WORK PACKAGE # 3
THE STRUCTURE AND THE MANAGEMENT OF DANUBIUS-RI CENTRE

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3.1. The main elements of the pan-European distributed research infrastructure in the area of integrated management of river-delta-sea systems both in the Danube region and in the European Union (*the hub and its nodes*)

DANUBIUS-RI will provide a world-leading RI to enable excellent interdisciplinary research in RDS systems with an anticipated high economic impact. It will provide:

- access to a range European RDS systems, facilities and expertise;
- a platform for interdisciplinary research;
- a `one-stop shop` for knowledge exchange in managing RDS systems;
- the bridge between research on freshwater and marine systems;
- factual understanding of the functioning of RDS systems;
- access to harmonised data; and
- a platform for inspiration, education and training.

There are a number of advantages of DANUBIUS-RI being a pan-European distributed RI rather than being based on a single centre, which duplicates the capability of existing RIs. The main advantages of it being a distributed RI are to engage with existing facilities and expertise across Europe and better to cover the wide geographical coverage not only of the Danube RDS system but other large European RDS systems. For these reasons DANUBIUS-RI will be structured as a single *Hub* and a number of *Nodes*.

The *Hub* of DANUBIUS-RI will be located in the Danube Delta. It will provide:

- leadership and governance;
- coordination and standardisation of activities within the distributed RI;
- communication with other RIs and major stakeholders;
- key scientific, educational and analytical capabilities;
- the gateway to the natural laboratory of Europe`s largest protected coastal wetland (the Danube Delta Nature Reserve); and
- access to the Lower Danube and the western Black Sea coast.

The *Nodes* will be distributed across Europe. They will harness existing expertise and synergies by bringing together groups of leading European laboratories to provide the facilities and services needed in a particular field. Each *Node* will comprise a lead laboratory and, in most cases, a group of satellite laboratories with related expertise of the highest quality. A *Node* might consist of a total of, say, five laboratories in different parts of Europe but, between them, providing facilities and services in a particular field of importance to DANUBIUS-RI.

The system of *Nodes* will form a geographically distributed observational infrastructure to quantify RDS system dynamics and will be used pragmatically for activities that need to be carried out a regional or local level.

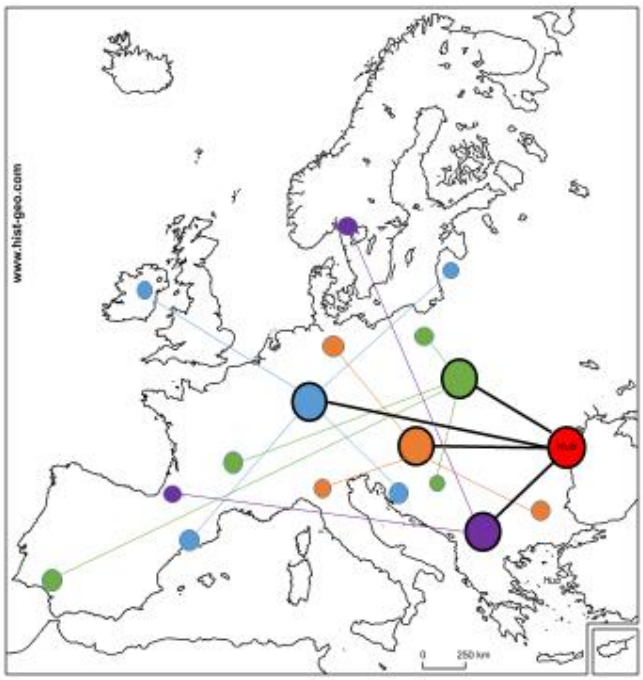


Diagram to show idealistic representation of *Hub* and *Nodes*

The above diagram shows four imaginary *Nodes* (orange, purple, blue, green). The blue *Hub*, for example, consists of the lead laboratory (large blue circle) and four satellites (small blue circles). All the lead laboratories and satellites are randomly located on the map, and have no implications for where lead laboratories and satellites will be located in practice. Only the *Hub*, shown in red, is correctly positioned. The thick lines link the lead laboratories of the *Nodes* to the *Hub*, while the thin lines link the satellites to the lead laboratories of the *Nodes*.

Nodes will provide:

- facilities and services in a particular field;
- data storage and provision;
- experimental and *in situ* measurements facilities;

- state-of-the-art analytical capabilities;
- implementation of standardised procedures at a regional scale; and
- interfaces with regional and local stakeholders, enhancing knowledge-exchange.

It is expected that there will be up to ten *Nodes*, in order to maintain a manageabe infrastructure. Each will comprise a lead laboratory and up to, say, four satellite laboratories. This will provide the opportunity for all member countries participating in DANUBIUS-RI to have laboratories within one or more *Nodes*. The Preparatory Phase of DANUBIUS-RI will draw up a definitive list of the fields initially to be covered by *Nodes*.

Towards the end of the Preparatory Phase, there will be competition for laboratories to lead each of the *Nodes* and a call for expressions of interest for laboratories to be component parts (satellites) of each *Node*. An important aspect of DANUBIUS-RI is that all laboratories within *Nodes* provide facilities and services of a high quality.

To be accepted within a Node, a laboratory will need to:

- be within a country that is a member of DANUBIUS-RI;
- meet a need for DANUBIUS-RI infrastructure;
- demonstrate that it meets a quality benchmark for the Node, or can invest to reach that level; and
- meets DANUBIUS-RI requirements for access, data etc.

The role and organisation of the *Nodes* needs to remain flexible and is likely to evolve during the course of the Preparatory Phase of DANUBIUS-RI. There may be a case for a single-sited (i.e. no satellites) *Node*, and the *Hub* might host satellites of one or more *Nodes*. Further work is needed before a decision on whether certain key components of DANUBIUS-RI, such as a data centre, might be *Nodes* or part of the *Hub*.

The integration of DANUBIUS-RI within the European Landscape of Research Infrastructures, connections within and outside the DANUBIUS-RI world and the development plan of the Hub are presented in the other chapters of this current document.

A proposal regarding the themes for the Nodes and an analysis on existing and needed excellence facilities, equipment and services to be provided within the Nodes is presented in Annex 1. Concrete plan for the component of the Nodes can be made only after having the commitment of the countries hosting the candidates to the leading and satellite laboratories / facilities.

3.2. The types of links and functionalities between the future hub of DANUBIUS-RI and the existing nodes of the pan-European research network

One of the main needs of the Danube International Centre for Advanced Studies for River-Delta-Sea – DANUBIUS-RI is to establish connections with other ESFRI infrastructures, via the Hub and the infrastructure's nodes and to strengthen its position in Europe through synergies with participants in other EU initiatives. The strategy is twofold, in a sense it is employing the expertise and know-how offered to the DANUBIUS-RI by the members of the IIC committee. In a different sense is planning to integrate various expertise and technologies linked to various other ESFRI infrastructures in the areas of Earth System and Environment, as well as of life sciences and health in a meaningful way, identifying the focus of these infrastructures and potential for becoming nodes or collaborators in the DANUBIUS-RI infrastructure.

ESFRI projects, either already functional or still under implementation are described in Table 1.

Field	**Project**	**Description**
Environmental Sciences	**EMSO**	Multidisciplinary Seafloor Observatory
	EPOS	Infrastructure for the study of tectonics and Earth surface dynamics
	EURO-ARGO	Ocean observing buoy system
	IAGOS	Climate change observation from commercial aircraft
	ICOS	Integrated carbon observation system
	LIFEWATCH	Infrastructure for research on the protection, management and sustainable use of biodiversity
	SIOS	Upgrade of the Svalbard Integrated Arctic Earth Observing System
Biological and Medical Sciences	**ANAEE**	Infrastructure for Analysis and Experimentation on Ecosystems
	BBMRI	Bio-banking and biomolecular resources research infrastructure
	EATRIS	European advanced translational research infrastructure in medicine
	ECRIN	Pan-European infrastructure for clinical trials and biotherapy
	ELIXIR	Upgrade of the European Life-science infrastructure for biological information
	EMBRC	European marine biological resource center

	EU-OPENSCREEN	European Infrastructure of Open Screening Platforms for chemical biology
	EURO-BIOIMMAGING	Research infrastructure for imaging technologies in biological and biomedical sciences
	INFRAFRONTIER	European infrastructure for phenotyping and archiving of model mammalian genomes
	INSTRUCT	Integrated Structural Biology Infrastructure
	ISBE	Infrastructure for Systems Biology – Europe
	MIRRI	Microbial Resource Research Infrastructure

Table 1. ESFRI projects – operational or under implementation

The projects presented in Table 1, are interacting intensively with existing or new research infrastructures in the area of Life and Earth sciences, with their focus on, but not limited to: Bioinformatics, Biobanking, Structural Biology, Imaging, Biological Sciences (Clinical Biology, Chemical Biology, Microbial Biology, Marine Biology, Structural Biology), Marine Sciences, Biodiversity, Arctic Sciences, Atmosphere,solid Earth, Ecosystems, which we can summarize in Table 2:

Focus	**Project**
Bioinformatics	ELIXIR, EATRIS, ISBE, MIRRI, ANAEE
Biobanking	BBMRI, INFRAFRONTIER, ELIXIR, MIRRI, INSTRUCT, ECRIN
Imaging	EURO-BIOIMMAGING
Biological Sciences (Clinical Biology, Chemical Biology, Microbial Biology, Marine Biology, Structural Biology)	ECRIN, EU-OPENSCREEN, MIRRI, EMBRC, INSTRUCT, LIFEWATCH
Marine Sciences	EURO-ARGO, EMSO, ICOS, SIOS,
Biodiversity	LIFEWATCH, SIOS,
Arctic sciences	SIOS, EISCAT 3D
Atmosphere	IAGOS, ICOS, EISCAT 3D
solid Earth	EPOS, EMSO
Ecosystems	LIFEWATCH, ANAEE, ICOS, EMBRC, EMSO, SIOS,

Table 2: Focus and synergies of the Research Infrastructures

As we can see, DANUBIUS-RI has contacts and can develop interactions focused on Marine Sciences, Atmosphere, Ecosystems, Solid Earth, and Biodiversity. However, since that DANUBIUS –RI Hub will be located in the Danube Delta and since this is the largest and best preserved of the European's deltas, there is the opportunity to preserve, protect and analyze 300 species of birds as well as 45 freshwater fish species that the Danube Delta hosts. Hence the Hub of DANUBIUS-RI will need to expand its interactions and expertise, establish connections for future nodes that have focused also on Biological Sciences (Clinical Biology, Chemical Biology, Microbial Biology, Marine Biology, and Structural Biology), Biodiversity, Bioinformatics (Bioanalysis, Biometry, Biobanking). The unique environment

of the Danube Delta is due also to the specific Geological conditions, such as structure and neotectonics that allow the frail equilibrium between land and sea, the balance between sedimentation and erosion, with its unique characteristics, chemical processes from the contact between freshwater and marine domain, all require specific focus both in the Hub and through the dedicated facilities from the Nodes.

The relations that DANUBIUS-RI has already established with other ESFRI infrastructures in order to fill in the gap in the landscape of existing RIs are objective and have a good start, but need to be extended in the next stages.

3.3. Methods of integration, communication, scientific management and data transfer for the establishment and operation of DANUBIUS-RI as a distributed infrastructure

Mechanisms to define a sound communication strategy with regulatory bodies are one of the main issues that should be considered when an ESFRI distributed research infrastructure has to be developed. Generally linked to the issue of governance the communication strategies should be put in place to diminish any associated risks arising from wrong data handling and to manage the relation between participants, or with the public and regulatory authorities, and equally communication concerning sensitive data. The research infrastructure should be able to rely on a well-defined track to reduce and manage all the risks linked to this inherent uncertainty by elaboration of well-defined data access policies, standards, protocols of data protection thus avoiding privacy violation and IPR infringements which are generally present as risks that will be clearly addressed. The exercise of developing such a register is extremely useful and helps the scientists to understand better the paths and procedures to be followed. Being aware of the high importance of appropriate definition of the methods of integration, communication, scientific management and data transfer for the establishment and operation of DANUBIUS-RI as a distributed infrastructure, the item is still under development and refining of ideas prior to be settled, accordingly in the current report will be presented only part of the working hypothesis, proposed methods and measures, risks to be considered during establishing of all necessary links etc.

The main characteristics taken into consideration for DANUBIUS-RI functionality, defining its communication and data transfer system as distributed research infrastructure, were related to the services that should be provided by DANUBIUS-RI, timely data provisions, data policy, interface necessary characteristics.

DANUBIUS-RI should provide unique services for scientists and organisations to access dedicated virtual environments to ensure integrated access to river, delta and coastal data, analytical and modelling workflows and computational capacity.

DANUBIUS-RI has to provide the data from an integrated set of long-term observations throughout the Danube and Black Sea regions as well as other similar areas and consequently will hold a mega database covering large river-delta-sea systems.

In the same time, DANUBIUS-RI will provide a portal to lots of data all over the place. The storage of the data is a debate matter with respect to storage distribution; it is supposed that DANUBIUS-RI will hold significant data at the Hub level, but certainly even in distributed area, main issue being to ensure the coordination of all data storage systems. Management of storage of large quantities of diverse environmental data will require resources, infrastructure and expertise. A key decision is whether all or some data sets will be held by DANUBIUS-RI or whether access will be facilitated via a portal or structured metadatabase. Once data sets are held locally, there is a necessity for resources to maintain and manipulate the datasets and an expectation, perhaps even a necessity, that the data are checked and "cleaned" before making them available to users. Over time the individuals and groups who generated the data may move elsewhere and there might be issues of subsequent maintenance and access. These should also be addressed in the DANUBIUS-RI data policy, and are under development, final version being defined subsequent acceptance of DANUBIUS-RI on ESFRI roadmap, namely during Preparatory Phase.

It is important to underline that DANUBIUS-RI is a platform and not just a provider of data services. With many potential research projects and activities covering a wide range of topics, DANUBIUS-RI will be a focus for the generation of large quantities of data related to wetlands. In addition, one of the anticipated roles of DANUBIUS-RI is the collection and collation of existing data sets from river-delta-sea systems and the formation of a metadatabase that will act as a portal to other related databases held in the Hub itself and in the related Nodes. Therefore, DANUBIUS-RI will act as a platform facilitating data access and exchange between wide ranges of potential data users of many disciplines. Straightforward access to such a range of data could provide opportunities for inter-disciplinary co-operation that might otherwise be difficult to initiate or establish.

Having these main characteristics drawn, in order to be fulfilled by DANUBIUS-RI several emergent issues are still to be discussed as: data role and data policies, intellectual property rights; clarifying issues related to historical data registration, current data registration, what is meant to be the DANUBIUS-RI as interface etc.

Data role and data policy; intellectual property rights. Three main principles will govern the data policy for DANUBIUS-RI; open access, quality control of the data (data/metadata) and interchangeable formats.

It is likely that some datasets that can be made available via a DANUBIUS-RI metadatabase will already be publicly available (e.g. under the terms of the 1998 Åarhus Convention).

There are several types of data to be handled under DANUBIUS –RI, and as consequence, even data policy have to be addressed accordingly. There are standard (generic) data; research (specialised) data and even commercial data which, in fact, are the most sensitive

point, being the most delicate issue to deal with respect to appropriate policy. A clear data management policy is therefore necessary for DANUBIUS-RI and all those who participate.

Data generated with the aid of sponsorship or collaborators may have limitations on their use or restrictions on their dissemination. Such constraints will need to be recognised in the data policy of DANUBIUS-RI. In order to preserve intellectual property rights, it should be recommended that any data generated under the umbrella of DANUBIUS-RI would only be placed in the central data management system with potential access to other users, once those responsible for their generation have completed the relevant reports or publications associated with the data. Acknowledgement of provision of access to data, by those who generated the data, should also be a condition of the use of any data held in the DANUBIUS database(s). Depending on the nature and complexity of the data in the system it may be necessary to have difference levels of data access. For example, it may be possible to allow access to raw data from routine monitoring operations, but only after an initial screening for errors, whereas complex datasets may require synthesis or simplification before making them available. In other cases it may be more suitable to offer summarised data, particularly where access to the original raw data must be restricted or withheld.

Historical data registration. Building time series is fundamental and highly valuable data to establish change – lacking in the research community, but the registration of historical data is affected by pre-digital data storage(paper only); non-standardised format; variability of database files format; lack of existing standards for sampling and analytical techniques which affects the capability of data comprehension. As consequence it is necessary that DANUBIUS-RI to introduce a well-defined document management system, to perform the reformatting of historical data into a standard structure. Due to source diversity it will be necessary language translation and common ontology development, developing links between data sets thus generating structured data sets from unstructured data.

Current data registration. This matter needs a prior agreement on the registration pathway and methodologies that should fulfil several requirements. From the very begging it will be defined a level of acceptance of the minimum basic standard since, for example, collection, compilation and storage of data ranging from routine monitoring measurements (such as river flow) to complex chemical analyses from specialised studies, pose many problems for the central data management system, such as data reliability, compatibility, ownership and access. As consequence, there will be defined common sampling and analytical methodologies (according to the regulations in force); adhesion to standards and data quality; development of an auditable quality system for standard variables. It should be defined the time of data provision, essentially correlated with type of handled data and with data addressability; for example real time/near real time data provision is important when assessing emergent matters (environmental accidents, flood associated disasters etc) and when solutions should be provided while for research purposes. Registration of current data will be performed in a common system, in order to ensure the compatibility and the possible comparison between data obtained from different methodologies, e.g.: comparison between data obtained by sensor networks with those provided by other sources.

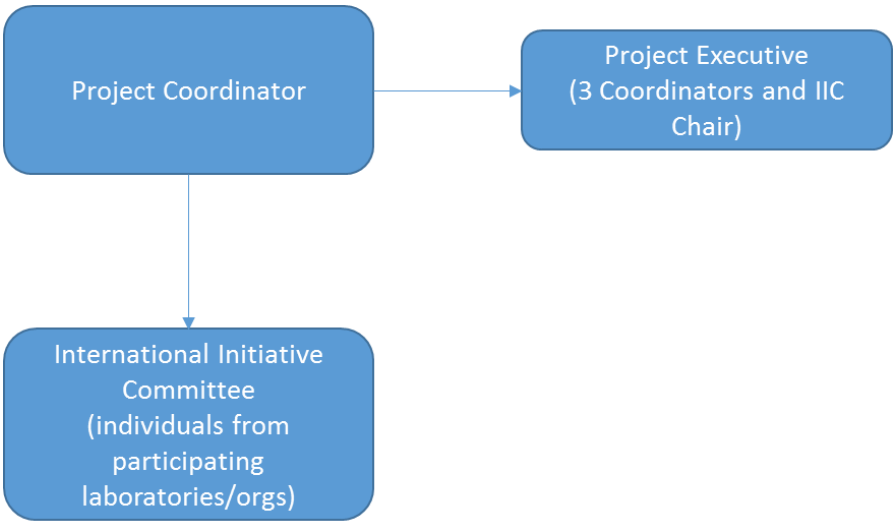
DANUBIUS-RI interface is meant to go beyond a "closed" data by data sharing facility allowing data uploading in user own format; it will be projected to allow standardised data to be extracted; data to be merged from multiple sources user enquiry to seamlessly garner data from multiple sources; new ontologies to be automatically developed for new data with user control. DANUBIUS_RI interface will be able to attribute source of the data; to provide automatically information about who is accessing data etc. Additional Functionality of the DANUBIUS-RI interface are data processing, data visualisation (time series/mapping) and modelling.

The data generated under DANUBIUS umbrella should have a user driven ontology system in order to match new data into the data base.

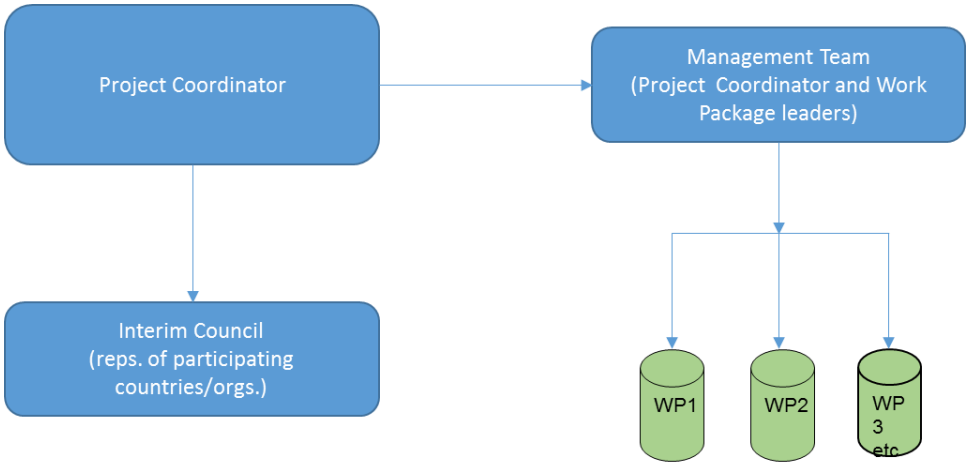
3.4. DANUBIUS-RI's governance structure

The governance of DANUBIUS-RI should be understood in the context of the phases of DANUBIUS-RI evolution, construction and establishment as a functional ESFRI structure.

In the phase of **proposal development and submission for ESFRI call** it is a Romanian leadership with an Executive comprising three Project Coordinators and the chair of an International Initiative Committee (IIC). IIC includes representatives of participating laboratories and other organisations and has an advisory function with respect to DANUBIUS-RI development and application submission to the ESFRI Roadmap.



During the **preparatory phase (PP), subsequent to acceptance on the ESFRI Roadmap, the leadership is of** Romania through a Project Coordinator, supported by an Interim Council. This Interim Council will be established with representatives of participating countries and organisations. A number of Work Groups will be defined, each being led by the best choice of suitable person from Romania or another participating country.



During the operational phase the_DANUBIUS-RI governance 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* will be external to the ERIC. Accordingly, the governance of *Hub* and *Nodes* will be clearly defined and will comprise some common levels while others, due to the specificity of the activity, will be different.
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 will facilitate access to the Lower Danube and the Black Sea. The Hub will be the main responsible to facilitate communication among Nodes and with the main stakeholders of DANUBIUS-RI.

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, 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 main ideas regarding the DANUBIUS-RI structure are given following, as a proposal, and are subjected to refining and re-structuring according to the challenges to be solved as will result during preparatory-phase. At the HUB level it will be the main organisation structure consisting in Decision and strategy level; Administration level; Hub Operational level and Hub maintenance level.

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. Underneath are itemized the main levels and bodies comprising the ERIC management and administration team:

- Decision and strategy level which include:

General Assembly (GA) - top level decision-making body comprising representative of all member countries and organisations;
Independent Advisory Board (IAB) - international group of (mainly) scientists providing strategic advice to **GA** and **DG**
Executive committee (ExCOM)- **Director General** (**DG**) and a number of senior staff based at HUB, in charge with implementing decisions of **GA** management of DANUBIUS-RI
Management Committee (MCOM) - extended version of **Executive Committee** to include representative from Nodes, concerned with running of distributed RI, reporting to **ExCOM**
Scientific Committee (SciCOM) membership mainly from Hub and Nodes to provide advice on operational matters, reporting to **MCOM**;
Technical Committee (TechCOM) membership mainly from Hub and Nodes to provide advice on technical matters, reporting to **MCOM**;
Intellectual Property Rights Committee (IPRCOM); Audit committee; Evaluation Committee

- The General Director / President;

- Administration level which is split on:

    - C1. Hub Operational level ; this involve operational working teams;

    - C2. Hub maintenance level; this involves various functional departments.

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**.**

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.

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

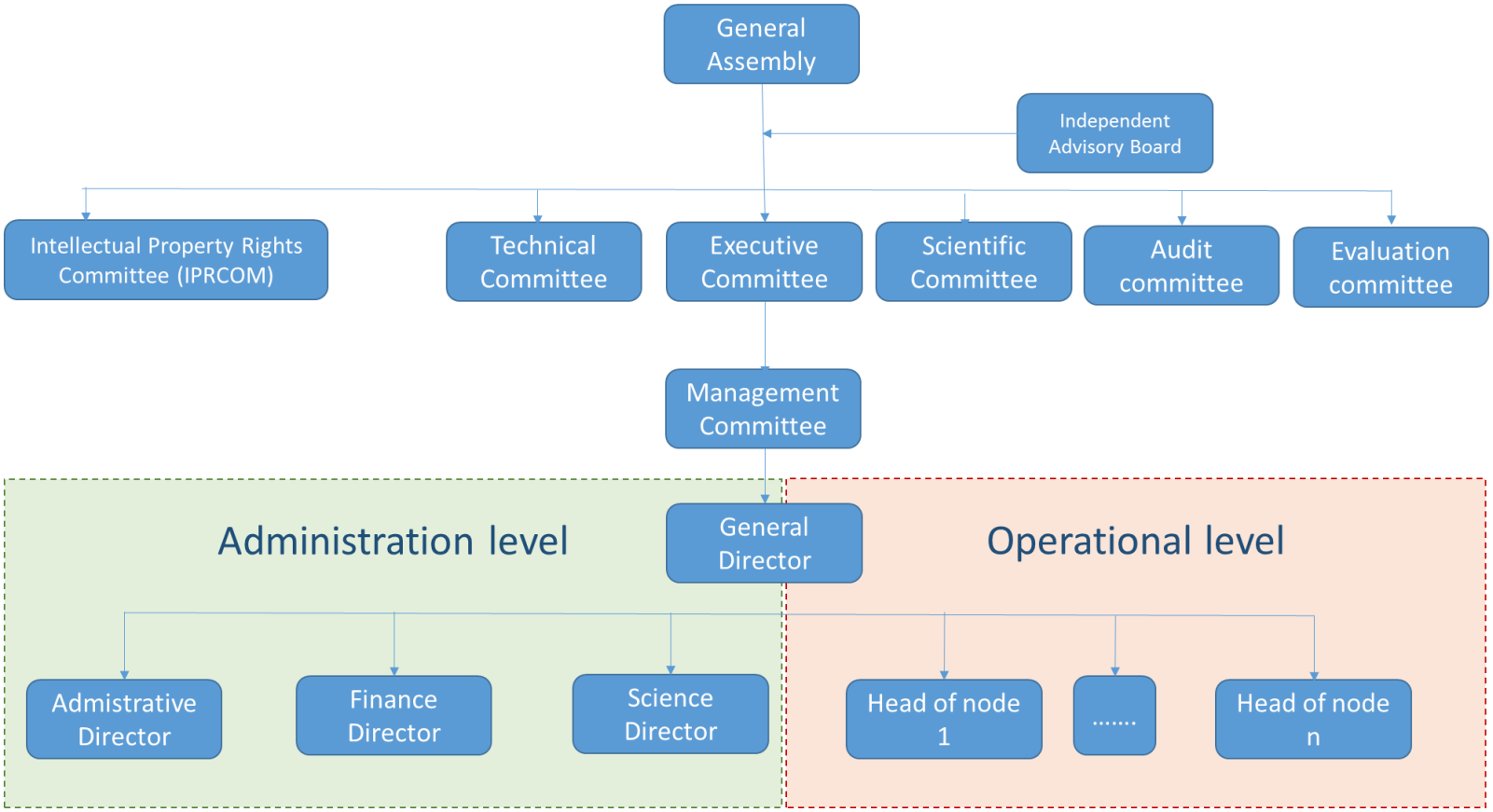
Management Unit;
Hub and Nodes coordination function;
Scientific function:

- 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.


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

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. 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 will be 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. The activity of each Node will be structured on two levels: operational level and a maintenance level.

3.5. ANNEXES

3.5.1. Annex1 - Proposal regarding the themes for the Nodes and an analysis on existing and needed excellence facilities, equipment and services to be provided within the Nodes

Sediment and erosion	**Remote Sensing**	**Analytical technologies and facilities**	**Environmental health and habitat restoration**	**Policy and legislative**	**Measurement and observation**	**Modelling**	**Education and training**	**Socio-economic and people**
Tours lab of environmental sciences France	READING VNW (SEDS INST.)	Chemical department BOKU SI Analytical facilities (heavy isotopes)	RIU Centre for Ecology Restoration Ecology Research Group Biodiversity and Ecosystem Services Research Group	Faculty of Sciences and Faculty of technical Sciences – University of Novi Sad	IFREMER	Hydraulics + Modelling "LIM" Spain	Faculty of Technical Sciences and Faculty of Sciences University of Novi Sad	UNESCO-IHE Governance and livelihood aspects
Jaroslav Cerni – Belgrade, Serbia	Hungarian Meteorological Institute	Max Plank Institute for intelligent systems CFS Analytical Chemistry	WWF Forest Landscape Restoration Programme	Academy of sciences of Moldova	Measurement+obs+hydraulics (sed etc. Southampton+ Badston (PMSC(ROS+)	WCL modelling of aquatic biodiversity	HCMR Greece	Bulgarian Academy of Sciences
Gratz University	Beauford Lab	ERI – Atmosphere	WCL Aquatic ecosystem	ONEMA France	Romania – Danube Delta	Bulgarian Academy of	Bulgarian Academy of	Athens University of

		Chemistry +Services	research surface waters (lakes, rivers, wetlands)		National Institute	Sciences – different institutes	Sciences +institutes	Economic and Business
GeoEcoMar	Tyndall Institute Ireland Nanotech sensors	EAWAG Freshwater Ecology – Switzerland	BOKU Institute of Hydroecology &Aqua Ecosystem MANAGEMENT	International RAMSAR	Wallingford	National Ocean Test Facility UCC Ireland	Lab Science Society Lyon France	University of Macedonia
Academy of sciences – Institute of Ecology, Geography, Geology and Seismology	Polytechnic University Bucharest TUCEB Transilvania University Brasov ANM Bucharest ESRI Romania	Leibniz Institute – Freshwater Ecology	Deltares	Deltares	Centre for Ecology and Hydrology UK	Centre for Ecology Hungary	BOKU/IHE programme on applied limnology	Piren Seine France
D BfG	Ithaca Italy	D BfG	European Environmental Agency	D: UFZ	Scottish Universities Environmental Research Centre UK	UEA Tyndall	UNESCO-IHE	Durham University
FCM Insituto Ceincias der Mar – Bracelona	Cork University	Centre of Bioanalysis, National Institute for Biological	F Cenagref	UNESCO – IHE (governance, management aspects)	Universidad de Cantambria (FH CAntambria) Universidad Politecnica de	TU Wien Wassenbau Institute Austria	Odessa State Environmental University	Stockholm Resilence CENTNE

		Sciences - Romania			Valencia Spain CEDEX			
CSIC CNRS (Ifremer) – France	NOAA	Scottish Universities Environmental Research Centre	D UFZ GUSS	Institute of Oceanology Varna	HEV ecology	Helsinki Institute for Information Technology Finland	CASSEE – Network of Life Science Universities	ITHACA Torino
Institute of Oceanology – Varna – Bulgaria	ESA Munich Centre for Remote Sensing&Data Mining	Institute of Oceanology – Varna – Bulgaria	Laboratory of ecology of fluvial hydrosystems Lyon, France	Integration of the sustainability into the regional as well as sectorial policies	D BfG	Department of Biology Kuyuns Hee University Korea	Danube FUTURE	Universidad de Girona Spain
DELFT University	KIT	Institute of Chemistry Institute of Zoology Hydrometeo services Moldova	Danube Delta National Institute Romania	Beauford Lab	Academy of Sciences of Moldova	Cenagref France		Formulating algorithms for application/implementation of socio-economic models for using environmental resources
Altera (DH) Netherlands	Centre for Bio-sensing University of Novi Sad – includes	Lab of ecotoxicology Metz France	CSIC Spain Centro Superior Investigationes Cientificas		Ukrainian scientific centre for the ecology of the sea Danube	Hungary Eotvos Lorand University Meteorologi		Modelling of socio-economic effects on the state of the

	observations of microclimate and hydrology uing remote sensing and wireless sensor networks				hydrometer	cal Institute of Hungary Geochemica l Institute		env.- natural resources
Boskalis dredging company - Netherlands	Institute of Oceanology Varna Institute of Meteorology and Hydrology Sofia	WCL outdoor facilities Lab mesocosm 2 flumes	UK Birmingham Stirling Aberystwyth		HCMR Greece	UNESCO-IHE		
BOKU	Brest lab of geography LTER Brest_Iroise	HCMR Greece	Institute of Biodiversity and Ecosystem Research – Sofia Institute of Oceanology – Varna Bulgaria		Radioactive – Stirling	Deltares		
Institutes dealing with sediment (IWHW)	CNR Italy	DREAM hydro lab	Institute of Zoology – Moldova		IRSTEA France	DHI Denmark		
Deltares	University of Sevilla Spain UPV – Universidada	Geochemical Institute of the Hungarian Academy of	We are intending a common international		National Oceanographic Centre Southampton	Kiev: Institute of Applied Mathematic		

	politecnica de Valencia	Sciences	natural conservation network together all with our neighbour countries			s		
Odessa National University	Plymouth Marine Lab – near real time provision of data global scale Stirling optics +calibration for aquatic environments	Faculty of Sciences and Faculty of technical Sciences – University of Novi Sad	Network of natural parks together with NA of sciences' ecological institutions one network on habitat restoration		Institute of Chemistry Institute of Geology Institute of Ecology and Geography Hydrometeo Services Moldova	Piren Seine France		
Hull University	EUFAR DLR NORC	Ifremer France			Institutes of Bulgarian Academy of Sciences	NOR Univ of Belgrade ?		
Southampton University	Cadastral and Geodesy Agency from Moldova	Irish Institute for big data and analytics research			Laboratory for Plant Ecology Laboratory of ecotoxicology LECOTOX University of Novi Sad	D University of Enlargen		
Exeter University	Sevastopol hydrophysical marine				Mace ……+Maine Inst (climate	UTCB Bucharest Romania		

	institution				+oceans)			
READING VNW (SEDS INST.)					WCL/BOKU LTER site Lunz Long term research Danube flood plains			
CORK Beaufort Lab								
UPC Spain								

DANUBIUS-RI International Initiative Committee – Summary report of meeting on 10-12 September 2014, Mamaia

1. Welcome and introductions

The welcome address was delivered by Manuela Sidoroff, General Director of the Romanian National Institute for Biological Sciences.

A 'tour de table' followed.

2. Goals of the meeting

Michael Schultz, the IIC Chair, presented the goals of the meeting – to provide advice to the project coordinators on:

1. the development of DANUBIUS-RI and a bid to the ESFRI Roadmap
2. possible funding models for DANUBIUS-RI
3. development of *Nodes*
4. progress in each country on support for DANUBIUS-RI
5. forward workplan

3. Presentation of DANUBIUS – RI - current position and updates- Dr. Adrian Stanica

The mission of DANUBIUS – RI is to provide world-leading research infrastructure that will enable excellent interdisciplinary research in river-delta-sea systems that will have high economic impact.
DANUBIUS RI aims to:

- Improve the sustainable and innovative management of wetlands, deltas, lagoons and coastal seas by studying in depth the processes influencing the evolution and environmental state of the River – Delta – Sea systems
- Increase the involvement of local communities in sustainable management of River – Delta – Sea systems
- Develop the knowledge-based economy to support the economic growth of the Danube – Danube Delta – Black Sea (D-DD-BS) region without disturbing its natural biodiversity

The scientific domains covered in DANUBIUS – RI will be life, earth and socio-economic sciences. The infrastructure will have an important role in education, law and regulations, green products and technologies and new R&D technologies and equipment.
DANUBIUS – RI is designed as a distributed infrastructure with a *Hub* in the Danube Delta and several nodes across Europe and internationally. The construction of the *Hub* – first building – already began at Murighiol.
The *Nodes* will be institutions world-wide that will provide leading facilities and excellent science.
DANUBIUS – RI project was declared Flagship Project of the EU Strategy for the Danube Region in 2013. In the same time, coordination is being developed with the other three EUSDR Flagship projects: DREAM (on RIs), DANUBE FUTURE (on Human Potential) and DRRIF (on Strategic Research Programme).
DANUBIUS – RI aims to be on the ESFRI roadmap. The next competition will be launched in September 2014 and Guide for Proposals quite quickly after that. The first stage is to have the proposal declared eligible by the ESFRI Executive Board, then gain support from ESFRI ENV SWG and the second is to get approval by ESFRI Forum. For the ESFRI proposal, there must be at least three countries supporting it.

The current issues of the project are related to the *development of* Nodes, Hub & Nodes *connections and models, data management, funding models, links with other EUSDR Flagship projects* and *the ESFRI application.*

Questions on the presentation:

1. Is there an overlap between DANUBIUS – RI and the Danube Future Flagship Project?

A: DANUBIUS – RI aims to be complementary, providing for example programmes and facilities for educational purposes that can be used by the Danube Future Project (dedicated to education). There is however, the need for a specific dialogue between the two flagships.

2. What will be the relation between DANUBIUS – RI and organizations like LOICZ and other similar in terms of node and hub organization?

A: DANUBIUS – RI aims to collaborate with these initiatives, it already got the first letter of support from EMSO (which is an ESFRI project), but also from JPI Water Challenges – and intends to obtain a letter of support also from LOICZ.

3. The vision of DANUBIUS – RI should be innovative, for example regarding climate change studies: they are usually restricted to Earth and life sciences but social-economic aspects of climate change impact are very important.

4. **Progress development at the *Hub* – Dr. Manuela Sidoroff and architect Ana Maria Crisan**

The construction of the first module of the *Hub* has begun at Murighiol. This represents one building with laboratories, a conference room that can be converted into laboratory space if needed and some accommodation facilities.

The architectural concept of the Hub was inspired by local traditional buildings. The construction, as rules and regulation for the Danube Delta area stipulate, had to be designed and built using local material and local labour force.

The first building is an elongated structure that combines tradition, modern, usefulness and innovation, also integrating the concept of DANUBIUS-RI.

Comments on the presentation:

a. The first module will be ready in June 2015.
b. It is important to describe more the function of the building and of the *Hub* in general.
c. In order to have a large building some amendments from the regulations must be obtained.
d. The project should be presented to the local community, stressing the advantages for the local people. The project was already presented in Tulcea, at the department level.
e. A waste management system *in situ* is not feasible so the solution is to transport the waste to the nearest waste treatment point.

5. **During the meeting a question was raised on changing the name of DANUBIUS – RI.**

The main argument was that the name suggests the infrastructure is only related to the Danube Region and not to river- sea systems in general. The infrastructure is promoting the study of these complex systems, not restricted to a particular one, so this must be also suggested by the new title.

The major concern though has been the fact that either in national Romanian and European documents the acronym circulated so far has been DANUBIUS-RI and it is foreseen that major problems may arise in the official documents if it is changed. A suggestion was made to keep the acronym for the *Hub* that will be located in the Danube Delta and find a more suitable one for the infrastructure.

Nevertheless, the decision was to check and see which solution is more effective and has less negative impact – and the decision will be taken in the following weeks by the coordinators.

6. **ESFRI updated - Michael Schultz and Viorel Vulturescu**

The official launch of the ESFRI Roadmap competition will be in Trieste on September 25th, 2014. A minimum number of three countries represented in ESFRI is required for the proposal to be declared eligible. This means official letters of support from national funding agencies in the (minimum) three countries.
What is known so far is that the proposals will be much more detailed: much more information will be needed in comparison with the competitions from 2006 and 2008. The current proposals will need to include various aspects that were previously defined in the Preparatory Phase (the EC funded project following acceptance on the ESFRI Roadmap). Although, unfortunately the final ToR and Guide for Proposers will be most probably made available only after the workshop in Trieste, it is clear that the proposals will need to be more mature than for previous calls. The proposals will be submitted only by the national ESFRI delegates using an ESFRI online tool.
Other differences in comparison with the previous calls regard the evaluation. Now the e-IRG (e-Infrastructures Reflection Group) will have a consultative role as well – and the management of the proposals will be judged also by the new ESFRI IG (Implementation Group). The Implementation Group consists of 8-9 members, delegated of the EU governments, with business and administration backgrounds and led by the Netherlands.
Again participants were reminded that the DANUBIUS-RI proposal is a research infrastructure proposal, and not a science programme nor a network of research infrastructures.

A key point raised by the participants addressed the need to identify clearly the concrete advantages of being part of a node or a participant of DANUBIUS – RI. The country representatives ask for official support but have to argue why being a part of this distributed infrastructure is a gain. **Some concrete advantages must be defined in the near future.**
Another main issue suggested is the lack of a communication strategy that must be developed both for the scientific and business communities.

7. **Introduction to the funding model**

The creation of DANUBIUS – RI will have three phases: preparatory, construction and operation.
Sources for funding must be identified and approached. Some suggestions were made:

- National governments
- H2020 funds
- Structural Funds
- World Bank
- Foundations
- Donors
- Industry
- Corporate
- Shipping companies

Several questions must be answered:

- where money is spent
- how money is spent
- how money flows (where it comes from / where it goes to)

To discuss the money flow a group exercise was organized,led by Vangelis Papathanassiou, Jos Brils and Thomas Hein. The synthesis of the results is shown in Annex A.

8. *Nodes*

The structure of *Nodes*, as defined in the material circulated prior to the meeting, was introduced to the participants. The main idea is to define a set of priority areas (themes) and develop dedicated *Nodes* that represent clusters of facilities needed with a common purpose. Each *Node* would be led by a Lead Laboratory, decided by competition, and with other laboratories forming satellite laboratories for each Node.

The participants were asked to identify up to six priority areas that should be covered by the *Nodes*. Notes were gathered from participants resulting in the following list of preferences:

- Analytical technologies and facilities
- Climate change
- Education and training
- Environmental health and habitat restoration
- Measurements and observation
- Modelling
- Policy and legislative
- Remote sensing
- Sediment and erosion
- Socioeconomic and people

The full list of suggestion is presented in Annex B.

Suggestions from the participants:

a. Make a recipe of particular ideas, facilities, services, expertise to attract people into the *Hub* and *Nodes*.
b. Approach topics specific for large river-sea systems or adapt the classic topics to large river-sea systems.
c. Find a graphic form of representing the links of Hub and Nodes on particular topics.

9. Progress report from each country

a. Germany

- The German consortium already contacted the ESFRI ENV representative and is rather optimistic that Germany might support the initiative
- Ministries contacted: research, environment and transport
- Thematic area: water, research infrastructure
- Centres interested in the initiative: BFG, Helmotz Centre for Coastal Research

b. Hungary

- The community of researchers is well organized and quite extensive, covering representatives from two institutes of the Hungarian Academy of sciences, two major universities, private companies.
- A proposal for a *Node* was made in writing.
- Problems in what regards the dialogue with the ESFRI delegate and ESFRI ENV representative – as after the recent elections a new office for research is to be established and the situation is still in progress of reorganisation.
- Nevertheless, the contact with the government delegates was renewed.

c. UK

- After the meeting in the UK with the Centre for Ecology and Hydrology in January 2014, there have been no major developments, waiting for the official competition to be announced.
- Besides the existing interested partners (Universities of Stirling, Glasgow, Birmingham, Hull), interest was found also in other institutions – National Oceanography Centre and Centre for Ecology and Hydrology
- For the UK to support the proposal at ESFRI, it is important to gain the support of NERC Centres such as NOC and CEH.
- There is a clear need for a communication strategy to show advantages and global impact in the science

d. *Moldova* - the Moldovan Academy of Science already issued a letter of support. Moldova wishes to develop a new Centre for water quality and the representatives of Moldova want to grow this centre as part of a possible Node of DANUBIUS-RI – to be considered as the Moldova contribution.

e. *Serbia* – The Ministry of Education, Science and Technological Development of Republic of Serbia, strongly supports integration and participation of Serbia in ESFRI. It was discussed which delegates could represent Serbia at ESFRI, and suggested that Professor Snezana Radulovic, from Faculty of Sciences, University of Novi Sad, can contribute significantly to the Environmental Sciences Strategy Working Group. The Official Letter of Support for DANUBIUS-RI from Serbia is to be expected very soon, since after elections the Ministry has finally been reorganized.

f. *Greece* – already sent an official letter of support from the Greek Secretary of State for Research

g. Ireland

- UCC contacted the Irish delegates and they need to bring in more information.
- First they would like to see commitment from other Danube countries (like Germany)
- Irish representatives remark that the idea of DANUBIUS – RI must be made much more valuable for the countries outside the Danube Region.

h. France

- French coordination of DANUBIUS-RI is now with CNRS, and there is a strong desire to promote the Rhone river-delta-sea system (zone ateliere) as observation natural laboratories, among other facilities – as parts of DANUBIUS-RI
- The Ministry of Research was contacted and there have been intense discussions with the ESFRI and ESFRI ENV representatives
- Ministry representatives must be convinced that this is an infrastructure, and not a scientific project – so there is a clear need for a stronger development of the infrastructure aspects
- Give space for innovation in the presentation of the RI project
- Take care not to superpose with other major infrastructures like ANAEE and Lifewatch

i. *Ukraine* – tries to include Chilia Secondary Delta in the project and collaborate with the Romanian and Moldovan partners; strong desire but given the present day political situation it is difficult to discuss at the level of government about RIs.

j. *Italy* – the community of participant institutions has organised itself. INGV and most probably OGS support and accept the coordination of ISMAR – CNR. The director of ISMAR CNR announced the Italian representative in ESFRI ENV about the interest of the afore-mentioned institutions to join DANUBIUS-RI and besides the technical facilities a major importance was given to the Po River- Delta – Sea and Northern Adriatic with the existing lagoons as natural laboratories. A lead person was also nominated.

k. *Spain* – Spanish participants (that wish to promote, besides the modelling facilities the Ebro and Llobregat river-delta-coastal sea systems) are already in discussion with the Spanish Ministry of Education and Research about the support of Spain for DANUBIUS-RI in ESFRI and ESFRI ENV.

l. EMSO, a major ESFRI existing project, has already sent an official letter of support.

Conclusions and future actions:

1. ***Circulate the responses to the* Nodes *proposal exercise.***
2. ***Make an urgent decision on whether to change the name to make clear the scope of the research infrastructure.***
3. ***Provide and circulate answers to the seven key questions identified during the meeting.***
4. ***Ensure that materials and communications emphasize that DANUBIUS-RI is:***
   - ***i. a research infrastructure project rather than a research programme or network***
   - ***ii. concerned with all large river-sea systems in Europe and globally.***
5. ***Create a communication strategy for research, business communities and government officials.***
6. ***Contact ESFRI delegates and develop a community in each country.***
7. ***Make a "to do" list for the next step of the project.***

Annex A.

Outcomes from Group A:

Basis:

a. Money – have to be spent according to the research/specific issues ; activitiew
- flowing according to the funding source

Consequence: the money are following the implication of the parties

b. Hub is always informed of every source of funding attracted

1st Scenario : **Hub is leading the solution**, than money **flow Hub to Nodes**
Massive/big projects run by DANUBIUS RI consequently means money flow Hub to Nodes
If nodes are asking for services from HUB/onter nodes or use the hub as a node than **flow Node to Hub** (subcontracting)

2nd Scenario: **Node is leading the solution**
a. benefits from HUB/DANUBIUS RI facilities? "If Danubius-RI is needed to run the proposal /project than money should be managed by hub "so flow Hub to Nodes
b. self supporting (no matter the public funds international or national) –no money flow from Nodes to Hub

DANUBIUS "survival, support & evolution"
HUB INCOME

- contribution of parties/countries;
- money for data use **if industry** are accessing data or there are using models;

- from projects: international; EU ; structural funds; etc
  FOCUSS on applying for big projects on thematic issues (based on specific expertise and DANUBIUS unique capabilities)
- consultancy

NODES – projects; emphasize the major role of trans-national funds
- consultancy

Industry as source of funding:
- Give Funds to solve a certain technical issue flow though the HUB and distributed according to the node specialization
- There are buying " DANUBIUS products" (eg specific sensors; application of specific model/technology)

Participation of industry either as user of provided specific service by DANUBIUS or as partner in EU projects at any level, nodes or hub

HUB/DANUBIUS RI will spent money

- pay taxes;

- IPR (if something is developed under DANUBIUSRI label)
- Investment

NODES same structure of spending money, but a local level

Annex B.

Annex B: list of areas proposed for *Nodes*

Proposals have had titles simplified to enable grouping of related areas. Identical proposals are shown only once.

Measurements and observation (7 proposals) Measuring (monitoring) networks Observation techniques Standardisation of observation LTER sites: access and observation Hydroecology (instrumented sites) Modelling (11 proposals) Statistical methods Numerical modelling Climate modelling Algorithms for model implementation Socio-economic modelling Physical modelling Ecological modelling Analytical technologies and facilities (8 proposals) Isotope analysis Emerging pollutants analysis Analytical facilities/technologies Remote sensing (5 proposals) Remote sensing Earth observation Environmental health and habitat restoration (7 proposals) Environmental health diagnosis Habitat restoration Sediment and erosion (4 proposals) Sediments Erosion Policy and legislative (7 proposals) Legal Policy development	Socioeconomic and people (5 proposals) Science for the people Societal Economic Climate change (4 proposals) Climate change Other proposals Delta Coastal Marine Freshwater Research integration Biogeochemical cycling and fluxes Floodplains and marshes Fisheries Engineering Hydraulics (flume) Water circulation Artificial neural networks Organism migration Ecosystem scale research Mesocosm Renewable energy GMES Catchment management Infrastructure services Ecosystem services Eutrophication High-tech equipment Sustainable development Natural hazards Geospatial technologies Data quality Geodata base Data management Sensor development Water management

Education and training (4 proposals) Education Training	Large-scale laboratory facilities Water quality Computing facilities

Annex C. Key questions (with answers provided by Executive following meeting)

1. *How will DANUBIUS-RI be unique and why is it absolutely necessary to have it?*

   Although there are many RIs providing centres of excellence for research on rivers, seas and other ecosystems and components of the hydrological cycle, infrastructure is lacking in Europe for interdisciplinary research on the whole river/sea system, including transition zones such as deltas and estuaries. Interdisciplinarity covers physical, chemical, biological, economic and social disciplines, as well as all environmental sectors including the atmosphere, cryosphere, lithosphere, terrestrial, freshwater and marine. It includes laboratory experiments, field observation and numerical modelling. DANUBIUS-RI's scope will be unique and will be necessary for a holistic understanding of large river-sea systems and the ability to address the major environmental, economic and social issues associated with them including future climatic scenarios. Europe already undertakes world-class research in various elements of large river-sea systems: the new RI will enable a further step change in the capability and reputation of European researchers.

2. *What are the services provided (be careful for redundancy)?*

   DANUBIUS-RI will provide directly (through *Hub* or *Nodes*) or indirectly (outsourcing) specialist services, facilities, platforms and expertise for research on large rivers, deltas, estuaries and seas, building on existing world-class expertise. These will range from observation (*in situ* to Earth observation) and analysis to data services and modelling. DANUBIUS-RI will collaborate with other RIs for sharing and synergism in the provision of facilities and services.

3. *What will be the benefits for supporting Governments and stakeholders?*

   Supporting Governments will benefit in several ways. Leading researchers from across Europe and internationally will be drawn to laboratories hosting *Nodes*. Researchers in member countries will have access to world-class facilities, services, data products and expertise for research on large river-sea systems, in both the *Hub* and *Nodes*. All the facilities from the *Hub* and *Nodes* will be open to host education programmes, facilitating the work of undergraduate and graduate students. The scientific profile of member countries will thus be enhanced. Both supporting Governments and a wide range of stakeholders will benefit from innovation and knowledge exchange that will be a key part of DANUBIUS-RI.

4. *How does DANUBIUS-RI differ from a network?*

A network is a grouping of independent organisations connected by a common purpose. DANUBIUS-RI goes much further than this: it is a single but distributed organisation with under one governance and management structure. The combination of expertise from different geographical areas will enable a move from 'local' to more global and generic knowledge.

5. *What tangible, 'sexy' product(s) will be produced?*

By facilitating the development of excellent science, DANUBIUS-RI will enable, for the first time, sustainable management plans across the whole of large river-sea systems from local to regional to European levels. The information and knowledge resulting will be is important for devising protective measures against dangerous hazards such as flooding, drought, earthquake, anthropogenic accidents.

6. *Who is paying for the staff needed to populate the* Hub *and* Nodes*?*

It is expected that countries or organisations hosting the *Hub* and *Nodes* will provide some support 'in kind' and this could include staff costs. The main support will come from the annual 'subscriptions' to DANUBIUS-RI from member countries and organisations. Payment for specific services provided by the *Hub* and *Nodes* might also include an element of staff payments, depending upon the funding model adopted. As a unitary, distributed research infrastructure, DANUBIUS-RI will be able to attract funding by participating in national, regional, European and international competitions, offering its facilities and know-how for major research, innovation and education programmes and projects.

7. *Is a stepwise approach possible (get experience, build trust, pilots)?*

A stepwise approach is both the most practical and the most sensible. DANUBIUS-RI is a major infrastructure and a stepwise approach will be taken from the start reflecting infrastructure priorities, feasibility and funding realities. For example, it is unrealistic to expect the ambitious data strategy to be operational on day one. The initial activity will take into consideration existing capacity and capability. Beyond this, DANUBIUS-RI will evolve over time with the science agenda, adding or removing infrastructure components as required by the research community and stakeholders.

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Annex D. Agenda of the meeting

Danube International Centre for Advanced Studies on River-Delta-Sea Systems (DANUBIUS-RI)

3rd Meeting of International Initiative Committee

Hotel Siret, Mamaia, Romania

DRAFT AGENDA

Wednesday 10 September 2014

0930	Welcome and introductions
1000	Minutes of 2nd meeting (Bucharest, March 2014)
1015	DANUBIUS-RI current position and updates
1100	Progress on development of Hub
1130	Coffee
1200	ESFRI update
1230	Lunch
1400	Funding Model
1600	Coffee
1630	Funding Model (continued)
1800	Close of meeting

Thursday 11 September 2014

0930	Updates on key issues (data, e-infrastructure, Nodes)
1030	Coffee
1100	Round table: progress in each Country (connections with user communities, contacts with ESFRI delegates, contacts with funding bodies)
1215	Introduction to excursion
1230	Lunch
1330	Excursion to Razelm Sinoe Lagoon System and to Histria and Argammum ancient settlements

Friday 12 September 2014

0930	Any other business
1000	Conclusions and actions
1100	Departure to Bucharest International Airport
1400	Arrival at Airport

Annex E. List of participants

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