes on goods and services as a percentage of GDP:
http://www.oecd-ilibrary.org/taxation/taxes-on-goods-and-services_20758510-table6
trade in goods and services as a percentage of GDP:
http://www.oecd-ilibrary.org/trade/trade-in-goods-and-services_20743920-table1

Life.4.3: Impact on social cohesion

Relevance:
The indicator describes estimated impacts on participation in social life, equality of citizens, cultural acceptance, etc. Social cohesion is a multi-facetted concept, related to diversity and labour market among other factors. Availability of data may vary considerably. Singular indicators can be used if put into a wider picture; e.g. unemployment rates by cultural background (related to module "Jobs"), activities for cultural integration, etc.

Compilation:

- Describe the current situation of social cohesion in the region (citizens in the region).
- Describe social cohesion on national (regions in the country) and EU level (the country on Europe).
- Outline how social cohesion has changed or is expected to change with the RI / RI modification according to local testimonies. Consider all levels mentioned above.

Definitions and explanations:
Social cohesion "(...) is a term used in social policy, sociology and political science to describe the bonds or "glue" that bring people together in society, particularly in the context of cultural diversity. Social cohesion is a multi-faceted notion covering many different kinds of social phenomena" (from Wikipedia, accessed May 15, 2011). It embraces the possibilities of citizens to participate in society, working life, culture, voting, all in all, to play an active role in society, together with their co-citizens.

Data sources and collection methods:

- Expert interviews with local testimonies (project team, RI managers and staff, citizen, policy makers etc.)
- Secondary data analysis from reference facilities (e.g. SE impact reports)
- Statistics of social participation if available and useful

Data analysis methods:

- Descriptive content analysis
- Case studies of reference laboratories

References:
Publication « Social exclusion and Social cohesion», available via Eurostat, on :
http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/CA-AB-01-002-13/EN/CA-AB-01-002-13-EN.PDF

Life.4.4: Long-term effect on the quality of life

Relevance:
The indicator describes the general welfare of citizens in every-day-life, focussing on social, health and security aspects rather than economic ones. It shows a relation to other indicators like social cohesion and health, and shall not repeat singular indicators, but bring them together in a broad picture on the well-being of citizens in every-day-life. (A focus on economic indicators, though, shall be avoided.)

Compilation:
- Identify and report the quality of life at current state.
- Describe expected changes in quality of life due to the RI.

Definitions and explanations:
Quality of life: According to the OECD glossary of statistical terms, "Quality of life is the notion of human welfare (well-being) measured by social indicators rather than by "quantitative" measures of income and production."

Data sources and collection methods:
- Document analysis (project proposal, financial documents, annual reports, accountability reports etc.)
- Expert interviews (public administrations, local / regional policy makers, social interest groups such as churches or unions, scientific experts etc.)
- Secondary data analysis from reference facilities (e.g. SE impact reports)

Data analysis methods:
- Descriptive content analysis
- Case studies of reference laboratories

References:
For the definition of Quality of Life:
http://stats.oecd.org/glossary/detail.asp?ID=2218

Module Eco: Ecological environment and awareness

Templates for the risk assessment can be found in **Annex II**.

This module explores the possible socio-economic (SE) impacts on the ecological environment of the region expected from the construction, operation, and decommissioning of the RI. It is divided into seven categories covering data on the energy system, water and effluents supply, use of materials and waste services, emissions and noise effects, radiation management, biodiversity and habitats protection, as well as environmental awareness issues. The required information is mainly collected through a document analysis of the project documents and existing studies for the region, expert interviews with scientific and technical experts involved in the project proposal and/or construction of the facility, regional agencies, environmental interest groups, citizens' organisations and other stakeholders related to the topics.

Categories	Methods
• Eco.1: Energy • Eco.2: Water & Effluents • Eco.3: Materials & Waste • Eco.4: Emissions & Noise • Eco.5: Radiation • Eco.6: Biodiversity & Habitats • Eco.7: Environmental Awareness	• CoM.1: Document Analysis • CoM.2: Expert Interviews • CoM.3: Questionnaires / Surveys • CoM.4: Secondary Data Analysis • AnM.1: Descriptive Content Analysis • AnM.2: Case Studies of Reference Laboratories

What energy impacts could be expected by the proposed RI and what are the benefits?

This category explores the possible S-E impact created by the RI project in the local energy sector in terms of energy consumption, special requirements for energy services, infrastructure and innovations, initiatives for sustainability of resources and public awareness. Information is gathered through quantitative and qualitative (descriptive) indicators.

Factors & Indicators:

Eco.1.1: Direct and indirect energy consumption by source
Eco.1.2: Special requirements on the energy supply system
Eco.1.3: Effects on energy services and infrastructures
Eco.1.4: Initiatives for a sustainable energy use and their effects
Eco.1.5: New knowledge, methods, technologies, controls, and standards regarding energy and their effects

Eco.1.1: Direct and indirect energy consumption by source

Relevance:
The indicator describes the RI's direct and indirect energy consumption by source.

Compilation:
- Estimate the direct energy consumption by your RI using own energy sources.
- Estimate the indirect energy consumption by your RI using electricity suppliers. This indicative figure will depend on the RI's type, siting and size, as well as the scale of the R&D activities.
- Report the possible impacts of your RI on the local energy supply system.

Definitions and explanations:
Direct energy: is the energy produced and consumed by the RI within its own operations, projects and facilities. It may include energy from fuels, sunlight, wind, water, etc. for running the RI equipment and vehicles, and for producing power and heat on-site. For fuels it can be measured in gigajoules.
Indirect energy: is the energy produced outside the RI's boundaries by the electricity suppliers, and consumed on the RI's site. Indirect energy depends on the local electricity grids where the RI will operate. It is measured in gigajoules or megawatt hours.
For comparative studies to describe the energy requirements, use standard units, such as:
Voltage: Volt (V), Kilovolt (kV), etc.
Electrical power: Kilowatt (kW), Megawatt (MW), Gigawatt (GW), etc.
Electric energy: Kilowatt-hours (kWh), Megawatt-hours (MWh), Gigawatt-hours (GWh), etc.

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with RI technical experts and regional energy agencies.

Data analysis methods:
- Descriptive content analysis

References:
None

Eco.1.2: Specific requirements on the energy supply system

Relevance: The indicator describes the specific requirements that the RI may have on the energy supply system (electricity, fuels) in terms of security, access, affordability, voltage requirements. These requirements can affect the types of impacts (Eco.1.3. – Eco.1.5.), which may be induced by the facility on the local energy supply system. Compilation: • Identify and report the specific requirements of your RI project on the energy supply, for example: security of the electricity supply against break downs, access to the energy supply network in case of remote facilities, affordability of the energy service, special requirements for higher voltage energy supply, etc. These requirements depend on the type, scale, location and R&D field of the facility (e.g. synchrotron, bio-bank, research vessel, telescopes, etc.) Definitions and explanations: None Data sources and collection methods: • Document analysis of project documents as the project proposal • Interviews with technical and management experts of the RI project and regional energy agencies. Data analysis methods: • Descriptive content analysis References: None	

Eco.1.3: *Effects on the energy supply system and its users*

Relevance:
The indicator describes the effects of the (new) RI on energy services and infrastructures and the consequences for the energy purchasers.

Compilation:
- Identify and report the specific requirements of the (new) RI regarding its energy supply that lead to investments or upgrades of energy services or infrastructures. Consider e.g. the continuous and peak needs for electrical power, the stability and reliability of the power supply system, the supplied voltage, or the required type of connections.
- Identify and report, which other energy purchasers are affected by increased energy needs, upgrades of the energy supply system or new energy services resulting from the (new) RI. Describe also the consequences for the other energy users.
- Identify and report possible competition and co-benefits with the local energy users

Definitions and explanations:
To describe the energy requirements, use standard units, such as:
Voltage: Volt (V), Kilovolt (kV), etc.
Electrical power: Kilowatt (kW), Megawatt (MW), Gigawatt (GW), etc.
Electric energy: Kilowatt-hours (kWh), Megawatt-hours (MWh), Gigawatt-hours (GWh), etc.

Data sources and collection methods:
- Analysis of documents as e.g. project proposal, technical project / RI documents, websites, internal reports
- Interviews with suitable experts from the RI or RI project, e.g. experts from civil engineering department, environmental manager, project coordinator

Data analysis methods:
- Descriptive content analysis & Narratives

References:
None

Eco.1.4: Initiatives for a sustainable energy use and their effects

Relevance:
The indicator describes the initiatives for a sustainable energy use and their effects on the local economy and society. These initiatives can be started by the local stakeholders, or planned by the RI project team. Co-benefits and multiplying impact effects can be identified by this indicator.

Compilation:
- Identify and report existing regional initiatives for sustainable energy use e.g. local photovoltaic, wind and hydroelectricity installations, waste recycling facilities, energy efficiency programmes for buildings and manufacturing processes, production and use of biofuels, etc.
- Identify and report sustainable energy initiatives planned by the RI project. These initiatives can be related to the R&D topics of the RI or be part of the environmental policy of the RI.
- Identify possible co-benefits and multiplying effects between the existing local initiative and those planned by the RI.

Definitions and explanations:
Initiatives for sustainable energy use (examples): use of renewable energy sources, energy efficiency strategies for buildings, equipment and processes, shared use of facilities, etc.

Data sources and collection methods:
- Document analysis of RI project documents, documents of local organizations/networks/initiatives
- Interviews with scientific, technical and management experts from the RI team, as well as with local stakeholders in sustainable energy.

Data analysis methods:
- Descriptive content analysis

References:
Energy Strategy for Europe
http://ec.europa.eu/energy/index_en.htm

Eco.1.5: New knowledge, methods, technologies, controls, and standards regarding energy, and their effects

Relevance:
This indicator describes the generation or acquisition by the RI project of new knowledge, methodological frameworks, standardisation and controlling procedures related to energy.

Compilation:
- Identify and report new designs, quality controls, planning and project management methodologies, standards and protocols regarding energy, which are either generated by the RI as part of its own S&T activities/governance model, or have been adapted by the RI from external sources.
- Outline those cases that can be disseminated to other organisations in the region as good practices.
- Identify and report the estimated energy cost savings due to the application of this know-how.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis of RI project documents, good practices in the field, etc.
- Interviews with scientific, technical and management experts from the RI team, and regional energy agencies.

Data analysis methods:
- Descriptive content analysis & Narratives

References:
None

What water & effluents impacts could be expected by the proposed RI and what are the benefits?

This category explores the possible S-E impacts created by the RI project on the local water supply and sewage services in terms of water consumption, generation of additional effluents, water resources sustainability and development of new practices. Information is gathered through quantitative and qualitative (descriptive) indicators.

Factors & Indicators:

Eco.2.1: Average and peak fresh water consumption by required water quality
Eco.2.2: Type, quantity, and effects of major effluents
Eco.2.3: Effects on water supply and sewage systems and their users
Eco.2.4: Effects on water supply and sewage services
Eco. 2.5: Initiatives for a sustainable use of water and their effects
Eco. 2.6: New knowledge, methods, technologies, controls, and standards regarding water, and their effects

Eco.2.1: Average and peak fresh water consumption by required water quality

Relevance:
The indicator describes the average and peak water consumption of the RI categorized by the required quality: drinking and environmental water.

Compilation:
- Estimate the average water consumption by your RI for drinking and industrial purposes (cubic meter per year).
- Estimate the peak water consumption by your RI for drinking and industrial purposes (cubic meter per year) and indicate the annual or seasonal dependency if any.

Definitions and explanations:

Drinking water: or potable water is water of sufficiently high quality that can be consumed or used with low risk of immediate or long term harm.
Environmental water: water from surface or underground sources used for industrial purposes.

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with scientific and technical experts, in particular those involved in the preparation of the project proposal (e.g. scientific manager).

Data analysis methods:
- Descriptive content analysis

References:
None

Eco.2.2: Type, quantity, and effects of major effluents

Relevance:
The indicator qualifies the type and quantity of the major effluents produced by the RI and describes the possible effects/requirements to the local sewage system and/or purification systems.

Compilation:
- Estimate the type of the major liquid effluents produced by the RI and their respective quantity
- Identify and report specific requirements for effluents treatment and their safe release in the environment (e.g. purification systems, pumps, filtration plants, composting depots, etc.)
- Estimate the time frame for acquiring permissions and international standards certificates for the sustainable management of the effluents.

Definitions and explanations:
Effluent: usually liquid waste flowing out of a factory, farm, commercial establishment, or a household into a water body such as a river, lake, or lagoon, or a sewer system or reservoir. Waste discharged into air is called emission.

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with scientific, technical and management experts of the RI, regional water/environmental agencies.

Data analysis methods:
- Descriptive content analysis

References:
ISO Environmental Management
http://www.iso.org/iso/environmental_management

Eco.2.3: Effects on water supply and sewage systems and their users

Relevance:
The indicator describes the effects of the (new) RI on services and infrastructures for water supply, sewage and wastewater treatment as well as the consequences for the water users.

Compilation:
- Identify and report the specific requirements of the (new) RI regarding its water supply that lead to investments or upgrades of water supply, sewage and water treatment services or infrastructures. Consider e.g. the average and peak freshwater consumption, the required sanitary waste water and industrial sewage capacities, or the required water quality.
- Identify and report, which other water consumers are affected by increased water needs, upgrades of the water supply, sewage, and treatment systems or new water-related services resulting from the (new) RI. Describe also the consequences for the other water users.

Definitions and explanations:

To describe the water requirements, use standard units if possible.
Water consumption: cubic metre per year (m3/yr), cubic metre per day (m3/day) , ...
Sewage capacity: litres per second (l/s)
Water quality: Water quality is a complex topic, which can be described by a large variety of attributes. A few simple examples are temperature (°C), acidity (pH), dissolved oxygen (% saturation), conductivity (Siemens per metre S/m or milli-Siemens per metre mS/m), oxygen reduction potential (Volt V or millivolt mV)), or turbidity. Discuss here only the water characteristics that are important for its use by the RI.

Data sources and collection methods:
- Analysis of documents as e.g. project proposal, technical project / RI documents, websites, internal documents
- Interviews with suitable experts from the RI or RI project, e.g. experts from civil engineering department, environmental manager, or project coordinator

Data analysis methods:
- Descriptive content analysis
- Narratives

References:
None

Eco.2.4: Effects on water supply and sewage services

Relevance:
The indicator describes the possible impacts of the additional water consumption by your RI on the local water supply and sewage system.

Compilation:

- Identify and report the effects of the RI water consumption on the capacity of the local water resources.
- Identify and report the effects of the RI water consumption on the local water supply system and its distribution network e.g. demand of additional infrastructure, security of water supply, etc.
- Identify and report the effects of the RI effluents on the local sewage system e.g. increased effluent capacity, separate collection, additional filtration, etc.

Definitions and explanations:
None

Data sources and collection methods:

- Document analysis of project documents as the project proposal
- Interviews with scientific and technical experts, in particular those involved in the preparation of the project proposal (e.g. scientific manager).and regional water agencies.

Data analysis methods:

- Descriptive content analysis

References:
None

Eco. 2.5: Initiatives for a sustainable use of water and their effects

Relevance:
The indicator describes the initiatives for a sustainable water use and their effects on the local economy and society. These initiatives can be launched by the local stakeholders, or planned by the RI project team. Co-benefits and multiplying impact effects can be identified by this indicator.

Compilation:

- Identify and report existing regional initiatives for sustainable water use e.g. integrated water management systems for the local water resources, shared waste water treatment facilities, local/national effluent fee programmes, etc.
- Identify and report sustainable water initiatives planned by the RI project. These initiatives can be related to the R&D topics of the RI or be part of the environmental policy of the RI.
- Identify possible co-benefits and multiplying effects between the existing local initiative and those planned by the RI.

Definitions and explanations:

Initiatives for sustainable water use (examples): rainwater harvesting, composting sewing water, solar desalination of water, eco-friendly detergents, sustainable water filtration systems, shared waste water treatment facilities, etc.

Data sources and collection methods:

- Document analysis of project documents as the project proposal
- Interviews with experts in the field (Environmental Service Providers) and from the RI project

Data analysis methods:

- Descriptive content analysis
- Narratives – good practices handbooks, etc.

References:
EC Environment portal
http://ec.europa.eu/environment/water/index_en.htm
Water Information System for Europe
http://water.europa.eu/

Eco. 2.6: New knowledge, methods, technologies, controls, and standards regarding water, and their effects

Relevance:
This indicator describes the generation or acquisition by the RI project of new knowledge, methodological frameworks, standardisation and controlling procedures related to water & effluents.

Compilation:
- Identify and report new designs, quality controls, planning and project management methodologies, standards and protocols regarding water & effluents which are either generated by the RI as part of its own S&T activities/governance model, or have been adapted by the RI from external sources.
- Outline those cases that can be disseminated to other organisations in the region as good practices.
- Identify and report the estimated water & effluents savings due to the application of this know-how.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with scientific and technical experts, in particular those involved in the preparation of the project proposal (e.g. scientific manager) and regional water agencies.

Data analysis methods:
- Descriptive content analysis

References:
None

What materials & waste impacts could be expected by the proposed RI and what are the benefits?

This category explores the possible S-E impact created by the RI project on the local materials & waste management services in terms of quantity of waste generated by the RI, disposal methods, treatment of hazardous substances, effects on the local service providers, infrastructures and innovation system, and initiatives for sustainable use of materials. Information is gathered through quantitative and qualitative (descriptive) indicators.

Factors & Indicators:

Eco.3.1: Quantity of waste by type and disposal method
Eco.3.2: Initiatives for a sustainable use of materials and effects
Eco.3.3: Type and quantity of handled hazardous substances, risks, required permissions and skills
Eco.3.4: Effects on waste services and infrastructures
Eco.3.5: New knowledge, methods, technologies, controls, and standards regarding waste and their effects

Eco.3.1: Quantity of waste by type and disposal method

Relevance:
The indicator describes the quantity of waste generated by the construction, operating and decomposing stages of the RI. Waste can be categorised by types and disposal method. Figures can be provided by annual basis or for entire stages.

Compilation:
- Estimate the quantity of solid and liquid waste generated by your RI by categorising them under type (metal, packaging, organic, mixed, etc.) and disposal method (hazardous and non-hazardous process waste). Pay attention on the specific types of waste by your RI that differ from the usual wastes in the region and require specialised treatment or disposal methods.

Definitions and explanations:
Liquid waste: differing from the effluents, liquid wastes are not directly released in the sewage system and may require specific disposal/treatment methods.
Disposal methods for solid waste: compost (for disposing organic wastes), landfill (for non- recycle non-hazardous wastes), burning (for bulk wastes, filters and scrubbers are used to eliminate harmful emissions).
Hazardous Waste Disposal Methods: incineration, bioremediation (use of natural degradation processes and microorganisms to convert hazardous wastes into nontoxic products), high-temperature plasma torch, etc.

Data sources and collection methods:
- Document analysis of RI project documents
- Interviews with S&T experts, RI managers, waste management organisations, etc.

Data analysis methods:
- Descriptive content analysis

References:
http://ec.europa.eu/environment/waste/index.htm

Eco.3.2: Initiatives for a sustainable use of materials, and their effects

Relevance:
The indicator describes the range of initiatives for sustainable use of materials – waste prevention and recycling, that will be implemented in the RI.

Compilation:

- Identify and report the initiatives for sustainable use of materials – practices for waste prevention and recycling, incl. adoption of innovative technologies that will be implemented in the RI.
- Identify possible synergies and multiplying effects with similar initiatives in the region.

Definitions and explanations:

Waste prevention practices: excellent examples of informational, promotional and regulatory measures to stimulate the prevention of waste. These practices are targeted on waste prevention and clearly distinct from other waste management strategies or broad environmental goals.
Recycling practices: these practices are specific for the different type of wastes and waste streams (e.g. construction and demolition wastes, batteries, packaging, sludge, etc.).

Data sources and collection methods:

- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environment agencies, etc.

Data analysis methods:

- Descriptive content analysis

References:
EC Waste Prevention Guidelines for the Member States:
http://ec.europa.eu/environment/waste/prevention/guidelines.htm
EU Fact sheets on selected best practices can be found at:
http://ec.europa.eu/environment/waste/prevention/practices.htm

Eco.3.3: Type and quantity of handled hazardous substances, risks, required permissions and skills

Relevance:
The indicator describes the management practice implied by the RI when handling hazardous substances – type and quantity of the hazardous waste, associated risks, permissions and skills.

Compilation:

- Identify and report the type and quantity of the hazardous substances generated by the RI.
- Identify and report the specific risks when handling these hazardous substances.
- Identify and report possible permissions needed for the operation of the RI with hazardous substances, as well as the timeframe needed for their acquisition.
- Report the skills required for handling hazardous substances in the RI in terms of human knowledge and specialised equipment / facilities

Definitions and explanations:
Hazardous substances: means every type of waste classified as harmful by the European legislation (91/689/EEC). As laid down in the directive 2008/98/EC such waste requires additional labelling, record keeping, monitoring and control obligations from the waste producer to the final disposal or recovery.
Occupational Safety and Health: is a cross-disciplinary area concerned with protecting the safety, health and welfare of people engaged in work or employment.

Data sources and collection methods:

- Document analysis of project documents as the project proposal
- Interviews with scientific and technical experts, in particular those involved in the preparation of the project proposal (e.g. scientific manager) and regional environmental agencies.

Data analysis methods:

- Descriptive content analysis

References:
EU REACH (Registration, Evaluation, and Authorization of Chemical) regulation
http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm
Restriction of Hazardous Substances Directive (RoHS) in electrical and electronic equipment:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0095:en:HTML

Eco.3.4: *Effects on waste services and infrastructures*

Relevance:
The indicator describes the effects of the (new) RI on waste services and infrastructures and the consequences for other clients of waste service providers.

Compilation:

- Identify and report the specific requirements of the (new) RI regarding waste services that lead to investments in or upgrades of waste services or infrastructures. Consider e.g. the needs for the disposal, recycling or reuse of wastes and specific need and capabilities for the handling of hazardous wastes.
- Identify and report, which other waste producers are affected by an increased production of waste, upgrades of the waste disposal and treatment systems, improved skills in waste-handling, or new waste services resulting from the (new) RI. Describe also the consequences for other costumers of waste services.

Definitions and explanations:

Hazardous waste means every type of waste classified as harmful by the European legislation (91/689/EEC). As laid down in the directive 2008/98/EC such waste requires additional labelling, record keeping, monitoring and control obligations from the waste producer to the final disposal or recovery.

Data sources and collection methods:

- Analysis of documents as e.g. project proposal, technical project / RI documents, websites, internal documents
- Interviews with suitable experts from the RI or RI project, e.g. environmental manager, security manager, or project coordinator

Data analysis methods:

- Descriptive content analysis
- Narratives

References:
Council Directive of 12 December 1991 on hazardous waste (91/689/EEC)
Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives
For more information see also:
http://ec.europa.eu/environment/waste/hazardous_index.htm
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0689:EN:NOT
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0098:EN:NOT

Eco.3.5: New knowledge, methods, technologies, controls, and standards regarding waste and their effects

Relevance:
This indicator describes the generation or acquisition by the RI project of new knowledge, methodological frameworks, standardisation and controlling procedures related to material & waste.

Compilation:
- Identify and report new designs, quality controls, planning and project management methodologies, standards and protocols regarding materials & waste which are either generated by the RI as part of its own S&T activities/governance model, or have been adapted by the RI from external sources. Outline those cases that can be disseminated to other organisations in the region as good practices.
- Identify and report the estimated material & waste savings due to the application of this know-how.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with scientific and technical experts, in particular those involved in the preparation of the project proposal (e.g. scientific manager) and regional environmental agencies.

Data analysis methods:
- Descriptive content analysis

References:
None

What emissions & noise impacts could be expected by the proposed RI and what are the benefits?

This category explores the possible S-E impact induced by the possible emissions and noise generated by the RI. It considers possible air pollutants, levels of noise, initiatives for reducing polluting levels, impacts on other environmental factors such as light penetration, and new knowledge produced for alleviating emissions and noise pollution effects. Information is gathered through quantitative and qualitative (descriptive) indicators.

Factors & Indicators:

Eco.4.1: Type, quantity, and effects of major direct and indirect air pollutant emissions
Eco.4.2: Initiatives to reduce pollutant emissions and their effects
Eco.4.3: Type, level, and effects of created noise
Eco.4.4: Initiatives to reduce noise and their effects
Eco.4.5: Impacts on light and lighting, direct and indirect (e.g. by required regulations) and their consequences ???
Eco.4.6: New knowledge, technologies, standards and controls, regarding emissions / noise and their effects

Eco.4.1: Type, quantity, and effects of major direct and indirect air pollutant emissions

Relevance:
The indicator qualifies the type and quantity of the major air pollutants produced by the RI and describes the possible environmental effects and purification system requirements.

Compilation:
- Estimate the type of the major emissions produced by the RI and their respective quantity
- Identify and report specific requirements for emissions treatment and their safe release in the environment (e.g. purification systems, filters, bio-remediation plants, etc.)
- Estimate the time frame for acquiring permissions and international standards certificates for the sustainable management of the emissions.

Definitions and explanations:
Air polluting emission: Waste discharged into air (chemicals, particulate matter, biological material, greenhouse gases) that harm human health and environment.

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with scientific, technical and management experts of the RI, regional environmental agencies.

Data analysis methods:
- Descriptive content analysis

References:
ISO Environmental Management
http://www.iso.org/iso/environmental_management

Eco.4.2: Initiatives to reduce pollutant emissions and their effects

Relevance:
The indicator describes the range of initiatives for air pollutants reduction that will be implemented by the RI.

Compilation:
- Identify and report the initiatives for air pollutants reduction –control technologies, use of bio-fuels, design of green areas, purification systems, adoption of innovative technologies, etc. that will be implemented in the RI.
- Identify possible synergies and multiplying effects with similar initiatives in the region.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environment agencies, etc.

Data analysis methods:
- Descriptive content analysis

References:
EC Environment, Air:
http://ec.europa.eu/environment/air/index_en.htm

Eco.4.3: Type, level, and effects of created noise

Relevance:
The indicator qualifies the type and level of the noise produced by the RI and describes its possible social and environmental effects.

Compilation:
- Estimate the type (acoustic – alarms, machines, etc., vibrational – machines, generators, etc.) and respective levels (often measured in decibels, dB) of noise generated by the RI during its construction and operation.
- Identify and report the possible effects of the noise created by the RI activities to the RI team, local community and the environment (e.g. risks of hearing impairment, sleep disturbance, increased stress level, disrupts in activity of the local animal species, etc.)
- Estimate the time frame for acquiring permissions and international standards certificates for the sustainable management of the noise.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environmental/health agencies, etc.

Data analysis methods:
- Descriptive content analysis

References:
EC Environment, Noise:
http://ec.europa.eu/environment/noise/home.htm

Eco.4.4: Initiatives to reduce noise and their effects

Relevance:
The indicator describes the range of initiatives for noise reduction that will be implemented by the RI.

Compilation:
- Identify and report the initiatives for noise levels reduction – fences, buffer zones, underground generators, etc. that will be implemented by the RI.
- Identify possible synergies and multiplying effects with similar initiatives in the region.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environment/health agencies, etc.

Data analysis methods:
- Descriptive content analysis

References:
EC Environment, Noise:
http://ec.europa.eu/environment/noise/home.htm

Eco.4.5: Impacts on light and lighting, direct and indirect (e.g. by required regulations)

Relevance:
The indicator describes direct or indirect effects of the RI on lighting in the area where the RI is located. The type of RI that may require regulation on lighting is typically an observatory. Negative effects of artificial light can be considered light pollution.

Compilation:
- Identify requirements of the RI on lighting in the area where the RI is/will be located.
- Describe if changes of existing regulations may be necessary for assuring the RI's requirements on lighting.
- Identify and report light emissions by the RI that make a considerable difference compared to lighting without the RI.

Definitions and explanations:
Light pollution is a generic term for all undesirable effects of artificial light. For observatories, the most disadvantageous factor is brightness caused by artificial light.

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Document analysis of existing regulations on lighting (if applicable)
- Interviews with S&T experts, managers of the RI, regional administration, environment agencies, etc.

Data analysis methods:
- Descriptive content analysis

References:
None

Eco.4.6: New knowledge, technologies, standards and controls, regarding emissions / noise and their effects

Relevance:
This indicator describes the generation or acquisition by the RI project of new knowledge, methodological frameworks, standardisation and controlling procedures related to noise management.

Compilation:

- Identify and report new designs, quality controls, planning and project management methodologies, standards and protocols regarding noise which are either generated by the RI as part of its own S&T activities/governance model, or have been adapted by the RI from external sources.
- Outline those cases that can be disseminated to other organisations in the region as good practices.

Definitions and explanations:
None

Data sources and collection methods:

- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environment agencies, etc.

Data analysis methods:

- Descriptive content analysis

References:
EC Environment, Noise:
http://ec.europa.eu/environment/noise/home.htm

What radiation impacts could be expected by the proposed RI?

This category explores the possible S-E impact created by the RI project when radiation risks are associated with the RI operation (e.g. synchrotrons, small scale nuclear generators, work with isotopes, X-rays, etc.) It describes the radiation types, levels, risks and management strategies, public awareness initiatives and innovation deployment capacity for safety and sustainability. Information is gathered through quantitative and qualitative (descriptive) indicators.

Factors & Indicators:

Eco.5.1: Type, level, and effects of created radiation and required permissions
Eco.5.2: Radiation risks, radiation risk management and public awareness
Eco.5.3: New knowledge, technologies, standards and controls, regarding radiation safety and their effects

Eco.5.1: Type, level, and effects of created radiation and required permissions

Relevance:
The indicator estimates and describes the existence of radiation, generated by the RI, its range of socio-economic and environmental effects and the required permissions. The indicator is recommendable to be considered and analysed regardless the domain of the RI as precautionary measure to the local community.

Compilation:
- Identify and report the existence of radiation generated by the RI in the course of its R&D activities (use of specialised equipment, isotopes, reproduction of nuclear processes, radioactive wastes, etc.) Classify the radiation identified by types and levels
- Identify and analyse the possible effects of the RI radiation on society, economy and environment (effects on the RI staff, neighbour residential buildings, additional costs for protective infrastructure, test and measurement equipment, early warning systems, local biodiversity and habitats, etc.)
- Identify and report the required permissions related to radiation safety and management and the timeframe for their acquisition.

Definitions and explanations:
Types of radiation: The radiation one typically encounters is one of four types: alpha radiation, beta radiation, gamma radiation, and x radiation. Neutron radiation is also encountered in nuclear power plants and high-altitude flight and emitted from some industrial radioactive sources.

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environment/health agencies, etc.

Data analysis methods:
- Descriptive content analysis

References:
EC Radiation Protection:
http://ec.europa.eu/energy/nuclear/radiation_protection/radiation_protection_en.htm

Eco.5.2: Radiation risks, radiation risk management and public awareness

Relevance:
The indicator describes the radiation risks, related management strategies and public awareness initiatives considered by the RI to tackle with the radiation emissions.

Compilation:
- Identify and report the radiation risks associated with the RI operation and the affected groups/areas
- Identify and report radiation management and safety practices to be deployed by the RI (environmental monitoring and assessment, early warning systems, protective infrastructure, etc.)
- Identify and report initiatives for public awareness on radiation safety and management to be carried out by the RI to the local community.

Definitions and explanations:
None

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environment/health agencies, etc.

Data analysis methods:
- Descriptive content analysis

References:
EC Radiation Protection:
http://ec.europa.eu/energy/nuclear/radiation_protection/radiation_protection_en.htm

Eco.5.3: New knowledge, technologies, standards and controls, regarding radiation safety and their effects

Relevance: This indicator describes the generation or acquisition by the RI project of new knowledge, methodological frameworks, standardisation and controlling procedures related to radiation management. Compilation: • Identify and report new designs, quality controls, planning and project management methodologies, standards and protocols regarding radiation which are either generated by the RI as part of its own S&T activities/governance model, or have been adapted by the RI from external sources. • Outline those cases that can be disseminated to other organisations in the region as good practices. Definitions and explanations: None Data sources and collection methods: • Document analysis of project documents as the project proposal • Interviews with S&T experts, managers of the RI, regional environment/health agencies, etc. Data analysis methods: • Descriptive content analysis References: EC Radiation Protection: http://ec.europa.eu/energy/nuclear/radiation_protection/radiation_protection_en.htm	

What biodiversity & habitats impacts could be expected by the proposed RI and what are the benefits?

This category explores the possible environmental and social impacts created by the RI project by affecting local biodiversity and unique habitats. Information is gathered through quantitative and qualitative (descriptive) indicators.

Factors & Indicators:

Eco.6.1: Location and size of RI site, related infrastructure and vicinity to protected areas or important habitats
Eco.6.2: Expected impacts of RI activities on habitats and biodiversity
Eco.6.3: Initiatives to reduce impacts on habitats and biodiversity and their effects

Eco.6.1: Location and size of RI site, related infrastructure and vicinity to protected areas or important habitats

Relevance:
The indicator describes the effects of the construction (location, land area) and operation (connection to local transport, energy, water supply and sewage networks) of the new RI on the neighbouring protected areas or important habitats.

Compilation:
- Identify the location of the new RI and its proximity to protected areas that might be influenced by the RI's construction, operation and further upgrade.
- Estimate the land area to be used by the RI's infrastructure development – main buildings, experimental and production units, storehouses, residential houses, etc. and their possible influence on neighbouring protected areas.
- Identify and estimate the land area and routes needed for connecting the RI to the local energy, transport, water and sewage networks.

Definitions and explanations:
Protected areas: are locations which receive protection because of their environmental, cultural or similar value – parks, nature reserves, marine protected areas, etc. The level of protection vary by the enabling laws of each country or rules of international organization
Habitat: (Latin for "it inhabits") is an ecological or environmental area that is inhabited by a particular species of animal, plant or other type of organism.

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environment agencies, etc.

Data analysis methods:
- Descriptive content analysis

References:
http://ec.europa.eu/environment/nature/index_en.htm

Eco.6.2: Expected impacts of RI activities on habitats and biodiversity

Relevance:
The indicator describes the effects of the RI activities (S&T, management, open access, etc.) in its operation stage on the local habitats and biodiversity.

Compilation:
- Identify the set of RI research activities that can favour local biodiversity and specific habitats studies and preservation e.g. ecological studies, S&T developments in environmental sciences, biotechnology, IT (sensors, remote controls, observation systems, early warning systems, etc.), veterinary medicine, geology, statistics, etc.
- Identify those activities related to the RI operation that may create misbalance in the neighbouring habitats and their biodiversity, such as generation of noise, microwaves, dust, use of wind generators, water from rivers, lakes or underground sources, increased traffic of visitors, etc.

Definitions and explanations:
Protected areas: are locations which receive protection because of their environmental, cultural or similar value – parks, nature reserves, marine protected areas, etc. The level of protection vary by the enabling laws of each country or rules of international organization
Habitat: (Latin for "it inhabits") is an ecological or environmental area that is inhabited by a particular species of animal, plant or other type of organism.
Biodiversity: is the degree of variation of life forms within a given ecosystem, biome, or an entire planet. Biodiversity is a measure of the health of ecosystems. Greater biodiversity implies greater health. Biodiversity is in part a function of climate.

Data sources and collection methods:
- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environment agencies, etc.

Data analysis methods:
- Descriptive content analysis

References:
http://ec.europa.eu/environment/nature/index_en.htm

Eco.6.3: Initiatives to reduce impacts on habitats and biodiversity and their effects

Relevance:
The indicator describes the range of initiatives considered by the RI project to reduce possible effects of the RI activities (S&T, management, open access, etc.) on the local habitats and biodiversity.

Compilation:

- Identify and suggest initiatives and good practices to be considered by the RI project for alleviating possible influences on nearby environments (vibration, noise and pollution reduction, space use optimisation, green transport, collaboration with local ecologists, etc.)
- Outline those initiatives that foster local biodiversity.

Definitions and explanations:
Protected areas: are locations which receive protection because of their environmental, cultural or similar value – parks, nature reserves, marine protected areas, etc. The level of protection vary by the enabling laws of each country or rules of international organization
Habitat: (Latin for "it inhabits") is an ecological or environmental area that is inhabited by a particular species of animal, plant or other type of organism.
Biodiversity: is the degree of variation of life forms within a given ecosystem, biome, or an entire planet. Biodiversity is a measure of the health of ecosystems. Greater biodiversity implies greater health. Biodiversity is in part a function of climate.

Data sources and collection methods:

- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environment agencies, etc.

Data analysis methods:

- Descriptive content analysis

References:
http://ec.europa.eu/environment/nature/index_en.htm

What impacts on environmental awareness could be expected by the proposed RI and what are the benefits?

This category explores the possible impacts on environmental awareness created by the RI project at (?) regional/national/European scale. Information is gathered through mainly qualitative (descriptive) indicators.

Factors & Indicators:

Eco.7.1: Initiatives to create environmental awareness
Eco.7.2: Impacts on environmental awareness

Eco.7.1: Initiatives to create environmental awareness	
Relevance: The indicator describes the range of initiatives considered by the RI project for creating and fostering public environmental awareness as part of its policy for social & environmental responsibility Compilation: • Identify and suggest initiatives and good practices to be considered by the RI project for creating public environmental awareness on the S&T activities of the RI. The awareness subjects can be determined by the type of experiments conducted in the RI (nuclear, lazer or chemical/biotechnology based experiments, medical/environmental tests, if live testing objects are affected, etc.) or by the type of scientific product generated by the RI activities (ecological surveys/findings, eco-innovations, collaborative networks, data bases, etc.) • Outline a RI policy plan for fostering environmental awareness initiatives in the local communities such as organisation of public discussions, business trainings, children education courses, etc. Definitions and explanations: None Data sources and collection methods: • Document analysis of project documents as the project proposal • Interviews with S&T experts, managers of the RI Data analysis methods: • Descriptive content analysis References: http://ec.europa.eu/environment/nature/index_en.htm	

Eco.7.2: Impacts on environmental awareness

Relevance:
The indicator describes the range of impacts on environmental awareness sought to be generated by the RI project. It may also include positive "side effects".

Compilation:

- Identify and report the groups of stakeholders targeted by the RI environmental awareness initiatives.
- Identify the range of desired impacts on environmental awareness by stating quantitative and qualitative goals.
- Consider possible positive effects of the RI on environmental awareness which can be expected without any additional activities by the RI (e.g. positive effects on biodiversity due to inhibition of construction in an area around the RI)

Definitions and explanations:
None

Data sources and collection methods:

- Document analysis of project documents as the project proposal
- Interviews with S&T experts, managers of the RI, regional environment agencies, media, etc.

Data analysis methods:

- Descriptive content analysis

References:
http://ec.europa.eu/environment/nature/index_en.htm

Risk Assessment: Project risk analysis

Module Risk: Project Risk Analysis

Templates for the risk assessment can be found in **Annex III.**

This module supports the collection, analysis and presentation of information about the risks associated with the RI project. It is divided into four categories. Risks take into account the potential events that can hinder or reduce the creation of benefits or even lead to undesired negative effects. They are directly related to the possible impacts of such a project. For this reason, analysis and discussion of the project risks is important in the context of a SE impact analysis. Risk analysis can help to predetermine adequate options for mitigating risk. The different categories cover different types of risks, namely the financial risks, potential risks concerning the supply with knowledge, skills and technology, the different risks created by the external context for the project, and the ecological and environmental risks (includes workers and the local population). The required information is mainly collected through an analysis of the project documents and face-to-face interviews with scientific and technical experts, as well as independent external expertise (for example radiation). A simple risk analysis method based on an assessment of the likelihood and consequences of a possible event is applied, which allows the risk level for each event to be defined. The results of the analysis are mostly descriptive.

Categories	Methods
• Financial Risks • Lack of Public Acceptance and Support • Supply Risks • External Risks for the Project • Risks Created by the Project	• Document Analysis • Expert Interviews • Descriptive Analysis • Risk Analysis

Which financial risks exist which might affect the RI activities and the potential impacts?

This category explores the financial risks of the project which are defined as the risks that a lack of financial resources might impede/curtail the activities during the different phases of the project (construction, operation, upgrading, decommissioning) and thus lead to reduced benefits or other undesired, negative consequences. Since in most cases the financial resources of RIs are prevalently based on funding from ministries and public administrations, an evaluation of the risk for lacking political support is included here.

Indicators:

Risk. 1.1: Lack of political support
Risk. 1.2: Financial risks for RI construction
Risk. 1.3: Financial risks for RI operation
Risk. 1.4: Financial risks for RI upgrading
Risk. 1.5: Financial risks for RI decommissioning

Risk.1.1: Lack of political support

Relevance:
The indicator describes the risk that the project might undergo during periods with a lack of political support in the course of the RI's lifetime. Since most RIs are to a large extent publicly funded and investments in RIs tend to be politically motivated, such a development might have severe consequences for a facility. In particular scientific or public controversies about the RI project might affect the initial political support. Changes in the political and economic framework conditions, the public opinion, the scientific knowledge or the technological possibilities that can occur during the long lifetime of an RI might cause a decrease of an initially existing political support.

Compilation:

- Identify and report indications for existing controversy about the RI project in the involved investor countries or regions. If such controversies exist, assess how likely they will affect the current or future political support and how severe the consequences for the project will be and define the risk level.
- Identify and report potential occurrences in the future that are likely to cause changes of the political support. Assess their likelihood and the possible consequences in order to define a risk level.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:

- Document analysis of political and / or public debates about the RI project, e.g. political speeches, media, ...
- Expert interviews with suitable internal and external experts (Depends strongly on the specific case: e.g. project manager, PR manager of the project, external scientists and technology experts, political journalists, sociologists, ethicists, representatives of public interest groups...)

Data analysis methods:

- Risk analysis
- Descriptive content analysis

Foresight methods as focus groups or public debates might be useful in some cases.

References:
Risk assessment template

Risk.1.2: Financial risks for RI construction

Relevance:
The indicator describes the risk of a lack of financial resources during the construction phase of the RI. A lack of financial resources can affect the timescale of the project and the performance of the facility and also the benefits which may be achieved. A significant financial risk may for example exist if the required construction budget as estimated by the project proposers is not covered completely by the investors' contributions. Financial risk can also be a consequence of uncertainties in the duration of the construction phase, if it involves e.g. technologies, components and instrumentation beyond the current state of the art for which the development time is difficult to assess.

Compilation:
- Use the information collected for indicator RI.5.5 (financial strategy and contingency plans) in order to estimate, whether a significant financial risk for the construction of the RI exists. Use the risk assessment matrix and definitions in the templates in order to quantify the risk.
- Identify the financial risk for construction as perceived by the RI proposers / managers and/or investors.
- Report the obtained results.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Results from indicator RI.5.5 concerning the financial data and strategy for the construction phase.
- Interviews with suitable experts from the project proposers, RI management and/or investors (e.g. project coordinator, financial manager of the project or RI, CEO of the RI, involved financial experts of the investors)

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.1.3: Financial risks for RI operation

Relevance:
The indicator describes the risk of sub-optimal financial resources during the operation phase of the RI, which can affect the performance of the facility and the quality of the obtained results. The uncertainty about the changes, which may occur in the social, political, economic, scientific or technological context of the RI during its long lifetime can also lead to financial risks, since such changes might influence the support of the RI by its major stakeholders and therefore also the available operation budget negatively.

Compilation:
- Use the information collected for indicator RI.5.5 (financial strategy and contingency plans) in order to estimate, whether a significant financial risk for the operation of the RI exists. Use the risk assessment matrix in the templates in order to quantify the risk.
- Identify the financial risk for operation as perceived by the RI proposers / managers and/or investors.
- Report the obtained results.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Results from indicator RI.5.5 concerning the financial data and strategy for the operation phase
- Interviews with suitable experts from the project proposers, RI management and/or investors (e.g. project coordinator, financial manager of the project or RI, CEO of the RI, involved financial experts of the investors)

Data analysis methods:
- Risk analysis
- Descriptive content analysis

Foresight methods as focus groups or public debates might be useful in some cases.

References:
Risk assessment template

Risk.1.4: Financial risks for RI upgrading

Relevance:
The indicator describes the risk of sub-optimal financial resources for a facility upgrade that is considered important for the future operation of the RI. Insufficient resources for upgrading can affect the scientific attractiveness and competitiveness of the facility as well as quality of results. A significant financial risk might exist in particular if future upgrades of the facility have not been already included in the initial project proposal and discussed with the investors in advance. The uncertainty about the changes, which may occur in the social, political, economic, scientific or technological context of the RI during its long lifetime can also lead to financial risks, since such changes might influence the support of the RI by its major stakeholders and affect also the available financial resources for upgrades negatively.

Compilation:
- If upgrading is already considered in the project proposal, use the information collected for indicator RI.5.5 (financial strategy and contingency plans) in order to estimate, whether a significant financial risk for the upgrading of the RI exists. Use the risk assessment matrix in the templates in order to quantify the risk.
- Identify the financial risk for operation as perceived by the RI proposers / managers and/or investors.
- Report the obtained results.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Results from indicator RI.5.5 concerning the financial data and strategy for the operation phase
- Interviews with suitable experts from the project proposers, RI management and/or investors (e.g. project coordinator, financial manager of the project or RI, CEO of the RI, involved financial experts of the investors)

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.1.5: Financial risks for RI decommissioning

Relevance:
The indicator describes the risk of sub-optimal financial resources for decommissioning the facility at the end of its lifetime. In cases where decommissioning is critical and can bear safety and environmental risks, insufficient resources for decommissioning might increase these risks and lead to undesired, negative impacts. The indicator is significant for facility types that must be decommissioned after their operational phase in order to avoid risks for the population or the environment e.g. due to the presence of hazardous substances, organisms or contaminations. If for the considered type of RI decommissioning is not required or not of any concern, this indicator can be skipped.

Compilation:
- If decommissioning is already considered in the project proposal, use the information collected for indicator RI.5.5 (financial strategy and contingency plans) in order to estimate, whether a significant financial risk for the decommissioning of the RI exists. Use the risk assessment matrix in the templates in order to quantify the risk.
- Identify the financial risk for operation as perceived by the RI proposers / managers and/or investors.
- Report the obtained results.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Results from indicator RI.5.5 concerning the financial data and strategy for the decommissioning of the facility
- Interviews with suitable experts from the project proposers, RI management and/or investors (e.g. project coordinator, financial manager of the project or RI, CEO of the RI, involved financial experts of the investors)

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Which risks for the lack of public acceptance and support does the RI project face?

This category analyses the risks for insufficient acceptance and support of the project by key stakeholder groups, specifically the population of the host region and society in general. Insufficient public acceptance and support can e.g. be the consequence of fears and lacking information due to an inefficient communication or a missing public inclusion in the planning process. It can however obstruct, slow down or block completely the activities, and thus damage the project. Such incidents might subsequently lead to a decline of the political support and thus the financial resources, which could even jeopardise the existence of the RI. It is therefore important to be aware about this type of risks and prevent them from the very beginning through an effective dialogue in order to inform, create transparency and build trust.

Indicators:

Risk.2.1: Activities to prevent a lack of public acceptance
Risk.2.2: Risks for a lack of public acceptance and support

Risk.2.1: Activities to prevent a lack of public acceptance

Relevance:
The indicator describes the activities of the project proposers in order to foster the public acceptance for the project. Activities that that have the objective to inform the population, promote public participation, and establishing an efficient dialogue with the important social stakeholder groups can help to prevent controversial activities, which may obstruct, slow down or block the project.

Compilation:
- Identify and report the project proposers' strategy and activities aimed at fostering the communication with society and public acceptance.

Definitions and explanations:
None

Consequences of an event:
Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Risk.2.2: Risk for a lack of public acceptance and support

Relevance:
The indicator describes fears, concerns, and actions of the population regarding the RI project and the related risks for the RI project. Fears, concerns, and actions of the population might e.g. lead to activities that obstruct, slow down, or block the project implementation or might affect the political support. This can have substantial negative consequences for the project itself and the obtained benefits.

Compilation:
- Identify and report the most important fears, concerns, and actions of the population regarding the RI project, which have been described by relevant testimonies.
- If such fears, concerns, and actions exist, assess how likely they will affect the RI project (e.g. political and financial support, timescale) and how severe the consequences for the project will be and define the risk level. Use the risk assessment matrix in the templates in order to quantify the risk.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Analysis of documents as newspaper articles, reports about public debates, or websites of relevant social stakeholders (e.g. local environmental groups)
- Interviews with internal and external experts (e.g. project coordinator, PR manager of the project; local journalists, representatives of relevant social stakeholder groups / public interest groups)

Data analysis methods:
- Descriptive content analysis

Foresight methods as focus groups or public debates might also be useful

References:
Risk assessment template

Category Risk.3: Supply Risks

Which risks relate to insufficient supply for relevant resources for the RI project?

In this category the risks concerning insufficient supply of all kind of relevant resources (except financial resources) are investigated. Resources to be considered include workers with relevant skills and expertise, technologies, innovative components and instruments, general infrastructures and services, as well as conventional supplies that is time and volume critical. A lack of such supplies or their delayed delivery might have significant financial consequences or affect the obtained results negatively.

Indicators:

Risk.3.1: Supply risks for RI construction
Risk.3.2: Supply risks for RI operation
Risk.3.3: Supply risks for RI upgrading
Risk.3.4: Supply risks for RI decommissioning

Risk.3.1: Supply risks for RI construction

Relevance:
The indicator describes the risk of insufficient supply of essential resources such as skills and expertise, technology, high-tech components and instrumentation, infrastructures and high-tech services during the construction phase of the RI. A lack of fundamental resources might delay the project, exacerbate the facility performance, lead to higher costs and / or a reduced scientific attractiveness, and have negative impact for the obtained results.

Compilation:
- Identify and report the most significant supply risks during the construction phase as described by relevant testimonies.
- Report how likely an insufficient supply is during construction and which consequences it will have as estimated by key testimonies. Use the risk assessment matrix and definitions in the templates in order to obtain the estimates from the interviewees and to quantify the risk.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Interviews with technical and scientific experts, in particular those involved in the preparation of the project proposal (e.g. project coordinator, chief project engineer, scientific project manager, procurement manager, HR manager etc. according to the type of considered resource)

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.3.2: Supply risks for RI operation

Relevance:
The indicator describes the risk of insufficient supply of essential resources such as skills and expertise, technology, high-tech components and instrumentation, infrastructures and high-tech services during the operation of the RI. A lack of fundamental resources might impede the facility performance, lead to a reduced scientific attractiveness, impede the creation of scientific and technological results of high quality and have negative effects for the obtained benefits.

Compilation:
- Identify and report the most significant supply risks during the operational phase as described by relevant testimonies.
- Report how likely insufficient supply is during the operational phase and what consequences it will have as estimated by key testimonies. Use the risk assessment matrix and definitions in the templates in order to obtain the estimates from the interviewees and to quantify the risk.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Interviews with technical and scientific experts, in particular those involved in the preparation of the project proposal (e.g. project coordinator, chief project engineer, scientific project manager, procurement manager, HR manager etc. according to the type of considered resource)

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.3.3: Supply risks for RI upgrading

Relevance:
The indicator describes the risk of insufficient supply for essential resources such as skills and expertise, technology, high-tech components and instrumentation, infrastructures and high-tech services for upgrading the facility. A lack of fundamental resources might delay the upgrade, exacerbate the performance of upgraded components, lead to higher costs and / or a reduced scientific attractiveness, impede the creation of scientific and technological results of high quality and have negative effects for the obtained results.

Compilation:

- Identify and report the most significant supply risks for the facility upgrades as described by relevant testimonies.
- Report how likely insufficient supply is for the facility upgrades and which consequences it will have as estimated by key testimonies. Use the risk assessment matrix and definitions in the templates in order to obtain the estimates from the interviewees and to quantify the risk.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:

- Interviews with technical and scientific experts, in particular those involved in the preparation of the project proposal (e.g. project coordinator, chief project engineer, scientific project manager, procurement manager, HR manager etc. according to the type of considered resource)

Data analysis methods:

- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.3.4: Supply risks for RI decommissioning

Relevance:
The indicator describes the risk of insufficient supply for essential resources such as skills and expertise, technology, high-tech components and instrumentation, infrastructures and high-tech services for decommissioning the facility. A lack of fundamental resources in this phase might in particular increase the risks from decommissioning for workers, population and environment (if such risks exist), delay the decommissioning activities and lead to increased costs.

Compilation:

- Identify and report the most significant supply risks during the decommissioning of the facility as described by relevant testimonies.
- Report how likely an insufficient supply is assumed to be during facility decommissioning and which consequences it can have according to key testimonies. Use the risk assessment matrix and definitions in the templates in order to obtain the estimates from the interviewees and to quantify the risk.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:

- Interviews with technical and scientific experts (e.g. project coordinator, chief project engineer, scientific project manager, procurement manager, HR manager, safety experts etc. according to the type of considered resource)

Data analysis methods:

- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

What other substantial external risks exist for the RI project?

This category analyses additional risks created externally, which could affect the impacts generated by the RI project. The analysis concerns risks created by the natural environment and potential man-made risks. Events related to such risks might have negative consequences on the RI's activities and thus also on the obtained socio-economic benefits.

Indicators:

Risk.4.1: Risk of natural disasters
Risk.4.2: Geological and geotechnical risks
Risk.4.3: Man-made external risks
Risk.4.4: Data security risks

Risk.4.1: Risk of natural disasters

Relevance:
The indicator describes the risk of the facility site being affected by natural disasters, which can cause damage or affect the activities negatively.

Compilation:
- Identify and report major natural disaster risks in the host region or local environment. Report also the frequency, strengths, and consequences of events (if any) observed in a suitable time period in order to illustrate the risks. E.g. for earthquakes, the number of events above a certain magnitude in the last fifty years might be a suitable measure. For tornados, hurricanes, or other storms above a certain strength level an appropriate measure might be number of events during the last year or five years.
- Estimate and report the risk level of this type of events for the RI project. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Examples for natural disasters: earthquakes, tsunamis, floods, thunderstorms, hurricanes, tornados, dryness, forest fires ...
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Websites and documents of meteorological offices, seismic observatories, local administrations, civil protection offices, newspaper articles
- Interviews with relevant experts e.g. civil protection officers, meteorologists, seismologists, geologists ...

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.4.2: Geological and hydro-geological risks

Relevance:
The indicator describes other* risks caused by geological and hydro-geological conditions of the facility site, which might cause damage to or affect the RI activities negatively.
* *not covered by the natural disasters indicator*

Compilation:

- Identify and report major geological or hydro-geological risks of the host site. Report also the frequency, strengths, and consequences of events (if any) observed in the local environment in a suitable time period in order to illustrate the risks.
- Estimate and report the risk level of this type of events for the RI project. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Examples: The site might have a limited capability to sustain high building loads, underground cavities might bear the risk to cave in, intensive rainfalls might lead to landslides, erosion might cause the precipitation of rocks, the ground might release radon or other hazardous gases ...
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:

- Project documents; websites and documents of local geological institutes, local administrations, civil protection offices, or environmental interest groups; newspaper articles
- Interviews with relevant experts e.g. civil protection officers, local geologists, the project's head of civil engineering, representatives of environmental interest groups

Data analysis methods:

- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.4.3: Man-made risks

Relevance:
The indicator describes major man-made risks in the local environment, which might cause damage or affect the RI activities negatively.

Compilation:
- Identify and report major man-made risks of the host site. Report also the frequency, strengths, and consequences of events (if any) observed in the local environment in a suitable time period in order to illustrate the risks.
- Estimate and report the risk level of this type of events for the RI project. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Examples: aircraft routes, industrial plants
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Project documents; websites and documents of local administrations, civil protection offices, or environmental interest groups; newspaper articles
- Interviews with relevant experts such as project managers (e.g. project coordinator, head of civil engineering), civil protection officers, representatives of environmental interest groups

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.4.4: Data security risks

Relevance:
The indicator describes the risk to data security including that created, processed, and stored at the facility and/or exchanged with external collaborators. The undesired access of third parties to confidential data (as e.g. personal information, proprietary research result) and the external manipulation of software and stored files might have severe consequences for the functioning of single components, instrumentation, or the whole facility and for the reputation and image of the RI. It might even lead to a loss of economic opportunities for the users, the internal staff or the facility itself and thus to a financial damage. A risk might also exist concerning the improper use of data from third parties downloaded by internal staff.

Compilation:

- Identify and report major risks for data security at the facility.
- Estimate and report the risk level of this type of events for the RI project. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Examples: undesired disclosure of personal information or proprietary research results, loss of data caused by malfunctions, loss of data or malfunction of It services due to malware attacks, unlawful use of information from third parties by internal staff etc.
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates
Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:

- Interviews with relevant experts such as project managers (e.g. project coordinator, head of civil engineering), civil protection officers, representatives of environmental interest groups
- Document analysis of studies concerning data security

Data analysis methods:

- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

What risks does the project create for people, the ecological environment, and objects?

This category explores major risks created by the RI project for the workers, the population, the ecological environment and material goods in its surroundings. The events described by these risks have negative consequences for persons, habitats or objects in the RI's environment and must therefore be considered as undesired impacts, which have to be prevented through suitable measures.

Indicators:

Risk.5.1: Ecological risks during construction
Risk.5.2: Security risks during construction
Risk.5.3: Ecological risks during operation
Risk.5.4: Security risks during operation
Risk.5.5: Ecological risks during upgrading
Risk.5.6: Security risks during upgrading
Risk.5.7: Ecological risks during decommissioning
Risk.5.8: Security risks during decommissioning

Risk.5.1: Ecological risks during construction

Relevance:
The indicator describes significant risks, which the construction of the new facility creates for the ecological environment. These risks indicate potential negative impacts on the ecological environment, such as e.g. the destruction or impairment of habitats and possible other harmful effects on the ecological context by the construction activities, e.g. through noise, emissions, hazardous waste, increased traffic, pollution of water or soil, etc.

Compilation:
- Identify and report major risks of the construction activities for the ecological environment.
- Estimate and report the risk level of this type of events. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates

Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Interviews with relevant experts such as project managers (e.g. project coordinator, head of civil engineering, environmental manager), experts from public administrations, representatives of environmental interest groups
- Document analysis of studies concerning ecological risks

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.5.2: Security risk during construction

Relevance:
The indicator describes significant risks, which the construction of the new facility creates for the security of workers, local population, facilities and equipment. These risks indicate potential negative impacts, e.g. on the health of people or the state of material goods.

Compilation:
- Identify and report major risks of the construction activities for the security of workers, population and goods.
- Estimate and report the risk level of this type of events. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.

Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Interviews with relevant experts as e.g. project coordinator, head of civil engineering, or security managers
- Analysis of project documents

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.5.3: Ecological risks during operation

Relevance:
The indicator describes significant risks, which the operation of the new facility creates for the ecological environment. These risks indicate potential negative impacts on the ecological environment, such as e.g. the impairment of habitats and possible other harmful effects on the ecological context by the facility activities, e.g. through noise, emissions, hazardous waste, increased traffic, pollution of water or soil, etc.

Compilation:
- Identify and report major risks of the operation activities for the ecological environment.
- Estimate and report the risk level of this type of events. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates

Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Interviews with relevant experts such as project managers (e.g. project coordinator, chief engineer, scientific manager, environmental manager), experts from public administrations, representatives of environmental interest groups

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.5.4: Security risk during operation

Relevance:
The indicator describes significant risks, which the operation of the new facility creates for the security of workers, local population, facilities and equipment. These risks indicate potential negative impacts, e.g. on the health of people or the state of material goods.

Compilation:
- Identify and report major risks of the operation activities for the security of workers, population and goods.
- Estimate and report the risk level of this type of events. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.

Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Interviews with relevant experts such as e.g. project coordinator, chief engineer, scientific manager, or security managers
- Analysis of project documents
- Document analysis of studies concerning ecological risks

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.5.5: Ecological risks during upgrading

Relevance:
The indicator describes significant risks, which the upgrading of the new facility creates for the ecological environment. These risks indicate potential negative impacts on the ecological environment, such as e.g. the destruction of habitats and other possible harmful effects on the ecological context by facility upgrading, e.g. through noise, emissions, hazardous waste, increased traffic, pollution of water or soil, etc.

Compilation:
- Identify and report major risks of the upgrading activities for the ecological environment.
- Estimate and report the risk level of this type of events. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.

Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Interviews with relevant experts such as project managers (e.g. project coordinator, chief engineer, scientific manager, environmental manager), experts from public administrations, representatives of environmental interest groups
- Document analysis of studies concerning ecological risks

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.5.6: Security risk during upgrading

Relevance:
The indicator describes significant risks, which the upgrading of the facility may create for the security of workers, local population, facilities and equipment. These risks indicate potential negative impacts, e.g. on the health of people or the state of material goods.

Compilation:
- Identify and report major risks of the facility upgrading for the security of workers, population and goods.
- Estimate and report the risk level of this type of events. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.

Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Interviews with relevant experts as e.g. project coordinator, head of civil engineering, or security managers
- Analysis of project documents

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.5.7: Ecological risks during decommissioning

Relevance:
The indicator describes significant risks, which the decommissioning of the new facility may create for the ecological environment. These risks indicate potential negative impacts on the ecological environment, such as e.g. the impairment of habitats and possible other harmful effects on the ecological context by the decommissioning activities, e.g. through noise, emissions, hazardous waste, increased traffic, pollution of water or soil, etc.

Compilation:
- Identify and report major risks of the decommissioning activities for the ecological environment.
- Estimate and report the risk level of this type of events. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.

Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Interviews with relevant experts such as project managers (e.g. project coordinator, head of civil engineering, environmental manager), experts from public administrations, representatives of environmental interest groups
- Document analysis of studies concerning ecological risks

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Risk.5.8: Security risk during decommissioning

Relevance:
The indicator describes significant risks, which the decommissioning of the new facility could create for the security of workers, local population, facilities and equipment. These risks indicate potential negative impacts, e.g. on the health of people or the state of material goods.

Compilation:
- Identify and report major risks from the decommissioning activities for the security of workers, population and goods.
- Estimate and report the risk level of this type of events. Use the risk assessment matrix and definitions in the templates in order to obtain such estimates through expert interviews (assessment by the experts) or own analysis of the collected information.

Definitions and explanations:
Likelihood for an event: Use the scale rare – unlikely – possible – likely – almost certain as defined in the risk assessment templates.

Consequences of an event: Use the scale insignificant – minor – moderate – major – catastrophic as defined in the risk assessment templates.

Data sources and collection methods:
- Interviews with relevant experts such as e.g. project coordinator, head of civil engineering, or security managers
- Analysis of project documents

Data analysis methods:
- Risk analysis
- Descriptive content analysis

References:
Risk assessment template

Alternative Scenarios

In this chapter, first of all, the specifics of each use case are briefly described, before elaborating on how to develop alternative scenarios.

Differentiation of the use cases

UC1
In UC1, where ex-ante estimation for a single RI is made, the alternative scenarios are used to check the robustness of the RI project in the defined host region.

UC2
In UC2, where two or more competing host sites are competing for the same RI and ex-ante estimation is made, the alternative scenarios have to be developed for each of the opting RI regions, following the procedure of this Module – each set of alternative scenarios will be influenced and pre-conditioned by the region's specifics.
For comparing we recommend to consider stability to unexpected factors (political, economic, etc.) and the (expected) capability to manage threats or turn them into advantages.

UC3
In UC3 (ex-ante estimation of two or more competing RI projects in the same host region), the alternative scenarios have to be developed or each of the opting RI regions, following the procedure of this module. Diversity of alternatives will be determined by the specific features and characteristics of each RI.

UC4
UC4 requires no application of this module.

UC5
Ex-ante estimation for an existing RI is similar to UC1, and the alternative scenarios are used to check the robustness of the RI in the future.

General information about the module

This module of developing alternative scenarios for the RI and its development is grounded on (i) the initial success scenario hypothesis drafted in the System Dynamics Module, (ii) the impact estimation against that scenario carried out under the impact assessment modules S&T, Eco, Jobs and Life, and (iii) the assessment of the associated risks (Risk Module). The main objective here is to outline, through a Scenario Workshop, a set of alternative scenarios for plausible future developments that explore major possible deviations from the success scenario hypothesis. Alternative scenarios are built to illuminate possible development driven by a set of drivers with high impact and yet high uncertainty that are critical for the RI and its hosting environment and could be disruptive in a positive or negative way to the "RI-region" system evolution.

The success scenario is developed in the System Dynamics Module by exploring present trends and drivers and it outlines a vision of the future at the time horizon set. Its development follows the so called exploratory approach where the process of scenarios development starts from the present moment and makes projections towards the future time horizon.

The normative approach for scenario development is the approach where the outline of a desirable vision of the future at the time horizon set is made prior to devising actions for designing the present to reach the desired future.

In this module, where drivers with high uncertainty are taken into account, along with possible external factors of disruptive and unexpected nature, it is appropriate to use the normative approach for assessing alternative scenarios and anticipating the RI system's deviation from its evolutionary future vision. Guidelines to this approach are given below.

Prior to the Alternative Scenarios Workshop, the case study team has to do the following preparatory work:

Update drivers of the RI-region system

Drivers are forces that influence the development of the analysed system and allow change to occur. They have continuous character and can "drive" the system in different directions. Drivers can be identified as underlying forces in existing and emerging economic, political, S&T, social, demographic and environmental trends.
The case study team prepares, as input to the Workshop, the list of drivers to be used for the set of alternative scenarios (see Fig. 1). The list of drivers is a combination of the drivers already identified in the System Dynamics Module and the drivers behind the socio-economic (S-E) impacts estimated and categorised in the Modules S&T, Eco, Jobs and Life. The case study team is free to modify or reformulate some drivers if the results from the impact modules have uncovered new forces stemming from the S-E impacts generated by the RI, or new information and perspectives need to be taken into account not considered in the initial success scenario. In sum-up, the information from these modules needs to be screened for compiling a more comprehensive list of drivers.

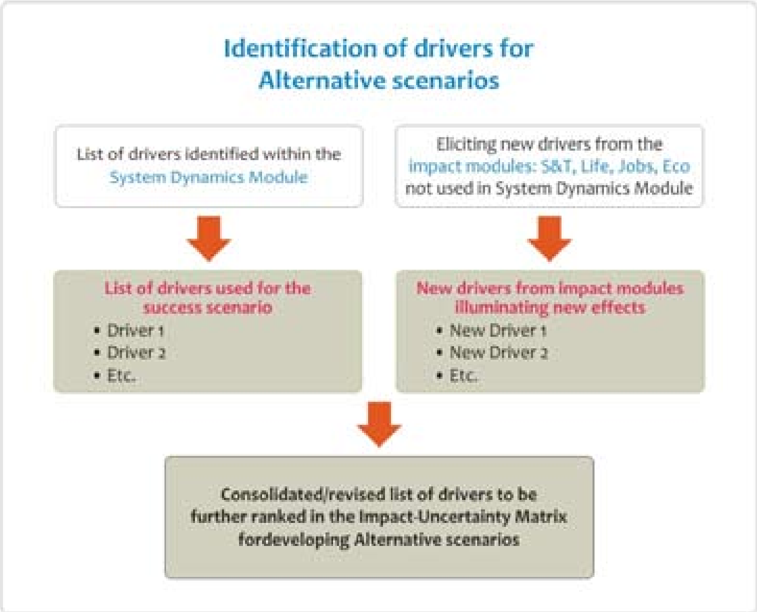

Figure 12: Identification of drivers for alternative scenarios

Elicit a list of 'wild cards'

Besides drivers, which are forces with continuous character and traceable evolution, there are certain factors with a disruptive and unexpected nature, called "wild cards" that likewise need to be considered while anticipating alternative future developments. "Wild cards" are usually the so-called "force-majeure" events or circumstances (e.g. natural disasters, terrorist attacks, unexpected supply shut-downs, etc.), with low probability but with very high impact. They are potentially disruptive (negatively or positively), beyond the control of the RI and are rapidly and unexpectedly moving. The Risk Module can be used by the case study team to list some "wild cards" stemming from the categorised risks.

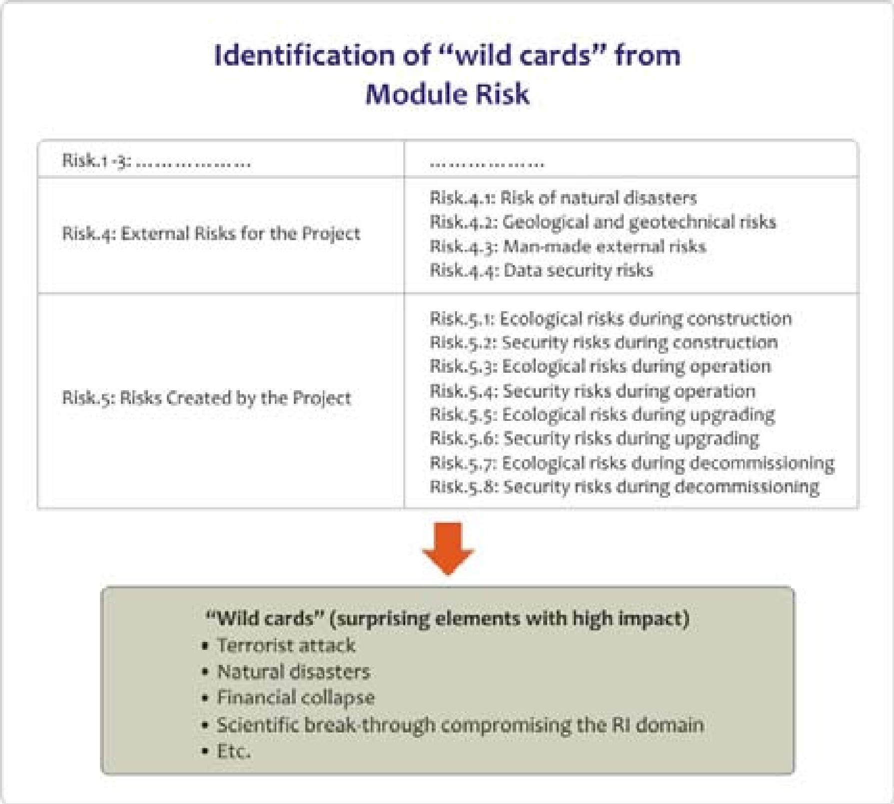

Figure 13: Example of 'wild cards" elicited from the Risk

The list of drivers drawn from the System Dynamics Module, and the S&T, Eco, Jobs and Life Modules, and the list of "wild cards" shall serve as inputs to the Alternative Scenario Workshop.

Setting up an expert panel

The expert panel is a group of no more than 15-20 experts, having a balanced representation in terms of interdisciplinarity – a variety of disciplines related to the RI domain as well as economics, management, sociology, and stakeholder groups – representatives of the stakeholder groups relevant to the RI domain.
The most widely used technique for setting up an expert panel is nominations and co-nominations. The case study team shall define the final composition of the expert panel.

Ranking the key drivers by impact and uncertainty

The drivers on the list prepared by the analytical team as input to the workshop need to be further assessed, clustered and ranked by the expert panel.

Drivers are ranked according to their impact (importance) and uncertainty:
Drivers with high impact are significantly affecting the system explored.
Drivers with high uncertainty mean forces that can potentially generate a number of effects but with no clear evidence on which direction they shall develop in the future (e.g. political environment, financial conditions, etc.).
Drivers with low uncertainty mean forces/trends that are certain and are very likely to continue to play a role in the future in a relatively clear way (e.g. technological trends, demographic trends, etc.).

Distinction between drivers and trends:
Driver: What is plausible to happen?
Trend: What is probable to happen?

„possible“ – might happen
„plausible“ – could happen
“probable” – likely to happen
“preferable” – desired to happen

Each driver is assessed by its impact and uncertainty and is positioned in the following classification matrix:

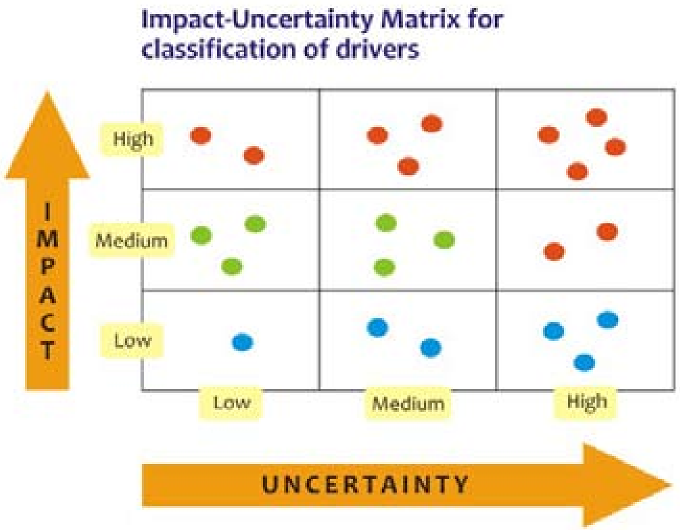

Figure 14: Impact uncertainty matrix for classification of drivers.

Drivers with high importance and high uncertainty are most likely to incur significant deviations from the initial success scenario developed on the basis of extrapolation of factors and trends during the System Dynamics Module. They form the pool of drivers around which alternative scenarios can be built.

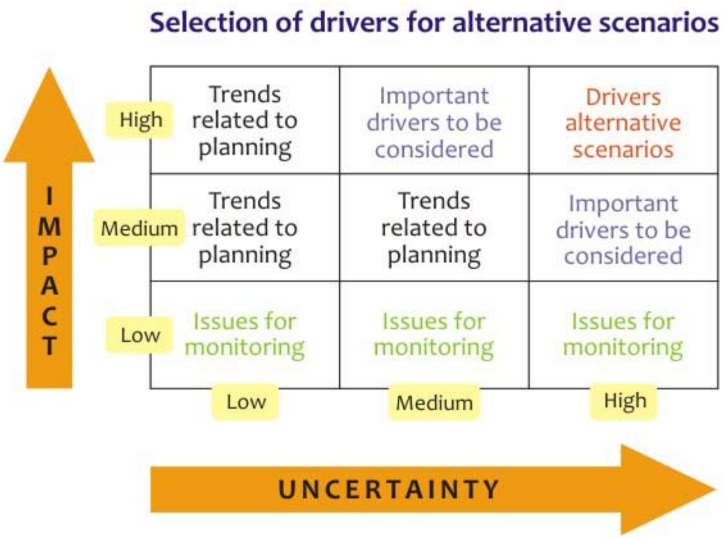

Figure 15: Selection of drivers for alternative scenarios

Selecting two drivers and building the Alternative Scenarios Matrix

The expert panel shall, by discussion and consensus, select two most uncertain drivers from the pool of high-impact-high-uncertainty drivers identified above. These two drivers can be considered as ones that are most varying in their potential future expression, thus outlining a set of clearly distinguished alternatives to the success scenario from the System Dynamics Module.

Each of the two drivers selected for the Alternative Scenarios Matrix may have a positive or negative direction of development with regards to the RI system. The positive and negative expressions and evolutions of each of the two drivers along the axes form a set of four alternative future scenarios.

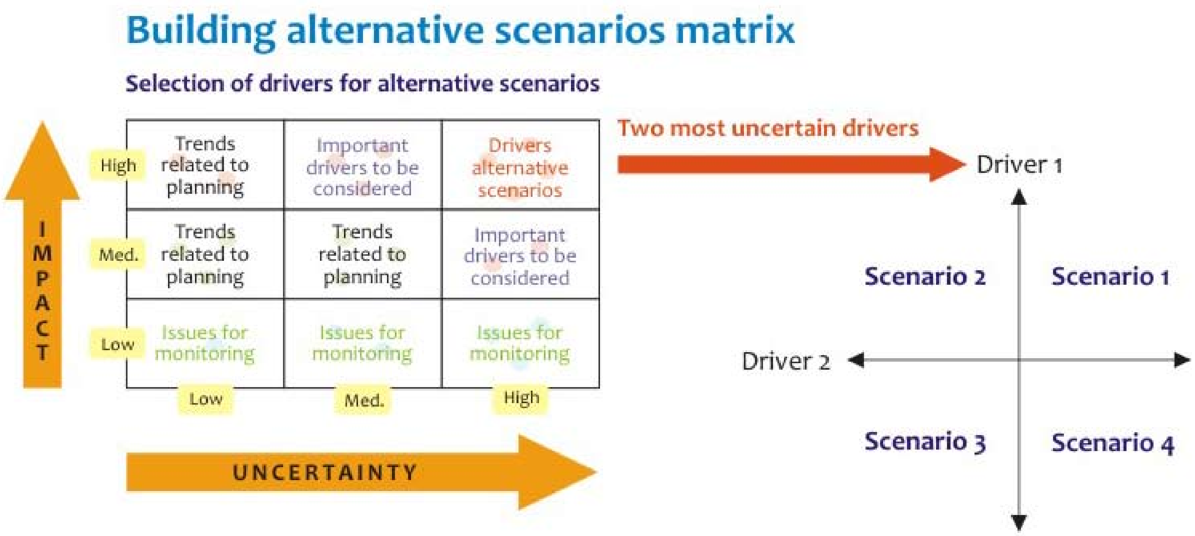

Figure 16: Building alternative scenarios matrix

Development of the alternative scenarios narratives

Alternative Scenarios are plausible shared visions of the future, described in narrative form, that provide an opportunity for the RI to anticipate how to position itself in those future alternatives and to take its present day decisions in a strategic manner. Scenarios are creative internally consistent stories that "flesh out" the set of alternatives defined by the two axes of the most uncertain drivers.

Why develop scenarios?

- Scenarios provide a context in which managers can make decisions
- Scenarios are not forecast of the future, they do not predict the future, they only illuminate important drivers of change
- Understanding these drivers can only help managers take into consideration the range of possible future developments and take better informed decisions
- A strategy based on this insight is most likely to succeed

The expert panel shall develop the 4 scenarios in a narrative form (a story) using as a basis the success scenario developed in the System Dynamics Module. The scenarios shall differ by the different evolutions of the two drivers selected as ones with highest impact and highest uncertainty. Each scenario shall describe what would the RI system look like at the time horizon set (in the System Dynamics module), with the major drivers leading to that alternative development and the major events occurred.

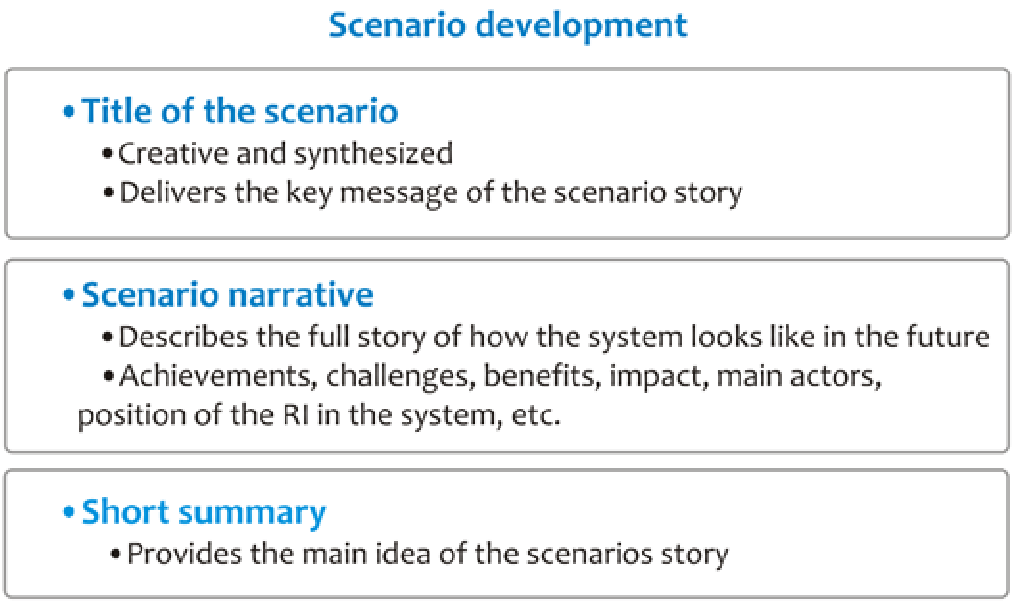

Figure 17: Scenario development

Examining wild cards effects

Examining the impact of "wild cards" within the framework of a given scenario is worthwhile for checking the RI system's reaction to unexpected, surprising, disruptive, force-majeure events. Even though such shocks can hardly be anticipated, their consideration in advance brings valuable support to taking long-term decisions.

Check of the system against shock

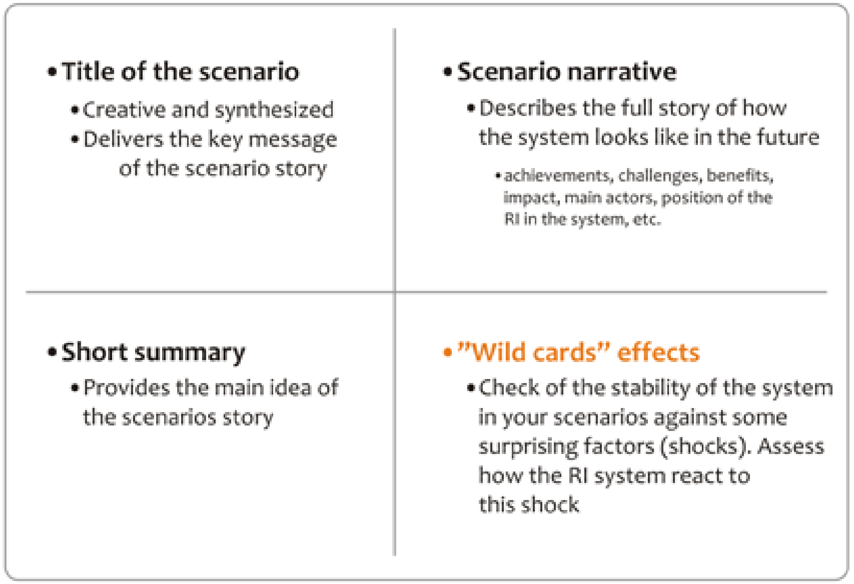

Figure 18: Check of the system against shocks

The expert panel is to apply the "What if…?" for assessing the impact of "wild cards" on a given scenario. One scenario can be "checked" against one or more "wild cards". There are no exhaustive criteria for selecting "wild cards" but some of the following could serve as guidance:

- the "wild card" should be appropriate to the scenario, i.e. it is recommendable to be associated with the RI domain and the topic of the scenario, in order to uncover useful additional information.
- It should be as original as possible, i.e. not taken into account in the process of scenario development thus far.
- "Wild cards" could be negative, i.e. would undermine the scenario constructed (an earthquake or another natural disaster for a nuclear RI), or positive, i.e. ones that could bring considerable valuable impact on the RI system, e.g. a scientific breakthrough beyond the expectations for the RI domain advancements.
- In order to avoid "prejudice" or to bring more creativity and open-mindedness to the process, it is recommendable to incorporate external expertise for assessing the impact of "wild cards" on the four scenarios developed.

Practical aspects of Alternative Scenarios

Developing alternative scenarios to a success scenario has a number of practical aspects:

- They help estimate the RI system's variability in a given scenario incurred by forces beyond the control of the RI;
- They help consider possible turning points or break points in the evolution of the RI system
- They help to recognize alternatives and be better prepared to possible shocks to the RI system
- They help the expert panel to cope with shortage of imaginative capacity

The scenarios are presented in a narrative form (Fig. 6 and Fig. 7). List of recommendations can be drawn out from the scenario narratives suggesting measures and actions for alleviating possible risks or for ceasing opportunities to the RI system outlined by each of the alternative scenarios. The expert panel can speculate on possible ways to develop the desired future as well as ways to avoid undesired developments or ways to react to possible external unexpected shocks to the system. These recommendations are not an action plan to the scenarios but are alerts to be aware of and thus make better strategic decisions on the RI system analysed.

Reporting

The final report of FenRIAM needs to address the decision makers in the framework of the scoping document. From a support decision instrument perspective, the following principles are recommended when writing the final report:

- Think about whom you are addressing.
  It is nor important that you yourself understand your study results, but that the one you are addressing does. So take over the perspective of the "target" (group / groups) and try to understand what it is that this person needs and wants to know.
- Provide a general introductory perspective of the lines of impact assessment.
  While a lot of data is collected during the different steps of the procedure, its significance in the final assessment may be revealed gradually. Therefore the final report may start with a short narrative depicting the main aspects of the RI and the region that contribute to the estimated impact, the main assumptions on future events and the main indicators in relation with the foreseen causalities.
- Ensure easy interpretation of the indicators.
  FenRIAM modules involve a series of technical sections. All the aspects that enable calculations need to be identified, but before that a brief presentation of the indicators and their relevance in the specific context ensure a proper reading of the report.
- Keep is as short as possible and as long as necessary.
  Impact assessment of RIs and RI projects is a complex challenge. Your report is a condensation of the complex study you did. Use annexes where useful to keep the line of argumentation in the report.
- Use graphical elements.
  Only text is tiring. Make your report interesting and appealing by using pictures and figures where adequate. Figures often transmit information much quicker than text.
- Use narratives.
  Short stories can make your report much more vivid and comprehensive. But when using narratives, be clear about what you want to express, what the message behind the story is.
- Integrate different modes of presenting information.
  Use different ways of presenting your results according to which way is the most adequate for the information you want to transmit. Do never use a mode of presenting information just to use this mode (e.g. we have not used any narratives, so let's do it now.). Be always clear why you present the information in the way you do. (You do not have to explain this explicitly, please do not do this, but be clear yourself.)
- Acknowledge the constraints in the application of the methodology, related to the data availability, stakeholders and experts involvement, changes in methods used etc.

Annex I: Templates for module S+T

This section contains a collection of templates, which might be useful for data collection and analysis. All templates except those for data analysis can be applied flexible and modified according to the specific need of each study, for example they could be skipped or substituted by the user's own templates or tailored to the needs of a particular case study.

Templates for the selection of data collection methods & information sources help to ...

- ... define, with which method and from which source a specific information can be collected
- ... elaborate lists of data that can be collected with a specific method from a specific information source

- Category S+T.1: TempS+T.1.1 / TempS+T.1.2
- Category S+T.2: TempS+T.2.1 / TempS+T.2.2
- Category S+T.3: TempS+T.3.1
- Category S+T.4: TempS+T.4.1 / TempS+T.4.2
- Category S+T.5: TempS+T.5.1 / TempS+T.5.2
- Category S+T.6: TempS+T.6.1 / TempS+T.6.2

Data collection templates support ...

- ... document analysis, interviews, surveys and the collection of numerical data ...
- ... list the required information for all categories and indicators and permit to copy and paste it into templates tailored to a specific information source

Document analysis: TempS+T.Doc
Expert interviews: TempS+T.Int
Collection of numerical data: TempS+T.Qu

Example:	If information is going to be collected through an expert interview (method) with the RI project coordinator (data source), an interview guideline with all the questions to be asked to this expert is required.

Data analysis templates facilitate ...

- ... the application of a number of data analysis methods by providing e.g. excel-based tools for calculations (I/O analysis, micro-models) or scales for risk analysis.

- I/O analysis: Step-by-step guide
- I/O analysis: Excel template
- Micro-model "Experimental Shadow Value":
- Excel template

TempS+T.1.1: Selection of data collection methods & information sources - category S+T.1

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
User Services	**S+T.1.1**	Services and opportunities for users	document analysis	
			expert interview	
			...	
	S+T.1.2	User proposals	document analysis	
			expert interview	
			...	
	S+T.1.3	Access and maintenance time	document analysis	
			expert interview	
			...	

TempS+T.2.1: Selection of data collection methods & information sources - category S+T.2

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Scientific Outcome	**S+T.2.1**	Publications	document analysis	
			expert interview	
			...	
			...	
	S+T.2.2	New methods, techniques and applications	document analysis	
			expert interview	
			...	
			...	

TempS+T.2.2: Selection of data collection methods & information sources - category S+T.2

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Scientific Outcome	**S+T.2.3**	New standards and procedures	document analysis	
			expert interview	
			...	
			...	
	S+T.2.4	New developed metadata	document analysis	
			expert interview	
			...	
			...	

TempS+T.3.1: Selection of data collection methods & information sources - category S+T.3

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Innovation	**S+T.3.1**	Intellectual Property Rights	document analysis	
			expert interview	
			...	
	S+T.3.2	Instruments and products	document analysis	
			expert interview	
			...	
	S+T.3.3	Spin-offs and start-ups	document analysis	
			expert interview	
			...	

TempS+T.4.1: Selection of data collection methods & information sources - category S+T.4

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Networking & Collaboration	**S+T.4.1**	Services and opportunities for users	document analysis	
			expert interview	
			...	
	S+T.4.2	User proposals	document analysis	
			expert interview	
			...	
	S+T.4.3	Access and maintenance time	document analysis	
			expert interview	
			...	
	S+T.4.4	Organised scientific events and participants	document analysis	
			expert interview	
			...	

TempS+T.4.2: Selection of data collection methods & information sources - category S+T.4

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Networking & Collaboration	**S+T.4.5**	Major scientific networks	document analysis	
			expert interview	
			...	
	S+T.4.6	Major networks with industries	document analysis	
			expert interview	
			...	
	S+T.4.7	Regional R&D network	document analysis	
			expert interview	
			...	

TempS+T.5.1: Selection of data collection methods & information sources - category S+T.5

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Impact on Suppliers	**S+T.5.1**	Relevant industrial sectors and markets	document analysis	
			expert interview	
			...	
	S+T.5.2	Joint development with suppliers	document analysis	
			expert interview	
			...	
	S+T.5.3	High-tech contractse	document analysis	
			expert interview	
			...	

TempS+T.5.2: Selection of data collection methods & information sources - category S+T.5

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Impact on Suppliers	**S+T.5.4**	Other benefits for high-tech suppliers	document analysis	
			expert interview	
			...	
	S+T.5.5	Low-tech contracts	document analysis	
			expert interview	
			...	
	S+T.5.6	Other benefits for low-tech suppliers	document analysis	
			expert interview	
			...	

TempS+T.6.1: Selection of data collection methods & information sources - category S+T.6

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
More Impacts on Firms and Customers	**S+T.6.1**	Scientific and analytical services	document analysis	
			expert interview	
			...	
	S+T.6.2	Customers and contracts	document analysis	
			expert interview	
			...	
	S+T.6.3	Industrial use	document analysis	
			expert interview	
			...	
	S+T.6.4	Revenues	document analysis	
			expert interview	
			...	

TempS+T.6.2: Selection of data collection methods & information sources - category S+T.6

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
More Impacts on Firms and Customers	**S+T.6.5**	Joint R&D projects with industries	document analysis	
			expert interview	
			...	
	S+T.6.6	Scientific papers cited in industrial patents	document analysis	
			expert interview	
			...	
	S+T.6.7	Benefits from improved general services and infrastructures	document analysis	
			expert interview	
			...	

TempS+T.Doc: Document Analysis Template

The document analysis template can be used to prepare excerpts of documents, websites, and similar data sources. Please select the indicators, which you are going to use in your particular study and for which you want to gather the information through document analysis. If desired, you can adjust the template for data collection from a specific document by selecting the relevant categories and indicators.

S+T.1: User Services	
S+T.1.1: Services and opportunities for users Text	Tables, diagrams, pictures, etc.
S+T.1.2: User proposals Text	Tables, diagrams, pictures, etc.
S+T.1.3: Access and maintenance time Text	Tables, diagrams, pictures, etc.
S+T.1.4: Users by country, field, and sector Text	Tables, diagrams, pictures, etc.
S+T.1.5: Monetary value of offered access time Text	Tables, diagrams, pictures, etc.

S+T.1: User Services	
S+T.1.1: Services and opportunities for users Text	Tables, diagrams, pictures, etc.
S+T.1.2: User proposals Text	Tables, diagrams, pictures, etc.
S+T.1.3: Access and maintenance time Text	Tables, diagrams, pictures, etc.
S+T.1.4: Users by country, field, and sector Text	Tables, diagrams, pictures, etc.
S+T.1.5: Monetary value of offered access time Text	Tables, diagrams, pictures, etc.

S+T.2: Scientific Outcome	
S+T.2.1: Publications (all types) Text	Tables, diagrams, pictures, etc.
S+T.2.2: New methods, techniques, and applications Text	Tables, diagrams, pictures, etc.
S+T.2.3: New standards and procedures Text	Tables, diagrams, pictures, etc.
S+T.2.4: New developed metadata Text	Tables, diagrams, pictures, etc.

S+T.3: Innovation	
S+T.3.1: Intellectual; Property Rights Text	Tables, diagrams, pictures, etc.
S+T.3.2: Instruments and products Text	Tables, diagrams, pictures, etc.
S+T.3.3: Spin-offs and start-ups Text	Tables, diagrams, pictures, etc.

S+T.4: Networking and Collaboration	
S+T.4.1: Strategy for networking and collaboration Text	Tables, diagrams, pictures, etc.
S+T.4.2: Research contracts and project funds Text	Tables, diagrams, pictures, etc.
S+T.4.3: Guest scientists Text	Tables, diagrams, pictures, etc.
S+T.4.4: Organised scientific events and participants Text	Tables, diagrams, pictures, etc.
S+T.4.5: Major scientific networks Text	Tables, diagrams, pictures, etc.
S+T.4.6: Major networks with industries Text	Tables, diagrams, pictures, etc.
S+T.4.7: regional R&D network Text	Tables, diagrams, pictures, etc.

S+T.5: Impacts on Suppliers	
S+T.5.1: Relevant industrial sectors and markets Text	Tables, diagrams, pictures, etc.
S+T.5.2: Joint development with suppliers Text	Tables, diagrams, pictures, etc.
S+T.5.3: High-tech contracts Text	Tables, diagrams, pictures, etc.
S+T.5.4: Other benefits for high-tech suppliers Text	Tables, diagrams, pictures, etc.
S+T.5.5: Low-tech contracts Text	Tables, diagrams, pictures, etc.
S+T.5.6: Other benefits for low-tech suppliers Text	Tables, diagrams, pictures, etc.

S+T.6: More Impacts on Firms and Customers	
S+T.6.1: Scientific and analytical services Text	Tables, diagrams, pictures, etc.
S+T.6.2: Industrial customers and contracts Text	Tables, diagrams, pictures, etc.
S+T.6.3: Industrial use Text	Tables, diagrams, pictures, etc.
S+T.6.4: Revenues Text	Tables, diagrams, pictures, etc.
S+T.6.5: Joint R&D projects with industries Text	Tables, diagrams, pictures, etc.
S+T.6.6: Scientific papers cited in industrial patents Text	Tables, diagrams, pictures, etc.
S+T.6.7: benefits from improved general services and infrastructures Text	Tables, diagrams, pictures, etc.

TempS+T.Int: Interview Guideline

Questions are intended as a guidance for all types of interviews (face-to-face, email, phone, etc.) and do not need to be used literally. Please adjust the guideline to the needs of a specific interview by selecting the relevant questions to be asked to the specific interviewee. Note also that the templates of questionnaire TempS+T.Qu provide a couple of tables, which support the collection of numerical data.

Interviewee: Function:	Date of interview:	Time of interview:	Interviewer:

S+T.1: User Services		
S+T.1.1	Question: Which services and opportunities for users does / will the RI offer?	Response:
S+T.1.2	Question: How many user proposals do you receive (expect) every year and how many can get access to the RI?	Response:
S+T.1.3	Question: How many hours of user access time and facility maintenance time are planned per year?	Response:
S+T.1.4	Question: How many users (are expected to) come to the facility each year? From which geographic regions, research fields and sectors?	Response:
S+T.1.5	Question: How high do you estimate the monetary value of one hour of user access time at the RI?	Response:

S+T.2: Scientific Outcome		
S+T.2.1	Question: Which types of publications and how many of each type result (are expected) from activities at the RI by RI staff and users each year?	Response:
S+T.2.2	Question: How many and which types of new methods, tech¬niques, and applications turn out (are expected) from activities at the RI by RI staff and users each year? Can you give some concrete examples?	Response:
S+T.2.3	Question: How many and which types of new standards and procedures result (are ex-pected) from activities at the RI by RI staff and users each year? Can you give some concrete examples?	Response:
S+T.2.4	Question: How many and which types of new metadata come out (are expected) from activities at the RI by RI staff and users each year? Can you give some concrete examples?	Response:

S+T.3: Innovations		
S+T.3.1	Question: How many Intellectual Property Rights did the facility produce during the last five years and in total? How many IPRs are expected during the next five years?	Response:
S+T.3.2	Question: How many new instruments and products have been (are expected to be) developed due to the RI's activi¬ties during the last (next) five years? Which types? Can you give some concrete examples?	Response:
S+T.3.3	Question: How many and which spin-off and start-up companies have been developed as a consequence of the RI's activities? Can you describe these firms and their prospective? Which opportunities for the creation of spin-off or start-up companies in the future do you see?	Response:

S+T.4: Networking and Collaboration		
S+T.4.1	Question: Which is the (new) RI's strategy for networking and collaboration?	Response:
S+T.4.2	Question: How many research contracts and how many project funds have been attracted (are expected) during the last (next) five years or in average per year? From which (possible) funding sources? Which type of partners from which geographic areas have participated / are expected to participate?	Response:
S+T.4.3	Question: How many guest scientists do you (expect to) host every year? From which geographic areas? How many facility scientists are (expected to be) hosted by other institutions each year? In which geographic areas?	Response:
S+T.4.4	Question: How many scientific events of which type are you organising / planning to organise annually? How many participants attended / are expected to attend? From which audiences and geographic areas?	Response:
S+T.4.5	Question: In which major scientific networks is the facility currently involved? Which are their main impacts? In which existing scientific networks does the facility want to get involved in the future? Which benefits would that create? Which new scientific networks might be created by the facility in the future? Which impacts would these networks have?	Response:

S+T.4.6	Question: In which major networks with industries is the facility currently involved? Which are their main impacts? In which existing networks with industries does the facility want to get involved in the future? Which benefits would that create? Which new networks with industries might be created by the facility in the future? Which impacts would these networks have?	Response:
S+T.4.7	Question: Which is the relevant network of regional R&D actors for the facility? Which major impacts does this network have? Which major impacts did / does the inclusion of the RI into this network have?	Response:

S+T.5: Impact on Suppliers		
S+T.5.1	Question: Which are the relevant industrial sectors and markets for the (new) RI?	Response:
S+T.5.2	Question: How important are joint development activities with suppliers for the (new) RI and which benefits do they have for the partners? Which joint development projects with suppliers have been performed (are expected) during the last (next) five years? Which benefits did they have (are expected) for the partners? Can you provide some concrete examples?	Response:
S+T.5.3	Question: How many high-tech contracts have been (are expected to be) awarded to suppliers during construc¬tion? Which is the (expected) monetary volume? How many suppliers from which geographic areas benefitted (are expected o benefit) from high-tech contracts during construction? Can you provide some examples of benefits that suppliers achieved (are expected to achieve) from such contracts during construction? How many high-tech contracts have been (are expected to be) awarded annually to suppliers during operation? Which is the (expected) monetary volume? How many suppliers from which geographic areas benefitted (are expected o benefit) annually from high-tech contracts during operation? Can you provide some examples of benefits that suppliers achieved (are expected to achieve) from such contracts during operation?	Response:

S+T.5.4	Question: Which further impacts on high-tech suppliers can you imagine?	Response:
S+T.5.5	Question: How many low-tech contracts have been (are expected to be) awarded to suppliers during construc¬tion? Which is the (expected) monetary volume? How many suppliers from which geographic areas benefitted (are expected o benefit) from low-tech contracts during construction? Can you provide some examples of benefits that suppliers achieved (are expected to achieve) from low-tech contracts during construction? How many low-tech contracts have been (are expected to be) awarded annually to suppliers during operation? Which is the (expected) monetary volume? How many suppliers from which geographic areas benefitted (are expected o benefit) annually from low-tech contracts during operation? Can you provide some examples of benefits that suppliers achieved (are expected to achieve) from low-tech contracts during operation?	Response:
S+T.5.6	Question: Which further impacts on low-tech suppliers can you imagine?	Response:

S+T.6: More Impacts on Firms and Customers		
S+T.6.1	Question: Which are the scientific and analytical services offered by the (new) facility? Who benefits (is expected to benefit) and in which way?	Response:
S+T.6.2	Question: Who has awarded (is expected to award) contracts to the facility during the last year / five years? Which type of contracts have been awarded (are expected)? Which monetary volume?	Response:
S+T.6.3	Question: How many proprietary and non-proprietary industrial users have worked (are expected to work) at the facility annually? How many user firms are (expected to be) involved in proprietary and non-proprietary research at the RI? How many of the firms are (are expected to be) SMEs, how many large enterprises? From which geographic areas do they come (are they expected)?	Response:
S+T.6.4	Question: Which are the main (expected) sources for revenues at the facility? How many revenues are achieved (expected) by source?	Response:

S+T.6.5	Question: Which major research projects with companies have been conducted (planned) during the last (next) five years? Which are the (expected) budgets and funding sources? Which types of companies have been involved (are expected to be involved)? Which benefits from these projects have been obtained (are expected to be obtained) for the public and private project partners?	Response:
S+T.6.6	Question: How many scientific papers published by researchers of the RI have been cited in industrial patents in the past and how many can be expected to be cited in the future?	Response:
S+T.6.7	Question: How has the facility improved (is the facility going to improve) the general services and infrastructures in the host region? How does (will) industries / society benefit from these improvements?	Response:

The templates of this questionnaire provide a couple of tables, which support the collection of numerical data. The tables can be used in expert interviews, sent to the competent addressee, or filled in by the case study team with data from the analysis of documents. Please adjust the questionnaire by selecting the relevant questions for a specific addressee.

Addressee (responding expert): name: email: function:	Send out on:	Response received on:	Contact person from case study team name: email: phone:

S+T.1: User services

S+T.1.2
User proposals

No. of user proposals per year received (or expected) by the facility	No. of user proposals per year that get access to the facility

Please add explanation if required

S+T.1.3
Planned (expected) user access time and maintenance time

Planned user access time	Planned maintenance time
(hours/year)	(hours/year)

Please add explanation if required

S+T.1.4 Users by country, field and sector	

Geographical area	Host country	EU member states	Other European	Non-European
Users				
	users/year	users/year	users/year	users/year

Scientific area	Area *	Area 2*	Area 3*	Area 4*
Users				
	users/year	users/year	users/year	users/year

Sector	Industry	University	Public Research Centre	Others
Users				
	users/year	users/year	users/year	users/year

S+T.1.5
Monetary value of offered access time

(Estimated) lifetime of the RI in years	
(Estimated) construction costs of the RI (€)	
(Estimated) average annual operation costs of the RI (€)	
(Estimated) total staff costs for construction (€)	
(Estimated) average annual staff costs during operation (€)	
(Estimated) total number of user access hours per year	
(Estimated) average functioning coefficient α of the experimental equipments*	

*Fraction of the total user time during which the experimental equipments are functioning in average

S+T.2: Scientific Outcome

No. of user proposals per year received (or expected) by the facility	No. of user proposals per year that get access to the facility

Please add explanation if required

S+T.2.1
Publications

Type		No.
Highly cited papers	No. in last five years	
	Average citation count per year	
	Total no. of citations	
Top ten papers	Average citation count per year	
	Total no. of citations	

Please add further columns if required

S+T.3: Innovation

S+T.3.1
Intellectual Property Rights

Name	Type				
IPR1					
IPR2					
IPR3					
...					
...					
...					
...					

*none, own, license;
Please add explanation if required

S+T.3.3
Spin-offs and start-ups

Name	Working places	Turnover Year1	Turnover Year2	Turnover Year3	Turnover Year5	Turnover Year10
Firm 1						
Firm 2						
Firm 3						
...						
...						
...		K€	K€	K€	K€	K€

Please add further rows or columns if required

S+T.4: Networking & Collaboration

S+T.4.2
Research contracts and project funds
(please specify period)

Research contracts and project funds

Contract / project	Total budget	Received RI funding	Funding source	No. of partners	Type of partners$	Partner countries*
Name 1						
Name 2						
Name 3						
...						
...						
Total						
	K€	K€				

$University (U), Public Research (R), Company (C), Others (O) / * Please use EU country codes
Please add further rows or columns if required

S+T.4.3
Guest scientists
(please specify period)

Guest scientists at the facility, period: (please specify)

Geographic provenience	No.	Scientific field	No.
Host country of RI		Field 1	
EU Member States		Field 2	
Other European Countries		Field 3	
Non-European Countries		Field 4	
...			
...		K€	K€

Please indicate fields and add further rows if required

	Facility scientists as host scientists of other institutions, period: (please specify)

Geographic area of hosting institution	No.	Scientific field	No.
Host country of RI		Field 1	
EU Member States		Field 2	
Other European Countries		Field 3	
Non-European Countries		Field 4	
...			
...		K€	K€

Please indicate fields and add further rows if required

S+T.4.4
Organised scientific events and participants

(please specify period)

Scientific events

Type of event	No. of events	Participants	Audience[$]	Provenience[*]
Conference				
Workshop				
Collaboration meeting				
Seminar				
School				
Other				
	annually (otherwise indicate period)			

[$] Scientists, technical experts, students
[*] Please use EU country codes

S+T.5: Impact on Suppliers

S+T.5.3
High-tech contracts and utilities

No. of contracts awarded to high-tech suppliers during the construction phase			
Geographic area	No. of contracts	Monetary volume (€)	No. suppliers
Host region			
Host country			
EU Member States			
Other European countries			
No-European countries			
Total			

No. of contracts awarded each year to high-tech suppliers during the operation phase			
Geographic area	No. of contracts	Monetary volume (€)	No. suppliers
Host region			
Host country			
EU Member States			
Other European countries			
No-European countries			
Total			

S+T.5.5 Low-tech contracts (please specify period)	see tables below

No. of contracts awarded to low-tech suppliers during the construction phase

Geographic area	No. of contracts	Monetary volume (€)	No. suppliers
Host region			
Host country			
EU Member States			
Other European countries			
Non-European countries			
Total			

No. of contracts awarded each year to low-tech suppliers during the operation phase

Geographic area	No. of contracts	Monetary volume (€)	No. suppliers
Host region			
Host country			
EU Member States			
Other European countries			
Non-European countries			
Total			

S+T.6: More Impacts on Firms and Customers

S+T.6.2
Customers and contracts

Contracts

No. of contracts per year	Company	R&D Centre	University	Others	Total
Scientific & analytical services					
Proprietary access time					
Licenses (royalties)					
Sales (products, components)					
Total					

Monetary volume of contracts

Monetary contract volume per year (€)	Company	R&D Centre	University	Others	Total
Scientific & analytical services					
Proprietary access time					
Licenses (royalties)					
Sales (products, components)					
Total					

S+T.6.3
Industrial use

Industrial users and user companies			
	Proprietary use	Non-proprietary use	Total
No. of industrial users / year			
No. of user companies / year			
of which SMEs			
of which large enterprises			

Geographic provenience of industrial users			
User companies: provenience	Proprietary use	Non-proprietary use	Total
Host region			
Host country			
EU Member States			
Other European countries			
Non-European countries			

If required, use more detailed geographic areas

S+T.6.4
Revenues

Annual revenues (€)						
	Year	Year - 1	Year - 2	Year - 3	Year - 4	...
Scientific & analytical services						
Proprietary access time						
Licenses (royalties)						
Sales (products, components)						
Total						

Please add columns or rows, if required

S+T.6.5
Joint R&D projects with industries

Joint R&D projects with industries						
Project	Budget (K€)	Funding sources#	No. of companies	Types of companies$	Countries of companies*	No. of other partners
Name 1						
Name 2						
Name 3						
...						
...						
Total						

#Joint (partners), internal (RI), industrial (partners), third parties (e.g. government, EC, ...)
$SME, large enterprise (L)
*please use EU country codes
Please add further rows or columns if required

Input-Output Method Step-by-Step

Input-output tables in FenRIAM allow simulating in a simple way the economic effects from introducing an RI into the regional or national economy. The objective is to assess the order of magnitude of the additional economic activity created by the RI. This step-by-step guideline aims at facilitating the application of the method. The building blocks are explained in detail in D.1.1.
Significance and limitations of the results
In order to allow simulations about the future state of the economy with an implemented RI, it is assumed that despite the differences between national and regional economic structures these calculations can provide valuable insights. Indeed most studies can currently only be based on national input - output (I/O) tables. This leads to limitations in the accuracy of the results, in particular if large differences exist between the national and regional economic structure and if a large part of the purchases occurs from regional suppliers. Also a large fraction of purchases from foreign suppliers can affect the accuracy. In the case that most of the procurement for a certain RI is performed with regional suppliers and regional I/O tables exist, they can be used instead of the national tables. A further limitation is that I/O tables are updated by the national statistical institutes only every five to ten years. Larger changes of the economic structure since the reference year of the latest I/O table can also reduce the accuracy of a study performed for a later time period. Yet, the aim of applying I/O analysis in FenRIAM is to highlight the order of magnitude of the achieved economic effects and not to quantify these effects precisely. Keeping this in mind the method can add value and lead to a better understanding of the SE impacts.

How to proceed:

- Download the national input-output tables from Eurostat

For the EU member states, national I/O tables may be found on
http://epp.eurostat.ec.europa.eu/portal/page/portal/esa95_supply_use_input_tables/data/workbooks
From the zip file of your country, open the symmetric I/O table excel file and select the spreadsheet called "domXX" where "dom" stands for domestic (we do not look at trade) and "XX" stands for the year (e.g. 05). Make sure to take the latest one.
I/O tables can also be found on the OECD website: http://www.oecd.org/sti/inputoutput/

- Download the FenRIAM I/O excel template

The template is available on the FenRIAM website: (insert link)

- Implement the I/O table in your country's excel file

FenRIAM and Eurostat I/O tables are homogenised, meaning that the spreadsheet template from Eurostat can be implemented directly into the FenRIAM I/O template (first spreadsheet called "Eurostat dom IO table").
Practically, copy the dataset from Eurostat without the category labels into the first spreadsheet called "Eurostat dom IO table" (step 0). In order to

keep the colour box which represents the aggregated categories, you should click right and paste special only the values. When pasted, make sure that for each sectors, the output at basic price is equal to the total use.

- Add the RI to your economy

When the first spreadsheet is filled, click to the second spreadsheet called "IO exercise". The excel file should have automatically computed the first part of the results (step 1 to step 4).
You should now enter the RI demand (the expected budget of the RI), filling the green part in the spreadsheet (step 5). In order to do this, the RI budget needs to be broken down by economic sector of the purchased goods or services. Since the logic of the I/O exercise is to capture the economic activity deriving from an increased demand from the RI at the different project stages, do this separately for the three different phases of the RI project, namely construction, operation, and decommissioning. A boost in the building sector can for example be expected as a result of the construction phase of the RI.

- Calculate the additional economic activity

Step 6 and Step 7 give the results of the exercise. The total effect columns show - for each sector and in total - the increase of economic activity needed to meet the additional demand generated by the RI. For each of the three phases construction, operation and decommissioning the I/O exercise provides an estimate of the increased economic activity in million Euros (MioEuros, M€). The total economic effect consists of three main contributions:

- Direct effects, which result from the increased demand of the RI;
- Indirect effects, which measure the size of the inter-industry flows to satisfy the original increase in demand (increased demand of the suppliers of the suppliers etc.);
- Induced effects, which are created by the increased household spending as a result of direct and indirect effect.

The FenRIAM exercise is limited to evaluate the direct and indirect economic effects of an RI in the different sectors of the economy. The numbers in the corresponding columns provide the economic effects in M€. The interpretation of the results in step 6 is the following: The total output increase needed to satisfy the additional demand from the construction phase of the studied facility is approximately "see number in cell F84" M€. The total additional economic output needed to satisfy the additional demand from RI operation is about "see number in cell F92" M€. Finally, the output increase required to satisfy the increased demand of the RI during decommissioning (dismantling of the facility) is about "see number in F100"M€.

- Calculate the additionally generated employment

Step 8 at the end of the exercise interprets the additional output in terms of generated employment. In order to perform this calculation, collect the required data about the total employment per sector (construction, industry w/o construction, services) in your country.
Information is available on: http://stats.oecd.org/index.aspx?DatasetCode=MEILABOUR.
Fill the data into the green cells of the table. You obtain then an estimation of the number of person-years of employment created for the entire construction phase (which is typically longer than one year) and in average for one year of operation. Person-years of employment may be understood as additional full-time jobs of one year duration.

Annex II: Templates for module Eco

This section contains a collection of templates, which might be useful for data collection and analysis. These templates are proposals in order to facilitate the application of RIAM. They may be modified according to the specific need of each study, skipped or substituted by own templates. The templates for the selection of data collection methods and sources help to define, which information can be collected by which method and from which source. A list of all the information that can be gathered with a certain method from a specific data source can then be prepared and specific data collection templates can be elaborated. E.g. if the information is going to be collected through an expert interview (method) with the RI project coordinator (data source), an interview guideline with all the questions to be asked to this expert is required. The general data collection templates of RIAM list all the required information for all the categories and indicators and permit to copy and paste them into specific templates.

Templates of module Eco:

Selection of data collection methods & sources:

- TempEco.1.1 / TempEco.1.2: Category S+T.1
- TempEco.2.1 / TempEco.2.2: Category S+T.2
- TempEco.3.1: Category Eco.3
- TempEco.4.1 / TempEco.4.2: Category Eco.4
- TempEco.5.1 / TempEco.5.2: Category Eco.5
- TempEco.6.1 / TempEco.6.2: Category Eco.6

Data Collection Templates:

- TempEco.Doc: Document Analysis Template
- TempEco.Int: Interview Guideline
- TempEco.Qu: Questionnaire for the collection of numerical data

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

TempEco.1.1: Category Eco.1 - Selection of data collection methods and sources

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Energy	**Eco.1.1**	Direct and indirect energy consumption by source	document analysis	
			expert interview	
			...	
	Eco.1.2	Special requirements on the energy supply system	document analysis	
			expert interview	
			...	
	Eco.1.3	Effects on energy services and infrastructures	document analysis	
			expert interview	
			...	
	Eco.1.4	Initiatives for a sustainable energy use and their effects	document analysis	
			expert interview	
			...	
			...	
	Eco.1.5	New knowledge, methods, technologies, controls, and standards regarding energy and their effects	document analysis	
			expert interview	
			...	
			...	

TempEco.2.1: Category Eco.2 - Selection of data collection methods and sources

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Water & Effluents	**Eco.2.1**	Average and peak fresh water consumption by required water quality	document analysis	
			expert interview	
			...	
			...	
	Eco.2.2	Type, quantity, and effects of major effluents	document analysis	
			expert interview	
			...	
			...	
	Eco.2.3	Effects on water supply and sewage services	document analysis	
			expert interview	
			...	
	Eco.2.4	Initiatives for a sustainable use of water and their effects	document analysis	
			expert interview	
			...	
			...	
	Eco.2.5	New knowledge, methods, technologies, controls, and standards regarding water and their effects	document analysis	
			expert interview	
			...	
			...	

TempEco.3.1: CategoryEco.3 – Selection of data collection methods and sources

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Materials & Waste	**Eco.3.1**	Quantity of waste by type and disposal method	document analysis	
			expert interview	
			...	
	Eco.3.2	Initiatives for a sustainable use of materials and effects	document analysis	
			expert interview	
			...	
	Eco.3.3	Type and quantity of handled hazardous substances, risks, required permissions and skills	document analysis	
			expert interview	
			...	
	Eco.3.4	Effects on waste services and infrastructures	document analysis	
			expert interview	
			...	
	Eco.3.5	New knowledge, methods, technologies, controls, and standards regarding waste and their effects	document analysis	
			expert interview	
			...	
			...	

TempEco.4.1: Category Eco.4 - Selection of data collection methods and sources

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Emissions & Noise	**Eco.4.1**	Type, quantity, and effects of major direct and indirect air pollutant emissions	document analysis	
			expert interview	
			...	
	Eco.4.2	Initiatives to reduce pollutant emissions and their effects	document analysis	
			expert interview	
			...	
	Eco.4.3	Type, level, and effects of created noise	document analysis	
			expert interview	
			...	
	Eco.4.4	Initiatives to reduce noise and their effects	document analysis	
			expert interview	
			...	
	Eco.4.5	Impacts on light and lighting, direct and indirect (e.g. by required regulations) and their consequences	document analysis	
			expert interview	
			...	
	Eco.4.6	New knowledge, technologies, standards and controls, regarding emissions / noise and their effects	document analysis	
			expert interview	
			...	

TempEco.5.1: Category Eco.5 - Selection of data collection methods and sources

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Radiation	**Eco.5.1**	Type, level, and effects of created radiation and required permissions	document analysis	
			expert interview	
			...	
	Eco.5.2	Radiation risks, radiation risk management and public awareness	document analysis	
			expert interview	
			...	
	Eco.5.3	New knowledge, technologies, standards and controls, regarding emissions / noise and their effects	document analysis	
			expert interview	
			...	

TempEco.6.1: Category Eco.6 - Selection of data collection methods and sources

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Biodiversity & Habitats	**Eco.6.1**	Location and size of RI site, related infrastructure and vicinity to protected areas or important habitats	document analysis	
			expert interview	
			...	
	Eco.6.2	Expected impacts of RI activities on habitats and biodiversity	document analysis	
			expert interview	
			...	
	Eco.6.3	Initiatives to reduce impacts on habitats and biodiversity and their effects	document analysis	
			expert interview	
			...	

TempEco.7.1: Category Eco.7 - Selection of data collection methods and sources

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Environmental Awareness	**Eco.7.1**	Initiatives to create environmental awareness	document analysis	
			expert interview	
			...	
	Eco.7.2	Impacts on environmental aware-ness	document analysis	
			expert interview	
			...	

TempEco.Doc: Document Analysis Template

The document analysis template can be used to prepare excerpts of documents, websites, and similar data sources. Please select the indicators, which you are going to use in your particular study and for which you want to gather the information through document analysis. If desired, you can adjust the template for data collection from a specific document by selecting the relevant categories and indicators.

Eco.1: Energy	
Eco.1.1: Direct and indirect energy consumption by source Text	Tables, diagrams, pictures, etc.
Eco.1.2: Special requirements on the energy supply system Text	Tables, diagrams, pictures, etc.
Eco.1.3: Effects on energy services and infrastructures Text	Tables, diagrams, pictures, etc.
Eco.1.4: Initiatives for a sustainable energy use and their effects Text	Tables, diagrams, pictures, etc.
Eco.1.5: New knowledge, methods, technologies, controls, and standards regarding energy and their effects Text	Tables, diagrams, pictures, etc.

Eco.2: Water & Effluents	
Eco.2.1: Average and peak fresh water consumption by required water quality Text	Tables, diagrams, pictures, etc.
Eco.2.2: Type, quantity, and effects of major effluents Text	Tables, diagrams, pictures, etc.
Eco.2.3: Effects on water supply and sewage services Text	Tables, diagrams, pictures, etc.
Eco.2.4: Initiatives for a sustainable use of water and their effects Text	Tables, diagrams, pictures, etc.
Eco.2.5: New knowledge, methods, technologies, controls, and standards regarding water and their effects Text	Tables, diagrams, pictures, etc.

Eco.3: Materials & Waste	
Eco.3.1: Quantity of waste by type and disposal method Text	Tables, diagrams, pictures, etc.
Eco.3.2: Initiatives for a sustainable use of materials and effects Text	Tables, diagrams, pictures, etc.
Eco.3.3: Type and quantity of handled hazardous substances, risks, required permissions and skills Text	Tables, diagrams, pictures, etc.
Eco.3.4: Effects on waste services and infrastructures Text	Tables, diagrams, pictures, etc.
Eco.3.5: New knowledge, methods, technologies, controls, and standards regarding waste and their effects Text	Tables, diagrams, pictures, etc.

Eco.4: Emissions & Noise	
Eco.4.1: Type, quantity, and effects of major direct and indirect air pollutant emissions Text	Tables, diagrams, pictures, etc.
Eco.4.2: Initiatives to reduce pollutant emissions and their effects Text	Tables, diagrams, pictures, etc.
Eco.4.3: Type, level, and effects of created noise Text	Tables, diagrams, pictures, etc.
Eco.4.4: Initiatives to reduce noise and their effects Text	Tables, diagrams, pictures, etc.
Eco.4.5: Impacts on light and lighting, direct and indirect (e.g. by required regulations) and their consequences Text	Tables, diagrams, pictures, etc.
Eco.4.6: New knowledge, technologies, standards and controls, regarding emissions / noise and their effects Text	Tables, diagrams, pictures, etc.

Eco.5: Radiation	
Eco.5.1: Type, level, and effects of created radiation and required permissions Text	Tables, diagrams, pictures, etc.
Eco.5.2: Radiation risks, radiation risk management and public awareness Text	Tables, diagrams, pictures, etc.
Eco.5.3: New knowledge, technologies, standards and controls, regarding radiation safety and their effects Text	Tables, diagrams, pictures, etc.

Eco.6: Biodiversity & Habitats	
Eco.6.1: Location and size of RI site, related infrastructure and vicinity to protected areas or important habitats Text	Tables, diagrams, pictures, etc.
Eco.6.2: Expected impacts of RI activities on habitats and biodiversity Text	Tables, diagrams, pictures, etc.
Eco.6.3: Initiatives to reduce impacts on habitats and biodiversity and their effects Text	Tables, diagrams, pictures, etc.

Eco.7: Environmental Awareness	
Eco.7.1: Initiatives to create environmental awareness Text	Tables, diagrams, pictures, etc.
Eco.7.2: Impacts on environmental awareness Text	Tables, diagrams, pictures, etc.

TempEco.Int: Interview Guideline

Questions are intended as a guidance for all types of interviews (face-to-face, email, phone, etc.) and do not need to be used literally. Please adjust the guideline to the needs of a specific interview by selecting the relevant questions to be asked to the specific interviewee. Note also that the templates of questionnaire TempEco.Qu provide a couple of tables, which support the collection of numerical data.

Interviewee: Function:	Date of interview:	Time of interview:	Interviewer:

Eco.1: Energy		
Eco.1.1	Question: What is the direct and indirect energy consumption by the RI? (see TempEco.Qu; Eco.1.1) What are the possible impacts of your RI on the local energy supply system?	Response:
Eco.1.2	Question: What are the specific requirements of your RI project on the energy supply in terms of security, access, affordability, etc?	Response:
Eco.1.3	Question: What are the specific requirements of the RI regarding its energy supply that lead to investments or upgrades of local energy services or infrastructures? What are the consequences for the other energy users? What are the possible competition and co-benefits with the local energy users?	Response:

Eco.1.4	Question: Which are the existing regional initiatives for sustainable energy use e.g. photovoltaics, wind generators, waste recycling facilities, energy efficiency programmes, etc? Which are the sustainable energy initiatives planned by the RI project? Identify possible co-benefits and multiplying effects between the existing local initiative and those planned by the RI?	Response:
Eco.1.5	Question: Are there any new designs, quality controls, planning and project management methodologies, standards and protocols regarding energy, which are either generated or adopted by the RI? What are the estimated energy cost savings due to the application of this know-how?	Response:

Eco.2: Water & Effluents		
Eco.2.1	Question: What is the average and peak water consumption by your RI for drinking and industrial purposes (cubic meter per year)? (see TempEco.Qu, Eco.2.1)	Response:
Eco.2.2	Question: Which types of the major liquid effluents are produced by the RI and in what quantity? Are there any specific requirements for effluents treatment and their safe release in the environment? What is the time frame for acquiring permissions and international standards certificates for the sustainable management of the effluents? (see TempEco.Qu, Eco.2.2)	Response:

Eco.2.3	Question: What are the specific requirements of the RI regarding its water supply that lead to investments or upgrades of water supply, sewage and water treatment services or infrastructures? Which other water consumers are affected by the increased water needs, upgrades of the water supply, sewage, and treatment systems or new water-related services resulting from the RI? (see TempEco.Qu, Eco.2.3)	Response:
Eco.2.4	Question: What are the effects of the RI water consumption and effluents on the capacity of the local services?	Response:
Eco.2.5	Question: Which are the existing regional initiatives for sustainable water use? Which are the sustainable water initiatives planned by the RI project? What are the possible co-benefits and multiplying effects between the existing local initiative and those planned by the RI?	Response:
Eco.2.6	Question: Are there any new designs, quality controls, planning and project management methodologies, standards and protocols regarding water & effluents, which are either generated or adopted by the RI? What are the estimated water cost savings due to the application of this know-how?	Response:

Eco.3: Materials & Waste		
Eco.3.1	Question: Which types of the major solid and liquid wastes are produced by the RI and in what quantity? Are there any specific solid and liquid wastes that require specialised treatment or disposal method? (see TempEco.Qu, Eco.3.1)	Response:
Eco.3.2	Question: Which are the initiatives for sustainable use of materials of your RI? What are the possible synergies and multiplying effects with similar initiatives in the region?	Response:
Eco.3.3	Question: What are the type and quantity of the hazardous substances generated by the RI? What are the specific risks, skills and permissions required for handling these hazardous substances? (see TempEco.Qu, Eco.3.3)	Response:
Eco.3.4	Question: What are the specific requirements of the RI regarding waste services that lead to investments in or upgrades of waste services or infrastructures? Which other waste producers are affected by an increased production of waste and upgrade of services/infrastructure resulting from the RI?	Response:
Eco.3.5	Question: Are there any new designs, quality controls, planning and project management methodologies, standards and protocols regarding materials & wastes, which are either generated or adopted by the RI? What are the estimated materials & wastes cost savings due to the application of this know-how?	Response:

Eco.4: Emissions & Noise		
Eco.4.1	Question: Which are the types of the major emissions produced by the RI and their respective quantities? What are the specific requirements for emissions treatment and their safe release in the environment? Which permissions and international standards certificates has to be acquired for the sustainable management of the emissions? What are the time frames?	Response:
Eco.4.2	Question: What are the initiatives for air pollutants reduction planned by the RI? What are the possible synergies and multiplying effects with similar initiatives in the region?	Response:
Eco.4.3	Question: Which types and levels of noise are generated by the RI during its construction and operation? What are the possible effects of the noise created by the RI activities to the RI team, local community and the environment? Which permissions and international standards certificates has to be acquired for the sustainable management of the noise? What are the time frames?	Response:
Eco.4.4	Question: What are the initiatives for noise levels planned by the RI? What are the possible synergies and multiplying effects with similar initiatives in the region?	Response:

Eco.4.5	Question: What are the requirements of the RI on lighting in the area where the RI is/ will be located? What changes of the existing regulations may be necessary for assuring the RI's requirements on lighting? What are the light emissions by the RI that make a considerable difference compared to lighting without the RI?	Response:
Eco.4.6	Question: Are there any new designs, quality controls, planning and project management methodologies, standards and protocols regarding emissions & noise, which are either generated or adopted by the RI?	Response:

Eco.5: Radiation		
Eco.5.1	Question: Does the RI generate radiation by its R&D activities? If yes, what types and levels are generated? What are the possible effects of the RI radiation on society, economy and environment? What are the required permissions related to radiation safety and management and the timeframe for their acquisition?	Response:
Eco.5.2	Question: What are the radiation risks associated with the RI operation? Which are the affected groups/areas What are the radiation management and safety practices to be deployed by the RI? What initiatives for public awareness on radiation safety and management are planned by the RI for the local community?	Response:

Eco.5.3	Question: Are there any new designs, quality controls, planning and project management methodologies, standards and protocols regarding radiation, which are either generated or adopted by the RI?	Response:
Eco.6: Biodiversity & Habitats		
Eco.6.1	Question: What is the location of the new RI and its proximity to protected areas? What are the land area and routes needed for connecting the RI to the local energy, transport, water and sewage networks? What might be the effects of the RI's construction, operation and further upgrade on these areas?	Response:
Eco.6.2	Question: Which are the RI research activities that can favour local biodiversity and specific habitats? Which activities related to the RI operation may create misbalance in the neighbouring habitats and their biodiversity?	Response:
Eco.6.3	Question: Which initiatives and good practices should be considered by the RI project for alleviating possible influences on nearby environments? Which of them foster local biodiversity?	Response:

Eco.7: Environmental Awareness		
Eco.7.1	Question: Which initiatives and good practices should be considered by the RI project for creating public environmental awareness on the S&T activities of the RI?	Response:
Eco.7.2	Question: Which groups of stakeholders will be targeted by the RI environmental awareness initiatives? What are the desired impacts on environmental awareness by stating quantitative and qualitative goals? Are there any possible positive effects of the RI on environmental awareness which can be expected without any additional activities by the RI (e.g. positive effects on biodiversity due to inhibition of construction in an area around the RI)?	Response:

TempEco.Qu: Questionnaire (Please adjust the questionnaire by selecting the relevant questions for a specific addressee)

The templates of this questionnaire provide a couple of tables, which support the collection of numerical data. The tables can be used in expert interviews, sent to the competent addressee, or filled in by the case study team with data from the analysis of documents. Please adjust the questionnaire by selecting the relevant questions for a specific addressee.

Addressee (responding expert): name: email: function:	Send out on:	Response received on:	Contact person from case study name: email: phone:

Eco.1: Energy

Eco.1.1
Direct and indirect energy consumption by source

Annual energy consumption by source					
Electricity	Natural Gas	Fuel, Diesel...	Renewable*	Heat / Steam	Others#
MWh (or GJ)	MWh (or GJ)	MWh (or GJ)	MWh (or GJ)	MWh (or GJ)	MWh (or GJ)

*Please explain, e.g. solar, wind, hydro.... ; #Please verify

Eco.2: Water and Effluents

Eco.2.1
Average and peak water consumption by required water quality

Freshwater consumption			Other water consumption*		
Total	Average	Peak	Total	Average	Peak
m^3/year	m^3/h	m^3/h	m^3/year	m^3/h	m^3/h

*Please explain, e.g. water of specific quality, reused water etc. Add further columns, if required

Eco.2.2
Water discharge by quality and destination

Water discharge in cubic metres / year (m^3/yr)					
Water quality*	Sewage to treatment facilities	Sewage to rivers, lakes, oceans etc.	Release to groundwater	Reuse	Others#
Freshwater					

Please add further rows if required
*Please indicate; #Please explain
Note: release to groundwater should also include spills

Eco.2.3
Effects on water supply and sewage systems and their users

Sanitary wastewater sewage capacity		Industrial wastewater sewage capacity	
Average	Peak	Average	Peak
l/s	l/s	l/s	l/s

Please add further columns if required

Eco.3: Materials and Waste

Eco.3.1
Quantity of waste by type and disposal method

Quantity of waste in tonnes (t)							
Type of waste*	Landfill	Incineration	Composting	Reuse	Recycling	Recovery	Others#

Please add further rows if required *Please indicate #Please explain

Eco.3.3
Type and quantity of handled hazardous substances, risks, required permissions and skills

Type of substance*	Quantity	Unit#	Type of substance*	Quantity	Unit#

Please add further rows if required *Please indicate; #Please explain

Eco.3.4
Type and quantity of produced and handled hazardous wastes, required capabilities and permissions

Type of waste*	Quantity	Unit#	Type of waste*	Quantity	Unit#

Please add further rows if required *Please indicate; #Please explain

Annex III: Templates for module Risk

This section contains a collection of templates, which might be useful for data collection and analysis. All templates except those for data analysis can be applied flexible and modified according to the specific need of each study, for example they could be skipped or substituted by the user's own templates or tailored to the needs of a particular case study.

Templates for the selection of data collection methods & information sources help to ... • ... define, with which method and from which source a specific information can be collected • ... elaborate lists of data that can be collected with a specific method from a specific information source	• Category Risk.1: TempRisk.1.1 • Category Risk.2:TempRisk.2.1 • Category Risk.3: TempRisk.3.1 • Category Risk.4: TempRisk.4.1 • Category Risk.5: TempRisk.5.1 / TempRisk.5.2
Data collection templates support ... • ... document analysis, interviews, surveys and the collection of numerical data ... • ... list the required information for all categories and indicators and permit to copy and paste it into templates tailored to a specific information source	Document analysis: TempRisk.Doc Expert interviews: TempRisk.Int. Interview support: TempRiskSupp RiskScale.1: Likelihood of Events Severity of Events: RiskScale 2 / RiskScale.3
Example:	If information is going to be collected through an expert interview (method) with the RI project coordinator (data source), an interview guideline with all the questions to be asked to this expert is required.
Data analysis templates facilitate ... • ... the application of a number of data analysis methods by providing e.g. excel-based tools for calculations (I/O analysis, micro-models) or scales for risk analysis.	• RiskMatrix: Risk Assessment Matrix • RiskAction: Risk Management Actions

TempRisk.1.1: Selection of data collection methods & information sources - category Risk.1

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Financial Risks	**Risk.1.1**	Lack of political support	document analysis	
			expert interview	
			...	
	Risk.1.2	Financial risks from construction	document analysis	
			expert interview	
			...	
	Risk.1.3	Financial risks from operation	document analysis	
			expert interview	
			...	
	Risk.1.4	Financial risks from Upgrading	document analysis	
			expert interview	
			...	
	Risk.1.5	Financial risks from Decommissioning	document analysis	
			expert interview	
			...	

TempRisk.2.1: Selection of data collection methods & information sources - category Risk.2

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Public Acceptance and Support	**Risk.2.1**	Activities to ensure public acceptance	document analysis	
			expert interview	
			...	
	Risk.2.2	Risks for reduced public acceptance	document analysis	
			expert interview	
			...	

TempRisk.3.1: Selection of data collection methods & information sources - category Risk.3

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Supply Risks	**Risk.3.1**	Supply risk for RI construction	document analysis	
			expert interview	
			...	
	Risk.3.2	Supply risk for RI operation	document analysis	
			expert interview	
			...	
	Risk.3.3	Supply risk for RI upgrading	document analysis	
			expert interview	
			...	
	Risk.3.4	Supply risk for RI decommissioning	document analysis	
			expert interview	
			...	

TempRisk.4.1: Selection of data collection methods & information sources - category Risk.4

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
External Risks for the Project	**Risk.4.1**	Risk of natural disasters	document analysis	
			expert interview	
			...	
	Risk.4.2	Geological and geotechnical risks	document analysis	
			expert interview	
			...	
	Risk.4.3	Man-made external risks	document analysis	
			expert interview	
			...	
	Risk.4.4	Data security risks	document analysis	
			expert interview	
			...	

TempRisk.5.1: Selection of data collection methods & information sources - category Risk.5

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Risks Created by the Project	**Risk.5.1**	Ecological risks during construction	document analysis	
			expert interview	
			...	
	Risk.5.2	Security risks during construction	document analysis	
			expert interview	
			...	
	Risk.5.3	Ecological risks during operation	document analysis	
			expert interview	
			...	
	Risk.5.4	Security risks during operation	document analysis	
			expert interview	
			...	

TempRisk.5.2: Selection of data collection methods & information sources - category Risk.5

The template helps to define, which information can be collected by which method and from which source. Please select the indicators that you are going to use in your study and indicate the methods (*) and sources (#), which you are going to use. For each source and method you can then prepare a list of indicators, for which they will provide the required information. This helps you to prepare specific data collection templates.

category	index	indicator	method*	sources# (document, website, interviewee, ...)
Risks Created by the Project	**Risk.5.5**	Ecological risks during upgrading	document analysis	
			expert interview	
			...	
	Risk.5.6	Security risks during upgrading	document analysis	
			expert interview	
			...	
	Risk.5.7	Ecological risks during decommissioning	document analysis	
			expert interview	
			...	
	Risk.5.8	Security risks during decommissioning	document analysis	
			expert interview	
			...	

The document analysis template can be used to prepare excerpts of documents, websites, and similar data sources. Please select the indicators, which you are going to use in your particular study and for which you want to gather the information through document analysis. If desired, you can adjust the template for data collection from a specific document by selecting the relevant categories and indicators.

Risk.1: Financial Risks	
Risk.1.1: Lack of political support Text	Tables, diagrams, pictures, etc.
Risk.1.2: Financial risk for RI construction Text	Tables, diagrams, pictures, etc.
Risk.1.3: Financial risk for RI operation Text	Tables, diagrams, pictures, etc.
Risk.1.4: Financial risk for RI upgrading Text	Tables, diagrams, pictures, etc.
Risk.1.5: Financial risk for RI decommissioning Text	Tables, diagrams, pictures, etc.

Risk.2: Public Acceptance & Support	
Risk.2.1: Activities ensure public acceptance Text	Tables, diagrams, pictures, etc.
Risk.2.2: Risks for a lack of public acceptance Text	Tables, diagrams, pictures, etc.

Risk.3: Supply Risks	
Risk.3.1: Supply risk for RI construction Text	Tables, diagrams, pictures, etc.
Risk.3.2: Supply risk for RI operation Text	Tables, diagrams, pictures, etc.
Risk.3.2: Supply risk for RI upgrading Text	Tables, diagrams, pictures, etc.
Risk.3.2: Supply risk for RI decommissioning Text	Tables, diagrams, pictures, etc.

TempRiskDoc.4.1: External Risks for the Project - Document Analysis Template

Risk.4: External Risks	
Risk.4.1: Risk of natural disasters Text	Tables, diagrams, pictures, etc.
Risk.4.2: Geological and geotechnical risks Text	Tables, diagrams, pictures, etc.
Risk.4.3: Man-made external risks Text	Tables, diagrams, pictures, etc.
Risk.4.4: Data security risks Text	Tables, diagrams, pictures, etc.

Risk.5: Risks Created by the Project	
Risk.5.1: Ecological risks during construction Text	Tables, diagrams, pictures, etc.
Risk.5.2: Security risks during construction Text	Tables, diagrams, pictures, etc.
Risk.5.3: Ecological risks during operation Text	Tables, diagrams, pictures, etc.
Risk.5.4: Security risks during operation Text	Tables, diagrams, pictures, etc.
Risk.5.5: Ecological risks during upgrading Text	Tables, diagrams, pictures, etc.
Risk.5.6: Security risks during upgrading Text	Tables, diagrams, pictures, etc.
Risk.5.7: Ecological risks during decommissioning Text	Tables, diagrams, pictures, etc.
Risk.5.8: Security risks during decommissioning Text	Tables, diagrams, pictures, etc.

TempRisk.Int: Interview Guideline (Please adjust the guideline to the needs of a specific interview by selecting the relevant questions)

Questions are intended as a guidance for all types of interviews (face-to-face, email, phone, etc.) and do not need to be used literally. Please adjust the guideline to the needs of a specific interview by selecting the relevant questions to be asked to the specific interviewee. Note also that template TempRiskSupp and the risk assessment scales RiskScale.1.1 – RiskScale.1.3 support the interviews.

Interviewee: Function:	Date of interview:	Time of interview:	Interviewer:

Risk.1: Financial Risks

Risk.1.1	Question: Which risks are there that could reduce political support for the RI during its lifetime? How likely is such an event and how severe are the consequences?	Response:
Risk.1.2	Question: What are the risks to financial resources during constructing the RI? How likely is such an event and how severe are the consequences?	Response:
Risk.1.3	Question: What are the financial operating risks for the RI? How likely is such an event and how severe are the consequences?	Response:
Risk.1.4	Question: What are the risks to financial resources for upgrading the RI? How likely is such an event and how severe are the consequences?	Response:
Risk.1.5	Question: Which are the financial risks for decommissioning the RI? How likely is such an event and how severe are the consequences?	Response:

Risk.2: Public Acceptance and Support		
Risk.2.1	Question: Which RI activities foster the public acceptance of the project?	Response:
Risk.2.2	Question: How likely are public concerns about the project and how severe are the consequences?	Response:

Risk.3: Supply Risks		
Risk.3.1	Question: What are the supply risks for essential resources during RI construction? How likely is this to happen and how severe would the consequences be?	Response:
Risk.3.2	Question: What are the supply risks for essential resources during RI operation? How likely is this to happen and how severe would the consequences be?	Response:
Risk.3.3	Question: What are the supply risks for essential resources for upgrading the RI? How likely is this to happen and how severe would the consequences be?	Response:
Risk.3.4	Question: What are the supply risks for essential resources for RI decommissioning? How likely is this to happen and how severe would the consequences be?	Response:

Risk.4: External Risks for the Project		
Risk.4.1	Question: What natural disaster risks exist for the RI? How likely is such an event and how severe would the consequences be?	Response:
Risk.4.2	Question: Which types of additional geological / geotechnical risks exist on the project site? How likely can an event cause damage and how severe would the consequences be?	Response:
Risk.4.3	Question: Which man-made risks for the RI exist in the local environment? How likely is such an event and how severe would be the consequences?	Response:
Risk.4.4	Question: Which security risk exists for data created or used at the RI? How likely is a loss or unauthorised disclosure of data and how severe would the consequences be?	Response:

Risk.5: Risks Created by the Project		
Risk.5.1	Question: What are the ecological risks during RI construction? How likely is an event with negative impact and how severe would the consequences be?	Response:
Risk.5.2	Question: Which security risks for people and goods exist during RI construction? How likely is an event with negative impact and how severe would the consequences be?	Response:

Risk.5.3	Question: What are the ecological risks during RI operation? How likely is an event with negative impact and how severe would the consequences be?	Response:
Risk.5.4	Question: What are the security risks for people and goods during RI operation? How likely is an event with negative impact and how severe would the consequences be?	Response:
Risk.5.5	Question: What ecological risks exist during RI upgrading? How likely is an event with negative impact and how severe would the consequences be?	Response:
Risk.5.6	Question: Which security risks exist for people and goods during RI upgrading? How likely is an event with negative impact and how severe would the consequences be?	Response:
Risk.5.7	Question: Which ecological risks exist during RI decommissioning? How likely is an event with negative impact and how severe would the consequences be?	Response:
Risk.5.8	Question: Which security risks exist for people and goods during decommissioning? How likely is an event with negative impact and how severe would the consequences be?	Response:

Temp RiskSupp: Interview Support Template (please name risks and indicate estimated likelihood and consequences of an event)

DATE:		INTERVIEWEE:			INTERVIEWER:	
RISK:		CONSEQUENCES				
		Catastrophic	Major	Moderate	Minor	Insignificant
LIKELIHOOD	Almost certain					
	Likely					
	Possible					
	Unlikely					
	Rare					
RISK:		CONSEQUENCES				
		Catastrophic	Major	Moderate	Minor	Insignificant
LIKELIHOOD	Almost certain					
	Likely					
	Possible					
	Unlikely					
	Rare					

RiskScale.1: Likelihood of Events

This scale defines the likelihood of events related to risks. Please use it in order to assess the levels of project related risks during the risk analysis. For example let an expert estimate the likelihood of an event or apply it for your own assessment of risks based on suitable information that you have collected.

LIKELIHOOD	How likely is the event to happen?
Almost certain	Event is expected to occur in most circumstances (probability > 1 in 10);
Likely	Event will probably occur in most circumstances (probability 1 in 10 - 100);
Possible	Event should occur at some time (probability 1 in 100 - 1000);
Unlikely	Event could occur at some time, but doubtful (probability 1 in 10000 - 10000);
Rare	Event may occur, but only in exceptional circumstances (probability 1 in 10000 - 100000);

RiskScale.2: Severity of Events

This scale defines the severity of events related to risks. Please use it in order to assess the levels of project related risks during the risk analysis. For example let an expert estimate the likelihood of an event or apply it for your own assessment of risks based on suitable information that you have collected.

CONSEQUENCES	**How severely could the event hurt someone or cause damage?**		
	People	**Environment**	**Financial**
Catastrophic	Multiple deaths and / or multiple life threatening injuries or exposures with irreversible consequences (paralysis, brain damage etc.)	Environmental disaster; multiple fatality of many species or damage to a habitat with a potential for recovery greater than ten years; endangered species local population and habitat destroyed	Huge costs; extreme event with potential to lead to failure of most objectives or collapse (e.g. > 25% of budget)
Major	Single fatality and/or life threatening injury or exposure with permanent consequences (paralysis, brain damage etc.)	Major release; multiple fatality of a species or damage to a habitat; potential recovery between one and ten years; not limited to areas within and near the operation site; high proportion of an endangered species lost and left not viable	Major costs; major event that can be endured with prioritised and focused management (e.g. > 10% of budget)
Moderate	Multiple serious injuries or exposures causing hospitalisation with moderate permanent effects	Moderate pollution; Multiple fatality of species or damage to a habitat; expected recovery less than one year; limited to areas within and near the operation site; loss of one member of an endangered species	High costs; significant event that can be managed under special circumstances (e.g. > 5% of budget)
Minor	Multiple medical treatment cases and /or minor injuries and / or first aid treatments from which recovery is likely	Minor pollution; detectable effects on plants, animals or communities (e.g. emissions, noise, odour, fall-out, discolouration of water); recovery time less than one week	Some financial impact; can be absorbed, but management effort required to minimise impacts (e.g. ~ 2.5% of budget)
Insignificant	No medical treatment required	Low pollution; no detectable effects to animals or communities on - and off-site; event requiring only routine procedures without reporting	Low financial impact, can be easily absorbed through normal activity (e.g. ~ 1% of budget)

RiskScale.3: Severity of Events

This scale defines the severity of events related to risks. Please use it in order to assess the levels of project related risks during the risk analysis. For example let an expert estimate the likelihood of an event or apply it for your own assessment of risks based on suitable information that you have collected.

CONSEQUENCES	**How severely could the event hurt someone or cause damage?**	
	Reputation	**Business Process & Systems**
Catastrophic	Serious (international) public / media outcry; damaging NGO campaign; licence to operate threatened; reputation impacted with major stakeholders	Future operations at site seriously affected; urgent corrective or remedial action required, major loss of production / services; key customers / users lost to alternative supply;
Major	Intense adverse national public / media / NGO attention; licence to operate suspended; unable to gain approval; reputation impacted with significant number of key stakeholders	Major damage to facility requiring significant corrective or preventive action; serious loss of production / services; some customers / users lost to alternative supply;
Moderate	Elevated concern by local community / media and local NGOs; significant difficulties in gaining approval; reputation impacted with some stakeholders	Moderate damage to equipment and / or facility; significant loss of or impact on production / services; some customers / users seek alternative supply for short term;
Minor	Minor, ongoing local public / media attention and complaints; significant hardship from regulator; reputation is impacted with a small number of people	Minor or superficial damage to equipment and / or facility; minor loss of or impact on production / services; minor delivery delays;
Insignificant	Public concern restricted to local complaints; ongoing scrutiny / attention from regulator; individual concern; no discernable impact on reputation;	Minor errors in systems or processes easily addressed or rectified by immediate corrective actions; minor delay without impact on overall schedule; no loss of production or impact on services; no damage to equipment;

RiskMatrix: Risk Level Definition

The Risk matrix helps to define the risk level for an event based on its likelihood and the severity of its consequences as assessed during the risk analysis. Please use it in order to define the project related risks during the risk analysis. For example if an event is almost certain and the consequences are moderate, the risk level is 8. If the event is unlikely and the consequences are moderate, the risk level is 5.

RiskMatrix: Risk Level Definition (to be used for the risk analysis)

		CONSEQUENCES				
		Catastrophic (5)	Major (4)	Moderate (3)	Minor (2)	Insignificant (1)
LIKELIHOOD	Almost certain (5)					
	Likely (4)					
	Possible (3)					
	Unlikely (2)					
	Rare (1)					

Source: Risk Management Toolkit – Australian Capital Territory Insurance Authority, see http://www.treasury.act.gov.au/actia/Risk.htm

RiskAction: Risk Management Actions

This template can help to elaborate recommendations for risk management. If your study does not include such recommendations, you can ignore them. Risk management actions are required for all risk levels except low risks. Extremely high risks and high risks should be avoided or reduced. Target risk levels should be set and actions taken in order to reach them. All risks above a factor of 4 should be monitored and reported and risk management responsibilities should be assigned.

Risk Factor	Description	Action
9-10	Extremely high risk	1. Options for risk treatment: avoid, reduce, transfer, or retain risks; evaluate consequences and conduct cost / benefit analysis of options; select best option; set target risk level; assign responsibilities; develop time table; 2. Monitor the risks 3. Report the risks
7-8	High risk	1. Options for risk treatment: avoid, reduce, transfer, or retain risks; evaluate consequences and conduct cost / benefit analysis of options; select best option; set target risk level; assign responsibilities; develop time table; 2. Monitor the risks; 3. Report the risks;
5-6	Moderate Risk	1. Options for risk treatment: avoid, reduce, transfer, or retain risks; evaluate consequences and conduct cost / benefit analysis of options; select best option; set target risk level; assign responsibilities; develop time table; 2. Monitor the risks; 3. Report the risks;
4 and below	Low risk	No action required

Source: Risk Management Toolkit – Australian Capital Territory Insurance Authority, see http://www.treasury.act.gov.au/actia/Risk.htm