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**Project proposal – Technical description (Part B)**

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## Proposal template Part B: technical description

### GREEK SPACE GEODESY EXCELLENCE CENTRE (CORSAIR)

[This document is tagged. Do not delete the tags; they are needed for processing.] #@APP-FORM-HECSA@#

#### List of participants

Participant No. *	Participant organisation name	Country
1 (Coordinator)	National Technical University of Athens (NTUA)	Greece
2	Chalmers Tekniska Hogskola AB (OSO)	Sweden
3	Collecte Localisation Satellites (CLS)	France
4	Institut de physique du globe de Paris (IPGP)	France
5	DeutschesGeoForschungs Zentrum (GFZ)	Germany

#### 1. Excellence #@REL-EVA-RE@#

##### 1.1 Objectives #@PRJ-OBJ-PO@#

###### 1.1.1 Space Geodesy and Earth Observation

Space Geodesy is a rapidly evolving multidisciplinary scientific field, playing a crucial role in a series of applications and research areas, including Earth monitoring, navigation and positioning, climate studies, earthquake and volcano monitoring, spacecraft navigation, Earth's interior and geodynamics and astronomy. It lays the fundamental groundwork for the exploitation of data collected from Earth orbiting satellites via its unique ability to provide precise modeling of satellite trajectories (i.e. Precise Orbit Determination (POD)), accurate observations and models for the Earth's rotation and orientation, as well as spatial reference frames of the utmost quality. In essence, Space Geodesy provides the fundamental data and models that underpin various scientific, environmental, and practical applications essential for our understanding of Earth and space. Observing the Earth system through space is in essence an exercise of Space Geodesy.

The ever-increasing number of earth orbiting satellite missions accompanied with an ever increasing need for improved accuracy (e.g. climate change studies) have in recent years upgraded Space Geodesy's role, placing it at the core of Geosciences. In 2020, the geoscience community has fixed an objective of 1mm accuracy and 0.1mm/yr stability for the terrestrial reference frame realization, a goal still to be reached. Exciting new missions, such as the ESA GENESIS mission utilizing multiple space geodetic techniques ("space-ties"), EUMETSAT Sentinel series and the Surface Water and Ocean Topography (SWOT) mission among others, are evidence of the promising future and renovated importance and expectations in the field.

ESA's most ambitious Earth observation program to date, COPERNICUS, headed by the European Commission, heavily depends on and contributes to Space Geodesy. The GEO international partnership<sup>1</sup> and its Global Earth Observation System of Systems (GEOSS) initiative as well as the Global Geodetic Observing System<sup>2</sup> (GGOS), both established in the last two decades, underpin the global interest in advancing our understanding of the dynamic Earth system by quantifying our planet's changes in space and time.

The aforementioned global initiatives and prospects, as well as the growing importance, impact and attention drawn in Space Geodesy, affirm a flourishing research field with a key role in technological and scientific advance.

###### 1.1.2 NTUA and Space Geodesy in Greece

Space Geodesy can also provide crucial insight on a regional scale. Greece lays on a region of exceptional interest for a series of Geoscience fields, constituting in essence a "physical laboratory"; tectonic deformation is inhomogeneous and among the largest in rate within Europe, seismic events are often and

<sup>1</sup><https://www.earthobservations.org/index.php>

<sup>2</sup><https://ggos.org/>

large in magnitude and a series of active volcanoes are spread throughout the country, posing both a public threat as well as unique research opportunities. Space Geodesy is the key in understanding such processes, via its unmatched crustal monitoring capabilities and is thus used by a number of Greek institutes involved in such studies. However, the latter are mere “consumers” of Space Geodetic products and results, a fact that severely undermines their research initiatives, independence and impact. The presence of a dedicated center of excellence for Space Geodesy in the country, could significantly enhance the R&I capacity of this national ecosystem.

The Coordinator, via its School of Rural, Surveying and Geoinformatics Engineering, is the oldest and most prestigious institution in Greece providing a curriculum in the field of Geodesy. In the dawn of the Space Geodesy era, NTUA via its Dionysos Satellite Observatory (DSO) laboratory, had played a significant role in the field, involved in a series of novel observational techniques, including astrometric data and laser ranging measurements. However, in recent decades, NTUA’s contribution in the field has lagged behind, while at the same time Space Geodesy has moved forward on a rapid pace. Accordingly, its involvement in international services and consortia has degraded. This string of events has caused NTUA’s research capacity to fall behind currently leading institutes in the field, and its research profile to shrink. In turn, this capacity gap undermines its ability to successfully apply for research proposals and thus secure funding for its research activities and recruitment needs. Unfortunately, NTUA’s international standing has been impaired, and currently does not constitute an appealing destination for young, talented scientists that want to thrive in the field of Space Geodesy.

The technological and research gap is evident in all Greek institutions involved in the field. Relevant studies are usually constrained to regional scale, producing scientific results of limited impact. Synergies both between these institutions and their international peers are intermittent and often incidental, lacking long-term planning and well defined objectives. Research capacity is limited and severely constrained by lack of expertise, a skilled workforce in state-of-the-art methodologies and a low international standing. This gap reflects also in the limited involvement of Greece in one of the fastest blooming technology markets internationally, that of Space science. Lack of expertise and a modern knowledge hub in the field are definitely factors that should be swiftly addressed to reverse the current situation.

### 1.1.3 CORSAIR Objectives

CORSAIR aims at creating a Center of Excellence for Space Geodesy in Greece, hosted by the Coordinator, with the crucial contribution of leading experts in the field. Twinning partners are hand-picked prestigious internationally leading experts in a series of Space Geodetic techniques, collectively constituting the fundamental observational techniques of Space Geodesy. Through the synergy with these institutes, NTUA will be able to:

- Significantly enhance its research capacity and gain expertise from world-leading scientists in the field, achieving scientific excellence and producing its own state-of-the-art software tools that will allow it to establish a key role in the future of Space Geodesy on an international level.
- Mitigate the technological/scientific gap with its partners, transforming it to an attractive center of excellence for new scientists, a center of excellence and innovation in the field of space-based geosciences.
- Significantly increase its international standing and visibility in the international research community. Create a network of collaborators, get involved in high-caliber international consortia and establish synergies with distinguished research institutions. Such strategic networking will assist NTUA in maintaining a long-term role in Space Geodesy and a long-term involvement in the research frontiers of the field.
- Create a dedicated unit trained in research project claiming and management and boost host’s success rate in research funding bids. Enhance the host’s capacity and efficiency in partnership-building, preparation and carrying out of research proposals funded by a series of diverse grant pools. Increase financial support capabilities for its research activities and its ability to attract and recruit talented young scientists.
- Establish a national ecosystem of space-based geosciences; promote R&I, networking and dissemination of expertise and advancements. Boost Greece’s involvement and role in the space and earth observation fields.

**Table 1: CORSAIR Objectives**

Objective	Involved WP	Key Performance Indicator
<b>Improving excellence capacity</b>		
Creation of highly skilled scientific workforce (Coordinator)	WP3 to WP5	<ul style="list-style-type: none"> <li>• Number of host institute staff trained</li> <li>• Number of host institute staff involved in software development</li> <li>• Number of training events attended (not organized by CORSAIR)</li> <li>• Number of host institute staff co-authoring scientific publications</li> </ul>
Recruit and train new/young scientists	WP3 to WP5	<ul style="list-style-type: none"> <li>• Number of PhD and PostDoc students trained</li> </ul>
Research capacity enhancement via in-house software & reaching scientific excellence	WP6	Release of software tools to accommodate: <ul style="list-style-type: none"> <li>• analysis of DORIS observations</li> <li>• analysis of SLR observations</li> <li>• state-of-the-art handling of EOPs</li> </ul> Software validation by expert partners and released online <ul style="list-style-type: none"> <li>• number of satellite missions in validation tests</li> <li>• quality of results compared to expert partner's software tools</li> </ul>
<b>Raised reputation, research profile and attractiveness of the Coordinator</b>		
Involvement of NTUA in the future of Space Geodesy	WP7	<ul style="list-style-type: none"> <li>• Number of international geodetic services and consortia in which NTUA will get involved in</li> <li>• Degree of and role in involvement</li> </ul>
Attractive center of excellence for young scientists	WP6	<ul style="list-style-type: none"> <li>• Number of applicants for PhD, PostDoc and (possible) tenure open positions</li> <li>• Number of funding bids submitted including scholarships</li> <li>• Success rate of funding bids submitted</li> </ul>
Increase host's international standing and visibility	WP5 to WP9	<ul style="list-style-type: none"> <li>• Number of conferences/workshops attended</li> <li>• Number of scientific publications in high-impact journals</li> <li>• Impact factor of scientific publication</li> <li>• Level of involvement in consortia (e.g. IAG and GGOS)</li> <li>• Number of users of software released</li> </ul>
<b>Increased mobility (inwards and outwards) of qualified scientists</b>		
	WP3 to WP8	<ul style="list-style-type: none"> <li>• Number of Coordinator staff visiting CORSAIR partners</li> <li>• Number of partner staff visiting NTUA</li> <li>• Mobility activities included in submitted research proposals</li> </ul>
<b>Strengthen research management, administrative and funding capacity of the Coordinator</b>		
	WP6	<ul style="list-style-type: none"> <li>• Number Coordinator staff trained (research administration unit)</li> <li>• Number of research proposals submitted</li> <li>• Diversity of funding pools targeted</li> <li>• Success rate of funding bids submitted</li> </ul>
<b>Establish a Greek ecosystem of space-based geosciences and promote R&amp;I</b>		
	WP7 to WP9	<ul style="list-style-type: none"> <li>• Number of stakeholders present in info-days and meetings.</li> <li>• Number of stakeholders included in research proposals submitted</li> <li>• Number of stakeholders subscribed to the CORSAIR newsletter</li> <li>• Number of stakeholders accessing online training material</li> <li>• Number of attendees in the Summer School</li> <li>• Number of high-schools and STEM members visiting DSO</li> </ul>

#\$PRJ-OBJ-PO\$#

**1.2 Coordination and/or support measures and methodology** #@CON-MET-CM@# #@COM-PLE-CP@#**1.2.1 General Concept and Overview**

Building a Center of Excellence for Space Geodesy in Greece is based on three fundamental pillars, which determine the methodology to be followed to achieve the proposal's objectives. The first pillar is the significant enhancement of the Coordinator's research capacity via staff training to create a highly skilled work force and in parallel build a state-of-the-art software toolset. The latter, accompanied with skilled personnel, constitutes an invaluable asset towards achieving scientific excellence.

A second pillar is the strengthening of research management capacity and administrative skills of the Coordinator institute via the establishment and training of a dedicated unit. This task also aims at significantly broadening possible funding pool options available to or targeted by the Coordinator.

Finally, a third pillar focuses on networking activities and involvement of the Coordinator in international, high prestige consortia, raising NTUA's reputation and visibility. Additionally, a Greek space-based geosciences ecosystem will be established, aiming at promoting R&I and collaboration of stakeholders on a national level.

**1.2.2 Enhancing Research Capacity and Achieving Scientific Excellence**

Modern Space Geodesy input is based on four fundamental observational techniques, namely Global Navigation Satellite Systems (GNSS), Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS), Satellite Laser Ranging (SLR) and Very Long Baseline Interferometry (VLBI). These four techniques constitute the pillars of modern Space Geodesy providing the crucial dataset to study the Earth system and its variations.

During the last few decades, a long list of modeling improvements has taken place that allow for sophisticated and robust processing methodologies and yield precision analysis products. Implementing such state-of-the-art methodologies though, requires a deep, comprehensive understanding of both the observational techniques as well as the underlying scientific background. Thus, such software packages are a privilege of a limited number of high-caliber scientific institutions, with significant international standing and highly skilled workforce. An example of such institutions are the internationally-leading partners involved in CORSAIR.

International Services have been established for all the above techniques, namely International DORIS Service (IDS), International Laser Ranging Service (ILRS) and International VLBI Service for Geodesy and Astrometry (IVS), comprised by world leading experts in the respective fields. These consortia play a key role in the shaping, growth and progress of the techniques themselves and are hence of fundamental importance for Space Geodesy, setting quality standards and enabling dissemination of its products; the latter constitute nowadays essential input for Earth observation and space studies. The twinning partners are members of such top-class International Services, a role that Coordinator aspires to play.

While NTUA has a well-established expertise in the field of GNSS, verifiable by its contribution in international consortia and its long list of relevant scientific publications, it lacks involvement and expertise in the other three techniques that lay at the core of Space Geodesy. Within the framework of CORSAIR, synergies are proposed with leading experts, with the aim of closing the knowledge and technological gap. A strategic aim of CORSAIR is that by the end of the project's lifespan, the Coordinator will have developed a state-of-the-art software tool-set coupled with a highly-skilled workforce to support high-end research in the field of Space Geodesy and Earth observation. The bulk of the effort for this goal will be undertaken in WP3, WP4 and WP5. Additionally, with the aid of the partners, the Coordinator will get involved in the international services, claiming an active role in the future and shaping of the field.

**Expert Nodes**

Each member of the consortium will act as an expertise transfer node for one of the techniques involved. A dedicated task force will be established in NTUA for each of the three techniques, made up of University personnel, at least one PhD student and one Post-Doc student (per technique). This allocation is expected to significantly enhance knowledge assimilation, create highly skilled experts, simplify management and logistics and solidify networking between partners. Given that at the time of writing NTUA has no active PhD or Post-Doc students at the aforementioned fields, CORSAIR will significantly increase its manpower and research capacity.

IPGP and CLS will act as the DORIS expert nodes; both institutes are leading experts in the field, heavily



involved in the technique since its introduction. Their role and contribution is underpinned by their status as Analysis Centers within IDS. The two institutes will take up the task of transferring relevant expertise to NTUA via interaction with the dedicated task force. Additionally, the two institutes are long contributors of the IDS and can introduce NTUA in the service, a fact that can lead to a solid, long lasting technical involvement and further networking capacity with high esteem institutions.

Despite SLR's prominent role in Space Geodesy, NTUA's involvement in the technique has been minimum in the last few decades. Besides core geodetic results SLR provides the most accurate observations for POD, a problem inherently coupled with the majority of space applications. Laser Ranging Reflectors (LRR) are part of the payload of a large number of satellites, especially missions where precise knowledge of the trajectory is required. GFZ will act as the SLR expert node, since it has a longstanding contribution in the technique evident by its involvement in the ILRS as an Analysis Center and a long list of relevant scientific publications.

OSO will act as the VLBI knowledge node. OSO hosts one of the few VLBI sites in Europe and is a prominent member of the IVS. OSO will undertake the task of transferring technique-specific knowledge and expertise to the host institute.

### **Achieving Scientific Excellence Phase I**

Achieving scientific excellence within CORSAIR is split into two distinct phases, to allow for a more efficient and robust scheme. During the first phase (WP3), highly skilled scientists from the expert nodes will transfer knowledge and expertise to the dedicated Coordinator task forces. The scientific curriculum will be determined by the respective expert nodes. Focus here will be placed on (a) the internals and details of the techniques themselves, (b) data curation, (c) technique specific error-budget and its mitigation, (d) application range, instrumentation and technique specific results, and (e) recent trends and research frontiers. Expert nodes will also present their own data analysis pipelines to NTUA, identifying best practices, strengths, weaknesses and limitations.

Knowledge transfer will be performed by means of:

- remote webinars, virtual training and video conferences hosted by the expert nodes and attended by the dedicated task force. Both training/lectures and Q&A sessions will take place during these meets, which will be held approximately once every two months, with a duration of two to four hours.
- remote venture labs, where the expert nodes will present and introduce their own analysis pipelines and in-house, software tools. Approximately a series of four venture lab meets will be held (per technique).
- one short-term visit of the Coordinator task forces at the premises of the respective expert node (i.e. visits at IPGP, GFZ and OSO). The visits will have a duration of one to two weeks, and will focus on an integrated presentation of data acquisition and instrumentation, data curation and analysis procedures followed by the expert nodes. A guided tour at instrumentation sites will also be performed at GFZ and OSO, since these institutes host instrumentation not available in Greece (only few such sites are installed worldwide). These visits will also place focus on solidifying networking activities and allow for further one-on-one communication and mentoring.

This first phase will start at the beginning CORSAIR and will have a duration of one year. At the end of this phase, the dedicated task forces will have gained a deep understanding of the methodologies involved within each of the techniques. With the newly found skills and the assistance of the respective partners, this phase will culminate with the compilation of technical documents that describe specifications, models and standards to be used to design a state-of-the-art software toolbox to perform data analysis of DORIS and SLR observations, accompanied with respective validation procedures. These documents will act as roadmap for the next phase of research capacity building and achieving scientific excellence.

### **Achieving Scientific Excellence Phase II**

The next, second phase (WP4 and WP5) will build upon the knowledge gained from the previous phase and will adhere to a more “hands on” approach. It will start by the end of the phase I and will last until CORSAIR’s end of life. The target here will be the severe strengthening of NTUA’s research capacity via the designing and building of a space geodetic software tool-box. Under the (per-technique) guidance of the expert partners and the work-plan established (in WP3), NTUA will undertake the task of gaining expertise and applying lessons learned in its own, in-house software package. These tools will allow the analysis of space geodetic data to perform precise orbit determination, positioning, and estimation of a series of geodetic parameters of interest. Though CORSAIR does not aim at a VLBI specific software tool, mastering the technique will prove to be essential for the handling of a series of input data, products and models (e.g. Earth's orientation parameters and fluctuations in the length of day) as well as the permanent tie between

Celestial and Terrestrial Reference Frames, that will be incorporated in the toolbox. Adopting the work plan established in the first phase will enable the efficient administration of the capacity building process and monitoring progress through well established, timely milestones, goals and validation tests.

Focus will be placed on (a) problem solving skills, (b) robust algorithmic approaches and best practices, (c) numerical methodologies, (d) program design and implementation strategies and (e) adoption of state-of-the-art models. Knowledge transfer will be performed by means of:

- remote webinars hosted by the expert nodes and attended by the task forces, focusing on implementation and validation of specific technical issues, i.e. modeling approaches. These meets will be performed once every three months.
- remote one-to-one and one-to-many video conferences hosted by the expert nodes. The conferences will focus on Q&A sessions, problem solving and advisory meetings, targeting specific needs that (may) come up during the implementation phase; they will be requested “on demand”.
- two short-term visits per technique; the Coordinator task force will visit the respective expert node (i.e. CLS, GFZ and OSO) and the expert nodes will make a short term visits to the Coordinator. The visits will have a duration of one to two weeks, and will focus on evaluation and validation of the software under construction and exchange of best practices. They are also expected to further strengthen twinning synergies and provide a framework for teamwork, enhancing collective problem solving.

The expected impact of this phase is twofold; on the one hand, it will result in a state-of-the-art software toolbox, which will constitute an invaluable asset for NTUA’s research capacity, a fundamental building block for further scientific development and growth. As already noted, such software packages are only few worldwide, owned and developed by prominent research institutes. On the other hand, the process of designing and implementing such a package will result in a highly skilled scientific workforce, with a deep understanding of the most elaborate and complex concepts of Space Geodesy and the means to tackle even the most demanding research questions. Hence, this approach is expected to stimulate scientific excellence and innovation.

Concurrently to the two phases, Coordinator’s staff and especially young scientists involved, will seek to attend any virtual and/or on-site training events organized by IGS, IDS, ILRS, IVS, IAG, ESA, GGOS or any other agency active in the field of Space Geodesy (e.g. DORIS-days, training events organized by ESA’s Education Office, GGOS Days).

### 1.2.3 Strengthening research management capacity and administrative skills

To further enhance NTUA’s research capacity, expertise transfer will expand beyond technical matters to include coaching on research proposal preparation, submission, management and administration. A dedicated Work Package is included in the Proposal to accommodate for related tasks (WP6), which is expected to result in a highly skilled and effective unit to significantly improve NTUA’s successful proposal submission rate, secure financial aid for the host’s research activities in the long-run and boost long-term synergy between partners.

The Coordinator will set up an agile research administration unit within its institution, made up of both scientific and administrative personnel. The sole purpose of this unit will be to seek, claim and manage research proposals. The unit will be trained by the internationally leading partners, utilizing their experience. A two-phase approach will also be followed here. The first phase will place focus on the training of the unit, which will involve:

- Introduction and familiarization with diverse funding pools and schema. Training here will focus on the introduction of various funding pools and capabilities which the unit can utilize to support research either individually (i.e. NTUA being the sole recipient of funding) or through partnerships. Such pools can be European (e.g. EU, ESA, etc), collaborative funding schema (contributions from stakeholders, such as government agencies, private foundations and industry partners), funding via research consortia and networks (e.g. funding via contribution in international services), and public-private partnerships, where partnerships with industry will be sought for to support R&D in Space and Earth Observation technology. Special care will be placed in funding pools and networking capabilities specifically targeting young scientists, e.g. MSCA Doctoral Networks and support for inwards/outwards mobility of skilled scientists.
- Project preparation, proposal writing and organisational issues. The leading partners will share their experience gained throughout the years in successfully preparing and organizing a research proposal submission. This will include project team composition, networking and partnership building, budget considerations, research focus presentation, dissemination activities, common pitfalls and best practices, seeking greater impact and pathways to achieving it.
- Project management and administration. Focus here will be placed in the successful administration and

management of research projects, involving effective monitoring activities both scientific-wise and financially, risk management, robust and agile financial administration and management activities and schemas correlated to budget scale.

Training will be performed via webinars, hosted by the partners and attended by the research administration unit. Each of the partners will host a total of three webinars, split into three training units, as described above. Once this training phase is over and throughout the rest of CORSAIR's lifespan, the research administration unit with the help and guidance of the twinning partners, will prepare and submit at least five research funding proposals which will build upon the research capacity build via CORSAIR, and will specifically target:

- two EU large scale research and innovation calls (e.g. HORIZON, COST),
- two research proposals targeting young scientists and mobility (e.g. EU MSCA calls)
- one funding bid targeting private/public collaboration, including at least one the ecosystem partners

Apart from NTUA, at least one of the CORSAIR partners will be involved in each of the proposals to be submitted.

#### **1.2.4 Raising Research profile and Strategic Networking**

Scientific publications are considered in CORSAIR as a significant pathway in achieving the project's objectives and maximizing its impact. For the lifetime of CORSAIR, a target of nine scientific publications in peer-reviewed journals is set; three of these will be published in high-impact journals (impact factor > 2.5). These publications will target specific issues of the three respective Space Geodetic techniques tackled in CORSAIR. This goal is expected to strengthen the commitment and engagement of the twinning partners, additionally significantly raising the host institute's research profile and international prestige.

Further strengthening of networking and scientific prominence will be sought through the partner's presence in at least ten international conferences. Technique-specific workshops organized by the respective international services will be prioritized. Partners will also attend at least two IAG related events, which are known to attract top class scientists in the field.

To further enhance strategic networking, synergy and mobility of skilled scientists, the Coordinator and the twinning partners will decide on the co-supervision of three PhD and three PostDoc thesis. One PhD and one PostDoc student will be allocated to each technique-specific task force and the co-supervision will be performed by one representative of the respective expert node. PhD and PostDoc students will be included in the short-term visits, with the possibility to extend their stay if such a need arises. The research subject of the thesis will be relevant to the respective technique, submitted in NTUA and written in English.

Building upon the international recognition enjoyed by the expert partners, their extensive networking capabilities and their status in prestigious consortia, the Coordinator will seek its own involvement in such establishments. Specifically, the Coordinator will seek to join and/or strengthen its involvement and role claiming in IDS, ILRS, IVS, IAG and GGOS. A specific Task (7.2) is dedicated in exploring such capabilities under the guidance of the partners.

#### **1.2.5 Establishing a Greek ecosystem of Space-based geosciences and ties between market and academia**

The Coordinator will take the initiative of bringing together all parties in Greece involved in the multidisciplinary field of space-based geosciences and Earth Observation. It will thus establish a Greek ecosystem of partners/stakeholders, in an effort to (a) disperse and disseminate knowledge in the field, (b) maximize the impact and scope of CORSAIR, (c) boost involvement and synergies between members and (d) enhance R&I and Greece's contribution and relevant market share. Through this newly established ecosystem, it will seek further strategic networking with research institutions and collaboration agreements with businesses/industry active in the field.

The ecosystem call is expected to initially attract more than ten participants, including possible industry partners active in:

- Space industry, space exploration, space awareness and security, Earth observation, tracking and navigation, infrastructure monitoring, natural resources and disaster management and related fields (e.g. Libre Space Foundation, Geosystems Hellas, Planetek Hellas, etc),
- Governmental agencies and research institutions active in Space Geodesy, Earth observation, mapping and cadastral services, disaster risk management and related fields (e.g. National Observatory of Athens, Beyond Centre, Hellenic Group on Earth Observations)
- Universities with academic, scientific and/or research interests that touch upon Space Geodesy (e.g. Aristotle University of Thessaloniki, National and Kapodistrian University of Athens).



The aim will be to create a vivid community of partners that will outlive CORSAIR and bloom in years to follow. Membership will be free and open and new members will be admitted at will. To establish the ecosystem, the Coordinator will issue multiple calls to parties that may be interested. CORSAIR foresees a series of dissemination, communication and exploitation activities (including an info-day, ecosystem meeting and the publication of a Newsletter) described in Section 2.2, to boost interest and involvement, strengthen member networking, disperse knowledge and maximize its impact. CORSAIR will also issue questionnaires targeting both research and business/industry members of the ecosystem. Conclusions will play an important role in the second phase of capacity building, so that the software tools that result from CORSAIR can answer realistic user needs and significantly contribute to R&I activities.

### 1.2.6 Coordination and Management Scheme

For an efficient management and administration, working groups will be established with clearly defined scope and responsibilities. The highest project body in charge for executive decisions and responsible for project activities and results, risks, quality assurance, resources, impact monitoring, meetings preparation, as well as for reporting towards the European Commission shall be the CORSAIR Project Management Board (PMB); it will consist of representatives of all partners. Task forces of all active work packages will periodically deliver progress reports to the Management Board. The board will perform on-line meetings every three months, or whenever a specific need arises.

The PMB will compile a Risk Management Plan referring to the monitoring of risks. The Plan will be continuously revised, and all participants shall promptly report any newly emerged risks that could impact project implementation, deviation from work plan and/or aims and hinder of result quality. For every identified risk, the level of occurrence likelihood and severity will be accessed and timely prevention and mitigation actions will be defined. Risk Management will be discussed at every PMB meeting.

A Quality Management Board (QMB) will also be formed with the role to develop a quality management plan, define and monitor the achievement of quality deliverables, conduct quality checks, and organize quality-related project meetings. The Quality Plan, that will prescribe quality assurance mechanisms, quality control measures/metrics, requirements for scientific results and gender dimension. Every six months the QMB will deliver integrated reports to the PMB.

Finally, a Financial Committee will also be formed; it will develop the Guidelines for the Use of the Grant, monitor project expenditures, deliver in-house reports to the PMB every six months and prepare financial reports for the European Commission.

Day-to-day administration will be undertaken by the Coordinator; it will lead day-to-day communication with leaders of WPs, help coordinate project activities, distribute documents/templates and see through any other trivial task that may come up. A kick-off and a wrap-up meeting will be held at the beginning and end of CORSAIR with the physical presence of all partners. The different groups and boards will be formed during the kick-off meeting, while evaluation and discussions both for the research capacity building part of CORSAIR and the administrative and managerial performance will be performed during the wrap-up.

## 1.3 Open Science

CORSAIR will adhere to a strict open-science policy, a fact reflected through a series of its outcomes. All publications described above, both the ones to be published in peer-reviewed journals and the ones to be presented in international conferences/workshops, will be open-access. Additionally, the software to be built will be developed using a free and open-source policy, using a license agreement that will adhere to this property (e.g. MIT License). The development phase, will be performed in the public domain, using one or more public repositories (e.g. gitlab). Hence, any interested parties will be able to browse, download/clone and use the software or specific components of it and even modify, expand and repurpose it to fit their needs. Due to the public domain development scheme adopted, the software will be available to users throughout the development phase, and not only at discrete “release” phases.

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## 2. Impact

### 2.1 Project's pathways towards impact

#### 2.1.1 CORSAIR Outcomes

**Improved excellence capacity and resources in Widening countries enabling to close the still apparent research and innovation gap within the European Union.**

CORSAIR specifically targets the significant enhancement of the Coordinator's research capacity and resources. Four WPs are allocated solely for this purpose (WP3 through WP6). To successfully reach this goal, expert assistance from top-class scientific partners is not only crucial but imperative. This Twinning action thus provides the perfect framework for such a cooperation. CORSAIR partners are world leading research institutes in their respective fields of expertise and CORSAIR is organized in a way that fully exploits their commitment in sharing knowledge and expertise.

CORSAIR will result in a highly skilled, extensively trained scientific workforce at NTUA, counting no less than twelve individuals. Additionally, the resulting software tools will provide an unprecedented, invaluable asset for NTUA providing the required capacity to reach scientific excellence in the field. It is important to note here that such software tools are only available by a small set of prestigious institutes around the world, the current leading experts of Space Geodesy. With these assets in place, NTUA will be able to significantly expand, intensify, refine and diversify its contribution to Space Geodesy and a series of applications that depend on earth observation from space, e.g. climate and atmospheric studies, orbit determination, geodynamics and geophysics.

For the first time in decades NTUA, and in general a Greek institution, will be equipped with the knowledge and tools/resources to tackle research frontiers and innovation in the field. Through the establishment of a Greek ecosystem of Space-based geosciences the Coordinator will gradually disperse knowledge and help raise expertise and involvement in Earth Observation on a national scale. This is expected to significantly assist in closing the -still apparent- research and innovation gap with leading European institutions and countries.

#### **A new set of free and open-source software tools to process Space Geodesy data.**

One results of CORSAIR that is of special importance, is the creation of a new software toolbox to tackle state-of-the-art analysis of Space geodetic data. The work-flow followed to reach this goal is described in Section 1.2.2. Such software tools are not only few in number, but also either not-free or not open-source or even both. They are usually developed by in-house scientific teams in top-class institutes worldwide. Via CORSAIR, the Coordinator with the crucial input of the expert partners will build a set of tools using standards and models of the highest quality and follow a policy of direct sharing with any interested partners. To place this result into perspective, it is worth noting that for the most recent realization of ITRF, the IERS contributed data from 7 Analysis Centers<sup>3</sup> including GFZ, while at the same time the IDS's contribution was derived from only 4 Analysis Centers<sup>4</sup> including CLS. ESA was involved in both contributions, and so was NASA's Goddard Space Flight Center. This shortage of dedicated analysis centers, is indicative of the limited availability of dedicated software solutions designed to handle such data in a precise manner and the challenges such a task poses.

#### **Scientific Results.**

Within the lifetime of CORSAIR a series of scientific publications will be issued, tackling open issues in the fundamental Space Geodetic observation techniques. These include publications in high-impact, peer-reviewed scientific journals and publications in international conferences. It is expected that these publications will either create new knowledge (e.g. adopt/introduce new modeling and/or numerical techniques) or reinforce current approaches through robust validation, experimentation and assessment of their characteristics.

#### **Enhanced strategic networking activities between the research institutions of the Widening countries and internationally-leading counterparts at European Union level.**

As already described and thoroughly presented in Section 3.2, all four CORSAIR twinning partners are world leading experts in Space Geodesy. CORSAIR activities are targeted towards creating solid, seamless networking between the Coordinator and the partners, past the lifetime of this project. On-line meetings and a series of visits are expected to solidify networking. Additionally, a number of tasks focuses on strategic networking, including (a) co-supervision of PhD and PostDoc students, (b) submission of further research proposals including all or a subset of CORSAIR's consortium, (c) co-authorship of research papers and (d) co-attendance of international conferences.

Strategic networking will also be streamed towards services and consortia of high importance. The

<sup>3</sup>Pavlis, E., V. Luceri, A. Basoni, D. Sarrocco, M. Kuzmich-Cieslak, K. Evans, and G. Bianco (Jan. 2023). "ITRF2020: The IERS Contribution and Operational Implementation"

<sup>4</sup>Moreaux, G., F. G. Lemoine, H. Capdeville, M. Otten, P. Štěpánek, J. Saunier, and P. Ferrage (2022). "The international DORIS service contribution to ITRF2020".

Coordinator with the aid of its CORSAIR partners, will actively seek to join and/or strengthen its involvement and role in IDS, ILRS, IVS, IAG and GGOS. Hence, by the end of CORSAIR, NTUA's networking capabilities will be severely upgraded.

### **Raised reputation, research profile and attractiveness of the coordinating institution and the research profile of its staff.**

CORSAIR recognizes the need to raise the Coordinator's institute attractiveness and reputation. To accommodate for this enhancement, specific actions are proposed, targeting:

- a raised research profile of the Coordinator and its staff; (a) scientific publications in peer-reviewed, high impact scientific journals, (b) attendance of international, high prestige conferences, and (c) introduction of the Coordinator and involvement of its staff in prominent international geodetic services and consortia are all measures to maximize the reputation and research profile of the institution and its staff.
- significantly enhanced funding capabilities and successful funding bid rate; a series of measures are proposed, such as (a) the establishment of a research administration and management unit, (b) its training in project seeking, claiming, and proposal submission, (c) diversification of funding pools and schema and finally (d) the submission of further research proposals. These measures are expected greatly enhance the Coordinator's competence in claiming research funding and thus secure significant financial aid for its research activities.

A raised reputation and research profile of the Coordinator institution and its staff, accompanied with significantly enhanced research funding capacity, is expected to cast NTUA into an attractive scientific destination, both for skilled researchers and young talented scientists.

### **Strengthened research management capacities and administrative skills of the staff working in institutions from the Widening country.**

CORSAIR makes special provision for strengthening the Coordinator's research management and administrative capacity. On top of that, it seeks to significantly enhance its competence in claiming research funding bids and the diversification of the targeted funding pools and schema. A dedicated WP (WP6) is allocated to meet these aims.

A research management and administration unit will be established in NTUA, consisting of both scientific and administrative staff. This unit is going to be extensively trained by the CORSAIR partners utilizing their own extensive experience and exchange of best practices via a series webinars (see Section 1.2.3). The unit is going to be further trained following a "hands-on" approach, as by the end of CORSAIR it is expected that it will have submitted a series of funding proposals under the guidance of the expert partners.

Given the fact that such a unit currently does not exist in NTUA, it is expected to greatly enhance the institution's capacity in managing research projects and substantially help in securing funding for extending the scope and reach of the institution's research activities.

### **A Greek ecosystem of Space-based geosciences.**

The Coordinator will take up the effort of establishing, for the first time, a national ecosystem of stakeholders involved in Space studies, Earth observation, Geosciences and related applications and fields. Despite the fact that Greece, as a region, constitutes a "natural laboratory" of global interest for a series of Earth observation studies, relevant research in Greek institutes is sporadic, unorganized (strategically) and dependent on expertise, products and tools only available via internationally leading experts. Additionally, scientific and commercial partnerships are hardly ever conducted and there are no ties between the market/industry and the research community. This fact significantly inhibits innovation and the national growth in a growing market.

A major part of WP7 and its Tasks is dedicating to reaching this goal; the Coordinator will issue calls to all possible interested parties, for establishing the ecosystem described above. It is expected, that at a first phase at least 10 to 15 individual partners will participate in relevant activities. Two meetings will take place in Greece, to further strengthen ties and enable networking between ecosystem members. CORSAIR will issue a six-month Newsletter, to further attract interest in the ecosystem and at the same time promote and advertise CORSAIR activities and results. Through a series of questionnaires, answered by all members of the ecosystem, an insightful, clear view of all activities relevant to the fields of interest (on a national scale) will be gained.

## **2.1.2 CORSAIR Impact**

## **Scientific**

With its newly found expertise and research capacity, the highly skilled scientific staff of the Coordinator will be able to significantly contribute to on-going research in the field of Space Geodesy and Earth Observation. Utilizing its training and its deep understanding of the underlying methods and models, it will be able to perform high-impact research in a series of fields such as precise orbit determination, reference spatial and time frames, gravity, modeling of non-conservative forces, creating new knowledge, introducing novel approaches and improving efficiency and robustness of algorithms. As already noted, only a few, selected international research teams are able to take up such challenging research areas, hence the Coordinator's expected scientific input could prove to be crucial.

High-end scientific contribution will also result from the 3 PhD and 3 PostDoc theses to be implemented (at least partly) within the framework of CORSAIR. With the co-supervision of the expert partners, this series of theses is expected to target open issues in analysis and modeling approaches of space based geodetic data, specifically targeting DORIS and SLR.

Apart from CORSAIR's consortium direct scientific contribution, the creation of a state-of-the-art, free and open collection of software tools, is expected to allure newcomers in the field of Space Geodesy and Earth Observation. This new set of tools, will equip such teams with the necessary toolset to perform high-end scientific studies and apply results and products to a wide range of multi-disciplinary applications such as climate change and atmospheric studies, space studies, geodynamics and geophysics, etc. Additionally, the set of tools can provide crucial and needed input in a series of international services providing solutions of utmost importance; IDS and ILRS can further strengthen and validate/access their disseminated product quality, while the IERS will benefit from a more diverse and robust solution-base, helping in reaching their declared objectives for TRF realization. CORSAIR's impact is thus expected to significantly support an enhance space geodesy analysis quality and products in the long run, hence indirectly boosting scientific research in a wide range of fields that use its products.

The scope and reach of CORSAIR's scientific contribution will be further enhanced by the ability to strategically coordinate and drive a (national) ecosystem and the dispersion of new knowledge within its established networks. Instead of acting individually and being dependent on (external) expert contribution, which is currently the case, synergies between ecosystem members will be able to lead to high impact research. Since these institutes already have, through the years, gained experience in the exceptional tectonic, volcanic and seismic characteristics of the region, coupled with extensive instrumentation networks installed throughout the country, synergies can lead to world class scientific output.

## **Economic/Technological**

One of the main objectives and outcomes of CORSAIR is the creation of a research management unit which will also be extensively trained in claiming funding bids from diverse pools. Coupled with strategic networking and synergies with top-class institutions, as well as an extensive network of Greek stakeholders, it is expected that both the Coordinator itself and other national stakeholders (or partnerships) will significantly enhance their R&I funding income and scope. It will further allow the Coordinator to significantly enhance its recruitment capacity, leading to more and better skilled researchers/scientists.

According to the EU's R&I Country profiles<sup>5</sup>, Greece's success rate in both HORIZON Europe and HORIZON 2020 is below average, and the same goes for NTUA's individual submissions. Additionally, NTUA has not been involved in any ERC program as PI. To revert this situation, the Coordinator will now have at its disposal the skills to target a significantly wider range of funding bids and apply for bids with a severely boosted success rate and an elevated role (e.g. PI). Networking actions are also expected to stimulate preparation of joint research projects. Given the fact that limited research funding is a major drawback for all Greek institutions, the expected impact is of paramount importance.

CORSAIR is also expected to strengthen ties and synergies between research and commercial users and/or industry, especially on a national scale. Possible commercial and industry partners could be any agency or firm active in a wide range of fields touching upon Earth Observation and Space studies. According to a comparative analysis of innovation performance in EU countries<sup>6</sup>, Greece is only ranked as a "Moderate innovator"; CORSAIR's impact in the long run, can significantly help in raising innovation performance, via providing highly skilled and trained human resources, diffusing knowledge and know-how in the Greek

<sup>5</sup>R&I Country Profile for Greece, [https://dashboard.tech.ec.europa.eu/qs\\_digit\\_dashboard\\_mt/public/sense/app/1213b8cd-3ebe-4730-b0f5-fa4e326df2e2/sheet/0c8af38b-b73c-4da2-ba41-73ea34ab7ac4/state/analysis/select/Programme/H2020/select/Country%20Code/EL](https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/1213b8cd-3ebe-4730-b0f5-fa4e326df2e2/sheet/0c8af38b-b73c-4da2-ba41-73ea34ab7ac4/state/analysis/select/Programme/H2020/select/Country%20Code/EL)

<sup>6</sup>European innovation scoreboard 2023, [https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard\\_en](https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard_en)



ecosystem and promoting synergies between its members. In the long run, stronger linkages between academia and business and improved career permeability are expected. Transition from an academic oriented career to a relevant business industry related one and vice versa will be more easily pursued, thus, providing alternative choices to the Greek researchers for their career paths.

Todate, space-based earth observation studies in Greece are of limited scientific importance and scale owing to the fact of missing relative expertise. Highly skilled personnel is scarce and expertise is sought for through partnerships with leading institutions. Accordingly, Greece's share of the relevant market is limited and only recently struggling to make infant steps. Hence, CORSAIR's impact is expected to be highly significant on a national scale; the Coordinator will be able to disseminate knowledge, provide the country with new, highly skilled scientists and engineers, support Greece's autonomy and self-sufficiency in related research and boost its commercial involvement.

The release of state-of-the-art software tools adopting an open-source and free policy, can also have a positive effect for commercial users on an international scale. Agencies active in space data analysis can freely use the tools or parts of it, avoiding purchase cost (relevant software are usually notably expensive), decreasing cost and increasing profit. Via its open-source character, the toolset can be easily repurposed, tailored to meet diverse needs, a fact that could lead to increased efficiency and/or new products/solutions.

### **Societal**

A direct impact of CORSAIR will be the significant enhancement of NTUA's academic capacity. With the new-found expertise and highly skilled scientific personnel, the Coordinator will be able to upgrade its curriculum, incorporating cutting edge scientific trends, technology and applications. Since NTUA is the most prestigious technical university in Greece, with hundreds of new students each year, the effect will be directly translated to a more skilled scientific and engineering manpower primarily for Greece and the EU.

Additionally, CORSAIR is expected to have an effect in the quenching of the crowding-out effect experienced in the European research area and especially Greece. After the economic crisis that struck Greece, the country has experienced a severe crowding-out effect especially of young skilled scientists. This fact continues to have severe consequences in the country's ability to pursue economic growth especially in technology and R&I. CORSAIR can create viable conditions, through raised reputation, enhanced research funding and recruitment ability of the Coordinator, and boosting of the space-oriented national market, for partly alleviating the crowding-out effect and accommodating skilled human capital redux.

CORSAIR will create the potential for boosting scientific advancement in Space Geodesy, which as noted earlier, plays a major role in widely used applications on a worldwide scale. Prominent examples are (a) positioning and navigation, which is heavily dependent on quality orbit determination, (b) climate change which is coupled with earth observation from space (e.g. from altimetry missions which are equipped with either LLRs or DORIS antennae) and (c) spatial, global reference frames used throughout all fields of geosciences and realized via Space Geodesy observations. Hence, in the long-run, CORSAIR can lead to scientific advancements that will improve positioning and navigation accuracy (for scientific and application usage), enhanced Earth monitoring capabilities and climate change impact monitoring.

Finally, dissemination activities targeting high-schools and the STEM community of Greece will take place during the lifetime of CORSAIR. The effect of these activities is expected to have a long-term societal impact; students will be introduced in fundamental concepts of Space Geodesy, information that is currently unavailable (at least at this level) yet of growing importance, in an era where technologies such as navigation and Earth monitoring are taken for granted. Exposure to such information can lead to a better understanding of everyday space-powered tasks (e.g. satellite communication) and an expanding world which now includes near space. Among other advantages, better educated citizens are better equipped to fend off trending phenomena such as conspiracy theories (often associated with space). Additionally, these educational visits are expected to boost interest in Space Geodesy and Earth monitoring, broaden student's scientific and carrier horizon and help in raising the country's future role in space sciences and technology.

## **2.2 Measures to maximise impact - Dissemination, exploitation and communication #@COM-DIS-VIS-CDV@#**

CORSAIR foresees to promote the project itself, the obtained results as well as interest and involvement in Space Geodesy and related applications by carrying out different types of activities, tailored to multiple and diverse audiences. An overview of the activities is presented in Table 2.

### **Web-Pages and Social Media Engagement.**



A dedicated CORSAIR website will be created, to act as the main channel for promoting and providing up-to-date information about the project. The website will be continuously updated during the whole life of CORSAIR project. The Quality Measurement Board will periodically collect visitor statistics and if needed provide means to further popularize the website. Except from CORSAIR's website, each of the software tools to be built in the project will have a dedicated webpage, including the source code, example usage, user forum and Q&A, help, manual, information and wiki pages. It is expected that this setup can greatly boost the user base, helping in incorporating engineers, scientists, researchers and commercial users.

CORSAIR will adopt a free and open-source policy for all of its software products (MIT license), making them available to any interested party. The release of the software however, will be accompanied with a relevant DOI (via zenodo), so that usage of the software tools is trackable and citeable. With the growth of the user community, this fact is expected to significantly boost the partnership's and especially the Coordinator's research profile, since usage of the tools for research, scientific and commercial reasons will be properly acknowledged (referenced).

All partners will be proactive in social media engagement; this will involve routinely posting new and updated information, results, progress, milestones achieved, attended and organized events, scientific and technical publications. To reach out to a diverse scientific and commercial audience, all relevant digital platforms will be utilized, i.e. LinkedIn, ResearchGate and Academia. Media engagement will also include Twitter (now X), targeting young talented scientists (e.g. postgraduates) not yet fully networked into scientific media platforms.

### **Scientific Publications.**

As already noted, a series of scientific publications will also help disseminate CORSAIR results. These will include scientific publications in peer-reviewed journals, attendance of international conferences, submission of three PhD theses and three PostDoc theses. All of the above, will be published adopting a strict open-access policy.

### **Summer School**

A dissemination activity of major importance will be the organization of a five-day Summer School that will take place in Greece, in the premises of DSO, for the endorsement of CORSAIR, dissemination of its scientific output and promotion of expertise and innovation in the fields of Space Geodesy, Orbit Determination, Space Studies and Geosciences. The School will include venture labs, seminars, lectures and training on Space Geodesy concepts, methods, observational techniques, modelling approaches and results/products. CORSAIR scientific outcomes and software tools will also be presented, as well as a wide range of multidisciplinary applications related to Earth Observation. All CORSAIR partners will contribute according to their expertise. Additionally, CLS utilizing its decades old involvement in providing space-based solutions, will address issues of high value-added products and services related to monitoring and surveillance solutions. The school will target the scientific and research community, commercial users/businesses, industry and the Greek ecosystem. Attendance will be free and open and applications will be examined by all partners; young researches and ecosystem members will be prioritized. The school will include a guided tour to the geodetic observation sites hosted at DSO (stationed in Dionysos, Attica). An attendance of approximately thirty individuals is expected.

### **CORSAIR Newsletter.**

CORSAIR partners will also issue a newsletter, containing information on: (a) the aims and objectives of CORSAIR, (b) milestones reached, (c) activities performed within CORSAIR including software design and release, conference attendance and scientific publications, (d) new prospects, missions and trends in Space Geodesy, (e) outreach material from all partners of CORSAIR and (f) outreach material from ecosystem members. The first issue of the newsletter will be prepared and published by the 12<sup>th</sup> month and from then on, a new issue will be released every six months. The newsletter will be distributed to any interested parties via subscription as well as via CORSAIR's webpage and social media; the latter is expected to maximize its reach in young scientists and engineers related to the field. Activities of the Greek Ecosystem will also be published in the newsletter, in yet another effort to boost involvement and its impact.

### **Activities Targeting the Ecosystem.**

Communication and dissemination activities specifically targeting the national (Greek) ecosystem will also be a focal point. This multidisciplinary ecosystem (described in Section 1.2.5) will be established during the course of CORSAIR by issuing calls to any interested party. Two dedicated meetings will be organized by

the Coordinator to take place in Greece, aiming at networking activities and potential collaborations between ecosystem parties, as well as the establishment of solid ties between members. The first (hybrid) conference will span a two-day interval and will focus on presenting CORSAIR's aims, objectives and anticipated impact, as well as Space-based Earth Observation research activities currently active at NTUA performed in various laboratories (e.g. remote sensing, positioning and navigation, atmospheric studies, etc). All CORSAIR partners will attend the meeting, introducing space geodetic techniques as well as recent trends, applications and use cases. Ecosystem members will be asked to present their current activities, research and industry portfolios, aspirations, products and solutions, as well as specific needs and interest related to CORSAIR and Space Geodesy.

The second meeting will have the format of an info-day, co-organized by NTUA and CLS in an effort to present current products and trends related to Space-based solutions and promote innovation. CLS will address issues of providing high value-added products and services, being a worldwide pioneer provider of monitoring and surveillance solutions for Earth, focusing on Environmental and Climate monitoring, Maritime Surveillance and Infrastructure monitoring. Target audience will include the Greek ecosystem with special focus on businesses and stakeholders active in the field.

To explore, access and evaluate both academia and commercial needs and interest on a national scale, the CORSAIR partners will compile and hand out a series of (on-line) questionnaires; one subset of these will target academia partners of the ecosystem and a second set will target commercial users/businesses. Information to be collected will target (a) methods and techniques of Space Geodesy they use, (b) application range, (c) datasets and analysis pipelines (d) specific needs in data processing and products (e) research interest, aspirations and future plans. The data collected will be thoroughly examined and evaluated so that all CORSAIR partners and especially the Coordinator gain a clear view on research and business needs in the field. Conclusions will play an important role in further expanding research activities and products; the Coordinator will exploit this knowledge to meet user demands and needs (both via expertise and software solutions) and elevate to a key role for space-based geosciences in the long run.

The impact of the ecosystem is expected to be significant both for the Greek research community and for commercial users/businesses active in the field. Promoting synergies and collaboration, and for the first time bringing together researchers and commercial users, it is expected to create new partnerships, better exploit funding opportunities, improve career permeability (between academia and business), expand technological access of businesses to new research results and emerging products/solutions, boost Greek involvement in relevant scientific fields and R&I, and claim a bigger share of an emerging market for Greek institutions/businesses, thus also creating new job opportunities. Via CORSAIR, NTUA will be able to educate highly skilled new scientists to take up these tasks.

### **Sharing and Dispersing Knowledge.**

Since all partners with the exception of CLS are either academic institutions or have direct involvement to academic curriculum, they will undertake the task to publicize and promote CORSAIR, especially to young scientists, e.g. graduates, postgraduates and PhD students. This will be performed by incorporating CORSAIR's results and activities in lectures and using the software tools in data analysis training sessions. The latter fact can help in the creation of a vivid user community which can in the future play a key role in greatly expanding the scope, reach, application and product range of the software tools built in CORSAIR.

Last but not least, the Coordinator will introduce fundamental concepts of Space Geodesy and Earth Observation and their crucial input for Climate Change monitoring and Space Science in high school students around Greece. NTUA will organize and host a series of high-school visits in the observational facility of DSO, where students will be presented with the fundamentals of relevant scientific fields, their application range, interactive venture labs and educational activities and perform guided tours at the instrumentation sites (GNSS antennae, DORIS beacon, astrometric camera, gravimeters, etc). Such calls will also be issued to the STEM community of Greece, and any interested STEM member can be a beneficiary. It is expected that during the lifetime of CORSAIR ten such visits will be performed.

**Table 2: CORSAIR Dissemination activities**

<b>Dissemination Activity</b>	<b>Details</b>	<b>Target Group</b>
Scientific Publications	Nine scientific papers and presentation in ten international conferences/workshops.	International scientific and research community of Space Geodesy, Earth Observation and related fields.
Ecosystem	One info-day and one two-day (hybrid)	Greek ecosystem members, including

<b>Dissemination Activity</b>	<b>Details</b>	<b>Target Group</b>
Meetings	seminar.	industry, commercial users, businesses and institutions involved in Navigation, Positioning, Climate Science, Environmental Monitoring and Natural Resources Management, Remote Sensing, Space Security and Awareness, etc.
Newsletter	Issued every six months, after the first year. Publication via CORSAIR's website, subscription and social media.	The Greek ecosystem (described above) and the international scientific and research community of Space Geodesy.
Lecture notes & Videos	Accessible at CORSAIR's website.	International scientific community, ecosystem members, industry, commercial users, businesses and research institutions active in Space Geodesy and related applications.
Summer School	Five-day Summer Schools at the premises of DSO	
CORSAIR Website	The project's public-access website	
Software Release & Software Pages	Free and open-source software; dedicated webpages for each tool created in CORSAIR	All of the above, also targeting Space Geodesy data analysis engineers, and user community.
Academic Curriculum	Promote CORSAIR via lectures and labs to be carried out in universities associated with CORSAIR partners.	Young scientists and engineers, graduate and post-graduate students in NTUA, IGP and OSO.
High Schools & STEM visits	STEM members and high-school students visiting the observation site of DSO.	High-school students in Greece and STEM community of Greece.

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**2.3 Summary****KEY ELEMENT OF THE IMPACT SECTION**

SPECIFIC NEEDS	EXPECTED RESULTS	D & E & C MEASURES
<ul style="list-style-type: none"> <li>• Enhance Coordinator's research capacity build state-of-the-art technological assets and highly skilled and qualified research staff to enable scientific excellence</li> <li>• Enhance strategic networking and synergy with top class European institutes; promote involvement in international consortia and raise Coordinator's international standing and role</li> <li>• Raise reputation, research profile and attractiveness of the Coordinator. Elevate NTUA to an appealing scientific destination for talented and skilled scientists.</li> <li>• Raise Coordinator's share in funding pools and improve financial support for research. Strengthened administrative skills and funding capabilities; improve success rate in research funding bids.</li> <li>• Raise interest in Space Geodesy and Earth observation in Greece; mitigate the technological gap and (the consequent) funding handicap between Greek institutions and European leading peers.</li> <li>• Establish a Greek ecosystem of stakeholders; promote collaboration, R&amp;I and strengthen academia and industry ties. Raise national involvement in relevant research and market share.</li> </ul> <p>Create a state-of-the-art software toolbox, following a free and open-source policy.</p>	<ul style="list-style-type: none"> <li>• Brand new software tools to perform analysis of Space Geodetic data, using state-of-the-art modeling.</li> <li>• Scientific contributions in Space Geodesy via a series of research publications and Theses.</li> <li>• Trained and highly skilled work force in the Coordinator, with increased scientific reputation.</li> <li>• Highly skilled, research management and administration unit to support bid claiming and project management in the long run.</li> <li>• Grant agreements and secure financial support for relevant future research activities.</li> <li>• A prestigious network of collaborators, involvement in international, high-prestige consortia. Increased mobility (inward/outward) opportunities for the Coordinator.</li> <li>• A vivid national ecosystem of stakeholders involved in Space sciences and Earth Observation. Strengthen ties between academia and industry.</li> </ul>	<p><b>Communication</b></p> <ul style="list-style-type: none"> <li>• Issue a Newsletter and use social media to promote CORSAIR</li> <li>• Use CORSAIR's website to attract interest in the project itself and Space Geodesy</li> <li>• Issue calls to any interested party to get involved in a national ecosystem.</li> <li>• Promote CORSAIR to graduate level students using partner's academic capacity</li> <li>• Greek high-school and STEM community educational visits at DSO</li> </ul> <p><b>Dissemination:</b></p> <ul style="list-style-type: none"> <li>• Release of software tools, attributing a citeable and trackable DOI; use a public domain software development platform and MIT license.</li> <li>• Scientific publications in journals.</li> <li>• Attendance and presentations in international conferences.</li> <li>• Summer School on Space Geodesy, Earth Observation and applications</li> <li>• One info-day and one conference in Greece, targeting the Greek ecosystem</li> <li>• Sharing of lecture notes and videos in CORSAIR's website</li> <li>• Wiki-pages and user forums in software websites</li> </ul> <p><b>Exploitation:</b></p> <ul style="list-style-type: none"> <li>• Use the research management and administration unit to claim research bids. Use strategic networking to get involved in large scale research projects and claim funding.</li> <li>• Use the raised profile and increased funding capabilities to allure young scientists and promote inward/outward mobility.</li> <li>• Use the software tools to produce high-quality solutions and products. Target scientific excellence, high-impact publications and increased interest from the private sector.</li> <li>• Use ecosystem questionnaires to drive software development &amp; products</li> <li>• Use synergies within the ecosystem to boost R&amp;I in Greece.</li> </ul>

TARGET GROUPS	OUTCOMES	IMPACTS
<p><b>Research and Scientific community</b> (Greek and international) in the fields of Space Geodesy and Earth Observation.</p> <p><b>International research and Scientific community</b> active in fields of study that make direct use of Space Geodesy products. Such are space industry, space awareness and security, monitoring and surveillance solutions (including remote sensing, positioning and surveying), geodynamics and geophysics, navigation, environmental monitoring, maritime surveillance, mobility, energies and infrastructures monitoring, climate change.</p> <p><b>Greek ecosystem of stakeholders active in space-based geosciences.</b> This includes relative research institutes, commercial users, businesses and industry.</p> <p><b>Young scientists and engineers</b> seeking academia and/or professional carriers in Earth Observation.</p> <p><b>High-School students</b> interested in STEM.</p>	<ul style="list-style-type: none"> <li>• Usage of software by the scientific community and industry (measured by their attributed DOIs, software “clones”, forums, wiki-pages, etc). A vivid user community for the software tools released.</li> <li>• High use of the scientific papers published through CORSAIR (measured with the relative rate of citation index of publications).</li> <li>• Involvement of Coordinator in high prestige international consortia and services, in multiple roles and levels. Increased visibility, role and international standing of NTUA.</li> <li>• Increase in Coordinator’s success rate in research funding bids. Enhanced research funding capabilities.</li> <li>• Raise attractiveness of NTUA, especially for young talented scientists.</li> <li>• Increase in scientific publishing rate and impact by the Coordinator staff.</li> <li>• Better educated young citizens (in Greece) in terms of Space Sciences and Earth Observation and important applications such as climate change studies.</li> <li>• Increased innovation performance (compared to EU countries) of Greece.</li> </ul> <p>#§IMP-ACT-IA§#</p>	<ul style="list-style-type: none"> <li>• Increase Coordinator’s and Greece’s share in research funding pools.</li> <li>• Increase Greece’s awareness, interest and involvement in a rapidly growing international market, that of Space technology and Earth Observation. Increase national (Greek) R&amp;I involvement in the field of Space sciences and Earth Observation.</li> <li>• Quench the crowding-out effect of young, skilled scientists experienced in Greece.</li> <li>• Significantly up-scale academic curriculum and research scope in Greece. Create a pool of experts, boosting innovation and research capacity on a national scale (improve innovation ranking).</li> <li>• Stimulate NTUA’s collaboration with the private sector, involvement in R&amp;I and products/solutions targeting Space technology and Earth observation.</li> <li>• Mitigate the currently apparent technological gap between Greece and leading European countries in Space and Earth Observation.</li> <li>• Equip the scientific community with state-of-the-art software tools to analyse space geodetic data; stimulate the generation of new products and/or products of increased quality.</li> <li>• Disperse and disseminate space geodetic products in yet a wider audience of scientists and applications.</li> </ul>



### 3. Quality and efficiency of the implementation # @ QUA-LIT-QL @ # # @ WRK-PLA-WP @ #

#### 3.1 Work plan and resources

The work plan for CORSAIR is so designed as to allow for the efficient achieving of the objectives set, while also accommodating a robust management scheme; at the same time provisions are made to adhere to the “lump-sum” budget format. The project is made up of nine Working Packages. The first two (WP1 and WP2) are devoted to project management, administration and coordination, while also allowing for continuous progress checking via monitoring of risks and implementation quality. WP3 targets scientific excellence via technique-specific transfer of knowledge from the expert nodes to the Coordinator, laying out the groundwork for further research capacity building. The next two Working Packages (WP4 and WP5) take up this aim on a technical level, using a “hands-on” approach; enhancement of research capacity is sought via the development of software tools, with the crucial contribution from the expert nodes, building on WP3. Further capacity building is target in WP6, where focus is placed on the establishment and training of a research administration unit (for the Coordinator); the skill building process is continued through (further) research project claiming. WP7 includes all tasks necessary to establish solid, extensive networking, both on an international level as well as on a national scale, via the establishment of a (national) ecosystem of space-based geosciences. Dissemination, communication and exploitation activities are included in the last two Working Packages (WP8 and WP9). To keep in line with the “lump-sum” budget format, Working Packages are conveniently split into reporting periods when needed.

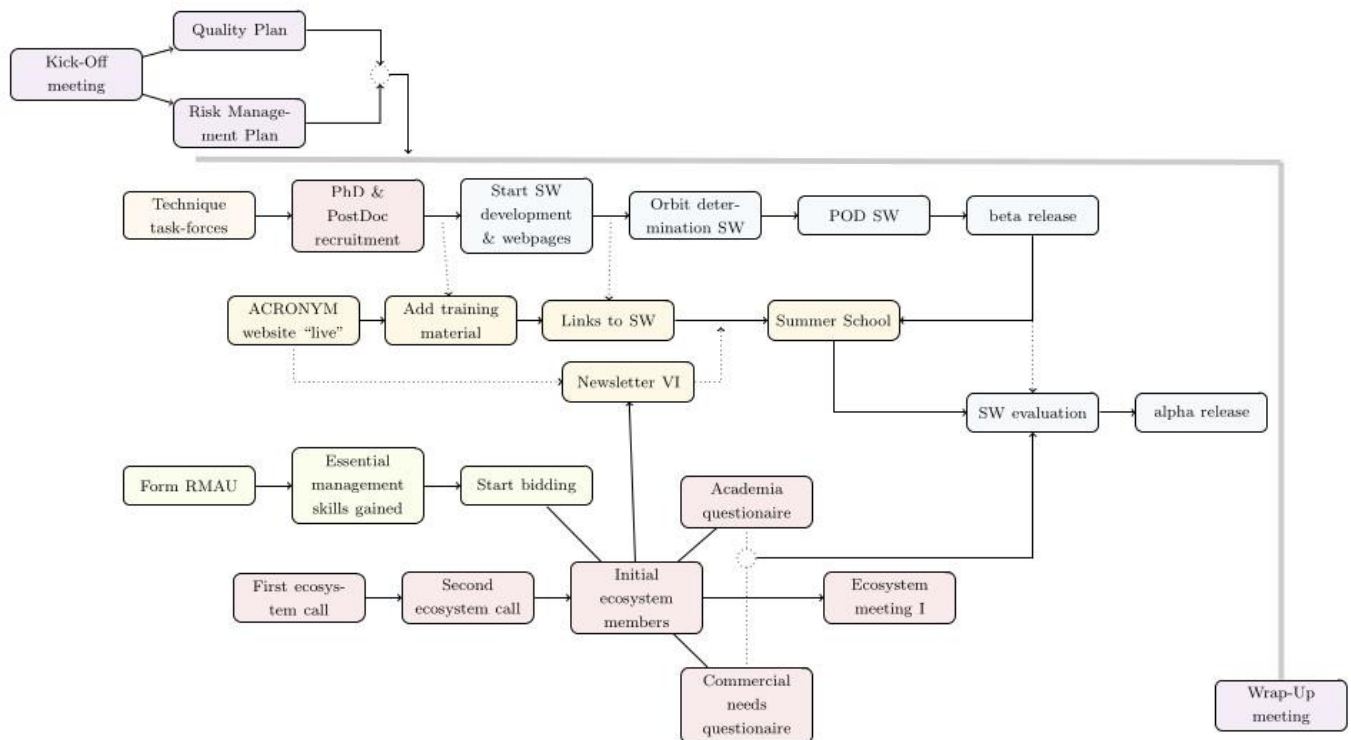


Figure 1: CORSAIR Workflow`

#### 3.2 Capacity of participants and consortium as a whole # @ CON-SOR-CS @ # # @ PRJ-MGT-PM @ #

##### 3.2.1 Capacity of NTUA in space Geodesy

NTUA via its School of Rural, Surveying and Geoinformatics Engineering, is the oldest and most prestigious institution in Greece providing a curriculum in the field of Geodesy. Via its Dionysos Satellite Observatory (DSO) laboratory, it has been involved in Space geodetic studies since the beginning of the space era. In recent decades its main research focus has been the quality analysis of GNSS observations to study the complex geodynamic setting of Greece. The laboratory has extensive expertise in the processing of GNSS observations, underpinned by a long list of relevant publications and its status as Densification Analysis Center for EUREF. For the last few years, its research scope has been expanding from regional to global scale studies, enlarging its scientific interest to include all core geodetic techniques.

### 3.2.2 Capacity of GFZ in the field of SLR and other space geodetic techniques

GFZ's Section 1.2 "Global Geomonitoring and Gravity Field" within GFZ's Department 1 "Geodesy" has a long-standing expertise using data from all four space geodetic techniques to improve the ITRF and to provide numerous Earth system parameters. The Section actively runs an Analysis Center (AC) for the ILRS and will shortly also become an AC for IDS. The Section has developed in house a software package "EPOS" (Earth Parameter and Orbit System) with its nucleus EPOS-OC (Orbit Computation) for data pre-processing, POD of LEO (Low Earth Orbiting), MEO (Medium EO) and HEO (High EO) satellites, orbit integration, orbit prediction, simulation of observations, and normal equation handling and solution. Its periphery comprises data pre-processing, orbit predictions for SLR tracking and mission operations, normal equation handling and solution. EPOS is capable to analyze all kinds of space geodetic tracking data, inter-satellite tracking data as well as 3D accelerometer data to handle non-gravitational forces and star camera attitude data, e.g. for time-variable gravity field determination from GRACE and GRACE-FO mission data. The software always follows most recent standards such as the IERS2010 Conventions or new terrestrial reference frames as the ITRF2020. EPOS-OC is regularly compared to other internationally accepted software package such as GINS (GRGS, Toulouse) or UTOPIA (CSR, Austin). Various simulation studies have recently been performed to improve the ITRF towards the GGOS requirements either by optimizing the global ground station network for SLR or VLBI or to use so called "space tie satellites" such as the upcoming ESA GENESIS mission by co-locating all four techniques on the same satellite, with the instruments duly calibrated and synchronized.

The Section also runs a SLR station on the Telegrafenberg in Potsdam which will celebrate its 50<sup>th</sup> anniversary in March 2024. The station is always under the best 10 stations in the world and fulfils the ILRS requirements. The station shall be renewed within the next 2-3 years and will then become the first "MHz-station" in the world.

### 3.2.3 Capacity of IGP

Created in 1921, IGP is a major institution for higher education and research. The Geodesy team was created by the merger with the LAREG team (IGN). Since the early 80s, IGN, and the French research GRGS were involved in the birth and first steps of the DORIS system. IGN/IPGP played an important role in the creation of IDS and was among the few first institutes to submit analysis products for the first contribution of IDS to ITRF (2005). Since then, it has played an important role in the evolution and growth of the technique, with numerous scientific contributions and a long list of relevant publications. The IGN/IPGP AC uses the high-quality GIPSY-X software to analyse DORIS data.

### 3.2.4 Capacity of CLS in Space Geodesy

The "Orbitography and Localization" department of CLS was created at the beginning of CLS in 1986 to operationally retrieve the positions of the ARGOS satellites and beacons. In 1990, with the first studies on the forthcoming DORIS system, CLS started to develop skills and software for estimating precise positions of the DORIS satellites and beacons. In partnership with the French national space agency (CNES), CLS was one of the first entities to routinely contribute quality products to the IDS. For more twenty years, these estimations are performed with the GINS software (Géodésie par Intégrations Numériques Simultanées) from CNES. The software uses state-of-the-art methodologies to model satellite motion and a series of geodetic parameters associated with tracking data, that can include GNSS, DORIS, SLR/LLR, optical, altimetric data or a combination of these. GINS can also be used for mission design since measurements can be simulated to test capabilities or new satellite missions. Since the creation of the IDS in 2003, the CNES/CLS Analysis Center contributes to the realizations of the ITRF. Furthermore, the "Orbitography and Localization" department of CLS hosts the IDS Combination Center (CC) since its origin in 2010. In addition to the routine evaluation of the station positions and Earth rotation parameters delivered by the IDS Analysis Centers, the IDS CC is also in charge of the realization of the DORIS contribution to the ITRF.

For more than twenty years, the "Orbitography and Localization" department of CLS also supports CNES for the operational supervising of the DORIS system and takes part in the development and maintenance of the DORIS onboard navigation software. In 2007, CNES and CLS joined their efforts to create a CNES-CLS IGS Analysis Center. Thanks to a CNES patent, the CNES-CLS IGS AC was the first to use GPS observations with integer ambiguity fixing. CNES-CLS GPS and GLONASS products are included in the official IGS combined solution. Today, the CNES-CLS IGS AC is one of the three IGS ACs to routinely deliver GPS, Glonass and Galileo products. Last but not least, over the last fifteen months, CNES and CLS upgraded the laser processing of the GINS software to become soon a new ILRS Analysis Center.

### 3.2.5 Capacity of OSO

Onsala Space Observatory (OSO), the Swedish National Facility for Radio Astronomy, provides scientists with equipment to study the Earth and the rest of the Universe. OSO operates three radio telescopes in Onsala for

geodetic Very Long Baseline Interferometry (VLBI) : a 20 m telescope equipped with a legacy S/X system participating to 40 to 50 sessions of the IVS per year, and twin-telescopes equipped with the new generation broadband system, VLBI Global Observing System (VGOS), operational since 2019 and participating to all 24-hr VGOS sessions of the IVS, as well as VGOS Intensives, VGOS-B and VGOS-C. The geoscience instrumentation at Onsala includes these three telescopes used for geodetic VLBI, but also several GNSS installations, a superconducting gravimeter, a platform for visiting absolute gravimeters, several microwave radiometers for atmospheric measurements, both GNSS-based and conventional tide gauge sensors, and a seismometer. The observatory can thus be regarded as a fundamental geodetic station.

### 3.2.6 Capacity of CORSAIR Consortium

From the above, it is evident that the CORSAIR twinning partners are world leading experts in Space Geodesy and its core observational techniques. Each partner possesses in depth knowledge of at least one of the techniques, laying at the utmost frontier of relevant research. Their involvement and contribution in international services underpins their status as modulators of space geodesy advancements and its future. Thus, they constitute the ideal expert partners to disseminate knowledge and assist the Coordinator in reaching scientific excellence.

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## Tables for section 3.1

**Table 3.1a: List of work packages**

Work package No	Work Package Title	Lead Participant No	Lead Participant Short Name	Person-Months	Start Month	End Month
WP1	Project Management and Coordination (RP1)	1	NTUA	9.0	1	18
WP2	Project Management and Coordination (RP2)	1	NTUA	9.0	19	36
WP3	Transfer of Knowledge	2	OSO	32.0	1	12
WP4	Building Excellence Capacity (RP1)	4	IPGP	21.2	13	18
WP5	Building Excellence Capacity (RP2)	4	IPGP	47.8	19	36
WP6	Strengthening research management, administration and funding capacity	3	CLS	10.5	1	36
WP7	Networking and Ecosystem Activities	1	NTUA	11.5	1	18
WP8	Dissemination, Exploitation and Communication (RP1)	5	GFZ	12.7	1	18
WP9	Dissemination, Exploitation and Communication (RP2)	5	GFZ	12.7	19	36

**Table 3.1b: Work package description**

<b>Work package number</b>	WP1
<b>Work package title</b>	Project Management & Coordination (RP1)
<b>Objectives</b>	

- establish a strong project management scheme, including appropriate communication and reporting channels to the European Commission
- ensure successful achievement of the project objectives on time and within budget
- conduct continuous quality assurance activities for project activities and its results
- continuous monitoring of the project's progress and timely initiation of corrective actions (if needed)
- coordinate project meetings, and/or participation in various external or self-organized events
- perform risk analysis to ensure compliance with standards set concerning project objectives.

**Task 1.1: Project implementation plan and Project Management Board (M1-M18): Lead NTUA**

IPGP will organize CORSAIR's kick-off meeting. Project Management Board will be formed which will act as the highest project body, with structure and responsibilities outlined in Section 1.2.6. The board will perform on-line meetings every three months, or whenever one of the Quality Management Board, Risk Management Board or Financial Management Board identifies a specific need/subject to be addressed. It will also periodically submit progress reports (every six months).

**Task 1.2: Quality management and monitoring (M1-M18): Lead CLS**

Activities of the Quality Management Board (structure and responsibilities outlined in Section 1.2.6.). The board will prepare the Quality Plan, a document that prescribes quality assurance mechanisms and metrics, quality control measures, and quality-related requirements for project results. Every 6 months the Quality Management Board will deliver integrated reports to the Project Management Board.

**Task 1.3: Risk management plan (M1-M18): Lead GFZ**

The Project Management Board will compile the Risk Management Plan at the beginning of the project. The Plan will be continuously revised and timely updated by the partners. Every identified risk will be accessed, and timely prevention and mitigation actions will be precisely defined. Risk Management will be discussed at every gathering of the Project Management Board.

**Task 1.4: Financial management (M1-M18); Lead NTUA**

One specific support team to the Project Management Board will be the Financial Committee, that will develop the Guidelines for the Use of the Grant, monitor project expenditures, deliver in-house reports to the Management Board and prepare financial reports for the European Commission.

**Task 1.5: Coordination, communication and administration (M1-M18); Lead NTUA**

Day-to-day communication through agreed electronic channels with Leaders of Work Packages, coordinate project activities, distribute documents, news, and achievements, and reports on communication with the European Commission. Perform all trivial administration tasks.

<b>Work package number</b>	WP2
<b>Work package title</b>	Project Management & Coordination (RP2)
<i>Continuation of WP1 for the second Reporting Period</i>	
<b>Task 2.1: Project implementation plan and Project Management Board (M19-M36): Lead NTUA</b> (continuation of Task 1.1)	
<b>Task 2.2: Quality management and monitoring (M19-M26): Lead CLS</b> (continuation of Task 1.2)	
<b>Task 2.3: Risk management plan (M19-M36): Lead GFZ</b> (continuation of Task 1.3)	
<b>Task 2.4: Financial management (M19-M36); Lead NTUA</b> (continuation of Task 1.4)	
<b>Task 2.5: Coordination, communication and administration (M19-M36); Lead NTUA</b> (continuation of Task 1.5)	

<b>Work package number</b>	WP3
<b>Work package title</b>	Transfer of Knowledge
<b>Objectives</b>	
<ul style="list-style-type: none"> <li>• form task forces allocated per Space Geodetic technique,</li> <li>• transfer knowledge from expert nodes to the Coordinator, building foundations for scientific excellence</li> <li>• establish technical standards, requirements and specifications for further research capacity building</li> <li>• involve talented young scientists in training and increase inwards/outwards mobility</li> <li>• seek and utilize training channels/options other than CORSAIR</li> </ul>	

**Task 3.1 Transfer of knowledge for DORIS (M1-M12); Lead IPGP**

The Coordinator will establish a task-force to be trained in the DORIS technique. IPGP and CLS will act as the expert nodes for DORIS-specific training. They will introduce the technique to their peers via online webinars, virtual training, venture labs and one short term encounter. Virtual meetings will be held once every two months. The involved partners will document specifications, standards and models as well as hierarchically ordered tasks, acting as a road-map for designing and implementing a DORIS analysis software, eventually leading to state-of-the-art quality. The plan will include timely milestones, goals and validation tests.

**Task 3.2 Transfer of knowledge for SLR (M1-M12); Lead GFZ**

The Coordinator will establish a task-force to be trained in the SLR technique and GFZ will act as the expert node. It will introduce technical aspects to their peers via online webinars, virtual training, venture labs and one short term encounter. Virtual meetings will be held once per two months. During the visit, NTUA personnel will make a guided in-situ visit to the SLR station operated by GFZ, where they will be introduced to the instrumentation and operational aspects of the site. The two partners will document specifications, standards and models as well as hierarchically ordered tasks, acting as a road-map for designing and implementing an SLR analysis software, eventually leading to state-of-the-art quality. The plan will include timely milestones, goals and validation tests.

**Task 3.3 Transfer of knowledge for VLBI (M1-M12); Lead OSO**

The Coordinator will establish a task-force to be trained in the VLBI technique and OSO will act as the expert node. It will introduce the technique to their peers via online webinars, virtual training, venture labs and one short term encounter. Virtual meetings will be held once per two months. During the visit, NTUA personnel will make a guided in-situ visit to the VLBI site operated by OSO, where they will be introduced to the instrumentation and operational aspects of the site. The two partners will document specifications, standards and models as well as hierarchically ordered tasks, acting as a road-map for designing and implementing a geodetic toolbox, specifically aiming at efficient and accurate handling of Earth Orientation Parameters, reference frame transformations and modeling of tidal phenomena, eventually leading to state-of-the-art quality. The plan will include timely milestones, goals and validation tests.

**Task 3.4 Attending training events (M7-M12); Lead NTUA**

The Coordinator will closely follow any training activities/events offered by International Geodetic Services and Consortia (e.g. IGS, IDS, ILRS, IVS, IAG, GGOS, ESA, etc), and will pursue attendance by the relevant task forces (established in Tasks 2.1 through 2.3) either physically or remotely. Priority will be given to young scientists of the Coordinator institute.

**Task 3.5 Assessment of currently available software tools (M7-12); Lead GFZ**

All partners will be involved, according to their respective fields of expertise, in an effort to inspect, assess, test and validate software tools that the Coordinator has already developed (in the past). Expert nodes will evaluate design and implementation issues, possible shortcomings and mitigation/refinement actions. This is expected to significantly assist the software building process described in WP4 and WP5.

<b>Work package number</b>	WP4
<b>Work package title</b>	Building Excellence Capacity (RP1)
<b>Objectives</b> <ul style="list-style-type: none"> <li>effectively enhance host's research capacity through exchange of expertise, skill building and software implementation; transfer of knowledge and best practices using a "hands-on" approach</li> <li>build a software toolbox to perform state-of-the-art data analysis for DORIS and SLR observations. Additionally, efficiently incorporate recent advances and high-quality products from VLBI analysis.</li> <li>create highly skilled scientific personnel at the host institute</li> <li>establish a long term plan for further enhancing the host institute's research capacity, international standing and involvement in the future of Space Geodesy</li> </ul>	



**Task 4.1 Building research capacity via DORIS (M13-M18); Lead CLS**

CLS and IPGP will provide assistance to NTUA aiming at the upgrade and refinement of its own DORIS analysis software, to perform precise orbit determination and estimation of geodetic parameters. Both expert nodes will assist NTUA's task-force via online webinars, one-on-one and one-to-many training, problem solving and advisory meetings, exploiting the capacity already established in Task 3.1. Additionally, NTUA's task force will visit CLS while both CLS and IPGP personnel will make one short visit to NTUA's facilities. Knowledge transfer at this stage will include robust algorithmic and design approaches, best modeling practices, state-of-the-art methodologies and implementation strategies. Regular virtual meetings will be held once per three months, while additional meetings will take place on demand, targeting specific issues and/or problems that may come up. Software development will adopt the work plan established in Task 3.1, enabling the efficient administration of the capacity building process, and monitoring progress through well established, timely milestones, goals and validation tests.

**Task 4.2 Building research capacity via SLR (M13-M18); Lead GFZ**

GFZ will provide assistance to NTUA aiming at the development of its own SLR analysis software, to perform precise orbit determination and estimation of geodetic parameters. The expert node will assist NTUA's task force via online webinars, one-on-one and one-to-many training, problem solving and advisory meetings, exploiting the capacity already established in Task 3.2. Additionally, NTUA's task force will visit GFZ and GFZ personnel will make a short visit to NTUA's facilities, in an effort to further consolidate an efficient flow of expertise. Knowledge transfer at this stage will include robust algorithmic and design approaches, best modeling practices, state-of-the-art methodologies and implementation strategies. Regular virtual meetings will be held once per three months, while additional meetings will take place on demand, targeting specific issues and/or problems that may come up. Software development will adopt the work plan established in Task 3.2, enabling step-by-step validation.

**Task 4.3 Building research capacity via VLBI (M13-M18); Lead OSO**

OSO will assist NTUA in incorporating a state-of-the-art handling of Earth Orientation Parameters and consequently reference frame transformation schema in its own software toolset. The expert node will assist NTUA's personnel via online webinars, one-on-one and one-to-many schooling, problem solving and advisory meetings, exploiting the capacity already established in Task 3.3. Regular virtual meetings will be held once per three months to monitor progress, while additional meetings will take place on demand, targeting specific issues and/or problems that may come up. Additionally, Coordinator's task force will visit OSO and OSO personnel will make a short visit to NTUA's facilities, in an effort to further consolidate networking and efficient expertise transfer.

**Task 4.4 Attending training events (M13-M18); Lead NTUA (*continuation of Task 3.4*)**

<b>Work package number</b>	WP5
<b>Work package title</b>	Building Excellence Capacity (RP2)
<i>Continuation of WP4 for the second Reporting Period</i>	
<b>Task 5.1 Building research capacity via DORIS (M19-M36); Lead CLS (<i>continuation of Task 4.1</i>)</b>	
<b>Task 5.2 Building research capacity via SLR (M19-M36); Lead GFZ (<i>continuation of Task 4.2</i>)</b>	
<b>Task 5.3 Building research capacity via VLBI (M19-M36); Lead OSO (<i>continuation of Task 4.3</i>)</b>	
<b>Task 5.4 Attending training events (M19-M36); Lead NTUA (<i>continuation of Task 4.4</i>)</b>	
<b>Task 5.5 Long term plan for scientific excellence (M30-36); Lead NTUA</b>	
The partners will thoroughly evaluate the progress performed within the framework of CORSAIR in terms of research capacity and scientific excellence achieved. They will then accordingly establish a work plan for all remaining steps required for NTUA to reach either an Analysis Center status or an Associate Analysis Center status, for the DORIS and SLR techniques, depending on each international service's needs (i.e. IDS and ILRS) and prerequisites.	
Additionally, the consortium will identify weak points in the capacity built and propose means to mitigate them. Finally, it will identify and propose a number of study areas that currently lay in research frontiers and attract international research interest. Ecosystem needs (scientific, research and commercial) will also be thoroughly accessed and considered. These focus areas will act as pathways for future evolution and growth of the Center of Excellence.	

<b>Work package number</b>	WP6
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<b>Work package title</b>	Strengthening research management, administration and funding capacity
<b>Objectives</b> <ul style="list-style-type: none"> <li>• strengthen research management capacity and administrative skills of the Coordinator</li> <li>• create a dedicated unit at the Coordinator institute, responsible for project claiming and management</li> <li>• build expertise at efficient and successful research proposal claiming; boost Coordinator's success rate in research funding bids</li> <li>• expand and diversify funding pools and capabilities targeted by the Coordinator</li> <li>• claim research funds to enhance NTUA's appealingness to scientists, recruitment capabilities, increase mobility and support and expand research activities (financially-wise)</li> <li>• secure financial aid for the host's research activities in the long-run and boost long-term synergy between the consortium partners</li> </ul>	
<b>Task 6.1 Establish a research management/administration unit in the Coordinator institute (M1-M3); Lead NTUA</b> The Coordinator will establish a task force made up of four to six employees including administrative staff, which will be trained in project funding seeking, proposal writing/submitting and efficient research project management and administration (Tasks 6.2 and 6.3). The sole purpose of this unit will be to seek, claim and manage research proposals, while its scope will expand well beyond CORSAIR, effectively securing financial aid and supporting and administration for research activities in the long run. The unit will report on its activities every six months to the Project Management Board.	
<b>Task 6.2 Exploring funding pools and opportunities (M4-M8); Lead IPGP</b> The twinning partners will introduce and acquaint the Coordinator's research administration unit to various, diverse research funding pools, grants, capabilities and opportunities, which the unit can utilize to support research either individually (i.e. NTUA being the sole recipient of funding) or through partnerships (Section 1.2.3). At least one training session will be hosted per partner and attended by the unit.	
<b>Task 6.3 Strengthening research management capacity and administrative skills (M9-M13); Lead OSO</b> The twinning partners will transfer technical knowledge and best practices to the Coordinator's research administration unit. Training will be performed via online webinars, hosted by the partners and attended by the unit. At least two training sessions will be hosted per partner, emphasizing on (a) Project preparation, proposal writing and organisational issues and (b) Project management and administration (Section 1.2.3). Partners will use large scale research projects they have managed in the past, to provide detailed examples of successful management and administration schema.	
<b>Task 6.4 Enhancing research funding capacity (M12-M36); Lead CLS</b> Once the training phase of the research administration unit is (nearly) over and throughout the rest of CORSAIR's lifespan, the unit with the help and guidance of the twinning partners, will prepare and submit a series of research funding proposals, targeting various funding opportunities and schema (described in Section 1.2.3). These will build upon the research capacity build and scientific excellence gained via CORSAIR.	

<b>Work package number</b>	WP7
<b>Work package title</b>	Networking and Ecosystem Activities
<b>Objectives</b> <ul style="list-style-type: none"> <li>• establish efficient, solid, long-term networking and collaboration between twinning partners</li> <li>• introduction of Coordinator to international consortia and/or services (i.e. IDS, ILRS and IVS) and upgrading of its role and contribution</li> <li>• establishment of a Greek ecosystem of partners involved in space-based geosciences and applications; access the ecosystem's needs and interests in an effort to boost national contribution in the field</li> </ul>	

**Task 7.1 Agreement on PhD and PostDoc co-supervision (M1-M4); Lead NTUA**

The Coordinator will reach an agreement with each of IPGP, GFZ and OSO, regarding the co-supervision of three PhD and three PostDoc theses. The agreement will be formally submitted to NTUA, and one representative of each partner will be included in the three-part advisory committee (for PhD Thesis). The subjects of the thesis will be co-decided between the partners, depending on their respective expertise.

**Task 7.2 Exploring roles and prescriptive in Space Geodetic International Services and Consortia (M6-18); Lead IPGP**

Building upon the international scientific recognition enjoyed by the expert partners, their extensive networking capabilities and their status in prestigious consortia and services, the partnership will seek to introduce, involve and/or upgrade the role of the Coordinator in prestigious international services and consortia. Via dedicated web-meetings, the expert partners will extensively inform the Coordinator on their own involvement in such establishments and suggest services and consortia that the Coordinator should seek to join. Additionally, they will assist the Coordinator in its effort to take such steps, utilizing their extensive networking capabilities (e.g. introduction to Working Groups, Boards, etc) and research standing (e.g. provide reference letters, research status verification, etc) and propose means for enhancing the Coordinator's attractiveness and role in such services/consortia (e.g. promoting Coordinator's research activities, role claiming, leading Working Groups, proposing study-groups, etc). Specifically, the Coordinator will seek to join and/or strengthen its involvement and role claiming at least in IDS, ILRS, IVS, IAG and GGOS.

**Task 7.3 Establishing a Greek Ecosystem of partners in space-based geosciences (M3-12); Lead NTUA**

The Coordinator will take the initiative of bringing together all parties in Greece involved in Space-based geosciences, related applications and industry/market. The ecosystem is thoroughly described in Section 1.2.5. The Coordinator will issue multiple calls through social media, e-mails, personal communication, national conferences and scientific/engineering journals, CORSAIR's website and will utilize its already large list of national collaborators and academia and research network to attract members of the ecosystem.

**Task 7.4 Exploring Greek academia needs and interest in Space Geodesy (M13-18); Lead OSO**

CORSAIR partners will compile a series of two on-line questionnaires to be sent to the academia members (including scientific and research institutions) of the ecosystem (Task 5.3). The questionnaires will contain a number of questions and inquires to comprehensively access and evaluate Greek academia/scientific and research needs and interest in Space Geodesy and Earth Observation (Section 1.2.5).

**Task 7.5 Exploring stakeholders and commercial needs and interest in Space Geodesy (M13-18); Lead CLS**

CORSAIR partners will compile a series of two on-line questionnaires to be sent to the commercial/business members of the ecosystem established in Task 5.3. The questionnaires will contain a number of questions and inquires to comprehensively access and evaluate market needs and interest related to Space Geodesy and Earth Observation (Section 1.2.5).

<b>Work package number</b>	WP8
<b>Work package title</b>	Dissemination, Exploitation and Communication (RP1)
<b>Objectives</b> <ul style="list-style-type: none"> <li>• significantly enhance the Coordinator's international standing and prestige via dissemination and communication activities</li> <li>• endorse and promote the achievements of CORSAIR and the newly established center of excellence</li> <li>• enhance Coordinator's research profile through scientific publications, co-authored with the top-class consortium partners; enhance its visibility, prominence and networking capabilities via consortium presence in international conferences/workshops</li> <li>• strengthen the potential for future collaborations nationally and beyond borders</li> <li>• support the national (Greek) ecosystem of stakeholders related to Space studies and geosciences; boost R&amp;I and disperse knowledge</li> </ul>	

**Task 8.1 Project website and social media engagement (M6-M18); Lead NTUA**

The host institute will design and implement a dedicated web site for the project, assisting networking capabilities, promotion and communication of activities taking place in the framework of the project and, dissemination of CORSAIR outcomes and results and in general outreach material. The website will be continuously updated during the whole lifespan of the project.

Promotion, communication and endorsement activities will also be performed via social media (e.g. LinkedIn) on a timely manner, throughout the duration of CORSAIR.

**Task 8.2 Sharing of technical knowledge and know-how (M13-M18); Lead IPGP**

Lectures and presentations prepared by the expert nodes (see WP2) will be made available (on-line, free access) to any interested parties on demand, via CORSAIR's website. Users will be able to browse content, lecture notes and watch video-lectures, shared on the project's web site.

**Task 8.3 Open-Access publications (M6-M18); Lead IPGP**

Expert partners will collaborate with the host institution in the co-authorship of nine scientific papers (in their respective fields of expertise) to be published in peer-reviewed journals. Three of these will be high-impact publications, i.e. journals with impact factor > 2.4. Scientific publications will adhering to an open-access policy.

Additionally, members of the consortium will attend and present relevant publications in ten international conferences. The target here includes technique-related workshops (e.g. Analysis Centre Workshops organized by IDS and/or ILRS) and conferences of significant importance and prominence (e.g. IUGG, EGU and AGU international conferences).

**Task 8.4 Approaching high-schools students and the Greek STEM community (M12-M18); Lead NTUA**

Issue calls to the STEM community of Greece and high-schools around the country. Each beneficiary will be hosted at the observational facilities of DSO, where they will be introduced to fundamental concepts of Space Geodesy, Earth Observation, their crucial input for Climate Change monitoring. Visits will also include introductory lectures, venture labs, educational activities and guided tours at the instrumentation sites.

**Task 8.5 CORSAIR Newsletter (M10-M18); Lead CLS**

CORSAIR partners will prepare and disseminate a newsletter, containing outreach material, results and activities of CORSAIR, and news on Space Geodesy and Earth Observation (detailed description in Section 2.2). The first issue of the newsletter will be published by the 12<sup>th</sup> month; a new issue will be released every six months. The newsletter will be published to subscribers, posted on social media (e.g. LinkedIn) and on CORSAIR's website.

<b>Work package number</b>	WP9
<b>Work package title</b>	Dissemination, Exploitation and Communication (RP2)
<b>Task 9.1 Project website and social media engagement (M19-M36); Lead NTUA</b> ( <i>continuation of Task 8.1</i> )	
<b>Task 9.2 Sharing of technical knowledge and know-how (M19-M24); Lead IPGP</b> ( <i>continuation of Task 8.2</i> )	
<b>Task 9.3 Open-Access publications (M19-M36); Lead NTUA</b> ( <i>continuation of Task 8.3</i> )	
<b>Task 9.4 Approaching high-schools students and the Greek STEM community (M19-M36); Lead NTUA</b> ( <i>continuation of Task 8.4</i> )	
<b>Task 9.5 CORSAIR Newsletter (M19-M36); Lead CLS</b> ( <i>continuation of Task 8.5</i> )	
<b>Task 9.6 Dissemination activities and support for the Greek ecosystem (M19-M36); Lead CLS</b>	
To support the establishment and longevity of the Greek space-based geosciences ecosystem (Task 5.3), the Coordinator will organize one hybrid two-day meeting to take place in Greece, with the (virtual or physical) attendance of all ecosystem partners as well as all CORSAIR partners, and one info-day to take place in Greece, with the attendance of all ecosystem partners, co-organized by CLS. The activities are described in detail in Section 2.2 (Activities Targeting the Ecosystem).	

**Task 9.7 Joint Summer School (M25-M36); Lead NTUA**

All partners will be involved in and participate (via physical attendance) in the Summer School to take place during the last year of CORSAIR. Partner contribution will relate to the respective areas of expertise and will involve organizational issues, training material preparation and training (e.g. lectures, venture labs). The Summer School is thoroughly described in Section 2.2 (Summer School).

**Table 3.1c: List of Deliverables**

Deliverable (number)	Deliverable name	Work package number	Short name of lead participant	Type	Dissemination level	Delivery date (months)
D1.1	Kick-Off Meeting	WP1	IPGP	R	PU	4
D7.1	Agreement on PhD & PostDoc co-supervision	WP7	NTUA	R	PU	4
D6.1	Research management and administration unit	WP6	NTUA	R	PU	3
D1.2	Project Management Board Meetings	WP1	NTUA	R	PU	6,12,18,24,30
D7.2	Greek ecosystem of space-based geosciences	WP7	NTUA	R	PU	12
D8.1	Project Website	WP8	CLS	DEC	PU	12
D8.2	CORSAIR Newsletter	WP8	CLS	DEC	PU	12,18,24,30,36
D3.1	Assessment of NTUA's in-house software tools	WP3	GFZ	R	PU	12
D3.2	Standards and specification for DORIS analysis	WP3	IPGP	R+O	PU	13
D3.3	Standards and specification for SLR analysis	WP3	GFZ	R+O	PU	13
D3.4	Standards and specification for EOP and tidal analysis	WP3	OSO	R+O	PU	13
D6.2	Research management and administration unit training	WP6	NTUA	R	PU	13
D7.3	Exploring ecosystem's needs	WP7	CLS	R	PU	18
D7.4	Involvement in Space Geodetic International Services and Consortia	WP7	GFZ	R	PU	18
D6.3	Research proposal (funding) submissions	WP6	OSO	R+O	PU	24, 36
D9.1	Lecture notes and Training material	WP9	GFZ	DEC	PU	24
D9.2	Greek ecosystem meeting I (indo-day)	WP9	CLS	R	PU	30
D9.3	Greek ecosystem meeting II	WP9	NTUA	R	PU	36
D5.1	Attendance report of training events (omitting CORSAIR)	WP5	NTUA	R	PU	36
D5.2	Software for analysis of DORIS observations	WP5	IPGP	R+O	PU	36
D5.3	Software for analysis of SLR observations	WP5	GFZ	R+O	PU	36
D5.4	Validation tests for EOP precise handling	WP5	OSO	R+O	PU	36
D5.5	Long term plan for scientific excellence	WP5	GFZ	R	PU	36
D9.4	Space Geodesy Summer School	WP9	NTUA	DEC	PU	36
D9.5	Open-Access Publications	WP9	CLS	DEC	PU	36
D2.1	Evaluation and Conclusions	WP2	OSO	R	PU	36



**Table 3.1d: List of milestones**

Milestone number	Milestone name	Related work package(s)	Due date (month)	Means of verification
MS1	Kick-Off Meeting Organized	WP1	2	Organization of an all-partner meeting.
MS2	Establishment of technique-specific task forces	WP3 to WP5	2	Establish members for technique-wise training.
MS3	Quality Management Plan & Risk Management Plan adopted	WP1	3	Compilation and adoption of the plans by the Project Management Board.
MS4	Agreement on PhD/Post-Doc co-supervision	WP7	6	Official certification by NTUA.
MS5	CORSAIR website	WP8 and WP9	9	CORSAIR website goes “live” (initial release).
MS6	Standards and specifications for software development	WP3 to WP5	12	Document reports
MS7	First issue of the CORSAIR newsletter	WP8 and WP9	12	Delivery by e-mail and available at CORSAIR website.
MS8	Research Management Unit formed and basic training through; start bidding	WP6	12	Training report and subsequent official research funding submissions.
MS9	Ecosystem calls I and II	WP7	13	Official calls via various means (e.g. social media, communication activities, etc).
MS10	Training material publicly available	WP8	19	Training material added on CORSAIR website.
MS11	Evaluation of Ecosystem needs and interests	WP7	20	Report by Quality management Board to Project Management Board.
MS12	Orbit determination via SLR and DORIS	WP4, WP5, WP8 and WP9	20	Software tests validated by expert nodes; publicly available via software repository.
MS13	Precise orbit determination via SLR and DORIS		28	Publicly available via software repository (beta version).
MS14	Software release		36	Publicly available via software repository (alpha version).
MS15	Wrap Up Meeting	WP1	36	All-partner meeting

**Table 3.1e: Critical risks for implementation #@RSK-MGT-RM@#**

Description of risk (indicate level of (i) likelihood, and (ii) severity: Low/Medium/High)	Work package(s) involved	Proposed risk-mitigation measures
Inability to travel e.g. due to pandemic security measures (medium/medium)	All	Partners will perform the required tasks via online platforms, utilizing experience gained throughout the last few years of security measures.
Failure to fully implement the Space Geodesy software tools (low/high)	WP4 and WP5	Partner's expertise and the availability of a relevant packages indicate an extremely small risk. If however such a situation arises, the consortium will limit the number of involved satellites and/or number of parameters estimated. The long-term plan established in Task 5.5 will act as a roadmap for eventually reaching state-of-the-art quality.
One partner resigns from consortium (low/high)	All	Research activities and expertise of the partners overlap in a degree that can assure the effective training of the Coordinator, even if one of the partners resigns. Further assistance will be sought in the corresponding international services with the intervention of the expert nodes.

Inability to attract ecosystem members (medium/low)	WP6, WP7, WP8 and WP9	If by the end of WP7 a minimum of eight ecosystem members has not been reached, further calls will be issued. Additionally, the Quality Management Board will propose measures to expand the scope, reach and intensity of the calls (e.g. include further potential members by expanding the spatial and/or interest range).
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**Table 3.1f: Summary of staff effort**

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	Total Person-Months per Participant
<b>1/NTUA</b>	5.5	5.5	22.0	12.0	31.5	7.0	8.0	8.0	8.0	<b>107.5</b>
<b>2/OSO</b>	0.5	0.5	2.0	1.7	4.3	1.0	1.0	0.7	0.7	<b>12.4</b>
<b>3/CLS</b>	0.5	0.5	2.0	2.0	4.0	0.5	0.5	1.0	1.0	<b>12.0</b>
<b>4/IPGP</b>	1.5	1.5	4.0	3.0	5.5	1.0	1.0	2.0	2.0	<b>21.5</b>
<b>5/GFZ</b>	1.0	1.0	2.0	2.5	2.5	1.0	1.0	1.0	1.0	<b>13.0</b>
<b>Total Person Months</b>	<b>9.0</b>	<b>9.0</b>	<b>32.0</b>	<b>21.2</b>	<b>47.8</b>	<b>10.5</b>	<b>11.5</b>	<b>12.7</b>	<b>12.7</b>	<b>166.4</b>

**Table 3.1g: ‘Subcontracting costs’ items**

<b>1/NTUA</b>		
	Cost (€)	Description of tasks and justification
<b>Subcontracting</b>	<b>5000.00</b>	The coordinator will subcontract an external audit company to make an independent inspection to CORSAIR finances. Findings from audit report will be submitted together with the final CORSAIR report.

**Table 3.1h: ‘Purchase costs’ items (travel and subsistence, equipment and other goods, works and services)**

<b>1/NTUA</b>		
	Cost (€)	Justification
<b>Travel and subsistence</b>	<b>111300.00</b>	The budget concerns two trips for project management, trips to each participant for training as well as participation in conferences
<b>Equipment</b>		
<b>Other goods, works and services</b>	<b>51500.00</b>	Included costs for the organization of the summer school, publication fees, and consumables for the management and promotion of the project
<b>Remaining purchase costs (&lt;15% of pers. Costs)</b>		
<b>Total</b>	<b>162800.00</b>	

<b>2/OSO</b>		
	Cost (€)	Justification
<b>Travel and subsistence</b>	<b>26500.00</b>	The budget concerns one trip for project management, two trips to Athens for training courses and the Summer School, as well as participation in conferences
<b>Equipment</b>		
<b>Other goods, works and services</b>	<b>13000.00</b>	Costs for the organization of Wrap-up meeting and publication fees included
<b>Remaining purchase costs (&lt;15% of pers. Costs)</b>		

<b>Costs)</b>	
<b>Total</b>	<b>39500.00</b>

<b>3/CLS</b>		
	<b>Cost (€)</b>	<b>Justification</b>
<b>Travel and subsistence</b>	<b>30350.00</b>	The budget concerns two trips for project management, trips to Athens for training courses the Summer School, and the Info-day meeting as well as participation in conferences
<b>Equipment</b>		
<b>Other goods, works and services</b>		
<b>Remaining purchase costs (&lt;15% of pers. Costs)</b>		
<b>Total</b>	<b>30350.00</b>	

<b>4/IPGP</b>		
	<b>Cost (€)</b>	<b>Justification</b>
<b>Travel and subsistence</b>	<b>22850.00</b>	The budget concerns one trip for project management, two trips to Athens for training courses and the Summer School, as well as participation in conferences
<b>Equipment</b>		
<b>Other goods, works and services</b>	<b>6000.00</b>	Costs for the organization of Kick-off meeting
<b>Remaining purchase costs (&lt;15% of pers. Costs)</b>		
<b>Total</b>	<b>28850.00</b>	

<b>5/GFZ</b>		
	<b>Cost (€)</b>	<b>Justification</b>
<b>Travel and subsistence</b>	<b>35170.00</b>	The budget concerns the two travels for project management, two trips to Athens for training courses and the Summer School, as well as participation in conferences
<b>Equipment</b>		
<b>Other goods, works and services</b>		
<b>Remaining purchase costs (&lt;15% of pers. Costs)</b>		
<b>Total</b>	<b>35170.00</b>	

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**Table 3.1k: Research Component**

Have you included a research component in your project?	No
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	Year 1											Year 2											Year 3													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	Reporting Period (RP1)											Reporting Period (RP2)																								
WP1: Project Management & Coordination (RP1)																																				
T1.1 Project implementation plan and Project Management Board																																				
T1.2 Quality management and monitoring																																				
T1.3 Risk management																																				
T1.4 Financial management																																				
T1.5 Coordination, communication and administration																																				
WP2: Project Management & Coordination (RP2)																																				
T2.1 Project implementation plan and Project Management Board																																				
T2.2 Quality management and monitoring																																				
T2.3 Risk management																																				
T2.4 Financial management																																				
T2.5 Coordination, communication and administration																																				
WP3: Transfer of knowledge																																				
T3.1 Transfer of knowledge for DORIS																																				
T3.2 Transfer of knowledge for SLR																																				
T3.3 Transfer of knowledge for VLBI																																				
T3.4 Attending training events																																				
T3.5 Assessment of currently available software tools																																				
WP4: Building Excellence Capacity (RP1)																																				
T4.1 Building research capacity via DORIS																																				
T4.2 Building research capacity via SLR																																				
T4.3 Building research capacity via VLBI																																				
T4.4 Attending training events																																				
WP5: Building Excellence Capacity (RP2)																																				
T5.1 Building research capacity via DORIS																																				
T5.2 Building research capacity via SLR																																				
T5.3 Building research capacity via VLBI																																				

T5.4 Attending training events				
T5.5 Long term plan for scientific excellence				
<b>WP6: Strengthening research management, administration and funding</b>				
T6.1 Establish a research management/administration unit in the Coordinator				
T6.2 Exploring funding pools and opportunities				
T6.3 Strengthening research management capacity and administrative skills				
T6.4 Enhancing research funding capacity				
<b>WP7: Networking and Ecosystem Activities</b>				
T7.1 Agreement on PhD and PostDoc co-supervision				
T7.2 Exploring roles and prescriptive in Space Geodetic International Services				
T7.3 Establishing a Greek Ecosystem of partners in space-based geosciences				
T7.4 Exploring Greek academia needs and interest in Space Geodesy				
T7.5 Exploring stakeholders and commercial needs and interest in Space Ge-				
<b>WP8: Dissemination, Exploitation and Communication (RP1)</b>				
T8.1 Project website and social media engagement				
T8.2 Sharing of technical knowledge and know-how				
T8.3 Open-Access publications				
T8.4 Approaching high-schools students and the Greek STEM community				
T8.5 ARONYM Newsletter				
<b>WP9: Dissemination, Exploitation and Communication (RP2)</b>				
T9.1 Project website and social media engagement				
T9.2 Sharing of technical knowledge and know-how				
T9.3 Open-Access publications				
T9.4 Approaching high-schools students and the Greek STEM community				
T9.5 ARONYM Newsletter				
T9.6 Dissemination activities and support for the Greek ecosystem				
T9.7 Joint Summer School				

**Figure 2: CORSAIR Gantt Chart**