EPOS IP Management Plan

D1.1

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TABLE OF CONTENTS

SUMMARY

This report concerns Deliverable D1.1 *EPOS IP Management Plan*. The report describes the whole EPOS implementation phase consisting of the legal establishment of the EPOS-ERIC and of the TCS-ICS service implementation through the **EPOS IP project**.

In particular, the report focuses on the description of the EPOS IP project concept and organization and on the management structure foreseen in the Grant Agreement and discussed with the EPOS IP partnership during the kick-off meeting. Indeed, this report describes the structure and the procedures adopted to guarantee the effective management of the EPOS IP project, the risks assessment and the strategies adopted to deal with ethics issues.

The EPOS IP Management Plan is one of the three key documents describing the project organization and planning. The other two are the EPOS IP Communication Plan (D2.1 released at M6) and the TCS-ICS Implementation Plan (various deliverables released from M12).

1. INTRODUCTION

The EPOS vision is to create a pan-European infrastructure for solid Earth science to support a safe and sustainable society. In accordance with this scientific vision, the mission of EPOS is to integrate the diverse and advanced European Research Infrastructures for solid Earth Science relying on new e-science opportunities to monitor and unravel the dynamic and complex Earth System. EPOS will enable innovative multidisciplinary research for a better understanding of the Earth's physical and chemical processes that control earthquakes, volcanic eruptions, ground instability and tsunami as well as the processes driving tectonics and Earth's surface dynamics. EPOS will improve our ability to better manage the use of the subsurface of the Earth. Through integration of data, models and facilities EPOS will allow the Earth Science community to make a step change in developing new concepts and tools for key answers to scientific and socio-economic questions concerning geo-hazards and geo-resources as well as Earth sciences applications to the environment and to human welfare.

EPOS is integrating the existing, but also new research infrastructures, identifying and filling current gaps, to help in solving the grand challenges facing the Earth and the society through solid Earth science. EPOS is globally unique in integrating Earth science community. The present document refers to the EPOS architecture, which is composed of three connected technical and organizational elements (Figure 1):

- *National Research Infrastructures* (**NRI**)
- *Thematic Core Services* (**TCS**)
- *Integrated Core Services* (**ICS**): *the central hub (**ICS-C**) and distributed resources (**ICS-d**)*

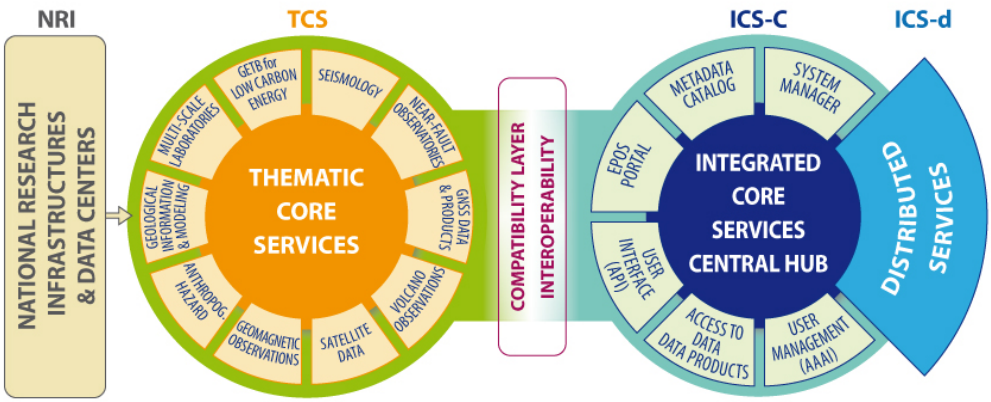

Figure 1. *Key elements of the EPOS Functional Architecture designed during the EPOS PP*

The ***EPOS Implementation Phase*** builds on the achievements of the successful EPOS preparatory phase project (EPOS PP) and it consists of two key activities:

- **EPOS-ERIC legal establishment;**
- **EPOS IP (Implementation Phase) project.**

The **EPOS-ERIC Interim Office**, established at INGV where the EPOS legal seat will be hosted, coordinates the legal establishment of the ERIC. The **EPOS IP project** is an essential component of the EPOS implementation phase, since it is responsible to coordinate the TCS and ICS implementation, validation and testing. The **Board of Governmental Representatives** (BGR) is the ultimate decision body for the whole EPOS implementation phase.

The EPOS IP project organization relies on three distinct plans: the management plan, the communication plan and the TCS-ICS implementation plan.

The present report describes the **EPOS IP Project Management Plan** (**PMP**). The PMP is designed to coordinate all the different activities related to the TCS-ICS implementation (involving legal, technical, financial and governance issues) and the administrative management of the consortium composed of 46 beneficiaries representing the "*developers*" in charge to implement the EPOS infrastructure on behalf of the solid Earth science community. The EPOS IP management also involves support and coordination of the activities planned in the project for harmonizing the sustainability of the implemented services with national priorities and strategies.

2. THE EPOS IMPLEMENTATION PHASE

A long-term integration plan is necessary to accomplish the EPOS mission, whose timeline is drafted in Figure 2. The EPOS implementation phase will last from 2015 to 2019. During this phase the two key activities anticipated above will be realized: the construction of the EPOS-ERIC and the implementation of TCS-ICS services throughout the EPOS IP project. They are both illustrated in Figure 2.

In particular, the EPOS IP project will implement of TCS-ICS services by:

- Implementing Thematic Core Services (TCS);
- Implementing Integrated Core Services (ICS);
- Designing the distributed resources (ICS-d);
- Ensuring sustainability and governance of TCS.

These activities imply to: (i) coordinate the initiatives dedicated to finalize the integration of national RIs with the TCS identified in the EPOS IP project; (ii) coordinate the implementation of TCS and ICS ensuring interoperability and coherence with the EPOS architecture; and (iii) ensure sustainability of the services as well as of the national RIs participating to the integration plan through the harmonization of implemented TCS with national priorities.

It is envisioned that during the Implementation Phase the governance of EPOS is subject to evolve according to the establishment of the European consortium EPOS-ERIC (expected to be operational in 2018). The parallel workflows associated with the ERIC establishment and the EPOS IP project are illustrated in Figure 2.

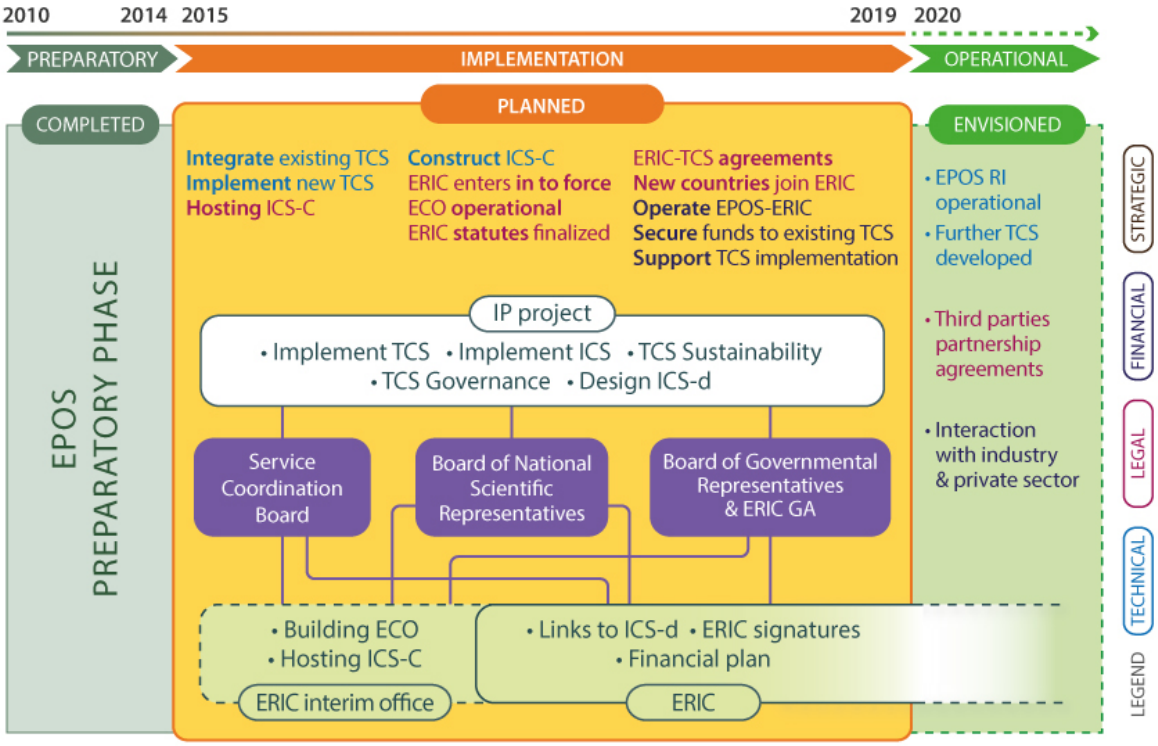

***Figure 2**. The EPOS Timeline toward construction and operation*

The governance structure of the EPOS IP project will be described in the next section. Here it is important to outline that to ensure that all the EPOS IP project achievements are effectively transferred to EPOS-ERIC and to guarantee that EPOS-ERIC statutes and rules are coherent with the integration performed within the EPOS IP project, the governing bodies envisioned for the ERIC governance have been anticipated in the Implementation Phase.

These bodies are: the **Service Coordination Board** (**SCB**) and the **Board of National Scientific Representatives** (**BNSR**). The Service Coordination Board is responsible for the harmonization of the activities and achievements of the ICS and TCS implementation, including governance, legal and financial issues. In its current composition, the SCB is made up of the TCS and ICS WP leaders (#6-17) and the Project Coordinator.

The Board of National Scientific Representatives (BNSR) will provide scientific and technical advises as well as support to the Board of Governmental Representatives (BGR) for facilitating their decisions concerning the whole implementation phase. The BNSR is made up of one scientific representative from each country participating to the integration process. Once the ERIC will be operational the BGR will become the General Assembly of EPOS-ERIC and the scientific members nominated in the ERIC General Assembly will substitute the BNSR. The BGR will nominate its own external advisory board independently of the EPOS IP project in order to monitor and evaluate the whole implementation phase.

3. THE EPOS IP project

Coherently with the H2020 program, the activities and the resources of the EPOS IP project are described in the Grant Agreement (Description of Activities, DoA), while the rules and the agreements among project beneficiaries are described in the Consortium Agreement.

Both documents were duly signed at the beginning of the project.

3.1. Governance structure

The governance of the EPOS IP project is made up of a governing body, the **Implementation Phase Council** (**IPC**), an executive body, the **Project Development Board** (**PDB**), an advising body, the **Advisory Board** (**AB**), the **Project Coordinator** (**PC**) and the **Project Management Office** (**PMO**).

As explained above, the SCB envisioned for the ERIC is operational also in the EPOS IP project in order to facilitate the coordination of TCS-ICS implementation.

The **Implementation Phase Council** (IPC) represents the decision-making body of the Consortium. It maintains an overview of the EPOS project deciding on issues related to the Grant Agreement and the Consortium Agreement. It will therefore approve project achievements for their transmission to the BGR for decisions concerning the EPOS implementation and construction. Among its duties there is that of appointing the members of the other EPOS IP bodies. IPC is composed by one representative for each Beneficiary.

The **Project Development Board** (PDB) is the executive branch of EPOS IP project. It consists of the Project Coordinator (acting as the chair) and the Leaders of WPs 2-7 plus the Chairs of Service Coordination Board (SCB), Implementation Phase Council (IPC), and Board of National Scientific Representatives (BNSR).

The **Advisory Board** (AB) is an external board that will oversee the project achievements, will provide advices and guidance (including ethics issues) as well as will evaluate the EPOS progress toward construction.

The **Coordinator** (INGV) is the legal entity acting as the intermediary between the Parties and the Funding Authority (the European Commission). The Coordinator shall, in addition to its responsibilities as a Party, perform the tasks assigned to it as described in the Grant Agreement and the Consortium Agreement.

To manage the EPOS IP project the Coordinator appoints a **Project Coordinator** and provides him/her all the necessary resources and authority to act on its behalf. The Project Coordinator shall, in addition to its responsibilities toward the Coordinator, perform the tasks assigned to Work Package 1 (management) as described in the Grant Agreement.

The **Project Management Office** assists the PDB, the SCB, the IPC and the Project Coordinator. The Project Coordinator chairs the PMO

3.2. Partnership

The partnership of the EPOS IP project is composed of 46 beneficiaries from 22 countries.

Through their involvement in EPOS IP, the beneficiaries share the responsibility of being the "*developers*", which are in change of implementing the services on behalf of the communities engaged in EPOS. Moreover, in order to continue the capacity building started in the preparatory phase (EPOS PP) and to further engage the community in the service implementation nineteen international organizations and national institutions have been invited to join EPOS IP as Associate Partners or Contributing Institutions

Associate Partners are international organizations or research institutions belonging to countries not yet involved in EPOS. In particular, institutions from Slovak Republic and Bulgaria have not yet achieved the engagement of their countries in the activities of the Board of Governmental Representatives and they are not included in the list of beneficiaries of EPOS IP. Indeed, their contribution as Associate Partners has been encouraged to foster their future participation to EPOS construction and operation. The case of Austria is actually very successful because at the time EPOS IP project proposal was submitted the country was in the same position as Slovak Republic and Bulgaria. Presently, Austria is fully engaged having officially nominated its governmental representative in the BGR.

Contributing Institutions are national institutions from countries already engaged in EPOS that are involved for participating to the service implementation activities and contributing to the engagement of the communities.

Associate Partners and Contributing Institutions currently engaged in EPOS are listed in Table 1. They will attend EPOS IP meetings and participate to the discussions within the communities concerning the progress of EPOS implementation toward the operational phase. They have the same rights of beneficiaries for discussing and contributing to the EPOS construction. This open and fully collaborative framework allows the further enlargement of the Pan-European dimension of EPOS.

Notably, international organizations such as EuroGeoSurveys, the European Space Agency (ESA) and national space agencies like CNES in France have decided to follow EPOS, to give free-of-charge access to data and to contribute to the EPOS integration plan supporting the community building. Indeed, access to services provided by Associate Partners will not imply any costs for EPOS IP and no resources (only reimbursements for meetings participation) will be allocated in the implementation phase work programme or charged by the grant agreement beneficiaries.

***Table 1**. Current list of Associate Partners and Contributing Institutions*

Associate Partner	Country	Contact person	Email Address	WP
European Space Agency (ESA-ESRIN)	Europe	Philippe Bally	Philippe.Bally@esa.int	12
EuroGeoSurveys	European Organization	Luca Demicheli	luca.demicheli@eurogeosurveys.org	15
Global Earthquake Model (GEM)	Global	Anselm Smolka	anselm.smolka@globalquakemodel.org	8
Zentralanstalt fuer Meteorologie und Geodynamik (ZAMG)	Austria	Wolfgang Lenhardt	wolfgang.lenhardt@zamg.ac.at	8
National Institute of Geophysics, Geodesy & Geography Bulgarian Academy of Sciences (BAS)	Bulgaria	Ivan Georgiev	ivan@bas.bg	10
Comenius University (CU-S)	Slovak Republic	Peter Moczo	Peter.Moczo@fmph.uniba.sk	8
Contributing Institutions	**Country**	**Contact person**	**Email Address**	**WP**
Bundesamt für Kartographie und Geodäsie	Germany	Wolfgang Soehne	wolfgang.soehne@bkg.bund.de	10
Centre National d'Etudes Spatiales	France	Mioara Mandea	mioara.mandea@cnes.fr	12
Institut National de l'Information Géographique et Forestière	France	Olivier Jamet	olivier.jamet@ign.fr	12
Charles University of Prague	Czech Republic	Jiri Zahradnik	jz@karel.troja.mff.cuni.cz	9
Universities of Athens	Greece	Panagiotis Papadimitriou	ppapadim@geol.uoa.gr	9
University of Patras	Greece	Efthimios Sokos	thimios@geology.upatras.gr	9
Dublin Institute for Advanced studies	Ireland	Chris Bean	chris.bean@ucd.ie	11
University of Ljubljana	Slovenia	Bojan Stopar	bojan.stopar@fgg.uni-lj.si	10
Lantmäteriet	Sweden	Martin Lidberg	Martin.Lidberg@lm.se	10
University of Bristol	United Kingdom	Jo Gottsmann	j.gottsmann@bristol.ac.uk	11
University of the Azores	Portugal	Teresa Ferreira	teresa.jl.ferreira@azores.gov.pt	11
Osservatorio Geofisico Sperimentale di Trieste	Italy	David Zuliani	dzuliani@inogs.it	10
Lab Nacional de Energia Geologia	Portugal	Rita M.M. Caldeira	rita.caldeira@lneg.pt	16

3.3. EPOS IP Workflow and Timeline

The work-plan of the EPOS IP project is composed of three main activity areas:

- ***Management*** (WP1)
- ***Communication*** **and** ***Harmonization*** (WP2 and WP3, respectively)
- ***Service Implementation*** organized in:
  - Legal and Governance, and Financial framework (WP4 and WP5, respectively)
  - TCS-ICS Interoperability and ICS development (WP6 and WP7, respectively)
  - Thematic core services implementation (WPs 8-17).

The graphical representation of the EPOS IP project structure is illustrated in Figures 3 and 4.

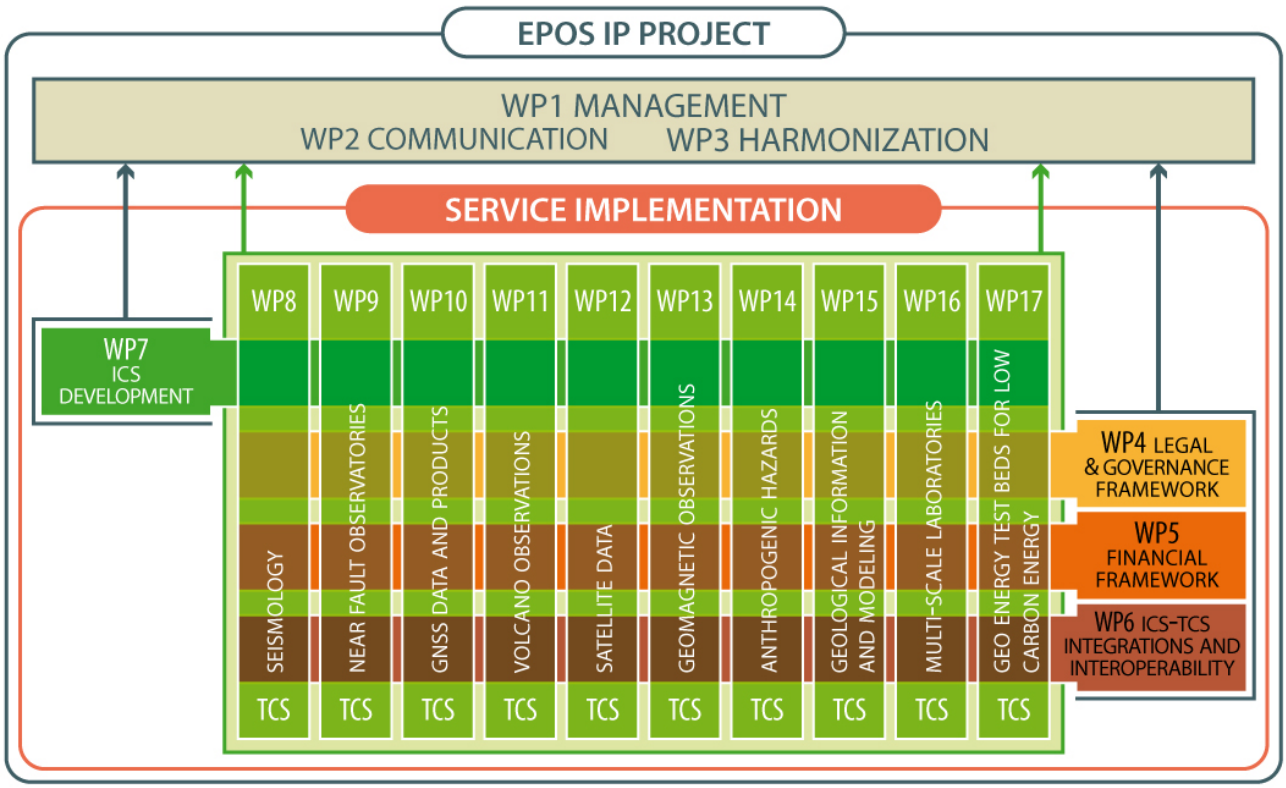

***Figure 3**. The EPOS concept and structure.*

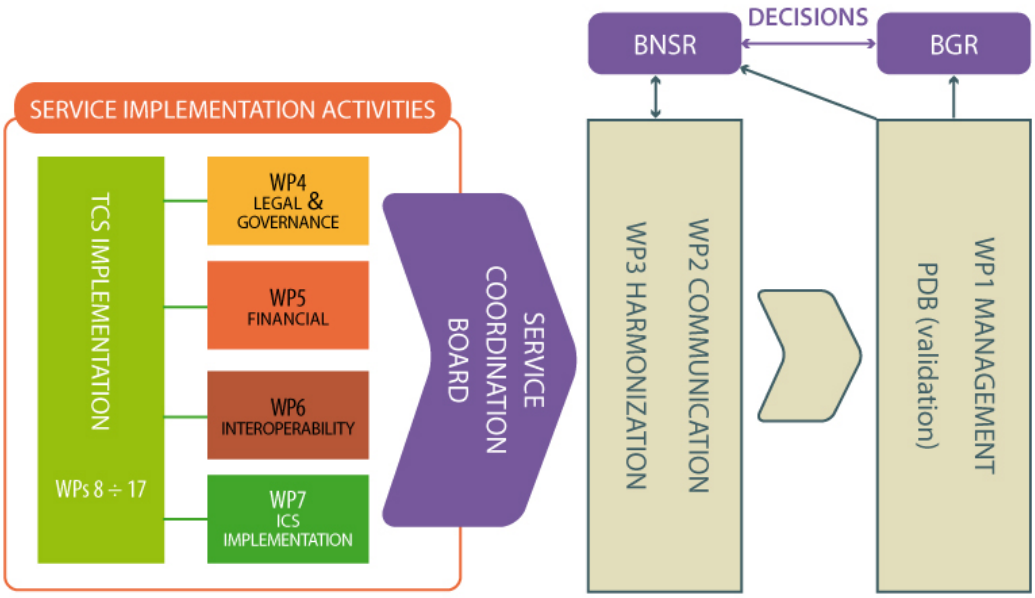

***Figure 4**. The EPOS workflow for the three main activity areas: service implementation, harmonization and communication, and management.*

Ten TCS work packages (WPs 8-17) are implementing the data provision and the associated services listed in the Grant Agreement, making them interoperable with the ICS and ready for integration into the EPOS-ERIC from a legal and finncial point of view.

Each TCS will be coordinated in one of the dedicated WPs (vertical green pillars in Figure 3) and identify the contributions of the different participating communities as follows:

- WP8: services and data provision for Seismology;
- WP9: coordination of Near-Fault Observatories and implementation of multi-disciplinary data service;
- WP10: services and data provision for the GNSS community;
- WP11: services and data provision for Volcano Observatories;
- WP12: services and products for Satellite Earth Observations;
- WP13: implementation and integration of Geomagnetic Observations services;
- WP14: implementation of services and data access in the field of Anthropogenic Hazards;
- WP15: coordination and implementation of services and data provision for Geology;
- WP16: implementation and integration of data and services from Multi-scale Laboratories;
- WP17: coordination of the implementation of the Geo-Energy Test Beds.

To facilitate coordination, each TCS WP includes specific tasks common to all TCS WPs (Figure 5) dealing with:

  - strategic activities and governance, requiring delivering of information and achievements to WP4 and WP5;
  - coordination and interaction with the community contributing to the EPOS communication strategy following the plan elaborated in WP2;
  - interoperability with ICS, in which collaboration with WP6 and WP7 is guaranteed and coordinated.

These common tasks will ensure an effective workflow towards the transversal WPs in charge of the overall EPOS integration and implementation of the architecture (WPs 4, 5, 6 and 7).

The coordination of TCS implementation with WP2 and WP3 and with the four transversal WPs represents the key element of the service implementation in EPOS.

The *Service Coordination Board* (**SCB**) will then ensure that all activities associated with the service implementation (see Figure 4) will be discussed and endorsed for communication through WP2 and for validation in WP1 and WP3, anticipating the ERIC governance model.

This approach will guarantee an effective workflow to move forward the sustainability of the EPOS implementation.

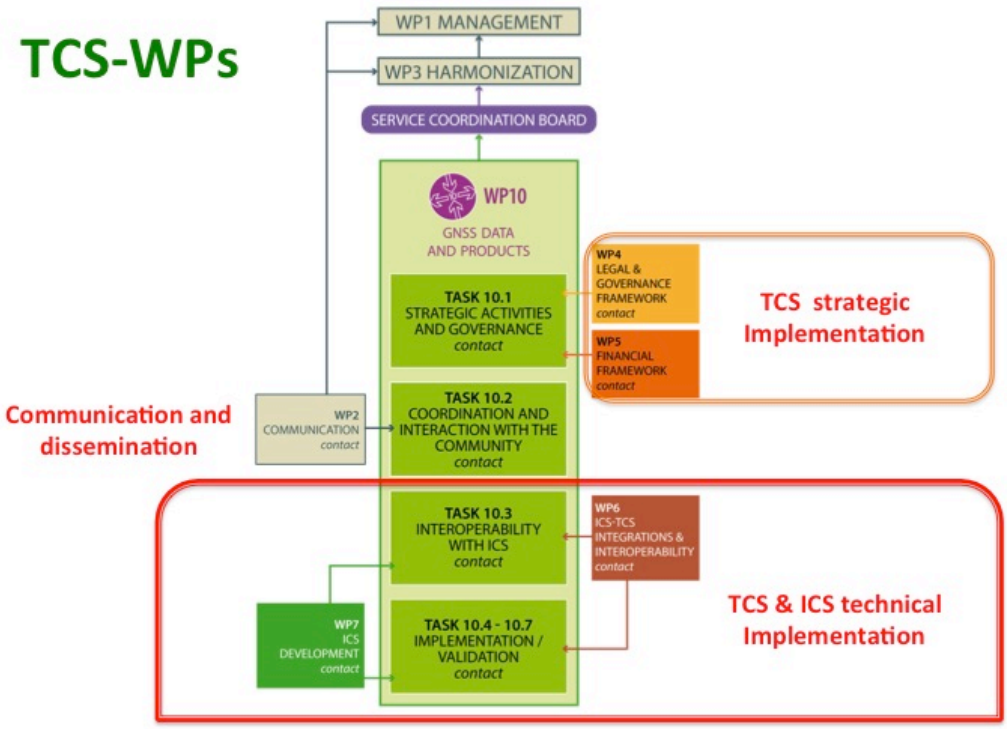

Figure 5. *TCS-WPs structure to manage implementation (WP10 example)*

The timeline for the EPOS implementation (Figure 6) is of particular importance for describing the workflow and defining the EPOS IP roadmap.

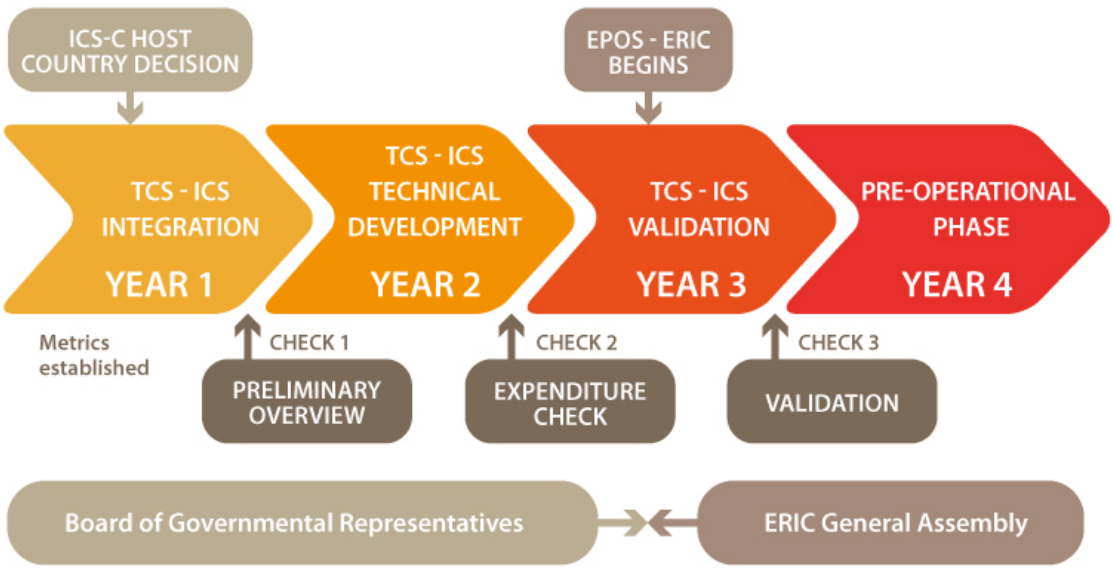

Figure 6. *EPOS timeline for implementation*

There will be three checkpoints preceding the pre-operational phase planned at the fourth year of activity. The first check is scheduled at the end of the first year (M12) and it consists of a preliminary overview of the project aimed at managing the risks, verifying the proper transfer of information and requirements within the service implementation activity plan, as well as checking the progress in implementing services and data provision and including the associated legal, governance and financial implications.

Year 1 of EPOS IP will be dedicated to:

- implementing individual TCS with the objective of integrating them with the ICS;
- implementing the compatibility layer and develop software for guaranteeing interoperability;
- collecting information on the legal, governance and financial framework for each TCS;
- collaborating with experts from the ICS-C host country, which will be selected by BGR under the coordination of the ERIC interim office, to start the construction of the ICS;
- establishing the metrics for EPOS IP impact assessment and TCS validation;
- disseminating the results and further engage scientists and other stakeholders;
- discussing the EPOS IP roadmap and preliminary achievements with the BNSR to foster harmonization with national priorities;
- presenting the roadmap toward construction to the BGR (ERIC-GA) for approval.

The second and more important checkpoint is scheduled at the end of the second year (M24). This will consist of a verification of expenditure, to verify that the project is managed in an efficient and timely fashion and that all the planned deliverables and outcomes are ready to start the validation phase. It will also consists in a validation of service implementation to assess their progress and capability to enter into the validation phase planned in Year 3.

Year 2 of EPOS IP will be dedicated to:

- assessing the progress in TCS implementation, their scientific relevance to EPOS, and the readiness for validation;
- assessing the TCS-ICS interoperability and the readiness for building integrated services;
- verifying the progress in the legal, governance and financial framework for TCS implementation;
- fostering harmonization with the BNSR and BGR (ERIC-GA) for discussing national commitments to EPOS;
- finalising the first report on EPOS IP impact assessment;
- launching the TCS-ICS service validation with those services that will be ready.

The last and final check is planned at the end of the third year (M36). This will consist of both, an expenditure verification, to verify that the project is efficiently managed for the timely delivery of outcomes, and an assessment of progress and impact to verify that the implementation phase has

reached the maturity to enter in the final pre-operational phase. It is expected that during the third year of the EPOS IP project, the EPOS-ERIC will enter into force. This implies that the ERIC GA will progressively substitute the BGR for deciding the EPOS operational phase. This transition will be managed by the EPOS-ERIC Interim Office, together with the EPOS IP Project Management Office and will ensure that all countries are kept involved in the design of the operational phase. The third year will also be crucial to discuss with national governments how the EPOS IP achievements will actually match national strategies and priorities. This will be a fundamental step toward the full establishment of the ERIC and the starting of the pre-operational phase with the perspective of opening the EPOS operational phase at the end of EPOS IP.

Year 3 of EPOS IP will be dedicated to:

- performing a final check of the expenditure together with an impact assessment of the new infrastructure;
- verifying the TCS-ICS interoperability discussing the validation phase to start testing of operational activities;
- discussing with BNSR and BGR (ERIC-GA) the national support to EPOS and the TCS legal and financial commitments;
- planning the final pre-operational pilot phase to finalize EPOS IP.

The last year of EPOS IP will be dedicated to the pre-operational phase from a technical point of view and to finalize the governance, legal and financial achievements to present the revised EPOS sustainability plan to the ERIC GA. This will involve both organizational aspects and technical operation. This pre-operational phase can be considered as a demonstration phase to convince the national governments, the users and the scientific communities that the new integrated services work as planned. The dissemination plan for the successful pre-operational phase will be essential to foster the full exploitation of the results. Outreach and promotion initiatives as well as brokering events with key stakeholders will be organized during the last year of activity. Year 4 of EPOS IP will be dedicated to:

- demonstrate the operational performance of the new TCS-ICS platform and test its impact;
- disseminate and promote the integrated infrastructure with specific stakeholders including industry;
- discuss the sustainability plan with BGR and inclusion of implemented services in EPOS-ERIC;
- launch the operational phase.

The work plan described above is represented with the flow of activities illustrated in the GANTT diagram included in the Description of Activities (DoA) of the EPOS IP Grant Agreement.

4. THE MANAGEMENT STRUCTURE

The management of EPOS IP will guarantee that the project's activities are properly coordinated with the appropriate level of contractual, ethical, financial and administrative organisation by the consortium and it will ensure that they are run and completed timely and with the necessary resources. The EPOS IP management relies on the effective operational project coordination strategies provided and improved upon during the preparatory phase.

The decision-making structure has been designed to make it conform to the specific needs of the implementation phase. The Project Management Plan has been designed in order to address:

- principles, structure and organization of the project governance;
- structure and organization of the management (budget control, strategic planning, reporting, committees, decision making processes);
- quality management of project organization and impact assessment;
- interactions and effective communication with the different boards.

The management of the project will rely on the **Project Management Office (PMO**), which has been established by the Coordinator (INGV). It will assist the Project Coordinator in managing the project including the appointment of the strategic boards identified to ensure a clear decision-making approach. The PMO will also assist the project coordinator to manage the coordination between EPOS IP project and the EPOS-ERIC Interim Office in charge of harmonizing the activities for the legal establishment of the EPOS-ERIC.

4.1. Role and composition of PMO

The PMO is composed by the Project Coordinator, the Project Director and three units as follows: scientific-technical unit, administrative unit, internal communication unit (Figure 7).

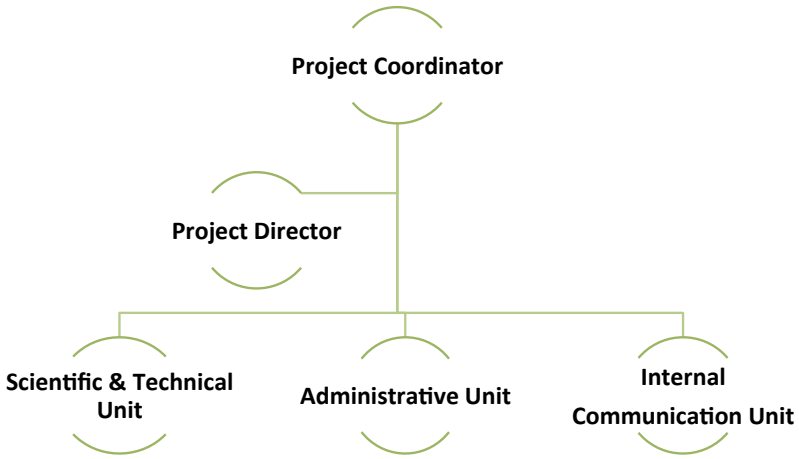

Figure 7. *Structure of the EPOS Management Office*

The **Project Coordinator (PC)** is responsible for the global coordination and organization of the activities and for managing the project at strategic level. As Chair of the PDB and member of the IPC and SCB, the PC is responsible for the successful and timely progress of the project by monitoring risks and ensuring the effective contribution to the EPOS construction. The PC is the contact person for the BGR for the constructive management of the whole implementation phase.

The **Project Director (PD) i**s the project's point person, responsible for the successful delivery of all outputs (deliverables and milestones) to guarantee that the project progresses on time and on budget. The PD will orchestrate and harmonize the interactions among work packages coherently with the EPOS IP structure.

The **Scientific & Technological Unit (STU)** is in charge of organizing the scientific and technical management, the successful submission of deliverables and the achievements of milestones to control project reporting. The STU will guarantee expertise and human resources for project managing as well as for organizing the PDB, SCB and IPC meetings, assisting the PC for the interactions with the EPOS IP Advisory Board (AB). The STU will monitor the whole project management from the technical point of view.

The **Administrative Unit (AU)** is in charge of the financial reporting to the EC and of the interactions with beneficiaries for all issues related to project budget and administrative issues. The AU will guarantee expertise and human resources for the financial management of the project, coherently with the GA and CA. The AU will monitor the whole project management from the financial point of view.

The **Internal Communication Unit (ICU)** is in charge of the communication between the PMO, the different project boards and the beneficiaries in order to monitor the efficacy and the well-timed circulation of information within the project. The ICU will guarantee expertise and human resources for verifying internal communication and the appropriate engagement of the partnership. The ICU will measure the internal communication for reporting as well as for risk management.

The PMO will interact with the EPOS-ERIC Interim Office to harmonize the implementation of activities of relevance for the legal establishment of the ERIC. In its current composition the PMO includes all the necessary expertise for guaranteeing an effective management of the project. The PMO is made up of 8 persons for a total of 4.5 FTE.

5. THE MANAGEMENT PROCEDURES

The EPOS IP management is coordinated in WP1 as described in the Grant Agreement. The overarching objective of WP1 in EPOS IP is the management of the project from technical, administrative, and financial points of view, with the final goal of delivering the EPOS IP project on time and within budget. WP1 is organized as an office led by the project coordinator assisted by the project director and involving skilled staff, including scientific, financial, and communications

managers, forming the Project Management Office (**PMO**).

The PMO activities rely on management procedures suitable to:

- enable an effective and efficient project management which also includes maximization of the scientific and socio-economic impact of the infrastructure;
- operate an adequate risk management process, including taking corrective steps for services which are not adequately progressing in implementation and preparation for the EPOS-ERIC;
- drive the consortium toward the implementation of thematic services and their integration in the new RI;
- ensure coordination with EPOS-ERIC and the BGR.

These procedures have been designed to facilitate the operational management of the project by guaranteeing the optimal and on time transfer of information between partners and a feasible risk management.

5.1. Standard procedures

The PMO has adopted standard procedures for its duty as well as for coordinating the activities directed, managed or overseen by the PDB.

The PMO has proposed standard procedures to:

- coordinate workflow and timeline of activities planned in WPs and associated with tasks, deliverables and milestones
- organize meetings of the project boards (PDB, IPC, AB, SCB) as well as meetings for interacting with the EPOS IP partnership and the communities
- manage financial issues and administrative duties coherently with H2020 standards
- adopt an effective internal communication coherent with WP2 activities for external and strategic communication
- manage human resources and expertise to foster a full exploitation of results.

These procedures rely on the tools provided by the European Commission in H2020, the practices provided by INGV as Coordinating Institution (the Coordinator) for financial administration and on specific management and communication tools developed in the project and adapted to the EPOS IP needs.

5.2. Tools for management and communication

The general presentation of the EPOS enterprise including its effective management of the implementation phase is delivered through the new EPOS website redesigned by using skills of experts external to the project. The new EPOS web portal will give access to the new intranet

where each WP, including WP1, has its own reserved area dedicated to project management. The EPOS Web portal represents deliverable D2.3 planned at M3.

The intranet includes new communication tools such as discussion threads, file repository, calendars, event organization tool, teleconference tool and management tool. They will be discussed in detail in the EPOS Communication Plan (Deliverable D2.1 released at M6). These communication tools will facilitate the meeting organization, the circulation of documents and reports as well as the establishment of a collaborative framework for discussions.

The PMO is also going to use a further management tool purchased by a private company in order to make the management increasingly collaborative within the PMO itself, embracing remote workers and allowing the adjustment of planning in real time. This will facilitate the control of deliverable elaboration, milestone achievements and timely progress toward the service implementation. This tool will be accessible to all WP Leaders to monitor and manage their commitments.

Dedicate mailing lists will be also created and managed through the new communication platform in order to facilitate messaging and contacts, avoiding the misuse of emails and indicating clear contact points and email addresses for each unit forming the PMO. This will be described in a summary document, called EPOS IP Management in a nutshell, that will circulate soon within the EPOS IP partnership.

5.3. Means of verification

The adoption of IT tools for management and internal communication will provide means for verification of the workflow and its timeline as well as for the assessment of the EPOS IP project on time delivering.

The adoption of key performance indicators will allow the assessment of the impact of internal communication, coherently with criteria and approaches adopted in WP2 (*Communication*).

The creation of a EPOS IP Calendar where meetings and workshops are listed well in advance their occurrence will facilitate circulation of information and participation to project initiatives.

5.4. Risks

The EPOS IP risk management framework has been established to ensure that the project progresses smoothly towards the operational phase. This process aims at identifying, analysing and prioritizing risks inherent in the project and then determining the appropriate actions to eliminate or mitigate their effects. A three-level system is being used: The EPOS Risk Management Policy sets out the principles, outlines the priorities, and instructs the project executive to put in place and to follow the EPOS Risk Management Plan; The Policy and Plan are supported by a dynamic EPOS Risk Register, which is regularly reviewed by the PDB.

The Risk Management Policy will provide the overarching "ground rules" and will be presented to the BGR and IPC for their approval. It will affirm the EPOS commitment to risk management, assigns responsibilities, and set out the EPOS priorities. The Risk Management Policy document will be based on the text produced by the EPOS preparatory phase. The Risk Management Plan will cover the processes and activities to be undertaken in order to give effect to the Risk Management Policy. The Risk Register will comprise a frequently updated database listing all the identified risks, a current assessment of the threat(s) they represent to the success of EPOS, the entities responsible for taking appropriate action, the potential action, and its current status. The PDB will be responsible for regular review of the potentially most significant threats and informing the PMO of its decisions and measures taken to mitigate these risks. The Risk Management Plan and the first release of the Risk Register represent a WP1 deliverable. To evaluate which are the critical risks associated to these services and their generation process, the cycle described in Figure 8 has been used.

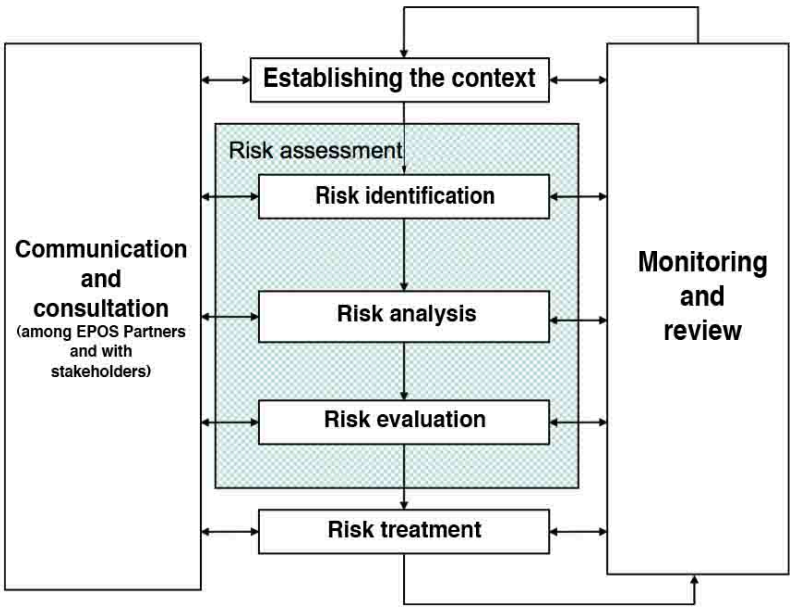

***Figure 8**- Cycle of risk assessment*

In order to identify the potential seriousness of the risk, the following five-point scale is used:

Scale	Likelihood of occurrence	Impact
Very Low	Unlikely to occur	Negligible impact
Low	May occur occasionally	Minor impact on time, cost or quality
Moderate	Is as likely as not to occur	Notable impact on time, cost or quality
High	Is likely to occur	Substantial impact on time, cost or quality
Very High	It is almost certain to occur	Threatens the success of the project

Table 2: *EPOS IP Critical Risks*

Description of Risks	WP	Potential Impact	Mitigation
Technical Risks			
Failure to successfully implement thematic services for EPOS integration	**SCB**	Poor provision of data, products and services; lack of elements of the EPOS infrastructure related to Thematic Core Services	Monitor TCS implementation status by PDB; guarantee efficiency to SCB; perform progress assessment and reports; introduce dedicated user-feedback reports
Failure in making TCS interoperable with ICS	**SCB WP 6**	Poor integration; ICS not attractive to users	Monitor TCS implementation status by PDB; guarantee efficiency to SCB; perform progress assessment and reports
Financial Risks			
Underestimation of real implementation costs	**WP5 WP3 PDB**	EPOS RI too expensive; lack of financial sustainability; failure to secure sufficient funding to move to construction phase	Update and revise the business plan; revise the cost assessment and the funding model; expenditure check
Underestimation of the resources, including expertise and human resources, to build the new e-infrastructure	**WP1 PDB**	Modest progress in the implementation phase; failure in respecting the timeline of implementation phase	Guarantee the allocation of necessary human resources and available skills, efficient project management and realistic progress assessment toward operation
Strategic Risks			
Failure to engage governments and convince them to prioritize EPOS within their national programmes	**WP3**	Lack of financial resources for M&O of implemented services; lack of in-kind contributions to EPOS RI	Monitor the interest of Governments through the involvement of BGR and the engagement of appropriate stakeholders
Failure to engage users and stakeholders to foster a full exploitation of services and products	**WP2 TCS-WPs**	The proposed infrastructure does not meet the user needs; poor impact of the new infrastructure	Revise and check Communication Plan; improve impact of dissemination; check impact assessment and science cases
Failure to demonstrate the EPOS impact on science	**WP2 WP3**	Poor access to data and/or poor quality of data and services	Update the EPOS science case; engage users to check the attractiveness of the EPOS RI for new science opportunities; improve communication
Failure to engage countries to support the wider EPOS mission	**WP1 WP3 WP2**	Few countries signing the ERIC; increase of individual membership fees for ERIC	Verify and strengthen the impact of harmonization with National Priorities; guarantee effective role to BNSR and BGR
Spreading the available resources, and especially human resources, too thinly	**WP1**	Failure in maintaining the planned workflow and timeline	Guarantee efficient and appropriate management; check the on time delivering of achievements and information
Over-dependence on key individuals	**PDB**	Lack of community building, poor involvement of partners	Adopt a management plan feasible to the complexity of the enterprise
Reduced visibility and impact	**WP2**	Failure in maximizing the impact	Verify and strengthen communication and dissemination strategy and activities; guarantee the full exploitation of results

A Risk Assessment Report will be prepared by PMO and approved by the PDB in the framework of the WP1 activities. The report will rely on the Risk Register and the assessment of exposure for each identified risk. The risk assessment report will be prepared based on a pre-defined scheme including: (i) risk number, (ii) brief description of the risk, (iii) who identified the risk, (iv) likelihood of occurrence, (v) potential impact, (vi) resulting exposure, (vii) urgency of mitigation, (viii) person(s) responsible for mitigation (risk owner), (ix) mitigation plan and (x) who will verify the effects of mitigation actions. A crucial step in risk management is the identification of critical risks. We group these critical risks in three categories: strategic, financial and technical risks as reported in Table 2.

5.5. Ethics

EPOS fosters the integrated use of multidisciplinary solid Earth data to improve our understanding of physical and chemical processes controlling earthquakes, volcanic eruptions, unrest episodes, tsunamis as well as those driving tectonics and surface dynamics. The final goal of EPOS is, therefore, the scientific progress. Indeed, EPOS deals with science: its contribution to security and safety consists in promoting and stimulating progress in science. Although some of the national RIs generating the data that EPOS is going to integrate also operate for civil protection purposes, EPOS is not committed with the surveillance of national territory neither in Europe nor in other regions of the world. EPOS will ensure scientific data integration and access to data and services for diverse stakeholders, including but not limited to solid Earth researches, but it will not interfere, at any level, with surveillance and emergency planning.

By dealing with planet Earth data, EPOS must have a global perspective, yet not being a global RIs. EPOS is committed to integrate data and services generated by European RIs. In this endeavour, EPOS is cooperating with other non-EU, global initiatives by sharing vision and mission within international programs (such as those fostered by the Group on Earth Observations, GEO). In this perspective, EPOS is going to respect and apply ethical standards as well as data sharing and access policies compliant with Horizon2020 principles, regardless of the country in which the data are produced. Indeed, EPOS is following appropriate data and access policies, which have been elaborated during the preparatory phase and will be implemented during the next implementation phase project. The data policy, which gives particular attention in respecting intellectual property rights (IPR) of data providers, has been shared among the scientific community and discussed with the Board of Governmental Representatives (BGR). The BGR and the external ethics board (see below) will monitor that open access data policy and IPR will be continuously respected. During the EPOS Implementation Phase Project, WP4, which deals with legal and governance issues, will specifically take under control these aspects (D4.2 and D4.4) including any relevant data protection provisions and report on changes in legislation that will be set in place in Europe during the project lifetime. Moreover, ethics reports will be included in the EPOS IP management (WP1) in order to have periodical reporting and control of these issues.

EPOS IP planned activities will not produce any negative impact neither on the environment nor on the health of the involved researchers. Therefore, EPOS is not generating ethics issues concerning environmental protection and safety. Specifically, EPOS is not going to perform deep drilling geothermal experiments; rather EPOS is going to integrate existing data, which have been generated during scientific drilling experiments. These data already exist: EPOS goal is to make them discoverable and, when possible, achievable to a broader scientific community. Similarly, EPOS aims at providing access to existing anthropogenic hazards data (e.g. induced seismicity) as well as at creating a virtual research environment providing scientists with data (not in real time) and processing and modelling tools currently used for anthropogenic hazards assessment. EPOS is only committed to communicate the implications of scientific investigations and results clearly and comprehensively, including a clear assessment of the associated uncertainties, to scientists inside and outside its community, to policy makers and to the public, while avoiding advocacy based on their authority as research infrastructure. Indeed, EPOS has no commitment in monitoring and reporting and/or communicating to stakeholders anthropogenic hazards and risk related to geo-resources exploitation activities. However, the external ethics board will be asked to identify and advise on any possible misunderstanding on the role of EPOS as well on any possible misuse of data or information from EPOS.

EPOS will undertake actions to prevent misuse associated with access to solid Earth data and services. This will be done by:

- Ensuring proper cyber-infrastructure security through novel and effective IT solutions
- Adopting access policies to data, services and facilities that will require registration, authentication and authorization (including licencing and respecting Intellectual Property Rights)
- Implementing appropriate IT solutions approaches for data curation and preservation
- Establishing an external board dedicated to monitor and manage ethics issues.

Security issues related to data and services will be managed during the project as described above. Particularly attention will be given to distinguish between science communication through dissemination and training and risk communication.

Other ethics issues concern the Governance in general. EPOS ERIC will be established during the EPOS IP lifetime. An external Ethics Board has been envisioned in the EPOS ERIC Governance Model. Moreover, the BGR will establish its own external advisory board now in order to manage ethics issues and conflict of interests. This will ensure the monitoring of documents with ethics relevance, such as Statutes, Data Policy and Access Rules. However, the BGR, as the decision body of the EPOS implementation phase, and the forthcoming General Assembly, as the decision body in EPOS ERIC, will monitor and guide the management of ethics issues benefiting of advise from the external advisory board.

Furthermore, the EPOS IP project will nominate its own Advisory Board (EPOS IP AB), which is in charge to monitor and report criticalities in Ethics Issues and Risk Management. The PDB has also

decided to establish a specific Working Group on Ethics Issues, which in the framework of EPOS IP will elaborate a document to define the landscape and the strategies for managing ethics issues associated with TCS-ICS service implementation and data provision.

Finally, WP1 has to elaborate a deliverable to be submitted at M3 (D1.7) concerning risks, security and ethics issue. This report will be provided to the WG on Ethics Issues as an initial contribution to their task and commitment.

6. CONCLUSION

The EPOS IP Project Management Plan here described represents a further development of the management structure envisioned in the EPOS IP Grant Agreement (DoA). The members of most of the boards have been appointed and a plan for ensuring the necessary human resources and skills to the PMO is now finalized. The PMO is operational since the beginning of the project. Indeed, during the kick-off meeting, held in Rome on October 5, 6 and 7, both the first PDB and IPC meetings were successfully organized and conducted. The minutes of the meeting have been already circulated corroborating the operational capacity of the PMO.

The Risk Management Plan and the Deliverable D1.7 will further integrate the project management plan presented in this report.