WORK PACKAGE # 3
THE STRUCTURE AND THE MANAGEMENT OF DANUBIUS-RI CENTRE - *DANUBIUS-RI DEVELOPMENT PLAN ON A 2018 PERSPECTIVE*

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3.1 Introduction

The development plan with a 2018 horizon has been created to serve as an aid to the decision making process, guiding the strategic planning for the establishment and operation of the future DANUBIUS-RI taking into consideration the priorities and requirements of the scientific community, the international context, and society challenges. The main stakeholders involved in the decision making process for future development of DANUBIUS-RI are various governmental authorities (notably, funding agency officials) from Romania and other participating Member States, practitioners, business community, and members of the scientific community.

This plan was elaborated jointly by scientists and consultants, under the aegis of the officials from the Romanian Ministry of National Education – Direction of Scientific Research, with well-defined contexts, goals, and outcomes. It involved extensive "bottom-up" consultations with scientific community, business sector representatives, as well as governmental authorities.

DANUBIUS-RI development plan will have the following roles:

- to support and guide the further preparation of the administrative, legal, technical and financial issues for the establishment and operation of the future DANUBIUS-RI;
- to timely guide the development process, by presenting a coherent vision and plan;
- to bring DANUBIUS-RI to a certain technical, organizational and financial maturity in the 2018 horizon;
- to present the links (relations) with other European RI/programmes/initiatives (*Nodes*, potential collaborators, initiatives, data providers, etc.);
- to present the actions to be carried out for promotion of the centre and to give the centre visibility.

The strategic objective is to develop DANUBIUS-RI as a pan-European *distributed open-access research infrastructure, gaining the* "ERIC (European Research Infrastructure Consortium)" legal status and be accepted on ESFRI Roadmap. In order to achieve this, throughout the development process should be avoided any confusions with a possible resemblance to an "Integrated Infrastructure Initiative" (I3).

The following parameters were considered in the 2018 development plan of DANUBIUS-RI:

- *Scientific scope* – 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 macro-system and other similar large macro-systems globally
- *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.

- *Temporal scope* – submission of an application under the 2016 ESFRI call for proposals;
- *Size of considered infrastructure* – 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.

3.2 In the light of the above, the 2018 development plan directly addresses DANUBIUS-RI proposed governance structure and legal framework, staffing, logistics, financing scheme, as well the steps to be further taken in this endeavour. DANUBIUS-RI development stages

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. DANUBIUS–RI aims to become one of the environmental RIs on the ESFRI roadmap, an infrastructure of pan-European importance that corresponds to the long term needs of European research communities in the field of integrated management of rivers-deltas/estuaries-seas, using the Danube – Black Sea system as an exemplar.

The major stages of DANUBIUS-RI development are presented in the following paragraphs.

- **DANUBIUS-RI proposal development and submission for ESFRI call** (at present):

On September 25th, 2014 the European Strategy Forum for Research Infrastructures (ESFRI) launched the third Roadmap update (2016) at a workshop in Trieste, Italy. By March 31st, 2015 ESFRI is expecting proposals for new or major upgrades of research infrastructures of pan-European interest corresponding to the long term needs of the European research communities. To be accepted on the ESFRI roadmap, DANUBIUS-RI candidate proposal will have to pass the evaluation process which assesses the scientific excellence, pan-European relevance, socio-economic impact, as well as the maturity level. According to the eligibility criteria, the candidate project must be supported by at least three different Member States / Associated Countries, and at least one of them should engage in a formal financial commitment. As part of the same process, will be carried out an in-depth analysis of the European Research Infrastructure landscapes and the candidate project relevance in the European and international scientific research arena.

In the light of this new timeline, a financial assistance gap has been identified between the end of the current research project (expected finalisation deadline October 30th, 2014) and the ESFRI call for proposals deadline.

Before proceeding with the construction of DANUBIUS-RI, various decisions need to be taken with respect to issues such as the identification of funders, the financial plan for sustainability, the governance by involved stakeholders, the site and legal form of the managing organization, the service policies. The financial aid should support all these activities, helping to finalize the setup of an adequate governance and management structure, the development of a good quality proposal, securing financial commitment and broadening DANUBIUS-RI membership. This way, the challenges with the candidate proposal submission can be addressed appropriately. During this phase and the next one, legal agreements (governance, financing) are being prepared and must be finalized with the signature of the Memorandum of Understanding.

- **Preparatory phase** (after acceptance on the ESFRI Roadmap)

Once accepted on the ESFRI roadmap, the project goes to the next stage. 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.

A dedicated Horizon 2020 call will be made available for DANUBIUS-RI after acceptance on the 2016 ESFRI roadmap. Additional financing will be available under the umbrella of the European Structural and Investment Funds 2014 - 2020.

During this phase an application will be prepared and submitted for ERIC status.

- **Construction phase**

Prior to this stage, the project initiator will contract the services for the development of the Feasibility study, the Technical project and the Execution details.

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

- Phase 0 (2014-2015)), when is expected that the first building is finalized (facilities for field research activities, for administration, conference hall, as well as utilities);
- 1st phase (2016 – 2017) involves the development of most of the planned constructions (about 75%) and some of the specialized scientific equipment.

The 1st phase consists of the construction of the initial support infrastructure – "the field station" with

- supplying laboratory
- accommodation and storage facilities
- office equipment.

Also required at this stage will be the development of connections with existing national and international research infrastructures and facilities engaged in studies on river-delta-sea macrosystems.

At the conclusion of this phase, the *Hub* will already offer a modern pan-European facility for complex field research on the Danube River - Danube Delta – Black Sea system.

This phase foresees the construction of ~75 % of the total buildings planned. These are:

a. Buildings for field research activities on the river – delta – sea system:
   - laboratories for the primary processing of samples collected in the field;
   - laboratories for sample analyses that have to be carried out immediately or for analyses of samples that cannot be transported to other laboratories without deterioration;
   - storage facilities for geological and biological samples;
   - facility for long-term samples storage – a "lithotheque";
   - workshops for constructing and repairing field equipment, and
   - space for field equipment storage.

b. Administrative building of the *Hub* and office building for scientists

c. Building with meeting/lecture rooms, conference halls, library, IT Centre (e.g. cloud computing centre), etc.;

d. Buildings for the accommodation of

- scientists,
- technical staff
- administrative staff,
- students and
- visitors.

Other major steps foreseen to be taken in the 1st Phase of construction include:

- supplying the *Hub* with field equipment for sampling and in situ observations, including automated equipment and equipment for long-term deployment in water.
- supplying and installing scientific equipment in the laboratories for primary sample processing and immediate analyses.
- equipping the administrative and office buildings and buildings for meetings, computing centre and accommodation;
- providing the technical and logistical facilities of the *Hub* at the newest standards of green management strategies:
- water supply,
- energy supply,
- waste water treatment;
- pier facilities for research vessels and boats of the *Hub*.

The construction phase already begun with the first construction for which all the legal establishments has been finalized:

- 2nd phase (2018 – 2019), involves supplying, installing and testing advanced, specialized scientific equipment;

The detailed list of specialised high-tech laboratories, physical modelling facility, micro-/mesocosms, as well as specialized equipment for these laboratories will result from the ESFRI Preparatory Phase Project comprised in fesability study

- 3rd phase (2019 – 2020) marked by the continuation of development of infrastructure facilities, covering also floating facilities, research vessels and other specialised equipments for rivers, transitional environments and seas.
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The design and construction of the first pillar of DANUBIUS –RI *Hub* corresponding to phase 0, fulfil, the specific regulations dictated by the location specificity, according to the queries of Danube Delta Biosphere Reservation and to the compulsory design parameters of the urbanism: maxium POT 15% since overall surface is 10 Ha and maximum CUT 0.5 and maximum building high of 10m.

The project for the pillar 1, which is the basis of the current under-construction phase, involves a small scale research building with a fingerprint of 648 sqm and a total surface of 914 sqm, developed as a structure with basement and ground floor. This consists in research area (two laboratories, devoted to sampling, primary biological, biochemical and chemical analysis and sample treatment for life sciences), conference area and researchers' accommodation area. The construction is built up in order to fulfil the ecosystem request and to produce a minimum C footprint.

This pillar is functioning completely autonomous with alternative energy (solar and geothermal energy), the building being constructed on the principle of eco-exchange.

Few studies on architectural solutions were performed in order to have an initial idea on the potential evolution of the 2nd phase of the construction of DANUBIUS-RI *Hub* were performed, and the potential choices are:

- Building developed as a part of the natural landscape, a tile construction included in the landscape.
- Modular buildings spread on the area and bounded by common tress-passages
- Central iconic building
- Linear building respecting lake shore

The 2nd pillar, corresponding to the 1st and the 2nd phases of construction, will represent a large area comprising main buildings devoted to core laboratories and storage, logistical field support (highly important considering the fact that the *Hub* function is even to ensure the gateway toward the unique natural laboratory of Europe, Danube Delta), mesocosm facilities, experimental facilities with highly specialized laboratories for earth, environmental and life sciences (including top-technology laboratory devices for geological, geochemical, biological, biochemical, eco-toxicological, metabolomics and genomics analysis) hosting testbed for new models, reed beds, innovative sensor technologies and for operationalising new technologies etc

Funding for Phase 0 will be 100% from National sources, while Phases 1, 2 and 3 will be from Structural Funds and requested national contribution.

All these main ideas will be the basis for the feasibility study and will support modifications according to the feasibility study progress.

The education strategy/program and its specific infrastructure will be developed by networking with universities, R&D units, other ESFRI and ongoing regional projects, other bodies that will take part in the DANUBIUS-RI

- **Go live! phase – ERIC development**

  The establishment of the ERIC will mark the formal start of DANUBIUS-RI and a transition from Romanian leadership to a new governance structure based on a General Assembly making decisions and a Director General heading the leadership and management.

- **DANUBIUS-RI operational phase**

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.danubiu-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 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.

- **Decommissioning phase**

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.

3.3 DANUBIUS-RI's governance structure

Proposal development and submission for ESFRI call

The proposal development is being led by Romania with an Executive comprising three Project Coordinators and the chair of an International Initiative Committee (IIC) which comprises representatives of participating laboratories and other organisations and advises the Executive on all matters regarding the development of DANUBIUS-RI and its submission to the ESFRI Roadmap.

Preparatory phase (after acceptance on the ESFRI Roadmap)

The preparatory phase will be led by Romania through a Project Coordinator. An Interim Council will be established with representatives of participating countries and organisations. A number of Work Packages will be established, each led by an appropriate individual from Romania or another participating country.
During the construction phase the management of the facility will be led by Romanian project coordinators with international support for further development to ERIC stage. In the preparation process, Romania, as DANUBIUS-RI initiator and the other Member States, as DANUBIUS–RI' supporters, should concentrate their contributions for the development of the DANUBIUS–RI as a pan-European distributed RI, rather than an Integrated Infrastructure Initiative (I3), as this would mean the automatic rejection in the call for ESFRI roadmap.
The efforts should be more focused on obtaining the support of various funding agencies at national and international level, as obtaining the financing for a large RI is a real challenge in the current socio-economic context;

Operational phase

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.

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. 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.

The *Hub* will also include the facilities to interconnect with the existing ESFRI projects (e.g. Tower for ICOS ?)

Nodes will be scientific and data-providing Centres of Excellence, and interfaces with regional stakeholders. They will provide facilities and services, and 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.

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.

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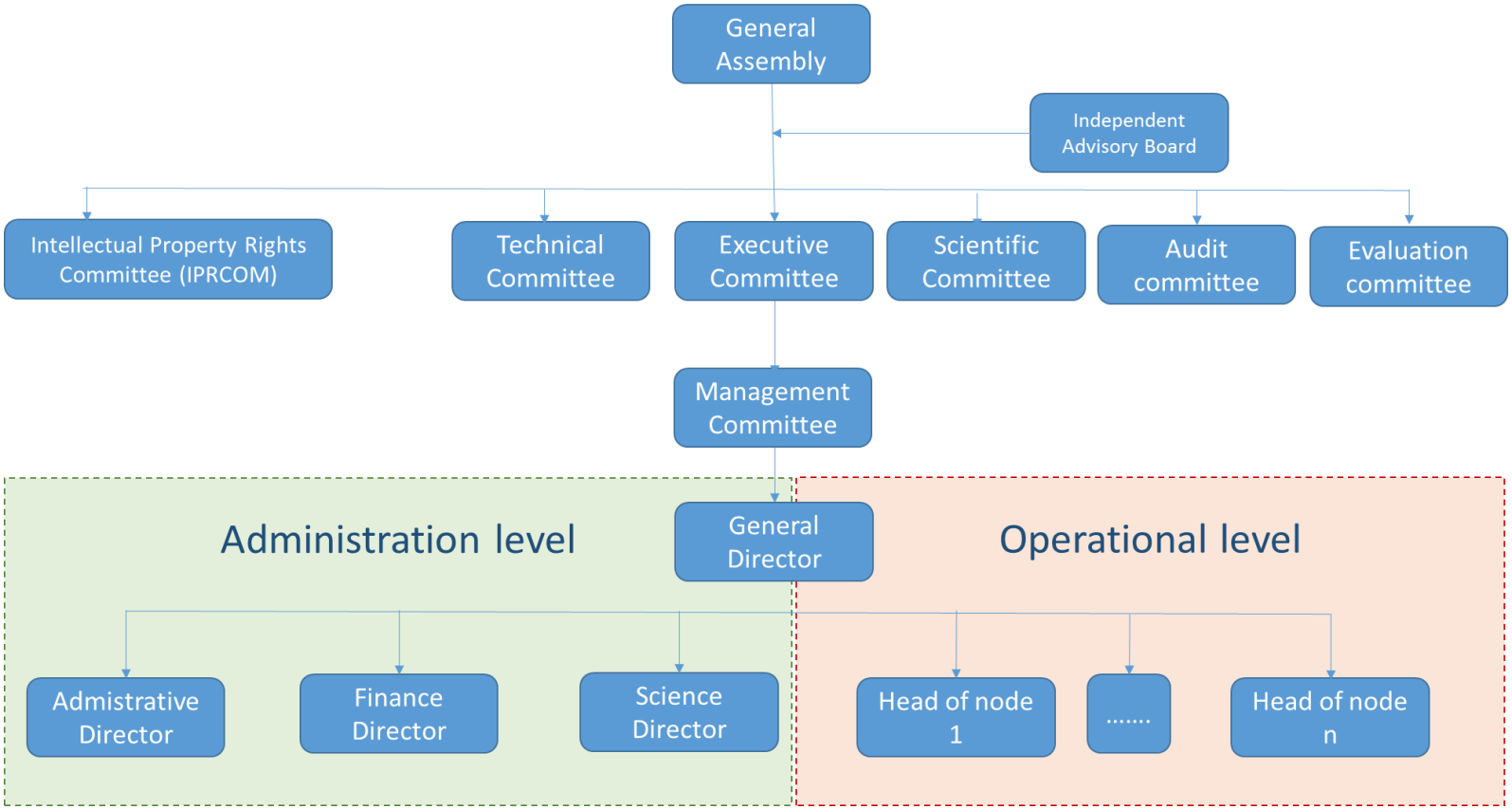
General Assembly
Independent Advisory Board
Intellectual Property Rights Committee (IPRCOM)
Technical Committee
Executive Committee
Scientific Committee
Audit committee
Evaluation committee
Management Committee
Administration level
General Director
Operational level
Admistrative Director
Finance Director
Science Director
Head of node 1
.....
Head of node n

The General Assembly (GA), formed by representatives of each party signatories of the MoU in a manner ensuring the representativeness of all DANUBIUS –RI members, representatives of funding agencies from each DANUBIUS-RI member, representatives of Romanian National Research Agency and Local Authorities: ARBDD and local region/county and the representatives of the leading laboratories of the *Nodes*

Considering the query for ESFRI to evolve from a strategic role as an incubator of RIs to include an evaluation function, with a mandate to implement the excellence through international peer review, the members of Independent Advisory Board will be elected by GA, which will vote from proposals performed by DANUBIUS-RI members. The proposals for IAB members will be based on the scientific quality criteria (documented/traceable highly ranked publications, h-index higher than 20; recognized innovation activity; proved research leading capabilities etc.)., considering one representative for each of the main scientific domains which are included on DANUBIUS-RI; the proposals will be oriented toward scientific excellence on the field, being chosen international scientific personalities.

The IAB role is to draw the DANUBIUS-RI scientific strategy in order to provide to DANUBIUS-RI the support to play as pan-European pole of scientific excellence. The IAB members will be accepted by the GA but the IAB activity will be independent of any party constraints.

In the upcoming stages, the management and administration team will be empowered with a complete set of Standard Operating Procedures (SOPs), as part of their Statutes, and will manage all the operations. At this stage we highly recommend the inclusion of at least the following ones:

- procedures/rules for the establishment/development of the *Hub*;
- working procedures (day to day management of the facility);
- procedures/rules for decision making within all structures;
- procedures/rules for the operation of the *Hub*;
- collaboration rules – for the *Nodes*, initiatives, data providers, clients, collaborators;
- access rules for users (researchers, students, institutions, economic partners).

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.

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.

Nodes

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. *Nodes* will also play a major role to improve the technological transfer and innovation. 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.

3.4 DANUBIUS-RI's financial scheme

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.

Each of the participating bodies has to monitor and attempt to access financing during all stages, covering both national and international funding opportunities.

Special attention needs to be given to periods of financing gaps between main stages of the project development, when financing should be also accessed in order to sustain the preparedness and development of the next steps. Close collaboration with national funding agencies that signed the MoUs is required in order to cover the potential identified gaps. We recommend yearly search, identification and application for national financing for DANUBIUS partners.

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.

Inside the financial schema are included the foreseen expenses interconnect with the existing ESFRI projects (Tower for ICOS?)

Budgeting

Both during Preparatory phase and Operational phase the budget shall be established and implemented and the accounts presented in compliance with the principle of transparency.

The table below presents a breakdown of the sources of financing by project development stages, which might prove to be a better tool in the monitoring process:

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 2017-2019	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 BREAKDOWN STRUCTURE

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

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.

Users and access policy

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.

Strategic importance for investment

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.

DANUBIUS RI is bringing into the European landscape a set of strengths that, based on the opportunities created by ESFRI, will be turned into advantages and assets at European level.

1. DANUBIUS-RI will be one of the most important large scale infrastructure on river –delta –sea systems; Comparable only to non-European similar initiatives as Mississippi and Mekong deltas; The need for an European one becomes stringent as DANUBIUS-RI will also take advantage of the singularity and unicity of Danube Delta

2. DANUBIUS-RI will be the major pan-European distributed RI filling the existing gaps in the research of the fresh water systems and river-sea interaction zones; **The opportunity to be a part of the European network of living labs**;

3. DANUBIUS-RI *Hub* will be based in Murighiol and will provide easy access to the natural laboratory of the Danube River – Danube Delta – Black Sea system for in-situ observations;

4. DANUBIUS proposes a scientific integrative approach to specific problems pertaining to river – delta – sea systems;

5. Unique and trans-disciplinary platform integrating the existing knowledge of disciplines like earth, environment, life and socio -economic sciences; Existence of a fragmentation within the pan European research infrastructures network, initiatives and programmes in the area of water cycle management, in terms of aimed objectives, interests, research agendas, research priorities, which will require more intensive activities in order to establish and adhere to a common scientific agenda;
6. DANUBIUS will cover the existing gap between the fresh and marine water scientific communities at European level and enhance collaboration at international level

7. Multidisciplinary scientific agenda of the RI (system characterization, environmental change, adaptive and sustainable management) that ensures its unique character among the existing RIs; DANUBIUS-RI brings together themes and research directions unique at European level; **There is a real need in the EU research community to address the major global scientific challenges in the area of integrated management of river-delta/estuary-sea systems**

8. DANUBIUS-RI *Hub* will provide research facilities (laboratories, storage, accommodation) in the proximity of the natural laboratory for sensitive sample analyses; It should be also mentioned the existence of Constanta and Tulcea airports in the vicinity of the DANUBIUS-RI *Hub*

Location and the proximity of research facilities to the research subjects brings the unicity in European level; connected to the *Nodes* that will be distributed and complementary, DANUBIUS-RI
9. DANUBIUS-RI *Hub* will be easily accessed by road and by Danube river;

10. DANUBIUS-RI is considered by the Romanian Government - Ministry of National Education as a major project to be financed by public funds during 2014 – 2020, under the European Structural and Investment Funds 2014 – 2020 (ESIF) for Romania; As EU Member States, Romania and its affiliated partners can access various sources of financing available at EU level, which address the thematic objective of the strategy Europe 2020 – consolidation of the research, development and innovation, as well as the objectives of the European Strategy of the Danube Region (EUSDR); Existence at the EU level, within the EUSDR, of three others research infrastructures (DREAM, DANUBE FUTURE, DRRIF), which can become future collaborators of DANUBIUS-RI *Hub* (flagship projects under EUSDR); Lack of a competing initiative covering DANUBIUS-RI scientific agenda among the "Danube riparian countries;

11. DANUBIUS-RI is one of the Flagship Projects of the European Union Strategy for the Danube Region (within PA7 “Knowledge Society of the EU Strategy for the Danube Region (October 2nd, 2013); EUSDR increases the opportunities for accessing the funding for DANUBIUS as a Flagship Project within PA7 “Knowledge Society”

12. The organizations supporting DANUBIUS RI IIC have relevant experience, great capabilities (managerial, human resources, scientific), being involved in various initiatives in the field of river – delta – marine system at national and international level;

13. DANUBIUS-RI has reached a certain level of maturity (identification of potential collaborators, development of the White book, Bluebook, organization of working groups with representatives of relevant pan European research institutions, EoI support letters from pan European and international research organizations, planning the future steps);

14. The capacity of the DANUBIUS-RI *Hub*, as open access infrastructure, to generate tailored types of collaborations with other pan European research infrastructures / programmes/ initiatives (supply/ usage of data, service provider, networking); **The opportunity of being accepted on the future ESFRI roadmap brings more attractiveness to the *Hub* and its future perspectives;**

15. DANUBIUS-RI *Hub* will facilitate and promote an education platform and a knowledge sharing forum for scientists and students;

16. The Danube river is the most "international" river of the world, with a catchment covering 19 countries; Declared support from the international bodies (UNESCO – IHE, ICGEB) for the future development of the DANUBIUS-RI *Hub*.

17. DANUBIUS-RI *Hub* will generate spill-over effects to the local community (new business opportunities for private investments, new jobs creation, skils development, education and training platform, environmental protection);
DANUBIUS-RI *Hub* construction and development will highly contribute to the development of the Danube region, by providing solutions to a series of major societal challenges (i.e. environmental protection), as well as by its spill-over effects in the long term; DANUBIUS-RI will provide support for education for the Black Sea Universities Network - a network of more than 100 higher education institutions from the Black Sea Region (Turkey, Georgia, Armenia, Azerbaijan, Ukraine, Moldova, Romania, Bulgaria, Greece, Albania, Serbia(.

18. DANUBIUS-RI *Hub* will generate research outputs transferable to other large river-delta-sea systems; **There is also to be mention that the transferable outputs are complete as long as DANUBIUS RI is dealing wil RDS system permanently**.

19. DANUBIUS-RI *Hub* will offer legislative support for environmental protection (laws, regulations and norms). **The support will be scalable at European level and endorsed by similar international initiatives outputs**.

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.

  Infrastructure development at local (Tulcea county) and national level in terms of social infrastructure (accommodation, health education), utilities (roads, airports, water supply, power supply, data connection) and social services.The social impact of DANUBIUS RI will be both in development phase and in operational phase, involving and developing resources locally and at national level, as much for the *Hub* as for the future *NODES*. The economic and social impact of DANUBIUS-RI will be accounted into specific KPIs for regional development:

  - No. of supporting (new and existing) SMEs in development/operational phase
  - No. of indirect supported SMEs in development/operational phase
  - No. of new jobs created in the region and at national level from horizontal and vertical integration
  - No. of new educational structures created (or accounted as no. of students in the specific new created facilities)
  - No. of new accommodation facilities
  - No. of modernised existing facilities
  - Roads created/modernised
  - Health facilities created in the area or regional

The *Hub* and the *Nodes* of DANUBIUS-RI should concentrate on both research excellence and service provision (research supplier), to attain the long term sustainability

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

3.5 DANUBIUS-RI's legal framework

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.

DANUBIUS-RI will include a *Hub* located in Murighiol, and will be responsible for the efficient coordinated operations of several *Nodes*, parts of the distributed facilities, and which may be either within the ERIC or outside the ERIC with their own legal personality.

For a pan-European distributed research infrastructure 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 at the *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 general director 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. 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.

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;

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)

DANUBIUS-RI will meet the following ERIC requirements:

- will support European scientific research programmes and projects;
- 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;
- will provide effective access to researchers from Member States and from associated countries;
- will bring its contributions to the mobility of knowledge and of researchers within the ERA and will increase the use of intellectual potential throughout Europe;
- will contribute to the dissemination of the results of scientific research activities within the community research.

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.

3.6 DANUBIUS-RI's "outside world"

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, programs and initiatives related to DANUBIUS-RI at European and global levels.

An integrative approach to specific issues and aspects related to the river-delta-sea systems is more and more needed, even if many research organizations active in the fields of river, estuarine, delta and marine sciences perform multi-disciplinary projects on this subject at European level. This is needed because ecosystems at the land-water interface represent biodiversity hotspots providing essential ecosystem services and are (yet) characterized by extremely dynamic processes. Also, the impact of the human population actions on these systems is important, they exerting a significant and growing pressure on the functionality of these (vulnerable) natural systems. All these factors should be considered integral parts of the ecosystem, being very important to identify and then promote initiatives for ensuring the (regional) sustainability, environmental protection and socio-economic development in an optimal way.

The initiative will answer mainly at the requirements of 2 important strategies in Europe for next period, with respect to environment, climate change and biodiversity, using the Danube – Danube Delta – Black Sea system as a model:

- the Europe 2020 strategy, and
- the European Union Strategy for the Danube Region.

The strategy with a major role in promotion of DANUBIUS–RI is the European Union Strategy for the Danube Region, elaborated by the European Commission in 2010 and assumed by April 2011, based on the contributions of the riparian states, and it was created taking into consideration some socio-economic and geo-politic arguments, since the Danube Region comprises 1/5 of the EU territory. This strategy is a community tool for macro-regional cooperation within the European Union, where are invited to participate the 14 EU Member States and third countries in the Danube Basin. The international *Hub* answers to one of the major action according with the Action Plan of the Strategy – Development of an international *Hub* for advanced studies for Danube Region.

In October 2013, DANUBIUS–RI has obtained the status of Flagship Project in the European Union Strategy for the Danube Region.

Also, the project is considered by the Romanian Government / Ministry of National Education as a Major Project to be co-financed by public funds during the next planning period, 2014 – 2020, through Structural and Investment Funds for Romania.

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.
- 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 outside world of DANUBIUS-RI will consist of:

- Stakeholders related to contributing states and agencies from members and observers states
- European commission as reporting body
- Scientific and research community
- Business community
- Other ESFRI projects;
- Other major RIs at global level.

Stakeholders

A stakeholder commitment shall be expressed both in terms of requirements and sustainability. Key role in defining the strategic planning of the DANUBIUS-RI will be the expectation and the requirements, formalized or identified of the stakeholders. Therefore, both in preparatory phase as in the development phase the need of identifying the requirements will be a must for the coordinating teams.

Types of commitment:

- Stakeholders' commitment should be expressed in terms both of requirements (i.e. lacking information, lacking facilities, need of structured scientific support) to fulfil their mission and offers (what are already available facilities, data, knowledge, even from a sectorial point of view they can share).
- Commitment (in writing) for direct annual (periodical) funding (*Hub, Nodes* local governments)

- MoUs and LoIs for collaboration in projects, or provision of services with selected Private Sector Entities or international organizations.
- MoU for long term provision of lab facilities (including personnel), provision, deployment and maintenance of scientific instrumentation (Scientific community, Research organizations, Academic departments in all partners)
- Permanent updates of the research and development facilities within the *Hub* and *Nodes*
- Permanent monitoring of the outside world in terms of suitable funding, partners, research needs and other opportunities.

The commitment will have to address also by the phases of the project – construction and/or operation and has to cover the needs and costs as identified in financial chapter. There is also mandatory that the commitment shall also include besides infrastructure, scientific knowledge and capabilities, also financial contribution according to the phase of the project and the declared involvement as long as financing gaps are identified and a core team for project continuity shall be involved.

Addressing national and international authorities as stakeholders, DANUBIUS-RI will actively cooperate with the national and international organizations which are charged with the environmental and sustainable management of specific elements of the RDS, using as case study the Danube River – Danube Delta – Black Sea system, by jointly establishing plans to solve some of its major challenges (ecosystem functions preservation and restoration, system resilience etc)

Addressing local communities as stakeholders. DANUBIUS-RI will cooperate with local communities on specific problems, according to the regional development plans and potential issues to be solved advising on potential solution and providing data to support socio-economic sustainable development paying a special attention to durable development of agriculture, fisheries and green technologies, increasing to public awareness for rational and sustainable use of natural resources.

European Commission

The ERIC shall submit an annual activity report, containing all relevant scientific, operational and financial indicators of activities.

All relevant KPIs will be reported and by exception any financial or other malfunction.

Scientific and research community

Addressing science, research and education stakeholders, as a top Research, Education and Innovation Infrastructure for natural and socio-economic sciences, DANUBIUS-RI will enhance knowledge transfer in this area by working closely with the existing Research and Education organizations. DANUBIUS-RI will support cutting-edge research, by peer-reviewed

open service: level playing field for EU scientists. DANUBIUS-RI will act as an international agency, by attracting and supporting world-class researchers and will support the research-community in targeting the extensive improvement of quality

DANUBIUS-RI will comprise pan-European institutions and Universities highly fitting with the scientific purposes in order to benefit from expertise already available. It will cooperate with other research teams to tackle significant problems across these large river-delta-sea systems such as reduction of biodiversity, identifying "environmentally friendly" solutions for economic development, and matching limited resources with increasing population.

It may include ministries of research and education, funding agencies of research, Academies of sciences, academies through institutes and universities.

Other potential beneficiaries in the public sector, besides education & research include: regulators, ministries of the environment, water agencies, ministries of transport, ministries of regional development, emergency intervention inspectorates, and ministries of health, the EC through relevant directorates (research, environment, sea, and transport).

Top scientists will be invited to form core teams to work on the research programs of DANUBIUS-RI. Their presence will attract young scientists as well as under-graduate and graduate students wishing to gain experience in these attractive and challenging areas. Field samples necessary for these studies will be taken, preserved and analyzed in-house or in laboratories of other research organizations (*Nodes* or Satellites of *Nodes*).

The education platform offered by DANUBIUS-RI will provide significant added value by creating a forum for knowledge exchange among scientists and between scientists and students. In so doing, the forum will promote cooperative projects, particularly between teams from eastern and western Europe. Intensive courses, summer schools, conferences and seminars will be invaluable mechanisms of knowledge dissemination. Moreover, DANUBIUS-RI will raise awareness of the value of the natural environment and its role in human well-being through ecological tours and talks designed for local communities, teachers or tourists.

DANUBIUS-RI will build upon the projects completed to-date (national or international,, development funds etc). It will further initiate and participate in projects within international frameworks by cooperating with other major research organisations well-recognized in their fields. Relevant research institutes and major organisations in charge with studying and monitoring the River –Deltas –Seas macrosystem will be attracted.

Economic community

Potential private sector beneficiaries include: innovation companies, companies that deal with technological development, IT&C, instrumentation, utilities, industrial clusters).

Other ESFRI projects

The relevant ESFRI projects and the type of connection from the "outside world perspective are listed in the other chapters of this report, as well as in the White Book of DANUBIUS-RI.

Others

Other relevant stakeholders can be the local communities and local administration, environmental NGOs, River Basin commissions, Regional seas commissions, United Nations and other international organizations.

DANUBIUS-RI will cooperate with local communities on specific problems, according to the regional development plans and potential issues to be solved advising on potential solution and providing data to support socio-economic sustainable development

The *Hub* will build upon the projects completed to-date (national or international/mainly FPs). It will further initiate and participate in projects within international frameworks by cooperating with other major research organisations well-recognized in their fields. Relevant Romanian research institutes and major organisations in charge with studying and monitoring the Danube River – Danube Delta – Black Sea macrosystem will be attracted.

Also, the *Hub* will actively cooperate with the national and international organizations which are charged with the environmental and sustainable management of specific elements of the Danube River – Danube Delta – Black Sea, by jointly establishing plans to solve some of the major challenges within the Danube – Black Sea macrosystem.

- The Danube River Basin

The Danube Black Sea Task Force (DABLAS) was set up in 2001 to provide a platform for cooperation to ensure the protection of water and water-related ecosystems in the Danube River and in the Black Sea. Its primary goal was to develop financing mechanisms for the implementation of investment projects for pollution reduction and the rehabilitation of ecosystems.

- The Black Sea

The Black Sea riparian countries (Bulgaria, Georgia, Romania, the Russian Federation, Turkey and the Ukraine) signed in 1992 and ratified in 1994 the Convention on the Protection of the Black Sea against Pollution (Bucharest Convention). To implement the Convention, its three Protocols (on the control of land-based sources of pollution, on waste dumping and on joint action in the case of accidents such as oil spills) and the Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea (1996, updated in 2002 and 2009), the Commission on the Protection of the Black Sea Against Pollution (the Black Sea Commission or BSC) with its Permanent Secretariat was established in 2004 as an intergovernmental body of coordination.

- The Danube Delta Biosphere Reserve:

When the Danube Delta Biosphere Reserve (DDBR) was established in 1990, the Danube Delta Biosphere Reserve Authority (DDBRA), a public institution under the coordination of the

Romanian Ministry of Environment, was created. It is an organization charged with the following responsibilities:

- Conservation and protection of the natural heritage of national interest in the Danube Delta Biosphere Reserve;
- Encouragement of sustainable use of the natural resources; and
- Provision of support, based on the results of research, for management, education, training and services.

3.7 DANUBIUS-RI' scientific agenda

DANUBIUS-RI will have a clear mission to achieve scientific excellence in supporting research in the water cycle, respectively management of integrated systems river-delta/estuary-sea, supported by the scientific commitment of its distributed facilities .

In seeking to advance the integrated management of river-delta/estuary-sea systems a number of major global scientific challenges are part of DANUBIUS-RI agenda:

- Understanding the genesis and natural evolution of large River-Delta/Estuary-Sea systems
- Quantifying the impact of anthropogenic changes on large River- Delta/Estuary -Sea systems
- Determining the vulnerability and/or resilience of large River- Delta/Estuary -Sea systems under a changing climate
- Characterizing biogeochemical cycles in large River- Delta/Estuary -Sea systems
- identifying emerging pollutants and pathogens and understanding their input pathways and fate in large River – Delta/Estuary - Sea systems as well as their related adverse effects or associated risks
- Advancing integrated management of catastrophic floods/ droughts or hazardous materials in large River- Delta/Estuary -Sea systems
- 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 the biodiversity in large River-Delta/Estuary -Sea systems
- Enhancing and protecting the ecosystem services provided by large River- Delta/Estuary -Sea systems

- Developing management solutions for existing and future framework policies, as well as for their harmonization (for example the WFD, MSFD)
- Providing scientific expertise to develop, improve and test tools to advance policy and guidelines for environmental protection.

The research community have the following expectations of DANUBIUS-RI :

- Access to unique natural laboratory and facilities for hydrological, biology, ecology, sedimentology, geo- and hydrochemistry research
- Access to broad range of expertise
- Apply own research in broader infrastructure or ecosystem level
- Coordinating monitoring, QA, protocols
- Opportunities for working in multidisciplinary team
- Provide sustainable means to bridge gap between marine and freshwater environments
- Face challenges in Danube river – Black Sea – Danube delta area in a way that may establish best practice for other river-seas systems worldwide
- Use 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 part)
- Common analytical and modelling tools
- Development and uptake of new technologies
- Development of innovative business opportunities
- Gateway to stakeholders
- Optimising conservation and restoration strategies
- Defragment research.

3.8 Assumptions and risks regarding the implementation of DANUBIUS-RI

Based on the guidelines drawn in the project proposal and White Book, developed as well in the Preparatory Phase, the construction phase shall start with a re-definition of the design theme. This is the starting point of the detailed design of the *Hub* in Murighiol and shall cover both actual identified needs and also to be ready and flexible to include a mid-term development needs not yet or not fully identified at this stage.

In all circumstances, in order to avoid redundancy and to enhance the best use of existing resources use, a review of the available facilities and capabilities among partners shall be run in the phase prior to the submission of the ESFRI proposal (November 2014 – March 2015); the review should also cover the outside world that might bring the needed opportunity at a lower access cost and increase the synergies at European research community level.

The assessment process has already started by a review of the scientific themes, laboratories and facilities and equipment. Based on this, the existing and needed facilities will be identified and decisions on their provision will be taken. The result will also consist in a detailed list of equipment and scientific domains for the initial phase of the development of DANUBIUS-RI.

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

A set of *key performance indicators* will be established for the next stage of the project.

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 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
- 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.

Assessing and addressing the potential risk

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.

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 is secured.	Permanent monitoring of the funding sources	Preparatory	High	High	PP management team
	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.	Preparatory	Low	High	PP management team

		Bilateral discussions with partners.				
	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 the recruitment of skilled personnel in order to work in a remote area.	Clear definition of structure, procedures and KPIs	Operational	Medium	High	General Assembly. 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