Online submission Form

Proposals for the 2016 ESFRI Roadmap

This document contains the Online submission form for Research Infrastructure proposals for the 2016 ESFRI Roadmap as prepared by the ESFRI Executive Board, its Strategy Working Groups and its Working Group on Implementation during summer 2014. It will be entered into an EU Survey tool to enable proposers (ESFRI Delegations and EIROforum members) to upload the proposals. Following submission in the EU Survey, all further document exchanges will be made through CIRCA.

The following rules apply for the proposals submission:

- The ESFRI Secretariat will provide a single password protecting the data-entry into this form to the ESFRI Delegations and the Members of the EIROforum exclusively. This password is for the internal use of the ESFRI Delegations or EIRO Forum Members only.
- A submitting ESFRI Delegation or the EIROforum Member is strictly responsible for the entire content of the submitted proposal. The Letters of Intent of EU Member States and Associated Countries (or EIROforum members Council resolution in the case of EIROforum members) must clearly state support and commitment to the content of the proposal.
- This form consists of three parts; each to be completed fully:

  PART A: PROJECT SUMMARY used for the eligibility check by the ESFRI Executive Board;

  PART B: SCIENTIFIC IMPACT, PAN EUROPEAN RELEVANCE, SOCIO-ECONOMIC IMPACT & e-NEEDS used by the Strategic Working Groups to evaluate the scientific excellence of the proposal.

  PART C: IMPLEMENTATION used by the Working Group on Implementation to assess the maturity of the proposal.
- The proposal must be completed in one go as no saving of work underway is technically possible.

- Some questions require ticking a bullet and/or filling a text section with a strictly limited number of characters and/or uploading documents (in PDF - maximum 1 MB each).
- If you believe the question does not apply to your proposal you may enter '*not applicable'* but you should explain why the question is not relevant in your case.
- Only the electronic version of this form may be used to submit proposals for the 2016 ESFRI Roadmap until the **31 March 2015 at 17:00 CET sharp**.

PART A: PROJECT SUMMARY

PROPOSING ESFRI DELEGATION OR EIROforum MEMBER

Romania

TITLE of the RESEARCH INFRASTRUCTURE

- FULL TITLE (maximum 200 characters with spacing)
- PROJECT'S ACRONYM (maximum 20 characters with spacing)

Danube International Centre for Advanced Studies on River-Delta-Sea Systems

DANUBIUS-RI

PROJECT COORDINATOR AND PARTNERS

- Project Coordinator:
  - Name
  - Affiliation
  - Contact email & telephone

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- Partners

- Bulgaria – Bulgarian Academy of Sciences – Institute of Oceanology, The National Institute of Meteorology and Hydrology, Institute of Biodiversity and Ecosystem Research
- Hungary – Hungarian Academy of Sciences – Research Centre for Astronomy and Earth Sciences, Centre for Ecological Research; Institute of Geography and Earth Sciences, Institute of Geological and Geochemical Research, Eotvos Lorand University, Department of Environmental Engineering – Széchenyi István University
- Austria – Wasser Cluster Lunz, BOKU
- Germany – BFG-German Federal Institute for Hydrology, Helmholz Zentrum Geesthacht Centre for Materials and Coastal Research
- Greece – Hellenic Centre for Marine Research
- Lithuania – Klaipeda University
- Moldova – Moldovan Academy of Sciences, The Institute of Chemistry Netherlands – DELTARES, UNESCO-IHE
- France – CNRS - Institute of Universe Sciences (INSU), Institute of Ecology and Environment (INEE).
- Italy – ISMAR-CNR, INGV
- Ireland – University College Cork

- Serbia – University of Novi Sad
- Spain – Politechnic University of Barcelona - CIIRC
- Ukraine – Odessa State Environmental University (OSENU), The Ukrainian Scientific Center of Ecology of the Sea (UkrSCES)
- United Kingdom – University of Stirling, University of Glasgow, University of Birmingham, University of Hull

GENERAL DESCRIPTION

Please tick the proper class:

- Major Upgrade / Reorientation of existing Research Infrastructure (or Research e-Infrastructure)
- ✓ New Research Infrastructure (or Research e-Infrastructure)
- New Research Infrastructure of Global interest with possible international localisation beyond Europe(or Research e-Infrastructure)

Please provide an abstract of your proposal. (maximum 2000 characters with spacing):

Globally, large river-sea (RS) systems are complex and dynamic, with huge environmental, social and economic value. They are poorly understood but under increasing pressure through pollution, hydraulic engineering, water supply, energy, flood control and erosion. Improved understanding of functioning is essential to avoid irreversible degradation and for restoration. Research has been largely discipline-specific, not addressing the system as a whole. Current research infrastructures (RIs) are inadequate for urgently needed interdisciplinary research.

RS systems in Europe are among the most impacted globally, after centuries of industrialisation, urbanisation and agricultural intensification. European researchers are pre-eminent in addressing these problems stimulated by system-oriented European policies. But progress is limited by research fragmentation and lack of RIs.

DANUBIUS-RI, a distributed pan-European RI, will draw on RS systems and existing research excellence across Europe, enhancing the impact of European research while maximizing investment efficiency.

It will provide: access to a range of European RS systems, facilities and expertise; a platform for interdisciplinary research; a ‘one-stop shop’ for knowledge exchange in managing RS systems; a bridge between freshwater and marine research; access to harmonised data; and a platform for inspiration, education and training.

DANUBIUS-RI will comprise a *Hub*, located in the Danube Delta, and *Nodes* elsewhere in Europe.

The *Hub* will provide leadership and governance, coordination and standardisation activities, communication with other RIs and major stakeholders, and key scientific, educational and analytical capabilities. It will be the gateway to the natural laboratory

of Europe`s largest protected coastal wetland, and facilitate access to the Lower Danube and Black Sea.

Nodes will be scientific and data-providing Centres of Excellence, and interfaces with regional stakeholders. They will implement standardized procedures at the regional scale. Activities will include experimental and *in situ* measurements facilities, analytical capabilities and data storage.

This structure will enable DANUBIUS-RI to build on existing expertise and synergies to support world-leading interdisciplinary research and innovation.

ELIGIBILITY CRITERIA

Please identify the type of Research infrastructure (drop-down box with values 'single-sited' and 'distributed')

DISTRIBUTED

Funding Commitment and Political Support:

Please identify the Member States and Associated Countries which have expressed **funding commitment** and **political support**:

a) Identify Country Codes (drop down list)
b) identify expression of **funding commitment** (Please upload at least **1 Letter of Intent**[1], Memorandum of Understanding; in the case of EIROforum members, please upload a Council resolution expressing funding commitment)

LETTER OF COMMITMENT FROM THE ROMANIAN GOVERNMENT

c) Type and amount of funding commitment (feasibility study/preparatory study already financed or being agreed to be financed (cost covered, planned), construction and/o operation of the RI
d) potential siting/hosting of RI or Headquarters of Distributed RI (D-RI) or Node of D-RI (cost covered, planned)

The *Hub* (Headquarters) will be situated at Murighiol on the Danube Delta (Tulcea County, Romania). The Government of Romania has committed to meet the construction costs. The location of the laboratories leading the *Nodes* will be decided through competition.

share of total cost covered by the commitment (%...)

e) Identify expression of **political support** - Identify Country Codes (drop down list) and please upload at least **2 Letters of Intent**[2], Memorandum of Understanding or other collaboration/participation declaration of engagement)

[1] *Eligibility Criteria detailed in the 2016 ESFRI Short Guide*

[2] *Eligibility Criteria detailed in the 2016 ESFRI Short Guide*

Please indicate which ESFRI Strategy Working Group do you believe to be the most suitable to analyse your Scientific Case?(Drop Down list: Energy; Environment; Health&Food; Physics and Engineering; Social&Cultural innovation)

Environment

In case this project should, in your view, be also assessed by an additional ESFRI Strategy Working Group, please indicate which? (Drop Down list: Energy; Environment; Health&Food; Physics and Engineering; Social&Cultural innovation)

No

PART B: SCIENTIFIC IMPACT, PAN EUROPEAN RELEVANCE, SOCIO-ECONOMIC IMPACT & E-NEEDS

Section1. SCIENTIFIC IMPACT OF THE RI

1.1. SCIENTIFIC FIELD (S)

Identify the RI Scientific field (1) Scientific field (2) and inter- or multidisciplinary scope of the RI (Maximum 500 characters)

DANUBIUS-RI will span the whole range of environmental science disciplines, and provide the infrastructure for applying them to all environmental domains. Research in different domains, for example freshwater and marine, is mostly undertaken separately, and there is poor understanding of the functioning of transition zones such as deltas and estuaries. DANUBIUS-RI will not only be multidisciplinary but, by acting as an incubator for scientists from these different disciplines and sectors to work together to address issues involving society, the environment and economy, truly interdisciplinary

Please summarise the Scientific Outline (Scope of Project) (maximum 5000 characters with spacing)

DANUBIUS-RI will provide the platform to review and synthesise our state of knowledge and develop the research and innovation agenda. Through this infrastructure, the scientific community will be able to implement this agenda, advance fundamental research in RS systems and find solutions to critical, timely and controversial issues.

It will address major global scientific challenges confronting RS systems, including:

- understanding their origin and natural evolution;
- quantifying the impact of anthropogenic changes;
- determining their vulnerability and/or resilience under a changing climate;

- characterizing biogeochemical cycles;
- identifying emerging pollutants and pathogens and understanding their input pathways and fate in large RS systems as well as their related adverse effects or associated risks;
- advancing integrated management of catastrophic floods/droughts and hazardous materials;
- investigating the consequences of physical destruction of morphological structures and habitats (e.g. through channelization, embankments, damming) and develop measures for hydromorphological restoration;
- conserving and restoring biodiversity;
- enhancing and protecting the capacity of ecosystems to deliver services to society; and
- providing scientific expertise to develop, improve and test tools to advance policy and guidelines for environmental protection.

In its scientific working modus DANUBIUS-RI will follow the 'wisdom hierarchy': data > information > knowledge > wisdom. Data will be collated following standardized protocols developed by the *Hub*. The data collated by the *Hub* and the *Nodes* will be processed into information understandable by the experts from different disciplines collaborating in the RI as well as by the stakeholders that DANUBIUS-RI seeks to connect to. Different strands of information will be combined into knowledge, e.g. informing us about how to execute measures for protection or restoration of RS systems ('knowing how to do it right'). Ultimately, the knowledge gained will culminate in wisdom, i.e. knowing on what, where and when to focus RS management attention ('knowing the right thing to do').

DANUBIUS-RI will provide a distributed research infrastructure comprising four key components:

- a geographically distributed observational infrastructure to quantify RS system dynamics;
- dedicated observatories for multi-disciplinary data acquisition, processing and modelling;
- state-of-the-art analytical facilities to assess environmental health; and
- facilities to enhance knowledge exchange (inter-disciplinary dialogue; stakeholder engagement; education; and dissemination).

The DANUBIUS-RI initiative responds to the recognised need for new research infrastructure to maximise the impact and visibility of cross-cutting European environmental research and address current and future societal challenges.
DANUBIUS-RI will provide the infrastructure for achieving a step change in our understanding of the functioning of large river-sea systems in response to global changes, to enable informed decision making for their sustainable management.

DANUBIUS-RI mission aims to provide a world-leading research infrastructure that will enable excellent interdisciplinary research in river sea systems that will have high economic impact, and its vision is to be recognized as the European center for excellent interdisciplinary research and innovation on river-sea systems globally.

DANUBIUS-RI will provide innovative, science-based solutions for major global scientific challenges and set up the framework for sustainable development of large river sea systems worldwide, using the Danube – Danube Delta – Black Sea system as an examplar.

DANUBIUS-RI aims to contribute to:

- The sustainable use of natural resources in river-delta/estuary-sea systems (energy, food, including exploitation of biodiversity);
- Provision of solutions to conflicting demands on river-delta/estuary-sea systems;
- Provision of innovative solutions for protection against natural hazards in river-delta/estuary-sea systems;
- support development of innovative, more effective monitoring techniques looking at water and sediment quality, biodiversity, etc. – as a basis to enforce regulations and better governance;
- encouragement of environmental stewardship;
- provision of enhanced opportunities for education, training at all levels;
- preservation of the cultural heritage;
- development of green products and technologies;
- improvement of regional economy

Please Upload Scientific Case Document (limit 1 MB)

White Book

Does the project correspond to a long term science programme (20-40 years) by a well-established scientific community? Does the project address a multidisciplinary scientific frontier opening novel

possibility in several research fields? Which ones and how? (maximum 2000 characters with spacing)

DANUBIUS-RI will be an ambitious interdisciplinary research infrastructure that will provide the needed integrative perspective on RS systems. It will do this by integrating the knowledge and understanding contributed by different disciplines within the Earth, Environmental, Social and Economic sciences. It will facilitate and coordinate research and will offer an infrastructure to deploy and maintain observation stations covering the freshwater – marine continuum.

Traditionally, research on RS systems has been discipline specific. DANUBIUS-RI will facilitate new approaches to integrate cognate disciplines and connect science to policy making and management. The infrastructure will encourage interdisciplinary research teams to advance a profound understanding of river-sea systems.

1.2. USER ANALYSIS AND INVOLVEMENT STRATEGY

DANUBIUS-RI will have a large user community that will be broad in scope, encompassing research, policy, and business.

Direct users of the infrastructure will be researchers spanning the environmental science disciplines (such as geoscientists, biologists, ecologists, chemists, physicists, numerical and physical modellers, climatologists, engineers, social and economic scientists, instrument developers) working on freshwater, terrestrial and marine habitats and transition zones. In addition, DANUBIUS-RI will attract service providers (consultants) and entrepreneurs.

Users of research products will include business/academia/decision and policy makers, at local, regional, national, European and global levels.

Potential Stakeholders are:

- ministries of research and education, funding agencies of research,

Academies of sciences, academies through institutes and universities;
Potential beneficiaries – public sector - besides education & research: regulators, ministries of the environment, water agencies, ministries of transport, ministries of regional development, emergency intervention inspectorates, ministries of health, the EC through relevant directorates (research, environment, mare, transport).
Potential private sector beneficiaries: innovation companies, companies that deal with technological development, IT&C, instrumentation, utilities, ??.

Local communities and local administration

Environmental NGOs
River Basin commissions, Regional seas commissions,

United Nations and other international organizations

1.2.1. What is the targeted user' community?

- macro-regional[3]
- pan-European
- ✓ global

If 'macro-regional' please give the background (maximum 500 characters with spacing)

1.2.2. What are the fields of research and size of the potential users community/communities? Please indicate estimates of the numbers of academic/publicly funded researchers, innovation/industrial technology developers, multidisciplinary/general public users. (maximum 4000 characters with spacing) (% per type of users)

Direct users of the infrastructure will be researchers spanning the environmental science disciplines (such as geoscientists, biologists, ecologists, chemists, physicists, numerical and physical modellers, climatologists, engineers, social and economic scientists, instrument developers) working on freshwater, terrestrial and marine habitats and transition zones. In addition, DANUBIUS-RI will attract service providers (consultants) and entrepreneurs. Users of research products will include business/academia/decision and policy makers, at local, regional, national, European and global levels.

Environmental science disciplines/Researchers	Freshwater	terrestrial habitats	marine habitats	transition zones
Geoscientists	X	X	X	X
Biologists	X	X	X	X
Ecologists	X	X	X	X
Chemists	X	X	X	X
Physicists	X	X	X	X
numerical and physical	X	X	X	X
Modellers	X	X	X	X
Climatologists	X	X	X	X
Engineers	X	X	X	X
social and economic	X	X	X	X
Scientists	X	X	X	X
Instrument	X	X	X	X
Developers	X	X	X	X
service providers (consultants)	X	X	X	X
Entrepreneurs	X	X	X	X

[3] This concerns four macro-regions identified by the EU Macro-regional Strategies. For reference please see: http://ec.europa.eu/regional_policy/cooperate/macro_region_strategy/index_en.cfm

1.2.3. How has the potential user community been involved in the support and development of the project?

✓ in the definition of the science case

in the definition of the technical design specifications

in analysing Costs vs. Benefits

✓ in planning and financing parts of the infrastructure (experimental suites, collections, data-bases)

Others

If Others, please describe: (maximum 1000 characters with spacing)

1.3. ACCESS POLICY

1.3.1. What will be the access policy of the RI? Please define the access, e.g. by means of access unit like beamtine or GB, and explain type of access, e.g. physical access to site, assisted-access from remote, remote submission of samples for anlaysis, virtual remote mode, access to data etc. Please also describe the conditions for access, e.g. restrictions of access via quota`s due to e.g. financial, programmatic or feasibility considerations. Please also elaborate on the processes to grant access and describe eventual support measures facilitating access. (maximum 4000 characters with spacing)

DANUBIUS-RI will be an open access infrastructure with possibility of developing institutional projects and economic driven research activities based on financial agreements. The curiosity driven research developed by the participating entities will be supported in terms of operational cost by public funding.

The access policy shall be directly connected with the concept of efficiency in terms of covering the operational cost and ensure the sustainability of the DANUBIUS RI or a similar compensation scheme used in other research infrastructures. Paying or materially contributing member states of the RI should have priority access to research facilities within DANUBIUS RI; the type of access shall be defined according to structure of *Nodes* and competencies provided as well as geographical distribution.

The type of access and pricing policy shall be determined based on the type of users that will be accessing the DANUBIUS RI.

DANUBIUS-RI will have a large user community that will be broad in scope, encompassing research, policy, and business. Direct users of the infrastructure will be researchers spanning the environmental science disciplines (such as geoscientists, biologists, ecologists, chemists, physicists, numerical and physical modellers, climatologists, engineers, social and economic scientists, instrument developers) working on freshwater, terrestrial and marine habitats and transition zones. In addition, DANUBIUS-RI will attract service providers (consultants) and

entrepreneurs. Users of research products will include business/academia/decision and policy makers, at local, regional, national, European and global levels.

Considering that DANUBIUS-RI will operate a fraction of paid-access for economic-oriented or proprietary research, NGOs and economic associations of category shall be granted open access to facilities provided by the RI, but finance the research services for economic private research objectives. These objectives have to be declared at the beginning of the collaboration together with ethical aspects that shall also be covered in the collaboration agreements.

Diplomatic relationship within the countries of provenance of national structures that are interested in DANUBIUS-RI facilities and DANUBIUS-RI partners' nationalities should be taken into consideration in the pricing policy approach.

Research institutions and education organizations shall be granted open access to RI services for scientific purposes.

1.3.2. What are the plans for training users and managers of the facility? Are there plans for advanced training of professional scientists/engineers/data managers? (maximum 2000 characters with spacing)

There shall be two different approaches on the training topics at the facility site. The users shall benefit of the high class researchers and personnel located at the facility and in the nodes. The remote training through webinar and training platforms will be part of the training activity in connection with data sharing and access policy.

As for the professional scientists/engineers/data managers there shall be implemented highly specialized training programs project or periodically based with internal and external trainers that will permanently develop the owned staff scientific and technical expertise and capabilities.

There shall be available also training for trainers programs that will develop the teaching and training skills for the professional scientists/engineers/data managers involved in user training programs.

After final assessment of DANUBIUS-RI capabilities and facilities, the training plans will be subject of a WP in the PP.

1.3.3. Which mode(s) of access is/are to be adopted? (maximum 1000 characters with spacing)

DANUBIUS-RI will provide a range of services, facilities and expertise, including access to platforms, assistance at field sites, chemical and physical analyses, and access to data. Different modes of access will be defined for each. The Hub will provide a one-stop shop for access across the RI.

1.3.4. What is the estimated % of different mode(s) of access? How is this division linked to the financing? (maximum 1000 characters with spacing)

The mode of access of the RI will be:

- directly at the facility located in hub
- through a node facility
- remote access according to the data policy
- mix access combining hub and nodes access

The access to the facility granted as an open access infrastructure will involve also the financing of the operational phase as revenues accounted in the financial schema but also as operational and running costs refunds.

More detail will be provided following further consideration of the nature and location of the Nodes.

1.3.5. What is the expected amount of access to be provided in proper units (like instrument-time per year, gigabits of data per year, CPU time, etc…) specific to the different access modes offered? What is the typical quota of access that will be granted to a given (average) successful proposal? How much of expected demand will be satisfied by the new/upgraded RI?

This question will be answered following further consideration of the nature and location of the Nodes.

Section 2. PAN- EUROPEAN RELEVANCE

2.1. PAN-EUROPEAN ADDED VALUE

2.1.1. Does the RI project address a gap in the current RI panorama in Europe and respond to unaddressed needs of the user communities? Is the project “unique” in the landscape of RIs? What is the RI project adding to European research capacity in one or more fields of research and innovation? (maximum 2000 characters with spacing)

Human society relies heavily on the functioning and services of large river-sea systems, such as water, energy, food, transport, construction materials and recreation.
A detailed understanding of river-sea system functioning is essential to maintain these services, to avoid irreversible degradation and to implement effective restoration, conservation and protection strategies. Europe lacks the necessary research infrastructure to enable major gaps in our understanding to be filled. This is largely a structural problem as research institutions, though often world-leading, have been set up as discipline-specific and able to address only elements of the river-sea systems. Europe’s research infrastructures are inadequate to support the interdisciplinary research that is urgently needed for an understanding of the whole river-sea system.
Although there are research infrastructures covering elements of this system, no ESFRI, European or national research infrastructure takes an integrated whole-

system approach, including the physical and biological transitions between freshwater and coastal waters, and social, economic and geopolitical interactions over space and time.

By bringing together the world-leading expertise from across Europe, DANUBIUS-RI will overcome the existing fragmentation of research infrastructures, many of which are focused on limited topics or on restricted geographical areas. DANUBIUS-RI will provide a platform for synergy between the expertise on freshwater and coastal/ marine research in Europe and create synergies for understanding the large river-sea systems resulting not only in making Europe the world leader in this field of research but providing the basis for informed decision-making to resolve tensions between economic activity and environmental protection.

2.1.2. Indicate current options (infrastructures or services that are operational and accessible) for the relevant science communities, if any, and explain why they are not adequate. (maximum 3000 characters with spacing)

Many of the services and facilities, eg physical and chemical analyse, are available at laboratories in a number of European countries. However, they often do not have the quality control and comparability needed for DANUBIUS-RI nor the expertise for interdisciplinary research. A range of observation activities exists but, again, they lack quality control and comparability. Data sources for different elements of the whole river-sea system do exist but are fragmented. Importantly, there is no infrastructure, available to the international research community, providing expertise for interdisciplinary research across the whole river-sea system including transition zones.

2.1.3. Is the development of a new Infrastructure the most appropriate solution to address this need? What, in your view, is the added value of performing the research activities foreseen within a RI instead of performing it as a research programme in consortia, cooperation networks etc.? (maximum 3000 characters with spacing)

The new, distributed infrastructure is required for a step change in our understanding of the highly complex and dynamic RS systems. DANUBIUS-RI will provide the structure for boundaries to be crossed: political, disciplinary and ecosystems.

DANUBIUS-RI will provide the following benefits to the research community:

- Access to unique natural laboratory and facilities for research in hydrology, biology, ecology, sedimentology, geology and hydrochemistry;
- Access to a broad range of expertise;
- Application of own research at a broader infrastructure or ecosystem level;
- Coordination of monitoring, QA, protocols;
- Opportunities for working in interdisciplinary teams;

- Sustainable means to bridge the gap between marine and freshwater environments;
- Opportunity to face challenges in the Danube – Black Sea area to establish best practice for other river-seas systems worldwide;
- Use of educational activities to introduce young scientists to complex systems;
- Data sharing;
- Access to catchment-scale integrated and standardised data (including the transitional and coastal – marine zones);
- Common analytical and modelling tools;
- Development and uptake of new technologies;
- Development of innovative business opportunities;
- Gateway to stakeholders.
- Optimisation of conservation and restoration strategies
- Defragmentation of research

2.1.4. How does the RI project contribute to the enhancement of the European Research Area?[4] (maximum 3000 characters with spacing)

DANUBIUS-RI will represent an added value in the strengthening and structuring of the European Research Area (ERA) and will bring a significant improvement in the water cycle scientific research at European and international levels;

2.2. EUROPEAN INVESTMENT ALIGNMENT

2.2.1. How will this RI help to focus national investment in this field at a European level? (maximum 3000 characters with spacing)

In all European countries there is a recognised need to invest in RIs to answer the questions of tomorrow and to remain competitive at a global level in research. Due to the very high costs needed to push research forward, no one country is likely, by itself, to be in the position to develop a large-scale world-leading RI. By combining

[4] Communication "A Reinforced European Research Area Partnership for Excellence and Growth" COM(2012) 392 expressed ERA Priorities: **More effective national research systems** – including increased competition within national borders and sustained or greater investment in research; **Optimal transnational co-operation and competition** - defining and implementing common research agendas on grand-challenges, raising quality through Europe-wide open competition, and constructing and running effectively key research infrastructures on a pan-European basis; **An open labour market for researchers** - to ensure the removal of barriers to researcher mobility, training and attractive careers; **Gender equality and gender mainstreaming in research** – to end the waste of talent which we cannot afford and to diversify views and approaches in research and foster excellence; **Optimal circulation, access to and transfer of scientific knowledge including via digital ERA** - to guarantee access to and uptake of knowledge by all.

funds from European countries, each partner will benefit from the resulting much stronger infrastructure.

Europe is the global leader in water policy and the Water (WFD) and Marine Strategy (MSFD) Framework Directives are recognised as international best practice. This RI will contribute to bridging the differences still existing between WFD and MSFD. By making the connection between the freshwater and marine environments, Europe can enhance its position as global leader.

DANUBIUS-RI will provide Europe with a critical mass of infrastructure, which individual countries could not afford. Duplication of expenditure and effort will be avoided. Investing in DANUBIUS-RI will result in an increased efficiency of collection of high quality data and provide exciting opportunities for sustainable solutions to complex problems of economic development and environmental protection.

2.2.2. How is the RI going to effectively orient resources from the relevant science communities and stimulate a substantial "joint programming"? (e.g. contributing complementary instrumentation, activating partnerships, training more young researchers in the relevant fields of science) (maximum 2000 characters with spacing)

As stated in the financial schema the resources will come from funding agencies, national and European. The joint programming simulation through partnerships with European and International communities will be source of resources and funding for Danubius RI in the operational phase. Detailed manner of resource mobilization and type of resources will be defined after definition of a most comprehensive landscape of available specialization and facilities to be involved in the joint programs.

2.2.3. What are the linkages with existing platforms, and networks and other ESFRI RI's? (maximum 3000 characters with spacing)

The relevant ESFRI projects and the type of connection from the "outside world perspective are listed in the annex of the Development Plan.

Major research infrastructures, programs and initiatives, both at European level as well as international have been screened from the point of view of their mission, objectives, status, and, most of all, position in comparison with DANUBIUS-RI. The analysis is presented in the Annexes of this report, as all data files and findings are shown there. This chapter briefly presents the major research infrastructures, programmes and initiatives related to DANUBIUS-RI at European and global levels.

2.2.4. Is this project as such, or in preliminary form, already adopted in one or more National Roadmaps?

✓ YES NO / Not Yet

If YES explain and indicate Country-Codes, amount of funds already allocated to the project in the framework of National Roadmaps. (maximum 1000 characters with spacing)

Romania. 150 MEuro – Letter of Commitment

If NO / Not Yet, do you plan an application to National Roadmaps? In which countries?

2.3. EUROPEAN GEOGRAPHICAL COVERAGE

2.3.1. What is the estimated capacity of the RI as compared to the Pan-European expected needs, and how is the Pan-European coverage addressed? (maximum 2000 characters with spacing)

Geographic scope – the infrastructure will not only be a gate to the natural laboratory of the Danube River – Danube Delta – Black Sea system but also to large river-sea systems across Europe. The opportunity will be maximized by building capacity with the new research infrastructure and by actively involving researchers and institutions both from within and outside the region.

2.3.2. What is the estimated % of non-hosting country users in Europe?

An estimate will be made on completion of current discussions with researchers outside Europe. Nevertheless, an important portion of users will be from countries where the problems of river-sea systems are critical (such as China, India, Bangladesh, Vietnam, and so on).

2.4. INTERNATIONALISATION POTENTIAL

2.4.1. What is the estimated % of non-European users?

Integrated water resources management of large river-sea systems is a critical problem at a global level and is acknowledged as such in the Millennium Assessment [ref]. Asia, Africa and South America, have even greater problems than Europe in river-sea systems. DANUBIUS-RI will attract a global community of researchers and stakeholders and already has UNESCO-IHE and UNESCO among its partners. The US-based Gulf Institute has expressed its desire to collaborate. Therefore we are confident that there will be a large number of non-European users.

2.4.2. How will it help European scientific communities' mobility and internationalisation? (linkage with the access model which should include open access through international competition on the basis of excellence) (maximum 2000 characters with spacing)

The international expertise which will be brought together under the umbrella of DANUBIUS-RI will cover the environmental, earth, life and social and economic sciences, providing the best expertise and capabilities within Europe for the Danube River – Delta – Black Sea system and other similar large systems globally

2.4.3. How can this project leverage European competitiveness in the specific field/fields of research? (e.g.uniqueness of technical offer, advancement of technical standard, innovation in research process, effective impact to innovation of research products, setting reference standard in data management, etc.)
(maximum 3000 characters with spacing)

DANUBIUS-RI will leverage European competitiveness through innovation in interdisciplinary research, advancement of technical standards in observation measurement and data, development of new measurement technology, and world-leading infrastructure and expertise in interdisciplinary research in whole river-sea systems.

2.4.4. Testing your proposal against the Pan-European ex-ante indicators[5] how would you rate the overall Pan-European relevance of the project: high, medium or low? Please explain (maximum 3000 characters with spacing)

DANUBIUS-RI scores on the following 'objective 0' Pan-European ex-ante indicators:

- addressing new scientific challenges with unique/innovative approach strengthening European leadership
- re-orientation of existing science sites to host new RI
- landscape analysis of RI in the field and the territorial distribution of service points in Europe

DANUBIUS-RI scores high or medium on all 'objectve 1' indicators

Assessment of potential scores on the 'objective 2-5' indicators will be made after further discussion with partners.

Section 3. SOCIO- ECONOMIC IMPACT

3.1. What will be the direct economic impact of this RI? (e.g. economic impact from direct spending in the site/region hosting the new facility, or the headquarters and/or the main nodes of a distributed facility in the construction phase, or the establishment of a well-connected e-infrastructure enabling fully distributed new research opportunities) (maximum 3000 characters with spacing)

DANUBIUS-RI has the potential for bringing a wide range of societal and economic benefits from local to global scales. The new knowledge generated will enable sustainable use of the ecosystem services provided by RS systems, on which societies rely for their well-being, [ref EU Roadmap Resource Efficient Europe]. These include disaster prevention and mitigation; [more examples eg from EC policy documents including green infrastructure].

[5]ESFRI Report on Indicators of Pan-European Relevance of Research Infrastructures" – Annex 2 – ex-ante indicators

Furthermore DANUBIUS-RI will train a new cohort of scientists, with an intrinsic capacity for interdisciplinary research. This will be an accelerator for further innovation.

DANUBIUS-RI aims to connect to SMEs that will commercially exploit the tools and instruments developed by the research infrastructure. It will draw on the experience of KICs [ref] to facilitate start-ups, thus contributing to job creation in Europe.

In case, you have carried out a socio-economic impact study, please upload: (maximum 1 MB)

3.2. What are the medium-long term socio-economic benefits of this RI? (e.g. in terms of replacing/re-orientating costly infrastructures that are already in place)? (maximum 2000 characters with spacing)3.3. What is the estimated impact on innovation activity in the production of goods and/or services that will result from this RI ?(e.g. in terms of well trained people, knowledge transfer, access programmes, services provided, etc.) (maximum 2000 characters with spacing)

The main basis for innovation provided by DANUBIUS-RI will be combining disciplines across the full river-sea continuum to produce the knowledge needed for balancing economic development and the sustainable use of natural resources, and for taking effective measures to protect and restore river-sea system functions.
Examples are:

- High-level, interdisciplinary courses for knowledge demanders and R&I funders, including: entrepreneurs, drinking water and energy producers, spatial planners, construction companies (builders of infrastructure, dredging companies), food producers, investors, insurance companies, NGOs, policy makers and implementers and river, forest or nature managers.
- Training a new cohort of Euro-scientists that have the intrinsic capacity for interdisciplinary research. They catalyse and accelerate further innovation. Here we will also draw on the experience of KICs [ref] to facilitate start-ups, thus contributing to job creation in Europe.
- New ways of communication between scientists and policy makers/managers. This will be done by creating a common understanding and language for agreeing upon R&I needs, and actively exchanging and recombining knowledge. Social scientists with expertise in boundary spanning activities will facilitate this. Furthermore, D-RI aims to connect to SMEs that will commercially exploit the tools and instruments developed by the RI.

Knowledge transfer through research infrastructures is a key contribution to a real international cooperation in research, under the assumption that the access to these research infrastructures is based on peer review and scientific excellence:

- The use of open access to scientific publications and data;
- Broader e-enabled access to the research data and to the protocols and metadata;
- The access to data/metadata shall be defined in order increase the quality and impact of research, without jeopardizing the research efforts of the owners of the facility who operate the Research Infrastructure.

3.4. What role can this RI play in industry/service/societal innovation developments? (maximum 2000 characters with spacing)

A freer flow of ideas between the public research sector and industry. The transfer of staff between research infrastructures, research organisations and industry should be increased and stimulated, as well as the emergence of industrial clusters around centres of excellence.
The development of knowledge and decision-support systems for: (a) sustainable use of natural resources (ecosystem services), (b) integrated river-sea management, (c) restoration measures, (d) disaster prevention and mitigation and (e) optimal blue-green infrastructure.

3.5. How is the project going to attract resources from innovation/industrial communities? (maximum 2000 characters with spacing)

The development of DANUBIUS-RI will constitute a substantial investment in research infrastructure. This investment, to be supported in part by EU structural funds, will facilitate the implementation of relevant European policies. It will exemplify best practice in following 'Smart specialisation' to build on geographical and research strengths. This will be a major contribution to the development of the Innovation Union.

When operational, DANUBIUS-RI will be self-sustaining in attracting further investment:

- Local companies will benefit from the presence of the DANUBIUS-RI *Hub* and *Nodes* (for instance in creation of wider market for provision of services, new connected jobs and new SMEs);
- Business generated directly and indirectly by DANUBIUS-RI will lead to further investment (private and public) and internationally the outputs will be available for practical use (providing competitive advantage for European business);
- The enhanced knowledge provided by the use of DANUBIUS-RI will increase investment efficiency. For example, the development and use of green technologies will maximise cost effective hazard protection (flooding, erosion, and drought). Provision of resilient systems in this way will reduce material losses from natural and human-induced hazards in RS systems.

3.6. What is the expected contribution of the RI to address Horizon 2020 Societal Challenges[6]? (maximum 2000 characters with spacing)

Even though it will be fully operational at the end of HORIZON 2020, DANUBIUS-RI provides a major platform where research and innovation activities will beperformed

[6] Please consult H2020 Societal challenges: http://ec.europa.eu/programmes/horizon2020/en/h2020-section/societal-challenges

in order to develop solutions to all the major Societal Challenges identified by Horizon 2020. Thus, foreseen activities will offer solutions to:

- Health, demographic change and wellbeing;
- Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy;
- Secure, clean and efficient energy;
- Smart, green and integrated transport;
- Climate action, environment, resource efficiency and raw materials;
- Europe in a changing world - inclusive, innovative and reflective societies;

Secure societies - protecting freedom and security of Europe and its citizens.Section 4. e- NEEDS

4.1. What will be the data management and open data policy of the RI? (e.g. Would data become accessible from a repository to the public? Would the RI be interfaced to E-Infrastructures for science?) (maximum 3000 characters with spacing)

The vision of DANUBIUS-RI as a data producer and provider is that of an international actor contributing to the growth of public good. Major users of data provided by DANUBIUS-RI will span many fields of interest: from scientific, educational and developers of non-commercial to commercial applications. DANUBIUS-RI will have an open access data policy towards all these categories. The data policy will address specific issues on data sharing and dissemination. Intellectual Property Rights will be guaranteed for data providers. Conditions for data access will be specific for each potential user, from a full member to an occasional interested party. These conditions will be prescribed by a data management policy. Where commercial gain is sought, appropriate charging and licensing will be implemented.

Danubius-RI is a distributed infrastructure and data access and storage follows the same philosophy. Data stored at *Nodes* will be formatted in compliance with a commonly agreed format, and in compliance with INSPIRE, in order to meet and facilitate the requirements of cooperation, such as free and open data exchange and access between all partners and researchers. The *Hub* will administer the interface for data exchange and access in agreement both with the technical requirements of the RI and the needs the partners.

A variety of non-digital data types and information including specimens will also be collected, stored and made available by DANUBIUS-RI. These sources of information will require special attention and meta data generated to provide for example their description, location and age. Specific storage facilities for sediment cores and biota samples will be provided.

Common protocols will be developed by DANUBIUS-RI with respect to all elements and stages of data management: from data acquisition, through to data processing and storage and ultimately data access. Procedures for data Quality Assurance and Quality Control will follow internationally accepted best practice, including ISO standards, and will be strictly implemented and audited.

The policy on digital data storage and communication will be to make best use of the existing European e-infrastructures. It is envisaged that facilities for local digital data storage and backup will be provided by the *Hub* and *Nodes*.

4.2. What is the plan for supporting advanced data management and how will it be funded? (maximum 2000 characters with spacing)

Plans for advanced data management are currently being developed, including support and funding. Best existing expertise and practice will be used, in order to have an efficient mechanism for data management. The funding model to be detailed in the preparatory phase will include these plans.

4.3.What is needed (if applicable) from external e-infrastructure services (resources for storage, computing, networking, tools for data management, security, access, remote analysis, etc.)? (maximum 2000 characters with spacing)

This problem is under discussion with the European partners in the current stage of the development of DANUBIUS-RI and will be developed further during the Preparatory Phase.
Nevertheless, it is foreseen that DANUBIUS-RI will make best use of the existing major e-infrastructures inEurope, by a tight collaboration with the e-IRG.

4.4. Will the RI contribute to the development of e-infrastructure commons[7] in the field or in general? (maximum 2000 characters with spacing)

DANUBIUS-RI will contribute to the development of the e-infrastructure commons through following the recommendations of the White Paper for international user communities. The Data Centre from the Hub and data connections will be made in accordance with the state of the art plans for development of-e-infrastructures.

4.5 Will the RI policy on data include training services for “data practitioners” to enable the effective use of data repositories and data analysis tools by non-scientists? (maximum 2000 characters with spacing)

Training for data practitioners will be an important aspect of DANUBIUS-RI and the responsibility of the *Hub*.

[7] Please consult e-IRG 2013 White paper: http://www.e-irg.eu/images/stories/dissemination/white-paper_2013.pdf

PART C: IMPLEMENTATION

5. PREPARATORY WORK ACHIEVED

5.1 Concept screening

5.1.1 What level of assessment has the project already received? Please identify the stakeholders involved (e.g. government ministries, research funding organisations, EC, private sector and public bodies, scientific community).
(maximum 1000 characters with spacing)

Development of the concept and the first Module of the *Hub* has been ongoing since 2010, funded by the Romanian Ministry for National Education (2010 –).

The French Government (ANR) launched a call in 2014 for French-Romanian collaboration on the development of DANUBIUS-RI.

One deliverable of FP7 DANCERS (contract 603805) D3.2. is provision of additional materials on DANUBIUS-RI.

In September 2013, the Danube Region part of DANUBIUS-RI was granted the status of Flagship Project in the EU Strategy of the Danube River – Priority Action 7 [ref].

Official letters of support have so far been obtained from:
- countries - Greece, Moldova, Bulgaria.
- international institutions: UNESCO-IHE, the Gulf Institute
- other ESFRI Projects: EMSO
- institutes and universities from UK, Ireland, France, Spain, Switzerland, Germany, Netherlands, Italy, Greece, Lithuania, Austria, Hungary, Serbia, Bulgaria, Moldova, Ukraine.

An International Initiative Committee was established in 2013, composed of representatives of the major stakeholders. Starting with the evaluation of the initial Romanian plans, it has been undertaking an ongoing assessment of the stages of development of DANUBIUS-RI.

5.1.2 Is the project based on a well-established international networking activity, like I3s or other programme with external international evaluation?
(maximum 1000 characters with spacing)

The projects initiative has been developed with international participation in the IIC. There is no previous I3 because of historical reasons. During the Cold War and the years prior to the integration into the European Research Area, the Danube was politically divided (and the river mouth and Black Sea were in the COMECON side of Europe).

In the previous decade a series of projects such as FP4 EROS 2000, EROS 21, FP5 EURODELTA put together the communities working in the Ebro – Rhone – Po – Danube – Rhine and Elbe. **But no** I3 project has been developed before. There are though parts of the facilities that are significant members of existing I3s, such as HYDRALAB.
In the PP, after identification of all the nodes/partners in the project, it will be subject of adhering a international network, with external international evaluation.

5.2 Design study

5.2.1 Has a design study been carried out with formal national, European and/or international support?
(maximum 1000 characters with spacing)

For the Hub a design study has been developed with national financial support and international know-how and participation. For the entire RI there is a Development Plan, also funded with Romanian national funding and participation of all partners.

Please upload references and outcome. (Maximum 1 MB)

5.2.2 Concerning the Technical Design Report (TDR): are all the relevant technologies available or substantial R&D is needed (how many years) in order to assess the full technical feasibility and draw a reliable cost-book?
(maximum 1000 characters with spacing)

All the relevant technologies for the construction of the RI are existing and will not involve substantial research and development. Full technical feasibility and expertise will be there from the beginning. However, an important activity of DANUBIUS-RI will be technological innovation in the development of instrumentation and tools, e.g., state-of-the-art sensors, in-situ observation equipment, mesocosms, analytical tool kits, algorithm development.

5.2.3 Is industrial capacity already in place (EU or international market) or does it need to be developed/installed in relation to the project (spin off companies, joint-ventures)?
(maximum 2000 characters with spacing)

All the equipments, observation facilities, analytic laboratories and modeling tools that will be built as parts of DANUBIUS-RI do not require specific industrial capacity that does not exist in Europe and /or the international market. Thus, there is no risk of not having the proper industries and technologies to build the RI. Nevertheless, DANUBIUS-RI is seen also as a testbed for the different sensors and technologies, that will enable the development of future joint-ventures. These will boost even further the leading position of Europe in the field of innovative companies in the

world. Nevertheless. a detailed approach on the topic can be developed only after the complete nodes identification and assessment.

5.3 Business case

5.3.1 What is your planned business case and has it already been reviewed?
(maximum 1000 characters with spacing)

The business case for investing in DANUBIUS-RI will need to articulate the objectives driving the initiative, as well as to describe “the problems” to be addressed, so it can provide the decision makers the necessary information to make the decision whether the investment should go through. The business case for investing in DANUBIUS-RI as part of the funding options available shall contribute to:

- new opportunities for technological development (energy, biomaterials, food, health, etc.);
- support to develop a more efficient monitoring and reduction of duplication;
- sustainable aquaculture;
- insurance and more effective fund management – better protection against natural and man-induced disasters;
- safer navigation;
- enhanced research capacity and competitiveness;
- development of transnational access to research infrastructure and facilities
- look to the losses due to problems;
- innovation.

5.3.2 Have you assessed the Cost-Benefit Analysis (CBA) of the RI and what are the results?
(maximum 1000 characters with spacing)

The cost and benefit analysis will be assesed during PP based on the detailed financial schemas, subject to feasibility study. At this point, the financials are gross estimates, a more detailed approach being needed for reliable CBA with much exact figures.

6. SITING

6.1 What is your strategy for site selection and for siting? If the RI is single sited, how will the site be chosen/was chosen? If the RI is distributed, will there be a central hub and how will its location be decided?
(maximum 1000 characters with spacing)

DANUBIUS-RI will act as a pan-European distributed open-access research infrastructure, and will comprise of a physical *Hub* in Danube Delta, at Murighiol and several *Nodes* distributed across Europe (both within and outside the Danube region). The *Hub* will consist of an administrative centre, research laboratories and educational facilities.
Although the *Hub* will be in the Danube Delta, and the Danube-Black Sea system will be used as an exemplar for research, DANUBIUS-RI will provide infrastructure support for research on large river – delta/estuary – sea systems across Europe.

6.2 Is the proposed site a 'green-field'? Is this proposal part of a broader plan of site development that includes synergetic initiatives?
(maximum 1000 characters with spacing)

or

6.3 Will the RI be installed in the premises of pre-existing facilities? Where these of similar or different scope? What is the 'value' transferred to the new project in this case in terms of general infrastructure/services and human capital?
(maximum 1000 characters with spacing)

The Hub will be on a 'green field' site while most of the facilities being part of the Nodes are expected to be based in the premises of pre-existing facilities.

7. PLANNING

7.1. What is the overall timeline for the project? Please describe all phases, i.e. pre-construction, decision-making, construction, start of operation for users, ramp to full capacity, full exploitation, eventual decommissioning and independent project evaluation.
(maximum 1000 characters with spacing)
If applicable, please insert timeline (Upload PDF limit 1 MB)

The project initiator anticipates 3 phases for the construction of DANUBIUS-RI facilities, namely:

Phase 1 – 2014-2015

The *first phase* of construction relates only to the *Hub.* It consists of the construction of the initial support infrastructure – the 'field station' with utilities, accommodation and storage facilities, supplying laboratory, conference hall and office equipment.

The technical and logistical facilities of the *Hub* will conform to current standards of green management strategies: water supply, energy supply, waste water treatment; pier facilities for research vessels and boats.

Phase 2 – 2016-2019

The *second phase of construction* involves supplying, installing and testing advanced, specialized scientific equipment that will provide a modern, first-rate European infrastructure for inter- and multidisciplinary studies of the complex factors controlling environmental state of the river-sea systems and their evolution. The detailed list of specialised high-tech laboratories, physical modelling facility, micro-/meso-cosms, as well as specialized equipment for these laboratories will result from further work with the Project partners, mainly during the PP Project.

Phase 3 – 2020-2023

The *third phase of construction* will be marked by the continuation of development of infrastructural capabilities according to the needs identified during the PP (and/or future alternate projects – with international partners) and consisting of future cutting edge science research capabilities.

At a future date, if it is decided that DANUBIUS-RI will cease to operate, steps will be taken to terminate the ERIC, following steps that will be set out in the statutes. In those circumstances, and subject to the Statutes, the facilities at Murighiol (the *Hub*) will become the property and responsibility of Romania to use either as a research centre or as another purpose. Subject to the Statutes, the *Nodes* will become the property and responsibility of the hosting organisations.

7.2 How do you plan to implement the RI once added to the ESFRI Roadmap? Please indicate the first steps and the five most important milestones until construction / operation start, and the five most important milestones in the first two years after construction / operation start.
(maximum 1000 characters with spacing).

A list of future development milestones as identified at this stage of the project rise the need of identifying and addressing the risks that might interfere with the development plan as stated in the principles section. Detailed analysis shall be developed on the next stages of the project, simultaneously with KPIs refinement and development of section for risk addressing.

Main identified milestones are:

- Inclusion in ESFRI Roadmap.
- Preparatory Phase funding by EU.
- Use of EU Structural Funds in some countries.
- Support by funding bodies in other countries.
- Successful competition for hosting *Nodes*.
- Continued support by Romanian Government of project development.
- Funding continuity

- Appeal to external “high calibre” scientists willing to use the RI
- Continuity of scientific support after the inauguration of the RI.
- Continuous use/upgrade of state of the art scientific facilities
- Continuous use/upgrade of state of the art scientific instrumentation
- Continuous use/upgrade of state of the art computing facilities

7.3 If you intend to apply to a Horizon 2020 Preparation Phase type-1 contract, what will be the main objectives and “deliverables” of your project? What aspects of readiness-to-implement will be within reach of a 2-3 years H2020-Preparatory Phase?
If you do not intend to apply for a Horizon 2020 Preparation Phase type-1 contract, please explain why.
(maximum 1000 characters with spacing)

The preparatory phase aims at bringing the project to the level of legal, financial, and technical maturity required for implementation. It requires the involvement of all stakeholders (governmental authorities, research councils, funding agency officials, operators of research facilities, research centres, university, relevant industry) to move the project forward and their financial commitments before and during construction phase. Throughout the preparatory phase the Commission may act as a 'facilitator'.
During this stage, all the technical, financial and legal documents and agreements which are necessary for the construction phase are finalized.

7.4 How do you rate the probability to reach the firm decision of implementation by the involved stakeholders and the financial commitment by a critical mass consortium within the permanence time on the ESFRI Roadmap, i.e. maximally ten years?
(maximum 1000 characters with spacing)

Implementation of DANUBIUS-RI is definite and has already started. There is a high probability that within the permanence time on the ESFRI Roadmap there will be a critical consortium of stakeholders across Europe. DANUBIUS-RI has the potential to evolve over time with the addition of new stakeholders (and possibly the loss of existing stakeholders).

8. GOVERNANCE, SCIENTIFIC AND LEGAL MANAGEMENT

8.1. What is the chosen or preferred legal structure?
(maximum 1000 characters with spacing)

Please upload statutes (or draft statutes) and/or related documents. (Upload PDF, maximum 1 MB)

DANUBIUS-RI refers to the facilities, resources and related services that will be used by the scientific community to conduct top-level research in the water cycle. It will

cover the scientific equipment and sets of instruments, the knowledge base resources (collections, archives, structures for scientific information), as well as the existing natural laboratory, all of them being essential to achieve excellence in research. DANUBIUS-RI will be organized as an open-access distributed infrastructure, under the legal framework of an ERIC.

For a pan-European distributed RI the most suitable legal governance system is likely to be ERIC (European Research Infrastructure Consortium). It is therefore envisaged that DANUBIUS-RI will apply for ERIC status. The ERIC will be registered in Romania and located at the DANUBIUS-RI *Hub* in Murighiol. Membership of the ERIC will be open to countries within and outside Europe. Observer status will be considered for intergovernmental organisations (e.g., river basin commissions and UN organisations) and for countries. Within the ERIC will be the headquarters (*Hub*), the director general and senior staff and probably some facilities and services. However, *Nodes* across Europe may be outside the ERIC, with agreements between the ERIC and the leading laboratory of each *Node*, and within each *Node* between the leading laboratory and satellite laboratories. The agreements, which will set out the roles and responsibilities of each party, will be made for a period of five years.
Laws covering the operational phase (ERIC):

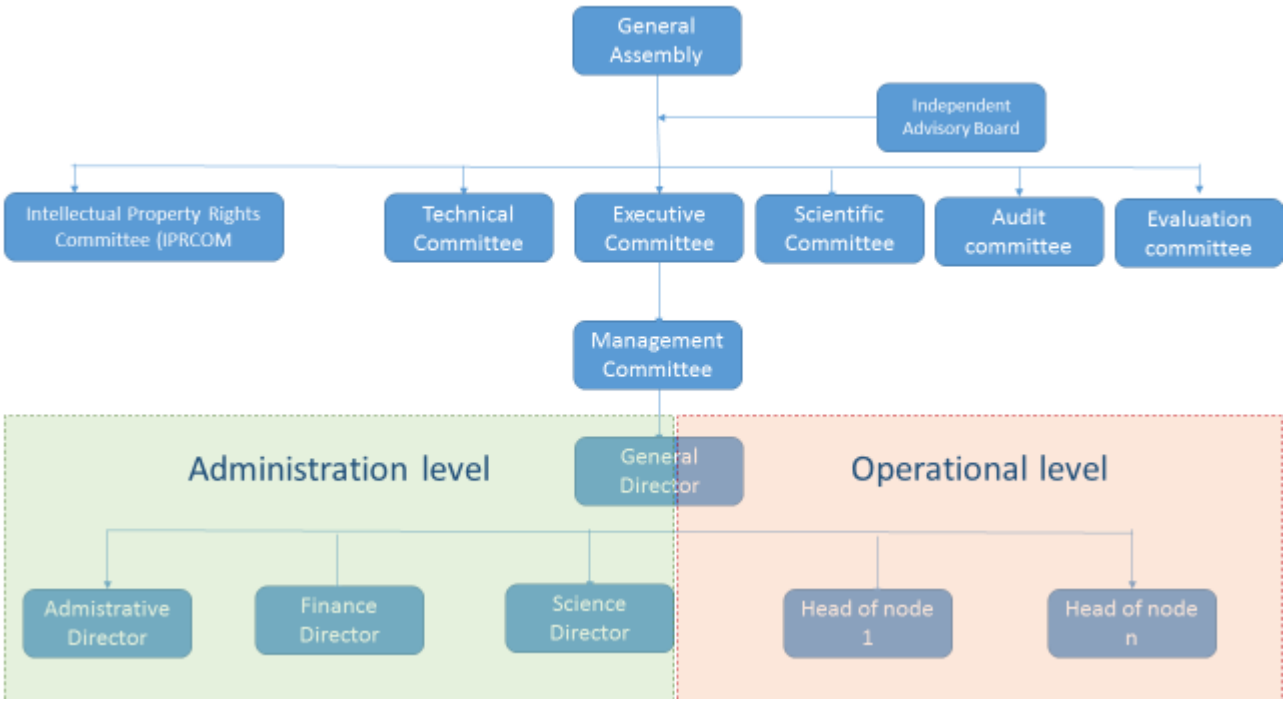
- European Union law, in particular the ERIC Regulation (EC) No 723/2009;
- The law of the Hosting State in case of matters not covered (or partly covered) by such European Union law.

DANUBIUS-RI will be established as a European Research Infrastructure Consortium (ERIC), consequently all the governance arrangements will be following ERIC guidelines. The ERIC will include the DANUBIUS-RI *Hub* based in Murighiol, while some of the constituting *Nodes* may be outside the ERIC.

8.2. What is your envisaged governance model? Please explain how the roles of the Chair, Director, Supervisory, Ethical Boards, etc. are defined to ensure good governance and control.
(maximum 1000 characters with spacing)

Governance and organisational arrangements will be detailed in a set of statutes which will be drawn up during the preparatory phase and approved during the ERIC application process.
A General Assembly, consisting of appointees from member countries of DANUBIUS-RI, will be the governing and decision making body. The director general and other staff within the ERIC will be appointed by international competition. The director general will be responsible for the overall direction and management of the RI, and will report to the general assembly. Details of other staff appointments and advisory committees within the ERIC will be developed during the preparatory phase.

Please upload an organisation chart of governance. (maximum 1 MB)



8.3 Please describe your project organisation, with clearly defined responsibilities and reporting lines/structures, measurable and credible Key Performance Indicators (KPIs).
(maximum 2000 characters with spacing)

The appointment of the director general and other staff within the ERIC will be openly advertised in international competition, as set out in the ERIC statutes. Appointments are expected for an initial period of five years with a possibility of extension. Staff appointments in *Nodes* that are outside the ERIC will be the responsibility of the host institutions following procedures and conditions to be agreed with the human resources manager at the *Hub*.

The director general will have overall management responsibility, delegated through senior staff as appropriate. Management arrangements within the ERIC will be set out in the ERIC statutes. A key role within the ERIC will be the finance director who has responsibility for ensuring the proper and efficient use of funds across the RI. The director general, the finance director and selected senior staff will form the DANUBIUS-RI Executive. Day-to-day management of DANUBIUS-RI activities at *Nodes* outside the ERIC will be the responsibility of local management of the host laboratory /organisation as agreed with ERIC.

The *Hub* will be a central infrastructure owned and controlled by Danubius-RI ERIC that will:

- supervise the operation of the infrastructure;

- supervise and organise data processing, quality control, and access;

- develop continuous research and development required for the evolution of the ERIC;

- contribute to the development of scientific research;

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supervise and organise data processing, quality control, and access;

develop continuous research and development required for the evolution of the ERIC;

contribute to the development of scientific research;

DANUBIUS RI shall have implemented during operational phase a set of Statutes and at least the following topics shall be covered by the Statutes of the ERIC:

- Description of the infrastructure
- Activities, Objectives and tasks
- Members and observers with rights and obligation
- Coordinating and Management structures - Governance
- Finance and procurement
- Policies (Access, Data management, Intellectual property, Evaluation Dissemination, staffing and employment, reporting).

Based in Romania and under the leadership of the GA and DANUBIUS-RI DG and Executive the DANUBIUS-RI management team will undertake the management and administration of the research facilities offered by the *Hub*, will provide access to the natural laboratory and its state of the art infrastructure, and will ensure the coordination of the scientific activities and their output with the other research facilities distributed across the *Nodes.*

The administrative and logistic role and activities to be carried out by the management team (coordinating bodies) in the ERIC will also comprise:

- Provision of administrative support services for DANUBIUS-RI (organise meetings, prepare agendas and minutes of meetings);

- Maintenance of an up to date data records regarding DANUBIUS-RI members and users, Member States representatives;
- Management of funds received from the funding agencies, European Commission, Government of Romania, third party funding agencies, revenues, keeping a bank account for DANUBIUS-RI;
- Preparation of annual budgets and audited accounts for DANUBIUS-RI;
- Covering the procurement, by developing and issuing invitations to tender, carrying out evaluation sessions, issuing contracts awards, negotiating and contracting various services, goods and works on behalf of DANUBIUS-RI;
- Coordination of the logistics and provision of access to the research infrastructure facilities, acting a clearing house for applications to access the infrastructure;
- Designing, setting-up and maintaining DANUBIUS-RI website and database portal (http://www.danubius-ri.eu/);
- Dissemination of information on scientific activities and expected outputs to the wider research communities;
- Designing and running educational / training courses.

An Independent Advisory Board will carry out periodical meetings, reviewing the internal and external environment. This way, the future development needs and opportunities will be identified at an early stage, contributing to the enhancement of DANUBIUS-RI's capabilities and future development. Each of the participating bodies (*Hub*, *Nodes* and future partners grouped in communities of users) shall have an active role in the development of all DANUBIUS-RI components, (governance and management, scientific agenda, infrastructure and facilities offered, human resources).

The management and decision structures will follow ERIC rules with regards to organization and operation activities, and will adequately and promptly respond to specific needs arising from the geographical distribution of the *Nodes* and their national regulations. Below are listed the main layers and bodies comprising the management and administration team:

- decision and strategy level;
    - General Assembly (GA);
    - Independent Advisory Board
    - Executive committee

    - Management Committee;
    - Scientific Committee (SciCOM);
    - Technical Committee (TechCOM);
    - Intellectual Property Rights Committee (IPRCOM);
    - Audit committee
    - Evaluation Committee
    - The General Director / President;
- Administration level;
    - *Hub* Operational level ;
    - Operational working teams;
- *Hub* maintenance level;
    - Functional departments.

The development and operation of DANUBIUS-RI *Hub* will be done in accordance with the following principles:

- distributed infrastructure;
- collaborative research;
- complementary skills and knowledge;
- integrated and participative management;
- permanent synergic development and improvement;
- permanent monitoring and evaluation of the main KPIs along all phases;
- identification of future partners, projects, themes, methods and available financing;
- preparedness and readiness for future joint research projects;
- risk evaluation and solutions oriented;
- strong and reliable Quality system covering the functionalities of DANUBIUS-RI.

DANUBIUS-RI *Hub* is expected to cover:

- the strategic planning;
- the scientific evaluation;
- the scientific endorsement;
- the provision of research infrastructure;
- the natural laboratory – experimental station;
- the coordination of *Nodes*' scientific activity and related research projects;
- the dissemination of research activities outputs;
- to be the main contact point for future collaborations;
- to cover the functions of data collection-data harmonization-data distribution;
- to be a Data Centre;
- To ensure ERIC organization;
- To ensure the management and administration functions.

The *Hub* will be developed based on the scientific case studies. A scientific proposal will be submitted and evaluated by the Scientific Committee for the use of the research infrastructure.

It is expected that the DANUBIUS-RI *Hub* will:

- Coordinate and supervise the operations of DANUBIUS-RI in accordance with the proposed strategy;
- Develop and issue DANUBIUS-RI strategic plan;
- Coordinate, guide and advice on annual work programmes for DANUBIUS-RI;
- Disseminate information on scientific activities and expected outputs to the wider research communities;
- Negotiate transnational access to DANUBIUS-RI infrastructure;
- Resolve any IPR issues between RI members, subcontractors, etc.

The *Hub* will be the main responsible for communication with external RIs, to facilitate communication among *Nodes* and with the main stakeholders of DANUBIUS-RI, as well as to ensure key scientific, educational and analytical capabilities.

Below we present a draft organizational and management functional structure breakdown for DANUBIUS-RI:

- Management Unit;
- *Hub* and *Nodes* coordination function;
- Scientific function:
  - Department Heads;
  - Working Groups;
  - Support Teams;
- Administrative function:
  - Financial function;
  - Procurement function;
  - Maintenance function;
- Cooperation and partnership function;
- Data centre coordination function;
- Public Outreach-International Relations function;
- Education function.

A *Node* is a scientific and data service provider, a specialized facility that contributes to the fulfillment of DANUBIUS-RI mission. *Nodes* will be characterized by excellence in science and technology, will not duplicate existing capability and will benefit from local funding. The *Nodes* will provide research infrastructures, experimental / in situ measurement facilities, analytical capabilities and data storage. It is expected to improve the existing monitoring systems and foreground data (data collected after the establishment of DANUBIUS-RI). The ways of endorsement, coordination and collaboration between the *Hub* and the *Nodes* will be subject of the Preparatory Phase Project when DANUBIUS-RI is on the ESFRI Roadmap. The *Nodes* will consist of Laboratories / facilities led by a Lead laboratory selected after a competition for each *Node*.

Nodes will be the interface with the regional stakeholders, enhancing the knowledge exchange, and will be responsible for implementing standardized procedures at a regional scale. Each *Node* will be structured on two layers: operational level and a maintenance level.

DANUBIUS-RI *Nodes* are expected to:

- Provide maturity and scientific excellence to DANUBIUS-RI;
- Bring specific expertise to DANUBIUS RI by:
    - Complementarity to the *Hub*'s infrastructure, scientific agenda and human resources (research and education services);
    - Partial replication of *Hub* functionalities within a limited area of competencies (scientific agenda, human resources, infrastructure, geographic location);
- Be committed to provide outstanding infrastructure;
- Have relevance to DANUBIUS-RI in terms of infrastructure, themes, institutional support and education;
- Bring committed adherence to DANUBIUS-RI;
- have networking and dissemination capabilities and act as a Point of sale for research infrastructure, scientific results and educational services;
- To cover at least one thematic discipline but preferably to have a multidisciplinary background;
- To be main outlet for local/regional/thematic collaboration and funding;
- To be a source of knowledge, competencies and infrastructure;
- To facilitate the usage of data bases.

Please upload an organisation chart of project. (maximum 1 MB)

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8.4 What is your plan for independent scientific monitoring of the RI when in the operational phase? (maximum 1000 characters with spacing)

The ERIC General Assembly will appoint an independent panel to undertake an evaluation of DANUBIUS-RI on periodical bases based on the maturity of project, subproject and themes.. This will complement the work of an internal standing Evaluation Committee of the RI based on KPIs .[MS1]

8.5 Has a Funding Agreement and MoU been concluded?
(maximum 1000 characters with spacing)

If Yes, please upload Funding Agreement and MoU

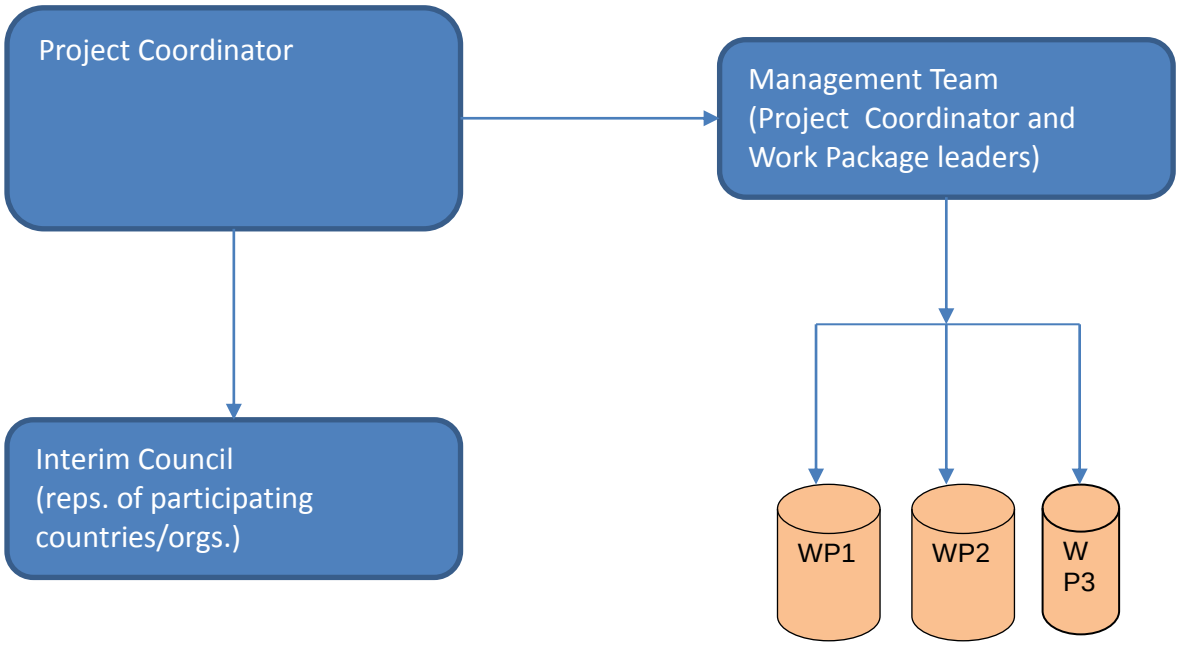
A draft MOU has been discussed with partners and will be finalised shortly.

9. HR POLICY AND PROJECT MANAGEMENT

9.1. Please analyse the availability of relevant competences for construction and exploitation of the RI?
(maximum 1000 characters with spacing)

The governance structure of the RI is already designed both for construction and preparation phase, that will follow the ESFRI roadmap and for the operational phase.

For the construction phase, the leading role and competencies shall be establish by the hosting country having a structure as below:



An assessment of the needed competencies shall be drown on each WP and also on each stages and missing competencies shall be identified or outsourced.

As long as for the operational phase the structure of the management and operational levels will be establish in the Statute of the ERIC and appointed on international completions and selection procedures.

The Director General and other staff within the ERIC will be appointed by international competition.

9.2 Describe plans or established procedures for gathering the necessary competences, project managers' selection and staff hiring. Describe the secondment policy (potentially relevant in particular for distributed infrastructures) if any.(maximum 1000 characters with spacing)

There shall be clearly defined the staffing and employment policy at the go live! Moment and on the operational phases. Based on the project phase the needed competencies shall be identified among the partners and nodes personnel for the establishment of the center by the Management team and Interim Committee.

In the operational phase, the secondment will be encouraged for the existing staff for the proven outstanding results in activity track records.

In both phases, any missing needed competency will be subject to clearly defined and ruled international competition of selecting staff according to the field and specificity of activity.

The SOPs for staffing and selection, included in the operational SOP will be developed in the PP of the project.

9.3 Describe parameters to gauge project success (KPI), planned project Work Breakdown Structure (WBS) and related responsibilities, major item procurement schedule, coordination methods within the project and among the partners and timeline with milestones.
(maximum 1000 characters with spacing)

The KPIs shall follow the best practices in design and follow-up of the indicators and also follow the directives of ESFRI in setting and evaluating indicators both for preparatory phase as for ERIC phase. There will be indicators to observe and follow in proposal submission in preparatory phase, but also in ERIC phase of the project (ex-post and ex-ante indicators).

In KPIs definition the data sources and data reliability shall be the most important aspects to be considered.

For the mid-term perspective in construction phase and in ERIC phase new set of indicators can be followed by the management team.

Below we present a set of key performance indicators that will be refined and grouped according to ESFRI directives (ex-post and ex-ante) in the next project development stage:

- Number of agreements signed with various collaborators;
- Number of access to available data produced;
- Number and quality of scientific publications produced (ISI);
- Number of research projects signed;
- Number of mobility programmes developed;
- Number of researchers hired/transferred/visiting DANUBIUS-RI.

The scope of KPIs is to permanently trace the status and level of accomplishment of the designed objectives of DANUBIUS-RI and shall be the keynote of the business case development

- Number of scientific publications
- Number of courses (in international education and high level science schools)
- Number of new academic titles endorsed
- Number of documents (such as local managing plans) that use of DANUBIUS-RI data
- Number of projects developed by DANUBIUS RI.
- Number of publications.
- Number of citations
- Revenues from projects
- Revenues from services
- Number of MSC, PhD, student
- International agreement type: ERIC or other, or explicit international mission if funded by one country
- Geographical distribution of service points or *Nodes*
- Upgrade/reuse of national pre-existing investments that acquired European/international dimension in the RI
- Place in the landscape of RIs in Europe
- Number of MS/AC and global partners contributing to (a) construction, (b) operation and c) to equipment
- Structure of commitments to (a) construction and (b) operation/GBAORD
- Estimated value of national *Nodes* contributing to a distributed RI to (a) construction and (b) operation/GBAORD
- Number of users of the RI per country/ total Number of scientists per country (in the given field)
- Number of user accesses
- Number of users-partnerships (when relevant for the kind of RI)

- Number of joint proposals/total users
- Fraction of non-European users (with non-EU affiliation)
- Share publication in top 10 journals in each field of reference of respective facilities
- Number of PhD theses and post-doctoral programmes/ citations (absolute and relative Number of patents and licenses based on the work of the RI, normalised to Number of patents and licenses in the field
- Number of industrial users and projects with industrial cooperation
- Previous Design Study Project
- Previous Preparatory Phase Project
- Well established I3 or equivalent networking in the science community that needs the RI
- Addressing new scientific challenges with unique /innovative approach strengthening European leadership
- Upgrade of an existing operational RI to pan-European or Global RI
- Re-orientation of existing science sites to host new RI
- Landscape analysis of RI in the field and the territorial distribution of service points in Europe
- Number of MS/AC and global partners engaged with determined share to (a) construction and (b) operation.-Mission statement from ownership
- Maturity of international organisation
- Number of *Nodes* of Distributed RI, partner facilities
- Structure of commitments to (a) construction and (b) operation/GBAORD
- Estimated value of national *Nodes* contributing to a distributed RI to (a) construction and (b) operation/ GBAORD
- Fraction of possible users of the RI per country/ total Number of scientists per country (in the given field)
- Scale of service (expected number & time of access per year w.r. size of reference community)
- Data management and access structure

- Number/size of users consortia willing / planning to contribute own resources to use the RI on contractual basis
- Expected % of non-European users
- Expressions of interest by diverse scientific teams
- Attractiveness at international level of staff
- PhD programme agreements with universities
- Industrial involvement in pre-procurement studies and in the construction phase, including IPR
- Accessibility by industrial users.

Please upload the Conceptual Design Report (CDR), if applicable. (maximum 1 MB)

9.4 What is your policy for gender balance at all levels of activity and responsibility, and in career planning? (maximum 2000 characters with spacing)

Any staffing policy defined at PP and ERIC level will clearly rule that the position is open for both gender and there shall be no discrimination. The balance will be kept by permanently monitor the staffing by gender and give equal access and opportunity in the selection process, for all levels of activity and responsibility. The SOP, part of the staffing SOP will be developed in the PP.

10. FINANCIAL ASPECTS AND COMMITTMENTS

10.1 What are the current cost estimates and budget projections,construction/implementation, operation and, if applicable, for decommissioning?Please indicate the confidence levels of your estimates. Please indicate if they are based on suppliers' quotations.(maximum 4000 characters with spacing)

The foreseen financial arrangements on a medium and long perspective from source of financing perspective are:

- 2015-2023 fully funded from external sources (national, EC, international) for a total of up to EUR 185 million;
- 2024-2029 funded 50 % externally and 50 % from revenues received from granting access to DANUBIUS-RI on different research projects (R&D, innovation, experiments, industry);
- 2030 onwards – 30 % externally and 70 % own financing.

Structural Funds, Horizon 2020, EDIB and national financing represent the most important financial instruments to finance DANUBIUS-RI.

Major stakeholders have expressed their commitment to engage their national funding agency officials to sign the Memorandum of Understanding (MoU) and obtain their Member State participation in the pan-European distributed open-access research infrastructure.

More accurate figures will be determined by a feasibility study to be carried out in 2015, when will be considered all the aspects related to DANUBIUS-RI *Hub* setup and its corresponding phases for construction, equipment installation, as well as its connectivity to different facilities distributed among the *Nodes.* The financing component has three different subcomponents that shall be considered:

- preparatory phase detailed financing scheme;
- accessing the funds for all stages of the project
- pricing and access policy.

List of possible major funding sources which can be identified at this point, and which require careful monitoring during all stages of development, includes:

- European funding agencies;
- European Structural and Investment Funds (ESIF) 2014 – 2020;
- National funding agencies;
- Other international funding agencies;
- Partners financial commitment;
- Private funding (allow access to research facilities within the *Hub* and *Nodes*, provide transfer of know-how and technology);
- Research clients (companies, local/ national / international organizations);
- Educational services providers for PhD and students.
- Annual Member and Observer subscriptions;
- Remuneration for services from the user community;
- Grants for specific research activities.

BREAKDOWN OF THE FINANCING SOURCES BY PROJECT STAGE

		STAGES					
		ESFRI proposal development –Current stage of the project	**ESFRI proposal submission**	**Preparatory Phase (after acceptance on the ESFRI Roadmap)**	**Construction phase (after preparation of feasibility study and all documents required for Structural Funds)**	**Go live! phase – ERIC implementation**	**Permanent development and improvement phase**
	ESFRI roadmap stages	Pre-accession		PP 2017-201	Construction phase 2016-2023	Operational phase 2024 -2029	
	Total financial value (estimates)			MEUR 5	180	MEUR 100	
	Investment capital			MEUR 0	MEUR 150	MEUR 10	
	Operational costs			MEUR 0	MEUR 30	MEUR 90	
	Already committed	Romanian Government					
Sources	European funding agencies			X	X		
	European Structural and Investment Funds (ESIF) 2014 2020			X	X		
	National funding agencies	X	X	X	X		

	Other international funding agencies			X	X	X	X
	Partners financial commitment		X	X	X		
	Private funding (allow access to research facilities within the *Hub* and *Nodes*, provide transfer of knowhow and technology):					X	X
	Research clients (companies, local/ national / international organizations)					X	X
	Educational services providers for PhD and students					X	X

Expenses structure	Main stages	ESFRI proposal development – Current stage of the project	ESFRI proposal submission	Preparatory phase (after acceptance on the ESFRI Roadmap)	Construction phase (prior preparation of feasibility study and all documents required for Structural Funds)	Go live! phase – ERIC implementation	Permanent development and improvement phase
Goods							
Figures	Supplies				x	x	x
	Equipments				x	x	x
	Research equipments				x	x	x
	IT Equipments			x	x	x	x
	Administrative equipments				x	x	x
	Office supplies	x	X		x	x	x
	Fuel			x	x	x	x
	Water, gas, electricity	x		x	x	x	x
	Internet services	x	X	x		x	x
	Travel	x	X	x		x	x
	Licenses				x	x	x
Services							
	Consultancy	x	X	x	x	x	x
	Legal and Acquisitions support		X	x	x	x	x
	Translations	x	X				
	IT Services			x		x	x
	Transport&Accomodation		X	x	x	x	x
	Training			x	x	x	x
	External Experts	x	X	x	x	x	x
	Marketing	x	X	x	x	x	x
	Other services (rental, printing a.o.)	x	X	x	x	x	x
Works							
	Building investment			x			x
	Capital expenses			x	x	x	x

People cost							
	IIC	x	X	x			
	Permanent structure			x	x	x	x
	Scientific structure			x	x	x	x
	Project based people cost				x	x	x

Please upload cost models and cost-book analysis, if available. In case of distributed RI, please take into account estimates for hub, national nodes and main upgrades (maximum 1 MB).

10.2 What is the essence of your Investment plan and to what set/subset of stakeholders was it presented?
(maximum 2000 characters with spacing)

When operational, DANUBIUS-RI will be self-sustaining in attracting further investment:

- Local companies will benefit from the presence of the DANUBIUS-RI *Hub* and *Nodes* (for instance in creation of wider market for provision of services, new connected jobs and new SMEs)
- Business generated directly and indirectly by DANUBIUS-RI will lead to further investment (private and public) and internationally the outputs will be available for practical use (providing competitive advantage for European business)
- The enhanced knowledge provided by the use of DANUBIUS-RI will increase investment efficiency. For example, the development and use of green technologies will maximise cost effective hazard protection (flooding, erosion, drought). Provision of resilient systems in this way will reduce material losses from natural and human-induced hazards in RS systems.

10.3 What is the current level of financial commitment to the project? Please elaborate on the (conditional) intentions to (co-) fund the construction costs and access, site-premium and indicate what kind of formal investment commitments (in cash and/or in-kind) have been made. What are the plans to fund operating costs?

To date, most funding for DANUBIUS-RI has been provided by the Romanian Government, with other funding and in-kind support coming from other partner countries and the EU.

Preparatory work funded by Romania from National Research Funds:

- Romanian National Core Programme project funded for the development of the DANUBIUS-RI White Book (Scientific Case Study) – 2010 – 2013;
- Romanian National Sectoral project funded for the ESFRI Proposal and Development Plan of the RI at the level of 2018 – 2013-2014;

- Romanian National Core Programme project funded for the development of the DANUBIUS-RI First Module of the *Hub* (2013-2015);

For the development of the *Hub* in Romania, the project DANUBIUS-RI was declared "project of national strategic importance" and will be built using a mix of structural funds and national funding (extra to the first 1 M Euros contract under development now). The structural and national funds to be made available are mentioned in the Letter of Commitment of the Romanian Government.

Other preparatory funding:
French Government (ANR) dedicated programme for the French-Romanian collaboration on the development of DANUBIUS-RI; (call launched on 2014)

Part of FP7 DANCERS (contract 603805) D3.2. – development plan of DANUBIUS-RI.

In kind contributions from the partner institutes (salaries and travel costs) – participants at the DANUBIUS-RI International Initiative Committee and other planning meetings.

DANUBIUS-RI intends to apply for a Preparatory Phase EC Grant within Horizon 2020, after acceptance on the ESFRI Roadmap.

For the construction of the facilities that would become parts of *Nodes*, funding is sought from a mix of national and Structural Funds. Where economically justifiable, loans from the European Bank for Investment, as well as from the World Bank will be sought.

Please also indicate whether you intend to apply for loans of the European Investment Bank, or equivalent national credit systems, and/or use the Financial Instruments under Horizon 2020. (maximum 3000 characters with spacing)

Please upload relevant supporting documents. (Maximum 1 MB)

10.4 Is the RI going to replace existing RIs that will become obsolete? How will you ensure that funding and users transfer from the obsolescent infrastructure (-s) to the new one and what political steps may be needed to ensure this?
(maximum 2000 characters with spacing)

Not applicable. It is not envisaged that the RI will make existing RIs obsolete or replace them.

10.5 Is the project consistent/mentioned with/in (a) Smart Specialisation Strategy (-ies) of Member States interested in hosting it and thus eligible for European Structural and Investment Funds (ESIF)? If appropriate and relevant, please explain.
(maximum 2000 characters with spacing)

The development of DANUBIUS-RI will constitute a substantial investment in research infrastructure. This investment, to be supported in part by EU structural funds, will facilitate the implementation of relevant European policies. It will exemplify best practice in following 'Smart specialisation' to build on geographical and research strengths. This will be a major contribution to the development of the Innovation Union.

The Hub of Danubius RI is included in the Romanian national SSS report - "Assistance to identifying national priorities as regards the Smart Specialisation Strategy in the next national strategy for research and innovation 2014-2020"

Analysis and Evidence Base of the R&D&I Market in Romania

Based on national strategy and final reports a more detailed explanation will be included.

10.6 What is the strategy for assuring the coverage of operational costs in the medium-long run? (maximum 1000 characters with spacing)

A finance model for DANUBIUS-RI, covering both construction and operation costs, is currently under discussion with partners and will be set out in the final version of this application.

10.7 What kind of accounting principles have been agreed with partners and shareholders? (maximum 1000 characters with spacing)

The accounting principles of DANUBIUS-RI respect the statutes and regulations of the ERIC and will be agreed upon together with all the partners during the Preparatory Phase.

11. FEASIBILITY AND RISKS

11.1 Are there scientific developments or competing projects elsewhere that could affect the research foreseen at the infrastructure?
(maximum 1000 characters with spacing)

Within the EU Strategy for the Danube Region the project DREAM (Danube Region Research and Management), coordinated by the Austrian University BOKU of Vienna is the other Flagship Project within Priority Area 7. This project can be considered as mainly complementary to DANUBIUS-RI (the Danube part of it). A good cooperation and even a clustering of the 2 projects is required in order to obtain a maximum of efficiency and synergy from the 2 RIs.

11.2 What are the risks that in your view could delay, increase costs of or make realisation of the infrastructure tasks impossible? Do you have any specific technical risks? Have you undertaken a technical options analysis?

(maximum 1000 characters with spacing)

As construction of the *Hub* is funded, underway and proceeding well, it is unlikely that this will risk delaying the RI reaching its operational stage. Delaying of financial commitment from partners is seen as the main risk for delay the establishment of other aspects of the RI such as development of the *Nodes* and staff appointments. The risk of cost increase is higher for the operation of the RI than the creation costs. For a pan-European distributed infrastructure involving a large number of organisations in different countries there is a risk of cost increase unless there is a strong central management.
We do not foresee major technological risks. A general technical options analysis is not applicable to our approach. However, technical options analyses may be used during the operation of the RI for new instrumentation or other equipment if necessary.

A risk register will be opened and maintained until DANUBIUS-RI becomes operational. It will be reviewed by the International Initiative Committee and, following award of H2020 preparatory phase funding, by the Interim Council. An ongoing risk analysis shall cover the stages identified in the development of DANUBIUS-RI. Therefore, the approach shall be to split the risks among the main phases of the project development:

Preparatory phase and operational phase

In order to reach the best benefit and the best addressability to risk, there is need to develop a risk assessment strategy that shall cover the following aspects:

- Potential risk –risk as has been identified by the Evaluation Committee
- Potential effect to Project describe the effect at the project level based on the actual phase
- Severity sets the escalation level and the impact on the project
- Cause that produce the identified risk
- Current risk management
- Risk owner
- Likelihood during life cycle of the project
- Current detection methods in place
- Detectability – directly connected to the defined KPIs
- Risk level – the scale that covers the all range of potential risks.

The major risks identified at this stage are:

- Lack of (sustainable) funding;
- Potential struggling and a real need of guidance in legal matters (ERIC regulations incorporation, IPR);
- Lack of coordination between various levels and stakeholders;
- Need of increased cooperation on national and international level between the research community and industry;
- Need of increased coordination between pan-European RI and other research programmes & initiatives and research organisations at EU level.

Future actions based on risk analysis:

- Dealing with trans-boundary environmental issues in a cooperating way (to improve trans-boundary cooperation)
- Improving the open access to environmental data
- Improving local founding on *Nodes* in order to provide technical facilities to be used for scientific investigation
- Definition of the possibility to consider DANUBIUS-RI as not only a diffused infrastructure but as an example of an infrastructure providing a relocatable methodology suitable for river-delta/estuary-sea systems
- Inclusion to ESFRI road map
- Finalization of *Hub* Blueprints
- Final Selection of *Nodes* for proposal submission
- Pre-Construction completion of all infrastructure requirements for *Hub* site
- Development of a communication plan within the RI and also with the outside world
- Breakdown and fine tuning of the main objectives
- Permanent monitoring of the funding sources
- Permanent and clear communication and promotions actions
- Clear distribution of coordinating roles among partners
- Permanent and clear communication and promotions actions

- Permanent monitoring of the external factors
- Permanent monitoring of the funding sources
- Close collaboration with local funding agencies
- Permanent monitoring of the funding sources
- Permanent and clear communication and promotions actions
- Permanent monitoring of the external factors
- Permanent improvement of the proposal and tight connection among partners and with the ESFRI
- Permanent and clear communication and promotions actions
- Permanent monitoring of the external factors
- Permanent improvement of the proposal and tight connection among partners and with the ESFRI
- Clear definition of structure, procedures and KPIs
- Clear definition of *Nodes*' role, status, responsibilities and commitment
- Clear overview of link between existing facilities and foreseen RI
- Permanent and clear communication and promotions actions
- Permanent monitoring of the external factors
- Clear definition of structure, procedures and KPIs
- Permanent monitoring of KPIs and scientific outcome.

11.3 What are the main schedule uncertainties?
(maximum 1000 characters with spacing)

11.4 Please identify the main technological and construction/operation-related challenges and how the RI will tackle them. (maximum 2000 characters with spacing)

All the information is presented in the Risk Registry following:

Risks

Type	**Identified risk**	**Actions to be followed**	**Phase of the project**	**Likelihood**	**Impact**	**Address by**/with
Legal and political						
	Unclear definition of national source of funding of the partners	Permanent monitoring of the funding sources. Bilateral engagement with partners	Preparatory	Medium	High	PP management team
	Ineffective cooperation between governments	Permanent and clear communication and promotions actions	Preparatory	Medium	High	PP management team
	Excessive influence of the government leading the project	Clear distribution of coordinating roles among partners	Preparatory	Medium	High	PP management team
	Support from *Nodes*' local government	Permanent and clear communication and promotions actions	Operational/ Preparatory	High	Medium	ERIC Statutes
	Poor connection with local realities, absence of effectiveness	Permanent monitoring of the external factors	Operational	Low	Medium	SOPs
	Lack of funding before Preparatory Phase funding	Permanent monitoring of the funding sources	Preparatory	High	High	PP management team

	is secured.					
	Insufficient funding for preparation of bid to ESFRI Roadmap	Close collaboration with local funding agencies	Preparatory	High	High	PP management team
	Failure to achieve Preparatory Phase funding	Permanent monitoring of the funding sources	Preparatory	Low	High	PP management team
	Lack of support from “key” countries with political and financial influence.	Permanent and clear communication and promotions actions	Preparatory	Medium	High	PP management team
	Political instability in Danube/Black Sea region- Complicated international relations in the region	Permanent monitoring of the external factors	Operational	Medium	High	Statutes/SOPs
	ESFRI does not provide enough information for the application.	Continuing improvement of the proposal and tight connection among partners and with the ESFRI	Preparatory	Medium	High	PP management team
	No interest from the participation governments	Permanent and clear communication and promotions actions. Bilateral discussions with partners.	Preparatory	Low	High	PP management team
	Political changes/risk of losing political support for the project in the long run.	Permanent monitoring of the external factors	Operational	Medium	High	Statutes/SOPs

Organizational						
	Failure to get onto ESFRI Roadmap.	Continuing improvement of the proposal and tight connection among partners and with the ESFRI	Preparatory	Medium	High	PP management team
	Not effective coordination and collaboration between *Hub* and *Nodes*	Clear definition of structure, procedures and KPIs	Operational	Medium	Medium	ERIC management. Statutes/SOPs
	Nodes Official statutes acceptance	Clear definition of *Nodes'* role, status, responsibilities and commitment	Operational	Low	Medium	Statutes/SOPs
	Misestimating of *Nodes* equipment structure and cost	Clear overview of link between existing facilities and foreseen RI	Preparatory/ Operational	Low	High	PP management team/Statutes
	Not full use of existing facilities and higher costs to recreate new ones	Clear overview of link between existing facilities and foreseen RI	Preparatory/ Operational	Low	High	PP management team/Statutes
	Confusion over role and selection of *Nodes*	Clear definition of *Nodes'* role, status, responsibilities and commitment Clear criteria defining *Nodes*' assessment and accessibility to DANUBIUS-RI	Operational	Low	Medium	Statutes/SOPs
	Commitment of partners and their fulfillment	Clear definition of structure, procedures and KPIs	Operational	Medium	High	Statutes/SOPs

	Missing leadership	Clear definition of structure, procedures and KPIs	Operational	Low	Medium	General Assembly, Statutes/SOPs
	Lack of support for DANUBIUS-RI ERIC Management	Permanent and clear communication and promotions actions	Operational	Low	Low	Statutes/SOPs
	Failure to get funding commitments from national funding bodies.	Permanent and clear communication and promotions actions. Bilateral discussions with member countries	Operational	Low	Medium	General Assembly. ERIC Statutes/SOPs
	Unclear definition of data policy	Clear definition of structure, procedures and KPIs	Operational	Low	Medium	General Assembly. Statutes/SOPs
	Lack of clear data strategy and associated e-infrastructure	Clear definition of structure, procedures and KPIs	Operational	Medium	High	General Assembly. Statutes/SOPs
	Risks from a complicated organizational structure aiming to accommodate different interests	Clear definition of structure, procedures and KPIs	Operational	Medium	Medium	Statutes/SOPs
	Long process for the establishment of the RI and associated instabilities	Permanent monitoring of the external factors	Operational	Medium	High	Statutes/SOPs
	High/Competitive remuneration packages for	Clear definition of structure,	Operational	Medium	High	General Assembly.

	the recruitment of skilled personnel in order to work in a remote area.	procedures and KPIs				Statutes/SOPs
Scientific						
	Insufficient level science produced using DANUBIUS-RI	Permanent monitoring of KPIs and scientific outcome	Operational	Low	Medium	Statutes/SOPs
	Too broad scope of the RI	Permanent monitoring of KPIs and scientific outcome; Breakdown and fine tuning of the main objectives	Preparatory/Operational	Medium	Medium	Statutes/SOPs/PP management team
	Duplication of services between *Nodes*	Clear definition of *Nodes'* role, status, responsibilities and commitment	Operational	Medium	High	Statutes/SOPs
	Clash of interest with other relevant projects in the region	Permanent monitoring of the external factors	Operational	Low	Medium	Statutes/SOPs
	No interest from the researchers	Permanent and clear communication and promotions actions	Operational	Low	Medium	Statutes/SOPs