

CALL FOR PROPOSAL — EXTENSION OF DEADLINE FOR PUBLICATION OF CLARIFICATIONS

GSA/GRANT/01/2017

Development of an Advanced RAIM Multi-constellation Receiver

The present call for proposals is composed of a set of Submission Documents, which form an integral part of this call:

A1-A6 Forms
B1-B2 Forms
C1 Form

The terms set out in the call for proposals document shall take precedence over those in the other parts of the Submission Documents

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INTERESTED PARTIES ARE INVITED TO READ CAREFULLY THE BELOW INSTRUCTIONS IN ORDER TO ENSURE THAT APPLICATIONS ARE COMPLETE AND COMPLIANT WITH THE INSTRUCTIONS WHEN SUBMITTED.

1. CONTEXT

1.1. Introduction

The mission of the European GNSS Agency (GSA) is to support European Union objectives and achieve the highest return on the European GNSS (E-GNSS) investment represented by the EGNOS and Galileo programmes, in terms of benefits to users and economic growth and competitiveness.

EGNOS is the European satellite-based augmentation system (SBAS) that is operational since October 2009 and will continue to provide its services for GPS augmentation and in the future for Galileo. Its open signal is free of charge and the service availability reaches 99% for the total of the EU coverage. EGNOS is able to enhance GNSS performance by offering an increased accuracy and reliability on the positioning. Since 2015 the EGNOS Safety of Life (SoL) service also includes LPV-200 service level, able to provide lateral and vertical guidance without the need for visual contact with the ground until a Decision Height/Altitude (DH/DA) of down to only 200 ft. above the runway, resulting in a better access to airports and in the reduction of delays, diversions and cancellations.

Galileo is a global navigation system under deployment in Europe. It is a civil system under civil control, intended to provide navigation services to users, including guaranteed services for specific user communities. Initial Services are based on a number of satellites placed in orbit that can be used in combination with GPS satellites. Already at this stage the user will be able to exploit a significant improvement in terms of signal availability, especially in harsh environments, as in urban canyons, where chances to receive signals from GNSS satellites are limited due to the restricted visibility of the sky. Galileo will provide precise, reliable and robust open service, enabling other desirable properties such as better resistance against multipath. In addition, Galileo is planned to provide Authentication over its Open and Commercial Services, a feature which is unique among the various GNSS providers. This will allow to assess the authenticity of the data provided through the signal in space against attempts to spoof it and will contribute to improve the robustness of GNSS for applications in which safety/security is concerned.

Integrity is one of the essential qualities of service to be provided to the users of Safety of Life applications. Advanced Receiver Autonomous Integrity Monitoring (RAIM) is a concept to which much effort is being devoted with the intention to provide a global integrity service based on multiple satellite constellations. Galileo can substantially contribute to RAIM. In this respect, cooperation with the United States of America was formally established through the creation of a specific EU-US RAIM Technical Sub-Group (TSG) in Working Group C of the EU-US cooperation agreement. The RAIM TSG has been established on July 1, 2010 and has been developing the concept with a focus on Civil Aviation, including possible architectures for its implementation as well as the reference user algorithm to be implemented at airborne receiver's level which can lead to service provision based at least on the GPS plus Galileo constellations. The RAIM TSG has produced several Reports with its findings which are publicly available (3 until now, see [RD.1], [RD.2] and [RD.3]).

The RAIM TSG was given the task to develop a solution to ensure navigation integrity for en-route flight, terminal, and approach operations, which should support lateral and vertical guidance down to a Decision Height/Altitude (DH/DA) as low as 200 feet height above touchdown, as required per LPV-200 (Localiser Performance with Vertical guidance with DA/DH equal to 200 feet).

RAIM has been developed to further extend the integrity concept used in SBAS but features different characteristics compared to current SBAS such as:

- Use of the dual-frequency ionosphere-free pseudo-range combination,

- NOT use of differential corrections (except for the Online ARAIM, see description below),
- Possible use of all GNSS constellations, providing a reliable and proven Integrity Support Message (ISM), and
- Timing constraints (i.e. time to alert) demanded to the receiver's algorithm instead of to a ground segment facility.

Two constellations and dual-frequency are required to meet minimum availability requirements globally for LPV-200 using ARAIM, therefore the availability of both Galileo and GPS constellation and a receiver able to process their broadcasted signal in the space (SIS) is at the basis of the implementation of the ARAIM concept.

Even if they have many similarities ARAIM offers a number of functionalities that complement SBAS both in the near-term and in the long-term, such as:

- Horizontal ARAIM in the Near Term Based on One Frequency, enabling dual or multiple constellation navigation based on one frequency, before dual frequency GPS (L1-L5) and dual frequency Galileo will reach their Full Operational Capabilities.
- Arctic Navigation, requiring integrity value to support increasing demand (energy exploration, eco-tourism and shipping, also enabling travel in existing ice cracks) in areas where there is no coverage by geostationary satellites;
- GNSS resilience: since integrity is either broadcast through GNSS signals, stored in the receiver itself or disseminated through aviation databases, ARAIM does not suffer from signal outages associated with the geostationary geometry. Indeed geostationary satellites' signals are frequently received under low elevation angles which are subject to blockage by terrain or buildings, and intentional or non-intentional radio frequency interference.

Furthermore the integrity provision through core constellations could in future obviate or reduce the need for geostationary satellites used by SBAS. This would reduce the needed amount of ground architecture elements and could also imply the reuse of SBAS reference stations for ARAIM monitoring, resulting in a faster ARAIM deployment¹.

The ARAIM concept is based on three possible architectures² enabling different level of performance:

- Horizontal ARAIM, to support horizontal navigation based on an occasional Integrity Support Message (ISM) updates.
- Offline ARAIM, to support horizontal and vertical navigation based on a monthly Integrity Support Message (ISM) updates.
- Online ARAIM, to support horizontal and vertical navigation based on an Integrity Support Message (ISM) frequently³ updates.

¹ Ref. Table E-1 in [RD.3].

² For further information please refer to documents in Section 19. Especially Working Group C, ARAIM Technical Subgroup Reports [RD.1], [RD.2] and [RD.3].

³ E.g. every 12 minutes, as indicated in [RD.3].

Horizontal ARAIM is similar to traditional RAIM, but has the provision to input new integrity parameters which are instead hardcoded in current RAIM GPS receivers. This capability will provide the users with information about large changes in the core constellation. It allows the allocation of uncertainties dependent on the actual status of each specific constellation, providing the architecture with the ability to adapt to actual performances by the constellations as they change (e.g. reporting the user with improved confidence in the ranging accuracy or *a priori* failure probabilities as the constellation matures).

Furthermore it introduces the use of dual frequency (L1 and L5) signals mitigating the effect of ionospheric uncertainty and the impact of radio frequency interference located on a specific band, by reverting to L1-only or L5-only operation (in exchange for reduced performance). It also utilises multiple constellations to reduce sensitivity to the strength of any individual constellation. This will obviate the RAIM outages currently experienced by aviation receivers since it is based on multi-constellation multi-frequency satellite navigation.

[RD.1], [RD.2] and [RD.3] analyse the feasibility to meet specific operational needs through the implementation of the ARAIM concept, as a function of the constellation strength (depleted, baseline, and optimistic) and the *a priori* failure probabilities.

Figure 1 illustrates the Horizontal ARAIM architecture, based on a multi-constellation space segment, a number of reference stations monitoring the Signal-In-Space (SIS) and supporting the computation and delivery of the Integrity Support Message (ISM).

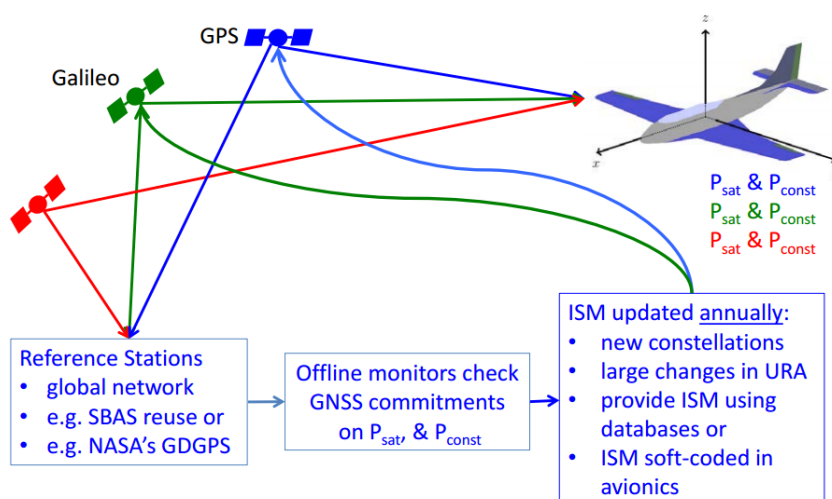


Figure 1 - Horizontal ARAIM [RD.3]

Offline ARAIM is designed to support both horizontal and vertical navigation. It includes a link from the ground to the avionics to adapt to a changing signal environment. However the architecture does not aim at following short-term variations in constellation status or performance, therefore the user is provided with an Integrity Support Message (ISM) whose update is very modest (monthly updates are sufficient). Instead the parameters are conservatively chosen to cover short-term performance variations.

The link from the Offline ground segment to the airborne fleet may be a suitable wireless link (e.g. core constellations or geostationary satellite's SIS, or terrestrial radio), or a database updated on a monthly basis.

Figure 2 shows the Offline ARAIM architecture which is very sensitive to the user range accuracies (URAs) that are contained within the navigation messages from the core constellations. These need to be consistent with published CSP performance commitments and verified by service history, therefore new constellation may be not able to initially achieve the needed level of URA performance. Thus Offline ARAIM is subject to *availability risk*.

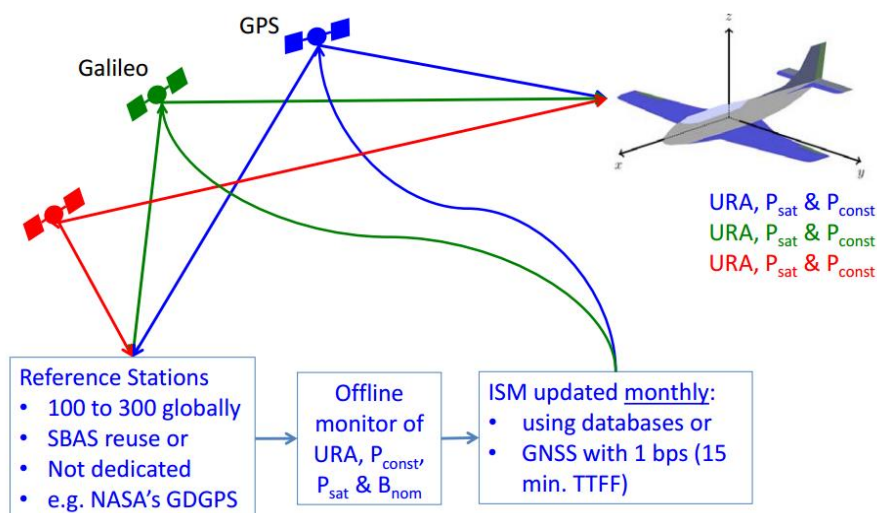


Figure 2 - Offline ARAIM [RD.3]

Online ARAIM is designed to mitigate the *availability risk* through the implementation of a ground segment able to:

- Reduce the user range accuracy with respect to the URAs broadcast by the core constellations: the system estimates and replaces the ephemeris and clock information, by using trusted hardware and software. The ephemeris and clock corrections must be generated frequently enough to improve the URAs;
- Timely detect and flag faulty satellites reducing the exposure time to failures.

The Online ARAIM approach is similar to the SBAS, however the six second time to alert associated with LPV-200 and LPV-250 is completely demanded to the user algorithm.

[RD.1], [RD.2] and [RD.3] describe the performance reachable through the implementation of this architecture, as a function of the constellation strength (depleted, baseline, and optimistic) and the User Range Accuracy, under certain assumption in terms of *a priori* failure probabilities.

Since the aircraft must receive and apply the ISM content shortly before conducting an approach operation to use satellite navigation for vertical guidance, it is subject to *connectivity risk*.

Online ARAIM architecture is depicted in Figure 3.

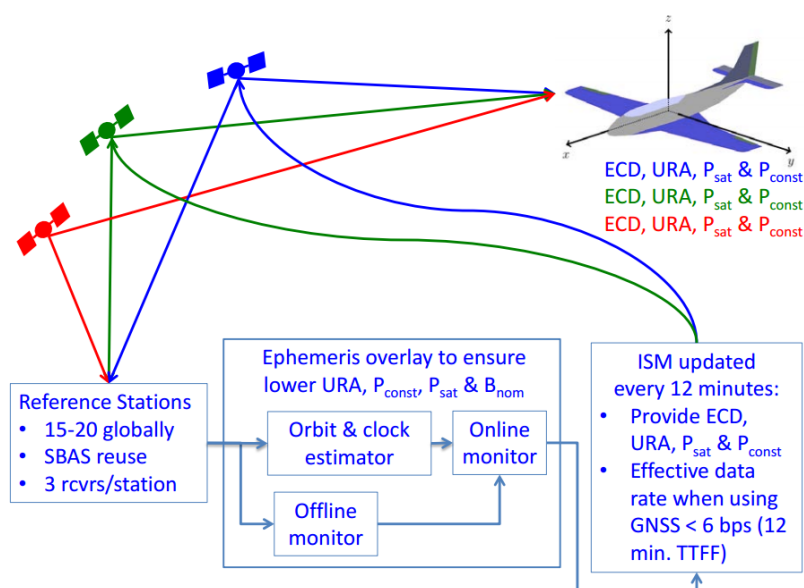


Figure 3 - Online ARAIM [RD.3]

Based on [RD.3], ARAIM services should be implemented incrementally, beginning with a horizontal only service, H-ARAIM, to support near-term, multi-constellation (MC) applications. A global vertical service (Offline and Online) can be implemented in a later stage, once sufficient experience is gained to demonstrate safe operations and to assess the monitoring capabilities necessary for the V-ARAIM.

In order to provide the above services, the corresponding Standards must be developed and validated. Activities are already starting to incorporate H-ARAIM into the future dual-frequency, multi-constellation (DFMC) SBAS Minimum Operational Performance Standards (MOPS) under development at the responsible organisations (such as EUROCAE). Similarly the Operational concept (CONOPS) will have to be as well developed and validated by ICAO.

All the above lead to the need of developing an ARAIM prototype implementing the ARAIM user algorithm, enabling global Horizontal and Vertical navigation for Civil Aviation.

At the end of the project, the prototype receiver shall be mature enough to allow the performance assessment in a number of Safety critical applications in aviation (both Horizontal and Vertical guidance).

It shall support the consolidation of the ARAIM algorithm, the characterisation of performance and shall contribute to validate the ARAIM concept against representative Safety of Life operations. In particular, this prototype shall guarantee enough flexibility to enable the analysis of the ARAIM error characterisation, its impact on performances and to accommodate changes and/or adjustments resulting from the project itself or from other related initiatives, as specified in section 2.2.

Furthermore, results obtained within the project can provide elements contributing to the development of the standards mentioned above.

1.2. Other initiatives in the ARAIM roadmap

The following initiatives, as well as any other project considered relevant for the scope of this action, shall be taken into account by the applicants while preparing the proposals, and by the beneficiary while executing the project:

- **R&D FOR ADVANCED RECEIVER AUTONOMOUS INTEGRITY MONITORING: ARAIM DEMONSTRATOR – [RD.4]:** the purpose of this project is to develop an ARAIM Demonstrator and to conduct the necessary tests, including tests with real Galileo Signal In Space (SIS) – as well as other constellations – that will serve as proof of concept for ARAIM and that will serve to clarify the open questions related to its implementation. Based on the achieved results, specific recommendations which can be accepted by the international community for the implementation of ARAIM shall be then proposed. The ARAIM Demonstrator (ADAM) project was kicked-off in September 2016.
- **AVIATION STANDARDISATION FOR MULTICONSTELLATION (ATLAS):** the project aims to support the introduction of Galileo and modernised version of EGNOS in the civil aviation sector in the context of new multiconstellation services recommended by the International Civil Aviation Organization (ICAO). The activities will consist in delivering draft technical standards for implementation of multiconstellation/dual frequency and of next generation SBAS as well as of Advanced RAIM techniques, as aviation receiver standards are currently published for GPS stand-alone and GPS/SBAS equipment. Standard deliverables generated are:
 - Galileo stand-alone receiver MOPS (final version)
 - Galileo/GPS receiver MOPS (final version)
 - Combined Galileo/GPS L1/L5 SBAS MOPS
 - ICAO SARPs for Galileo Open Service and Galileo SARPs Validation File
 - ICAO SARPs for next generation SBAS
- **AVIATION DFMC SBAS RECEIVER PROTOTYPE – [RD.5]:** The purpose of the project is to design, develop and test a prototype of the DFMC SBAS (Dual Frequency Multi-Constellation Satellite Based Augmentation System) user terminal for the aviation SoL service, augmenting GPS and Galileo capabilities. The developed receiver, besides the SBAS DFMC functions (for GPS and Galileo), shall also include Horizontal-ARAIM (Advanced Receiver Autonomous Integrity Monitoring) and RAIM (Receiver Autonomous Integrity Monitoring). The implementation of Horizontal-ARAIM, and the assumptions for the Vertical-ARAIM (only taken into account for the purpose of dimensioning the computational resources of the prototype receiver), are based on the current state of standardisation of this feature.

Based on the above identified projects, the applicant shall propose a project plan aiming at maximising the effectiveness of the results of the project (see IMPORTANT NOTE (1) in section 2.2) and allowing for the interaction with the above – or any other relevant – projects. In this regard, to be noted that the information about the progress of the relevant projects will be provided by GSA/EC to the beneficiary along the project.

1.3. Background of the call

This call is based on the Delegation Agreement concluded between the European Union, represented by the European Commission, and the European GNSS Agency (GSA) on the Exploitation Phase of the Galileo Programme signed on 2 October 2014.

In this framework, and in accordance with the Galileo Grants Plan for 2016 published on the GSA website (<http://www.gsa.europa.eu/gsa/grants>), the GSA is launching a call for proposals to increase Galileo adoption in aviation receivers.

2. OBJECTIVES AND SCOPE OF THE CALL

2.1. Objective of the call for proposals

This Call for Proposal aims to achieve the following objectives (for each grant):

- (1) to develop, test and assess the performance of an Advanced RAIM (Receiver Autonomous Integrity Monitoring) receiver's prototype, following the guidelines defined by the ARAIM TSG (Technical Sub Group).
- (2) to characterise, consolidate and validate the local effects of the threat model as specified by the ARAIM TSG.
- (3) to contribute to the standardisation activities on ARAIM.

2.2. Scope and areas of activities of the call for proposals

In line with the ARAIM roadmap defined in [RD.3], this call has the objective to fund specific activities to develop an ARAIM receiver's prototype aiming to consolidate the user algorithm, assess and validate the performance of the ARAIM concept, liaising with the concurrent development of the ARAIM demonstrator (specified in [RD.4]) and other projects quoted in section 1.2.

The receiver's baseline used to develop the ARAIM prototype shall at least feature dual constellation (Galileo and GPS) and dual frequency, with current state of the art SBAS capability.

In order to reach the objectives of this call, beneficiaries are expected to conduct the following activities within the scope of this call.

Task 1:

The first task of the project aims at defining the requirements and implementing the first version of the ARAIM receiver's prototype. It also includes the consolidation and approval of a performance validation plan.

The beneficiary shall **define all the receiver's requirements** (including functional, safety and performance) against which the design, development and testing activities will be carried out, based on the following considerations and technical constraints:

- The ARAIM algorithm, which has to be implemented, shall be based on the last available updated reference algorithm defined by the ARAIM Technical Subgroup in WG C, being it the reference algorithm defined in [RD.3] or a more recent version, if made available during the development of the prototype.

Beneficiary may in addition propose alternative or evolution versions of the reference algorithm. However those shall in any case result either in equivalent (or better) performance or in a significant computational complexity reduction providing comparable performance;

- The prototype receiver shall be able to support the following two ISM dissemination means, given that the options are still open:
 - 1) Integrity Support Message (ISM) dissemination through Signal in Space (either GNSS core constellations or geostationary satellite's SiS).
 - 2) Integrity Support Message (ISM) update through one of the databases in the airplane which are regularly updated. For this, the beneficiary should first perform a trade-off analysis of various options (considering the need for interfaces and corresponding failure modes), to be later decided which option to implement, based on the analysis.
- Even though the Concept of Operations (ConOps) is not yet defined and is to be developed at ICAO, the beneficiary shall propose some operational requirements on which the prototype design shall be based, such as the option to de/select the constellation(s) and the frequency(ies), the option to switch between ARAIM and SBAS and switching modes based on algorithm computational burden (e.g. Online to Offline ARAIM in case of depleted constellation).
- The design approach shall aim at obtaining:
 - 1) an incremental and flexible architecture supporting the performance assessment of the user algorithm under all the three ARAIM architectures (Horizontal, Offline and Online).
 - 2) a flexible architecture able to accommodate potential changes/adjustments (e.g. in terms of ISM format, algorithm optimisation and further updates, ConOps developed at ICAO, error model, etc.).
 - 3) a modular architecture that would facilitate interoperability, integration, test and validation.
- The prototype shall be able to operate as a minimum in the following modes:
 - Galileo and GPS mode for H-ARAIM
 - Galileo and GPS mode for V-ARAIM
 - Galileo-only and GPS-only mode for H-ARAIM;
- The receiver shall also implement the single-frequency GPS-only RAIM, to perform benchmarking analysis (as specified in the text below);

The beneficiary is also requested to perform a preliminary safety assessment, to identify all safety requirements (including the adequate Design Assurance Level (DAL)/Software Assurance Level (SWAL) levels) and to identify all the necessary activities and relevant associated documentation in support of the safety case.

The beneficiary shall present all the consolidated requirements (including functional, safety and performance) together with the preliminary design option in a ***Preliminary Design Review (PDR)***, to demonstrate that it meets the identified requirements, that all the components have been considered and that the verification methods have been properly identified.

The design of the receiver and its components shall take into consideration the following aspects:

- The beneficiary shall base the design, as much as possible, on already existing hardware. Minor hardware adaptations (if any) shall be justified in the proposal;

- The design of a dedicated antenna is out of scope for this project;

Upon successful completion of the PDR the detailed design shall be initiated.

The design shall implement, during the action, the flexibility required to adapt the architecture to potential changes resulting from the development of the ARAIM Demonstrator [RD.4], the operational concept developed at ICAO, the definition of an updated version of the reference algorithm and from the receiver's performance assessment.

The beneficiary shall assess the final receiver's architecture and refine the test and validation specifications and plan before the **Critical Design Review (CDR)**, which shall demonstrate that the design is mature enough to support the development and test phases.

Upon successful completion of the CDR the beneficiary shall proceed to **develop** the first version of the **ARAIM receiver's prototype**.

As last step of Task 1, the beneficiary shall define and **consolidate a performance validation plan** (deliverable (8)) detailing the test campaign aiming at the validation of the receiver's performance, by using theoretical models and simulated scenarios first (*in-lab validation*) and representative scenarios at a later stage (*real GNSS signal validation*). In that respect the beneficiary shall prepare a number of test scenarios to validate the ARAIM receiver against the Safety of Life (SoL) needs, in support of the following target operations:

- **Horizontal ARAIM:** the ARAIM receiver shall be assessed against the requirements defined for lateral navigation (RNP 0.1 and RNP 0.3).
- **Vertical ARAIM:** the ARAIM receiver shall be assessed against the requirements defined for lateral and vertical navigation, namely the requirements for approach procedures (LPV-200 and LPV-250).

The performance of the integrity concept algorithms shall be evaluated in terms of integrity, availability, and continuity against a full set of representative conditions. The tests shall also aim at identifying and assessing the vulnerabilities of the approach, in terms of *availability risk* and of *connectivity risk*, depending on the underlying ARAIM architecture (Offline and Online, respectively) under nominal and degraded conditions.

Furthermore the plan shall also include a section devoted to GPS-only RAIM testing aiming at comparing the performance achievable by ARAIM with the one achievable by RAIM under the same conditions, in the scope of both the *in-lab* and the *real GNSS signal* validation.

IMPORTANT NOTE (1): The applicants are requested to include already in their proposals (see deliverables (2) and (8)) a preliminary list of requirements for the prototype and a preliminary version of the plan describing how they propose to verify the compliance of the prototype with the target operational requirements (i.e. LPV-200, LPV-250, RNP 0.1 and RNP 0.3).

In this regard the applicant is also expected to analyse the ARAIM roadmap defined in [RD.3] and the inter-dependencies with the concurrent relevant initiatives listed in section 1.2 to propose a suitable validation approach and related planning. The proposed approach shall aim at the maximisation of the representativeness of the scenarios used for the ARAIM receiver validation.

The preliminary plan shall be evaluated against the award criteria (see section 10).

Task 2:

The second task of the project aims at assessing the achievable performance of the implemented receiver's prototype.

Due to the conceptual differences between ARAIM and SBAS (such as the level and content of the broadcast information, single- vs. multi-frequency, single- vs. multi-constellation, ground vs. user segment based alerting service, etc.), the error characterisation applicable for ARAIM might differ from the one defined for SBAS. The preliminary characterisation of the nominal errors involved in the algorithm is specified in [RD.1], [RD.2] and [RD.3]: residual tropospheric error, code noise, multipath and the effect of the nominal signal in space error (which includes the nominal clock and ephemeris error, antenna bias, inter-frequency bias, code-carrier incoherence and the nominal signal deformation). It depends on the specific architecture (e.g. the Online ARAIM shall also provide ephemeris and clock corrections), also includes the threats resulting from the Integrity Support Message (ISM) dissemination and also the effect of ionospheric delay error has to be modelled to support the single frequency case (based on the [Galileo Ionospheric Model](#)).

Only local errors depend on the receiver, therefore **the beneficiary shall focus on the specific local effects (i.e. receiver noise and multipath)** which are also dependent on a number of scenario's conditions such as the target aircraft, the local environment, the specific GNSS receiver's noise, the operational scenario, etc. The outcome of the analysis shall be (for each scenario, if needed) a conservative threat model used for integrity purposes and a less conservative model used to define the accuracy.

The ARAIM threat characterisation, in terms of error models, together with the single (P_{sat}) and wide (P_{const}) fault probabilities, shall be used as design parameter for the ARAIM algorithm, which will calculate the All-in-view position, the Fault tolerant position, the Protection levels (VPL – Vertical Protection Level and HPL – Horizontal Protection Level) and the EMT (Effective Monitor Threshold, where needed) to evaluate the Integrity of the solution.

IMPORTANT NOTE (2): A preliminary description of the proposed methodology to consolidate the characterisation of the ARAIM local errors shall be also submitted in the proposal (see deliverable (7)) and evaluated against the award criteria (see section 10).

Once the error model has been characterised, the beneficiary shall launch the **test campaign in accordance with the approved validation plan** (see deliverable (8)).

IMPORTANT NOTE (3): The beneficiary may decide to initially assess the receiver's performance based on an already existing threat model and in a later stage re-test the receiver having identified a more suitable model. In any case the two activities (threat model characterisation and performance assessment) shall result in a reiterative process aiming at identifying the best model and assessing related achievable performance in compliance with the operational requirements, as described in Figure 4.

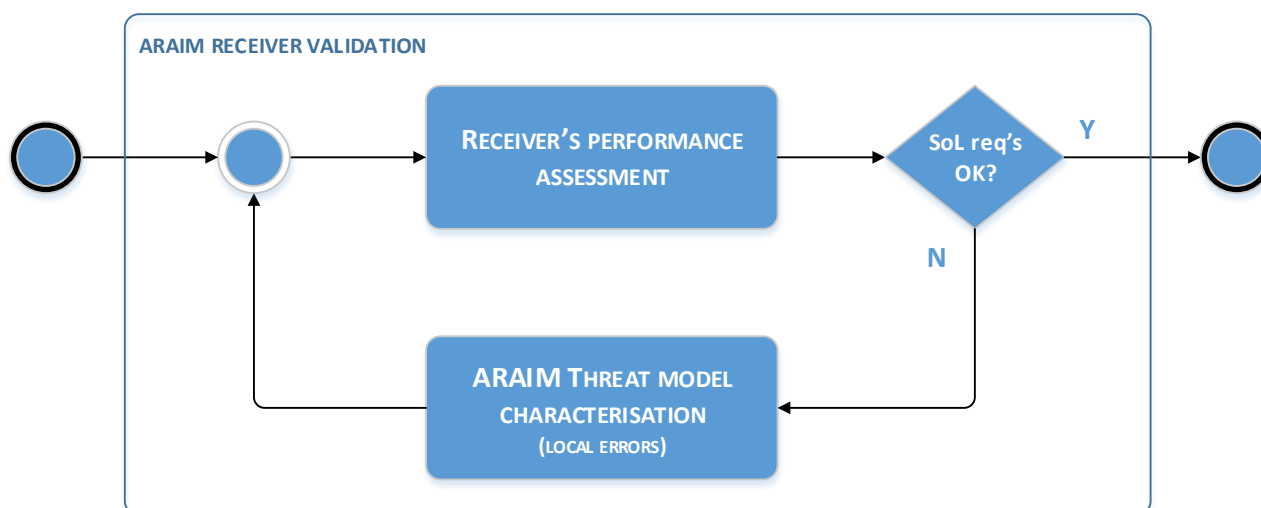


Figure 4 – ARAIM Receiver Validation against SoL Operational Requirements

The first testing stage, expected to be conducted in a **simulated environment**, shall also include an assessment and consequent fine-tuning of the implemented error models and the algorithm, to verify the capacity of the protection levels to duly over-bound the positioning error while enabling optimised performance. This phase shall be based on clear assumptions, such as the employment of masking angles, the effect of the ionospheric scintillation from high latitudes to the equator, the GNSS core constellations fault rates, etc. and shall aim at verifying the design hypotheses of the ARAIM concept and assessing its performance against the pre-defined target operational scenarios.

GPS-only RAIM performance shall be also measured under the same conditions and a comparison analysis shall be provided (see deliverable (9)).

In order to conduct this reiterative process (testing, assessment and fine-tuning of the algorithm and the threat model) and to assess the receiver's prototype performance, the beneficiary shall identify, implement and validate the test and validation tools deemed necessary to conduct such activities. They should at least include:

- a simulator tool able to generate GNSS Signal In the Space, raw data and the Integrity Support Message (ISM), to reproduce a number of significant scenarios;
- a tool to analyse the performance of the ARAIM solution, in terms of accuracy, integrity, continuity and availability.

The beneficiary shall demonstrate the successful completion of the first stage of validation (*in-lab validation*) in a **Test Readiness Review (TRR)** (see Figure 5).

Upon successful completion of the TRR, according to Figure 4, the beneficiary shall move to the next step, as defined in the approved plan – deliverable (8) – which consists in the **assessment and validation of the achievable performance using real GNSS signals in a number of representative scenarios (*real GNSS signals validation*)** and in the concurrent measurement of the RAIM performance under the same conditions.

In this regard the beneficiary shall implement the validation plan aiming at the performance assessment using real GNSS signals, possibly complemented by simulated data where needed. The level of simulated data (e.g. RF GNSS signals, GNSS raw measurements of pseudo-range or carrier phase, GNSS signal sampling as binary data, ISM, etc...) shall be carefully assessed, depending on the goal of each specific test.

The performance of the ARAIM receiver (and the RAIM-only integrity monitoring as well) shall be assessed against the Safety of Life requirements for each target operation by using real GNSS signals up to the maximum extent.

The following considerations, not to be intended as exhaustive, should be taken into consideration by the beneficiary to properly perform this task:

- Related projects: the beneficiary shall coordinate the validation activities to the ARAIM demonstrator project [RD.4]. In addition the beneficiary shall also coordinate, up to a maximum extent, with the Aviation DFMC SBAS Receiver Prototype [RD.5] which also include H-ARAIM capability and with the ATLAS project which aims at performing ARAIM validation campaign. Other initiatives and an effective coordination strategy for the receiver's validation shall be proposed by the applicant in the submitted proposal (see IMPORTANT NOTE (1)).
- Data collection campaigns: as an option the beneficiary shall perform flight tests to record real GNSS data in a number scenarios, or as an alternative relevant real GNSS data from previous flight tests shall be used. Collected data shall be analysed to validate the ARAIM error characterisation and to build representative test scenarios.
- Operational scenarios: given the target operations, a complete set of scenarios shall be built by the beneficiary, aiming at thoroughly covering the specific operations and the environment conditions. For this purpose the operational characterisation shall also include faulty conditions, taking into account all possible threats and malfunctions.
- Synthetic data generation: the beneficiary shall complement the real GNSS data with synthetic data to simulate specific degraded scenarios, e.g. under low visibility conditions, extreme environment conditions, satellite and/or constellation fault(s), degraded constellation(s), loss of one frequency, loss of the ISM, etc.

Based on the analysis of the results coming from the test campaign, the beneficiary shall follow a reiterative process aiming at the assessment of the obtained performance, identification of the adaptations needed to improve the results, optimisation of the solution and fine tuning of both the threat models and the algorithm. This approach shall aim at the fulfilment of the operational requirements and therefore at the validation of the **final version of the ARAIM prototype receiver**.

The beneficiary shall present the results of the validation process in a **Final Review**, which will gather all the results in terms of ARAIM compliance with the target Safety of Life (SoL) requirements. The results shall also cover a benchmark analysis highlighting the improvements introduced by ARAIM with respect to GPS-only RAIM. Also consolidated recommendations for improvements and non-compliances (if any) shall be addressed at this stage.

Task 3:

The objective of the third task is to disseminate the results of the project, contribute to standardisation activities and provide technical support to GSA/EC.

Throughout the implementation of the action (according to Figure 5), the beneficiary shall allocate proper resources to disseminate the project's results, contribute to the ARAIM standardisation and provide technical support, when requested by the GSA.

- **Sub-task 3.1:** The beneficiary shall take measures to **disseminate the achievements of the project** among relevant stakeholders in the appropriate phases of the project. The dissemination plan shall

define the strategy to engage those stakeholders with the aim of showcasing the ARAIM performance, fostering the innovation created in the frame of the action and creating market awareness of the project's results.

The beneficiary shall submit at least two (2) technical papers to international conferences. In addition the beneficiary shall examine the possibility to also include a receiver's prototype *demonstration* involving all the main stakeholders and key players in order to optimise the benefit resulting from its execution. The applicant's decision to run a demonstration is not mandatory, however it contributes to the effectiveness of the dissemination of the results which shall be assessed against the award criteria (see section 10). Other expected dissemination means are specialised magazines and sector press, presentations, leaflets and brochures, public event(s), promotional video(s), websites, social networks, etc.

- **Sub-task 3.2:** In case the results obtained during the implementation of the action will be deemed satisfactory and meaningful they might be used as an **input for the ARAIM standardisation** process in charge of the Standardisation bodies (ICAO, RTCA and EUROCAE) and/or Aeronautical Navigation Service Providers (ANSPs). In addition the beneficiary shall be ready to **provide technical support** to GSA/EC, on demand, during the implementation of the project.

Figure 5 below describes the expected project flow and summarises the objectives and relevant main milestones (to be approved by the GSA) of each project's task. Furthermore the most critical sub-tasks on which most of the effort is expected to be allocated are also identified.

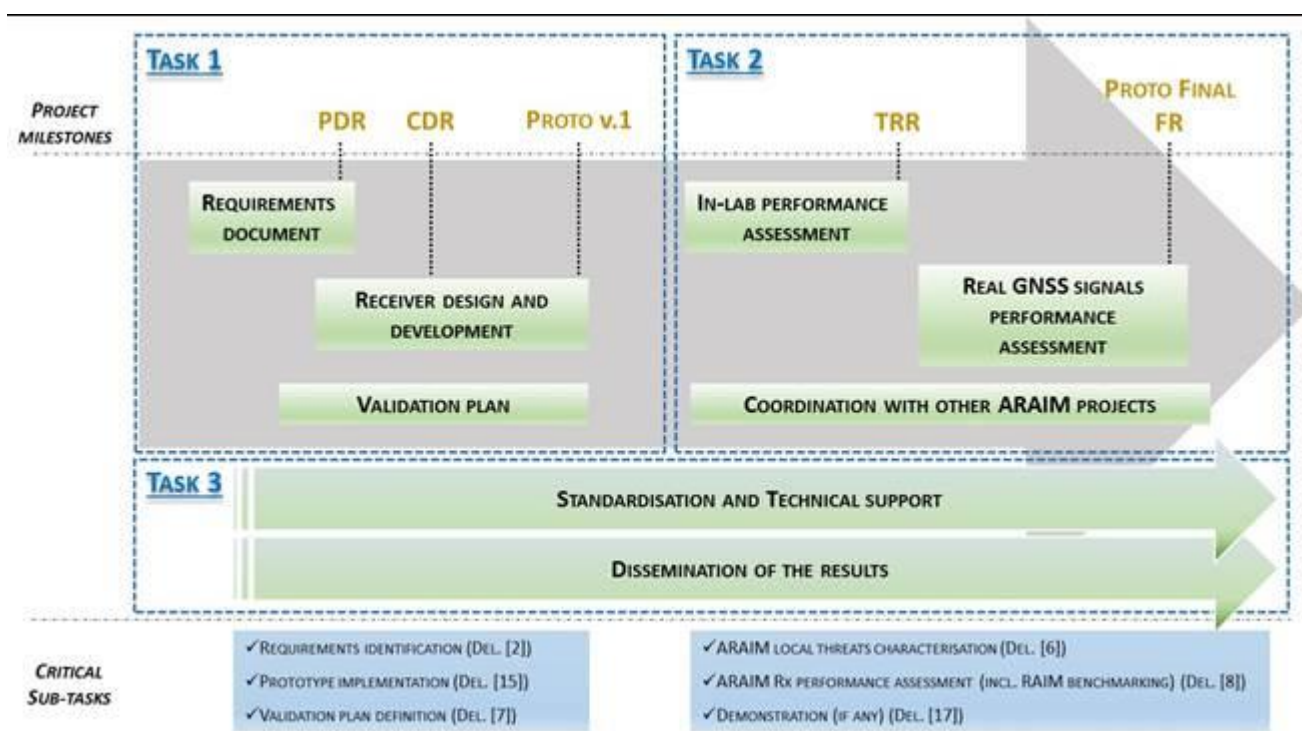


Figure 5 - Overview of the project

2.3. Deliverables

The beneficiaries are expected to submit during the implementation of the action a list of deliverables. The proposal (in the B1 Form) should define the planning for their submission as well as their nature and format (document, prototype, multimedia, etc.).

The list of deliverables shall include at least the following:

- (1) Work plan
- (2) ARAIM receiver requirements document
 - ✓ V.0 (preliminary) to be provided in the proposal⁴
 - ✓ V.1 as defined in section 2.2 – Task 1
- (3) ARAIM receiver Requirements Justification File
- (4) Safety assessment document
- (5) Preliminary architecture of the ARAIM receiver
- (6) Detailed architecture and Design Justification File of the ARAIM receiver
- (7) Error model – characterisation and validation:
 - ✓ V.0 (preliminary) to be provided in the proposal⁵
 - ✓ V.1 as defined in section 2.2 – Phase 2 of the project
- (8) ARAIM prototype validation plan against Safety of Life operations requirements (including both *in-lab* and the *real GNSS signal* validation):
 - ✓ V.0 (preliminary) to be provided in the proposal⁶
 - ✓ V.1 as defined in section 2.2
- (9) Validation report (including both *in-lab* and the *real GNSS signal* ARAIM performance validation and GPS-only RAIM performance comparison)
- (10) Testing tool specifications
- (11) Testing tool validation plan and report
- (12) Dissemination Plan
 - ✓ V.0 (preliminary) to be provided in the proposal
 - ✓ V.1 updated before the PDR
- (13) Report on the Demonstration activities (NOTE: to be delivered only in case the demonstration is proposed by the applicant)
- (14) Roadmap for operational implementation (of both H-ARAIM and V-ARAIM)
 - ✓ V.0 (preliminary) to be provided in the proposal
 - ✓ V.1 updated before the Final Review
- (15) Dissemination documents and multi-media
- (16) ARAIM receiver prototypes⁷
- (17) Demonstration kit (NOTE: to be delivered only in case the demo is proposed by the applicant)
- (18) Report on the Demonstration of the ARAIM receiver prototypes (NOTE: to be delivered only in case the demo is proposed by the applicant)
- (19) Demonstration training material (NOTE: to be delivered only in case the demo is proposed by the applicant)
- (20) Report about the status of implementation of the dissemination plan

⁴ See IMPORTANT NOTE (1) in section 2.2

⁵ See IMPORTANT NOTE (2) in section 2.2

⁶ See IMPORTANT NOTE (1) in section 2.2

⁷ The objective of each funded project is to provide the GSA with two (2) identical prototypes. However it is up to the applicant to produce additional units to properly support the development activities (e.g. multiple activities executed in parallel, back-up units, etc.).

The draft grant agreement is specifying the conditions of the ownership and right to use policy of the above deliverables.

NOTE: In case the beneficiary opts for conducting a demonstration, it shall provide to the GSA a fully functional demonstrator including prototype(s), additional hardware/software, IPRs licencing, if necessary, and any related documentation.

2.4. Project Workflow

Each activity subject to the call shall follow avionics system engineering lifecycle and foresee intermediate milestones which shall already be reflected as far as possible in the submitted proposal, according to the work flow described in the following.

The proposed workflow to be finally approved by GSA at kick-off meeting shall in principle contain the following elements:

- (1) **Work plan** (deliverable (1)), as described in Section 3 of the B1 form.
- (2) Submission of a **requirements document** (deliverable (2)), detailing the ARAIM prototype requirements which are the input to the design activity for the prototype's receiver.
- (3) Performance of the core design activity containing at least the following milestones:
 - a. **Preliminary Design Review (PDR)** for GSA approval as suitable for input into the detailed design process. Exit criteria for this review shall at least include the approval of the prototypes' requirements and of the preliminary design architecture. Potential risk items are highlighted and mitigation plans are evaluated;
 - b. Conclusion of the design process by a **Critical Design Review (CDR)** for GSA approval which shall result into the completion of the system detailed design and architecture. Exit criteria for this review shall at least include the approval of the detailed design in accordance with the requirements and suitable for the implementation phase, other than the closure of any open action resulting from the PDR stage;
- (4) Development and test of the receiver's **prototypes** (deliverable (16)).
- (5) Consolidation and approval of the performance **validation plan** (deliverable (8))
- (6) **Assessment of the receiver performance** against both Horizontal and Vertical Safety of Life operations – including a comparison analysis between ARAIM and RAIM performance:
 - a. Receiver's performance validation in a simulated environment, whose evidences shall be assessed in a **Test Readiness Review (TRR)**: aiming at the preliminary in-lab validation of the error models and the algorithm;
 - b. Receiver's performance validation under real conditions and using real GNSS signals, whose evidences shall be assessed in a **Final Review (FR)**: exploration of the achieved performance under real scenarios, to demonstrate that the ARAIM receiver meets the target Safety of Life requirements for each pre-selected operation;
- (7) **Dissemination activities**, optionally including a final demonstration execution.
- (8) **Support to the ARAIM standardisation** process in charge of the Standardisation bodies (ICAO, RTCA and EUROCAE).

The applicant shall submit already in the proposal a preliminary validation plan (deliverable (8) V.0 in section 2.3) taking into account that the activities related to the "Receiver's performance validation in a

simulated environment” (see point (6)a. in current section) shall be conducted in collaboration with the Joint Research Centre (JRC) at the European Microwave Signature Laboratory (EMSL) of the European Commission in Ispra, Italy.

Please note, there are no additional costs for the beneficiaries related to these validation activities for what concerns the use the JRC facilities and the involvement of the JRC experts. However, they shall take into account the travel and transportation costs and shall include in their proposal a planning of any activity requiring the JRC EMSL and/or personnel intervention.

In addition, before the validation will start, the beneficiaries may also have access to the JRC facilities in order to perform additional tests which are part of the project implementation, if the beneficiaries would consider this opportunity useful. For those tests, the access to the facilities will be also free of charge but the JRC support will be limited to assist in the use of the facilities. Should the beneficiaries consider this option, an agreement should be established with JRC for access and use of their facilities.

Concerning the final acceptance of the receiver which will be conducted in the scope of the “Receiver’s performance validation under real conditions and using real GNSS signals/data” activity (see point (6)b. in current section), the beneficiary shall propose an adequate strategy, describing the proposed tools and the coordination level with relevant projects, and aiming at the exploitation of real GNSS signals.

2.5. Outputs expected from the implementation of activities

The proposals shall aim to achieve the objectives of the action. All the deliverables (as listed in section 2.3), will be used by EU and GSA in accordance with Article II.9 of the Grant Agreement.

3. TIMETABLE

Scheduled start-up date for the action: **Q4 2017**, unless the applicants can demonstrate the need to start the action before the agreement is signed.

Maximum duration of the action: **2 (two) years**

This call for proposals shall be conducted according to the following indicative timetable:

	Stages	Date/time or indicative period
a)	Publication of the call	28 February 2017
b)	Deadline for request for clarifications	5 May 2017
c)	Publication of the clarifications	24 May 2017
d)	Deadline for submitting applications	31 May 2017
e)	Evaluation period	June – July 2017
f)	Information to applicants on the outcome of the evaluation	August - September 2017
g)	Signature of the Grant Agreement	October 2017

4. EU FINANCING

Maximum budget allocated for EU financing under this action: **EUR 2.500.000**

Maximum number of projects: 2

Indicative EU financing amount for each of the two projects: **EUR 1.250.000**

Maximum EU financing rate of eligible costs: **70%**

Publication of the call does not guarantee the availability of funds for the above action and it places no obligation on the GSA to award grants to any applicant.

GSA reserves the right to award a grant of less than the amount requested by the applicant. In such a case, the applicant(s) will be asked either to increase his co-financing, propose other co-financing means or to decrease the total costs without altering the substance of the proposal. Grants will not be awarded for more than the amount requested.

5. ROLES AND TASKS WITHIN THE CONSORTIUM

5.1. Entities involved in the activities subject to the proposal

The proposal shall clearly identify the entities (legal and/or natural persons) to be involved in the activities subject to the proposal, being the applicants (including **coordinator and co-applicants**) as well as any third parties, such as **affiliated entities and subcontractors** and their contributions to the implementation of the proposal under the grant agreement. Parties' participation in the project will be subject to the requirements as laid down in this Call for Proposals.

5.2. Coordinator

The consortium members should choose within their midst a lead organisation, referred to as the "Coordinator".

The coordinator submits the application on behalf of the consortium and will be the intermediary for all communication between the co-beneficiaries and the GSA as well as responsible for supplying all documents and information to the GSA in due time upon request. Coordinator will also be responsible for distribution of payments received from GSA to the co-beneficiaries.

5.3. Co-applicant(s)

Each co-applicant will be considered as co-beneficiary if the proposal is successful. Before signature of the grant agreement all applicants within the consortium shall agree upon appropriate arrangements between themselves for the proper performance of the specific actions. In particular by submitting their joint proposal, they shall accept joint and several financial responsibility of the debt of a defaulting beneficiary up to the value of the contribution that the beneficiary held liable is entitled to receive, as stipulated in the General Conditions of the draft grant agreement.

Co-applicants shall immediately inform the coordinator of any event liable to substantially affect or delay the implementation of the action, who will communicate with the GSA subject to grant agreement as well as clauses ensuring compliance with the requirements on ownership and usage rights of results and any pre-existing rights towards the GSA and the European Union as specified in the draft grant agreement.

When a grant is awarded, the co-beneficiaries forward to the coordinator in a timely manner all the data needed to draw up the reports, the financial statements and other documentation required by the grant agreement.

The coordinator and all co-applicants forming the consortium must satisfy the eligibility criteria.

5.4. Affiliated entities

Legal persons having a legal or capital link with applicants, which is neither limited to the action nor established for the sole purpose of its implementation, may take part in the action as affiliated entities, and may declare eligible costs. For that purpose, applicants shall identify such affiliated entities in the application forms and in the proposal. **Each affiliated entity shall have to comply with the same eligibility and non-exclusion criteria as those applying to the co-applicants and submit the same forms.**

Affiliated entities can be:

- a) several legal persons forming together one legal person or 'sole beneficiary' which may, or may not, have been specifically established for carrying out the action (e.g. groupings, joint ventures).
- b) legal persons having a legal or capital link with a beneficiary or co-beneficiary, which is neither limited to the action nor established for the sole purpose of its implementation (e.g. networks, federations, trade-unions).

5.5. Subcontractors

Subcontractors are not beneficiaries to the grant, nor affiliated entities.

Subcontracting⁸ refers to contracts concluded for the externalisation of specific tasks or activities which form part of the action.

The beneficiaries remain solely responsible for the implementation of the action. Subcontracting is not allowed among the beneficiaries in the project. Please note that the beneficiaries should have the necessary capacity to perform the project themselves.

Subcontracting of specific tasks or activities (i.e. the externalisation) which form part of the action as described in the proposal must satisfy the conditions applicable to any implementation contract (as specified above) and in addition to them the following conditions:

- a. it may only cover the implementation of a limited part of the action and **shall in no case cover a significant part of the critical sub-tasks specified in Figure 5 in Section 2.2 (i.e. core activities);**
- b. it must be justified having regard to the nature of the action and what is necessary for its implementation;
- c. it must be clearly stated in the proposal.

In principle, under this Call for Proposals, **core activities** are understood as all those activities proposed by the applicant which have a significant influence on the project implementation and outcome (e.g. on the main results to be achieved, in terms of knowledge development, etc.).

Where the implementation of the action or the technical proposal (B1-B2 Forms) requires the award of subcontracts (implementation contracts), the beneficiary must award the contract to the bid offering best value for money or the lowest price (as appropriate), avoiding conflicts of interests and retain the relevant documentation for the event of an audit. Entities acting in their capacity of contracting authorities in the meaning of Directive 2004/18/EC⁹ or contracting entities in the meaning of Directive 2004/17/EC¹⁰ shall abide by the applicable national public procurement rules.

The costs of subcontracting can be eligible under the conditions indicated in the grant agreement (see also point 2.8 in section 12.2 below). The proposal should clearly specify the activities (in the description of the action and in the estimated costs of subcontracting must be clearly identifiable in the estimated budget) that will be subcontracted and the contract should be awarded in accordance with the conditions

⁸ Art. 137 FR, 209 RAP

⁹ Directive 2004/18/EC on the coordination of procedures for the award of public work contracts, public supply contracts and public service contracts.

¹⁰ Directive 2004/17/EC coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors.

set in the grant agreement. Recourse to the award of contracts must be duly justified having regard to the nature of the action and what is necessary for its implementation.

Recourse to the award of sub-contracts must be justified having regard to the nature of the action and what is necessary for its implementation. **Any justification provided by the beneficiary needs to be pre-endorsed by the GSA and subcontracting shall require GSA's approval** which may be considered granted in cases where the subcontracting is already fully described in the proposal so accepted by the GSA, given that it will then be implemented accordingly and fulfilling the eligibility criteria.

The tasks concerned must be set out in the description of the action and the estimated costs of subcontracting must be clearly identifiable in the estimated budget. However, approval of subcontracting by GSA (whether at the time of the evaluation of proposal or later during implementation of the action) does not automatically mean that the related costs will be considered eligible and reimbursed. The costs will need to comply with the eligibility criteria set up in the grant agreement in order for them to be reimbursed.

Any modifications on an ad hoc basis while the action is under way must be presented for ex-ante approval by the GSA and for major items will require an amendment to the grant agreement otherwise will not be reimbursed.

It is not necessary to have already selected subcontractors at the time the proposal is submitted. However, cost of subcontractors not selected in accordance with the rules referred to in this Section will not be eligible.

6. ADMISSIBILITY REQUIREMENTS

APPLICATIONS MUST COMPLY WITH ALL OF THE ADMISSIBILITY REQUIREMENTS SET OUT IN THIS SECTION.

Applications must comply with the following conditions in order to be admissible:

- Applications must be sent no later than the deadline for submitting applications referred to in section 17,
- Applications must be submitted in writing, using the submission set described in section 16,
- Applications must be drafted in one of the EU official languages with a preference to English. For further information please refer to Section 17 below,
- Applications must respect the maximum rate for EU co-financing,
- Applications must respect the maximum amount for EU co-financing¹¹.

In this context, any project directly or indirectly contrary to EU policy or against public health, human rights or against citizen's security will be rejected.

¹¹ Proposals exceeding the applicable maximum EU co-financing rate and allocated EU budget for this call (see section 4) shall not be considered further and will be rejected.

7. ELIGIBILITY CRITERIA

APPLICATIONS MUST COMPLY WITH ALL OF THE ELIGIBILITY CRITERIA SET OUT IN THIS SECTION.

7.1. Eligible applicants

- Applications by legal persons established¹² in and/or natural person(s) being national of any of the following countries, are eligible:
 - EU Member States
 - Switzerland, Norway
- Applicants must correspond to the definition of any of the following target organisations: **active in the development and/or integration and/or performance assessment of GNSS receivers and/or development and validation of safety-critical software, and/or expert in the field of GNSS research and development (R&D), and/or expert in the assessment or development of aviation standards and/or active in the dissemination of the project's results;**
- Corporate bodies must be properly constituted and registered under their applicable law. When an applicant does not have legal personality, a physical person must be designated to provide the legal responsibility.

The coordinator (see ref. to section 5.2) and all co-applicants (see ref. to section 5.3) forming the applicant consortium, as well as the affiliated entities (see ref. to section 5.4) shall satisfy the same eligibility criteria.

7.2. Structure of the consortium

Only applicant consortia shall be eligible to participate in this call – proposals by single legal or natural person shall not be admissible.

The coordinator will submit the proposal on behalf of the consortium. It shall be the intermediary for all communication between the co-applicants and the GSA and responsible for supplying all documents and information to the GSA in due time upon request.

The proposal consequently must be submitted by a consortium composed of at least two (2) entities out of which:

- the coordinator shall be a legal person;
- the co-applicant(s) can be either legal and/or natural person(s).

For the sake of clarity, the term “**applicant**”, referred to in this call, shall encompass co-applicants and coordinator as appropriate.

¹² Legal persons are considered to be established in the EU when they are formed in accordance with the law of an EU Member State, Norway or Switzerland, and have their central administration, registered office or principal place of business in an EU Member State, Norway or Switzerland.

All co-applicants in the same consortium shall agree upon appropriate arrangements (internal cooperation agreements) among themselves for the proper performance of the action. In particular, they shall accept joint and several liability of the debt of a defaulting partner up to the value of the contribution that the partner held liable is entitled to receive.

The grant agreement shall be signed by coordinator of the successful consortium; provided that a mandate (Annex IV of the grant agreement) has been provided to it by the other co-applicants. A copy of this mandate shall be provided to the GSA.

Legal persons having a legal or capital link with applicants, which is neither limited to the action nor established for the sole purpose of its implementation, may take part in the action as **affiliated entities (see ref. to section 5.4)**, and may declare eligible costs. For that purpose, applicants shall identify such affiliated entities in the application form.

7.3. Supporting documents proving compliance with the eligibility criteria

- The **coordinator**, who will be receiving payments on behalf of the consortium of beneficiaries and shall be **responsible for distributing payments to the co-beneficiaries**, shall provide:
 - **A duly filled Financial Identification Form (FIF)**, which can be downloaded from the following website:
http://ec.europa.eu/budget/contracts_grants/info_contracts/financial_id/financial_id_en.cfm

It must be duly filled in and signed, and if applicable be accompanied by the relevant bank statement.

- **All the applicants and any affiliated entities** (see ref. to section 5.4) shall provide the following supporting documents to establish their eligibility:
 - **A duly filled and signed Legal Entity Form (LEF) accompanied by the relevant evidence (see below) of the applicant's legal status has to be provided at the stage of submission.**
 A specific form in all official languages of the EU is available at the following internet page (use of the English forms is preferred):
http://ec.europa.eu/budget/contracts_grants/info_contracts/legal_entities/legal_entities_en.cfm
 - In addition:
 - **private legal person(s)** : extract from the official journal, copy of articles of association, extract of trade or association register OR a copy of the certificate of liability to VAT (if, as in certain countries, the trade register number and VAT number are identical, only one of these documents is required);
 - **public legal person(s)** : a copy of the resolution, law, decree or decision establishing the public company, or as an alternative, any other official document establishing the public legal person by the national authorities may be submitted;
 - **natural person(s)** : legible photocopy of identity card and/or passport OR an official VAT document (if applicable).

Consortium: In addition to the supporting documents (see section 7.3 above) referring to the legal status of applicants forming the applicant consortium, each **applicant shall further submit letters confirming their**

participation to the project, their role in the consortium (lead applicant/coordinator or co-applicant/co-beneficiary) **and the main task to be performed.**

IMPORTANT NOTE (4): Legal persons may participate in multiple applicant consortia, if the actions covered in the respective Technical Proposals (B1 form) are different from each other in order to comply with the principle of non-cumulative financing and award.

7.4. Eligible activities

Types of eligible activities required to achieve this call's objectives as listed under section 2 above, such as, but not necessarily limited to the following:

- Design, development and testing of GNSS receivers for aviation;
- Safety-Critical software development, integration and testing;
- Potential provision of support to aviation standards definition (if requested by the GSA);
- Dissemination of the results and other additional activities linked with the exploitation of results.

8. EXCLUSION CRITERIA

APPLICATIONS MUST COMPLY WITH ALL OF THE EXCLUSION CRITERIA SET OUT IN THIS SECTION.

Article 105a, paragraphs 1 to 4, 6 and 7, except point (b) of the first subparagraph and the second subparagraph of that paragraph, paragraphs 8, 9, 11 and 13 to 17 of Article 106 and Article 108 of Financial Regulations shall apply to grant applicants and beneficiaries. Article 107 shall apply to applicants. Applicants shall declare whether they are in one of the situations referred to in Article 106(1) or Article 107 and, where applicable, whether they have taken remedial measures as referred to in point (a) of Article 106(7).

8.1. Exclusion from the participation

Exclusion criteria are specified in the standard **Declaration of Honour (A5 Form)** of this call.

The same exclusion criteria apply to all affiliated entities (see ref. to section 5.4).

8.2. Exclusion from award

Applicants will not be granted EU funds if, in the course of the grant award procedure, they:

- are in an exclusion situations established in the A5 form;
- have misrepresented the information required by the GSA as a condition of participation in the grant award procedure or fail to supply this information upon request by GSA.

The same exclusion criteria apply to affiliated entities.

Administrative and financial penalties may be imposed on applicants that are guilty of misrepresentation.

8.3. Supporting documents proving compliance with exclusion criteria

All applicants and any affiliated entities (see ref. to section 5.4) must sign and submit a Declaration of Honour (A5 Form).

Please note that according to this **A5 Form**, the successful applicants – subject to the outcome of the risk assessment¹³ performed by GSA on a case by case basis – may be required to send a number of supporting documents related to aspects of the Declaration of Honour before the respective grant agreement can be signed. Collecting these supporting documents may take some time and applicants shall ensure their timely availability for performing this requirement accordingly. Applicants shall approach the GSA in due time in case they are of the opinion that certain points of the declaration are not applicable to them (e.g. due to their legal structure).

9. SELECTION CRITERIA

APPLICATIONS MUST COMPLY WITH ALL OF THE SELECTION CRITERIA SET OUT IN THIS SECTION.

9.1. Financial capacity

Applicants must have stable and sufficient sources of funding to maintain their activity throughout the period during which the action is being carried out. The applicants' financial capacity will be assessed on the basis of the following supporting documents to be submitted with the application by each applicant and affiliated entity (thresholds applying by applicants):

- a) Total grant amount < EUR 750 000:
 - a declaration on their honour and,
 - the table provided for in the application form (A6 Form), filled in with the relevant statutory accounting figures, in order to calculate the ratios as detailed in the form. For newly created legal persons, a business plan might replace the above documents.
- b) Total grant amount ≥ EUR 750 000, in addition to the above:
 - an **audit report** produced by an approved external auditor certifying the accounts for the last financial year available.

On the basis of the documents submitted, if GSA considers that financial capacity is not satisfactory and in any other case GSA may deem it appropriate, it may:

- request further information;
- propose a grant agreement without pre-financing;
- propose a grant agreement with a pre-financing paid in instalments;
- propose a grant agreement with a lower percentage of a pre-financing;
- propose a grant agreement with a pre-financing covered by a bank guarantee;

¹³ See ref. to Art. 131.3

- reject the application.

The verification of the financial capacity **shall not apply to public bodies and international organisations.**

9.2. Operational capacity (B2 Form)

The applicant consortia shall demonstrate a balanced expertise in areas like development, integration, testing, manufacturing, distribution of GNSS components, GNSS chipsets/receivers and/or providing expertise in the field of GNSS R&D.

Applicants must show they have the **operational (technical and management) capacity** to complete the activities to be supported by this Call for Proposal and must **demonstrate their capacity to manage the activities** corresponding to the size of the project for which the grant is requested.

In particular:

- The team responsible for the activities must have an eminent technical competence,
- Applicants must have a high degree of specialisation in areas relevant for the activities subject to the proposal,
- Applicants must prove that they are able to identify and build Safety-Critical use cases and to design, develop, test and validate integrity algorithms,
- Applicants must prove that they have at their disposal technical infrastructures (relevant design and validation tools and/or hardware/software tools) necessary to perform the implementation.

In this respect, applicants have to submit in addition to the Declaration of Honour (A5 Form), the following elements:

- description of the profile of the individuals¹⁴ primarily responsible for managing and implementing the activities;
- a description of the technical equipment, tools or facilities at the disposal of the applicant;
- description of the role of each applicant (coordinator, co-applicants and affiliated entities) in the organisational structure in general and regarding the performance of activities subject to grant agreement.

In the case of affiliated entities (see ref. to section 5.4) taking part in the project, the above requirements apply to each affiliated entity.

¹⁴ To highlight the relevant competencies for this Call for Proposal please use the Europass CV template which can be accessed from: <https://europass.cedefop.europa.eu/de/documents/curriculum-vitae/templates-instructions>

10. AWARD CRITERIA

Eligible applications will be assessed on the basis of the following criteria. When assessing the below award criteria, the evaluation committee shall use the elements indicated below for each criterion.

AWARD CRITERIA AND KEY ELEMENTS LIKELY TO BE ASSESSED BY THE EVALUATION COMMITTEE		MAX. SCORE
1. Relevance of the proposal to the objectives of the call, credibility of the proposed approach, and innovation of the solutions proposed:		50
<i>Relevance and quality of the proposed validation approach (preliminary version of deliverable (8)).</i>		
<i>Relevance and quality of the methodology for requirements identification, development and testing of the developed receiver.</i>		
<i>Relevance and quality of the methodology used to characterise the ARAIM local errors (preliminary version of deliverable (7)).</i>		
<i>Overall quality of the proposal in terms of deliverables, their content and structure.</i>		
<i>Active involvement in the consortium of the main key stakeholders and their complementarity within the consortium.</i>		
2. Impact in terms of economic and public benefits derived from the proposal:		20
<i>Roadmap for operational implementation of H-ARAIM and V-ARAIM (preliminary version of deliverable (14))</i>		
<i>Maximisation of the benefits to citizens by the adoption of the results in the market.</i>		
<i>Representation of companies with their headquarters geographically based in an EU Member State or Norway or Switzerland.</i>		
3. Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources:		30
<i>Consistency of the work plan aiming at the maximisation of the quality and representativeness of the results.</i>		
<i>Appropriateness of the management structures and procedures, including risk and innovation management.</i>		
<i>Coherence of the work plan in terms of activities' definition, schedule, effort and cost, including justification of the resources to be committed.</i>		
<i>Appropriateness of the distribution of the tasks among the proposed resources.</i>		
<i>Credible and effective dissemination plan (preliminary version of deliverable (12)) for the results and effectiveness of the proposed demonstration (if any).</i>		
Maximum total score		100

If a total score lower than **60** points or a score lower than **60%** for any of the above three criteria is obtained, the proposal will not be evaluated further and will be rejected.

11. LEGAL COMMITMENTS¹⁵

Applicants are reminded:

The successful applicants shall be bound by the Special and General Conditions of the draft grant agreement. Submission of a grant application (proposal) by the consortium implies the acceptance of these Special and the General Conditions. This also includes the obligation of the provision of accurate, sincere and complete information within the context of this grant procedure including but not limited to filling out the provided forms with true, correct and complete data representing the real status of the applicant.

In the event of a grant awarded by the GSA following this call, a grant agreement drawn up in Euro and detailing the conditions and level of funding, will be sent to the coordinator of the consortium, alongside a description of the procedure in view to formalise the obligations of the parties.

The coordinator, representing the awarded consortium, on the basis of duly provided powers of attorney (Mandate – Annex IV of the grant agreement) shall sign 2 (two) copies of the original agreement and shall then return it to the GSA for countersignature.

In case the GSA requests the below documents¹⁶ to be made available and if these are not submitted within the relevant deadlines, the GSA reserves the right to cancel the award and/or the grant agreement signature process and re-allocate the budget. These documents being:

- (1) Submission of all supporting documents pertaining to the Declaration of Honour (A5 form) for each co-applicant (and affiliated entity if case may be) in due time upon request by GSA after the receipt of such request;**
- (2) Submission of the signed grant agreement by the coordinator with authorisation (i.e.: Mandate - Annex IV of the Grant Agreement) for each co-applicant at latest 1 (one) month after the coordinator's receipt of the grant agreement for the signature process.**

Applicants are reminded to start immediately the collection of the supporting documents for the relevant points in the Declaration of Honour upon GSA's request, bearing in mind that particularly for large consortia, the collection of documents may be very time consuming.

12. FINANCIAL PROVISIONS

When preparing their proposal, applicants shall observe the elements described in the following sub-sections for calculating the required budget for the implementation of their project.

12.1. General principles

Non-cumulative award

Each action may give rise to the award of only one grant from the budget to any one consortium.

In no circumstances shall the same costs be financed twice by the European Union budget.

¹⁵ Art. 121 FR, 174 RAP

¹⁶ Please refer to section 8.3

Applicants have to inform the GSA immediately of any multiple applications and multiple grants relating to the same action. The applicants shall inform about sources and amounts of EU funding received or applied for the same action or for part of the action. Applicants shall indicate if they receive EU funding for their functioning during the financial year in which the action takes place.

Non-retroactivity

No grant may be awarded retrospectively for actions already completed.

A grant may be awarded for an action which has already begun, provided the applicant can demonstrate the need to start the action before the grant agreement is signed. In such cases, costs eligible for financing may not have been incurred prior to the date of submission of the grant application.

Co-financing

Grants shall involve co-financing, which implies that the resources necessary to carry out the action shall not be provided entirely by EU contribution. EU financing may not cover 100% of the total costs of the action.

Co-financing of the action may take the form of:

- the awarded beneficiary's own resources,
- income generated by the action,
- financial contributions from third parties.

Co-financing may also take the form of in-kind contributions from third parties, i.e. non-financial resources made available free of charge by third parties to the awarded consortium as the corresponding costs are not eligible.

No-profit rule

EU grant may not have the purpose or effect of producing a profit within the framework of the action.

For this purpose, **profit is defined as a surplus of the receipts over the eligible costs incurred by the beneficiary**, when the request is made for payment of the balance. Where such a surplus occurs, the GSA is entitled to recover the percentage of the profit corresponding to the EU contribution to the eligible costs actually incurred by the beneficiary to carry out the action.

Balanced budget¹⁷

The estimated budget of the action is to be attached in excel format to the application form following the model provided in the Form C1.

It must have revenue and expenditure in balance. The amounts must be expressed in **Euro** with maximum two decimals.

Applicants (and affiliated entities) with general accounts in a currency other than the euro must convert costs incurred in another currency into euro at the average of the daily exchange rates published in the C

¹⁷ Art. 196.2 RAP

series of *Official Journal of the European Union*, determined over the corresponding reporting period (available at <http://www.ecb.europa.eu/stats/exchange/eurofxref/html/index.en.html>).

If no daily euro exchange rate is published in the *Official Journal of the European Union* for the currency in question, conversion must be made at the average of the monthly accounting rates established by the Commission and published on its website determined over the corresponding reporting period.

http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/inforeuro_en.cfm

Applicants and affiliated entities with general accounts in euro must convert costs incurred in another currency into euro according to their usual accounting practices

For awarded projects, the final payment will be based on the final financial report at the end of the project and supporting documents, taking into account any previous pre-financing and interim payment.

Financial support to third parties

The applications for this action may not envisage provision of financial support to third parties.

12.2. Funding form

GSA grants are calculated on the basis of a detailed estimated budget indicating clearly the costs that are eligible for EU funding. The grant amount may neither exceed the eligible costs nor the amount requested. Amounts are indicated in Euros.

➤ **Maximum amount requested**

The EU grant is limited to a maximum co-funding rate of 70% of eligible costs incurred in the implementation of the specific actions taking into account the maximum grant amount referred to in section 4.

Consequently, part of the total eligible expenses entered in the estimated budget must be financed from sources other than the EU grant.

➤ **Eligible costs of the grant**

Eligible costs are costs actually incurred by the beneficiary of a grant which meet all the following criteria:

- ✓ they are incurred during the duration of the action, as indicated in the grant agreement, with the exception of costs relating to preparation of the final reports and audit certificates;
- ✓ they are indicated in the estimated budget of the action;
- ✓ they are necessary for the implementation of the action, in accordance with the description of the action, attached to the grant agreement;
- ✓ they are identifiable and verifiable, in particular being recorded in the accounting records of the beneficiary and determined according to the applicable accounting standards of the country where the beneficiary is established and according to the usual cost accounting practices of the beneficiary;
- ✓ they comply with the requirements of applicable tax and social legislation;
- ✓ they are reasonable, justified, and comply with the principle of sound financial management, in particular regarding economy and efficiency.

The beneficiary's internal accounting and auditing procedures must permit direct reconciliation of the costs and revenue declared in respect of the action/project with the corresponding accounting statements and supporting documents.

The same criteria apply to the affiliated entities.

Please note that the exact scope of the eligibility of costs is defined in the grant agreement, which will be signed with the successful applicant(s).

➤ **Eligible *direct costs***

The eligible direct costs for the action are those costs which, **with due regard for the conditions of eligibility set out above**, are identifiable as specific costs directly linked to the performance of the action.

When preparing the proposal, applicants shall observe the elements described in the following sub-sections for calculating the necessary budget for the implementation of their project. The following categories of costs can be considered as **eligible direct costs**:

1. **Personnel costs** are:
 - 1.1 cost of personnel working under an employment contract
 - 1.2 costs of natural persons working under a contract with the beneficiary other than an employment contract
2. **Other direct costs** are:
 - 2.1 cost of travel and related subsistence allowances
 - 2.2 costs for equipment and other assets specifically procured for the action
 - 2.3 costs for equipment or other assets not procured specifically but directly used for the action – depreciation costs
 - 2.4 the costs for rental or lease of equipment or other assets
 - 2.5 the cost of using technical facilities or laboratories
 - 2.6 costs of consumables and supplies
 - 2.7 costs arising directly from requirements imposed by the grant agreement
 - 2.8 costs entailed by subcontracts
 - 2.9 costs of financial support to third parties [not-applicable]
 - 2.10 duties, taxes and charges

1. Personnel costs

- 1.1 the **costs of personnel** working under an employment contract with the beneficiary or an equivalent appointing act and assigned to the action (including civil servants and other personnel of national administrations to the extent that they relate to the cost of activities which the relevant public authority would not carry out if the project concerned were not undertaken), comprising actual salaries plus social security contributions and other statutory costs included in the remuneration, provided that these costs are in line with the beneficiary's usual policy on remuneration. Those costs may also include additional remunerations, including payments on the basis of supplementary contracts regardless of the nature of those contracts, provided that they

are paid in a consistent manner whenever the same kind of work or expertise is required, independently from the source of funding used;

Personnel costs must be calculated by the applicants/beneficiaries as follows:

{(Hourly rate multiplied by number of actual hours worked on the action), plus for non-profit legal entities: additional remunerations to personnel assigned to the action}.

The total number of hours declared in EU or Euratom grants, for a person for a year, cannot be higher than the annual productive hours used for the calculations of the hourly rate. Therefore, the maximum number of hours that can be declared for the grant are:

{Number of annual productive hours for the year minus total number of hours declared by the beneficiary, for that person for that year, for other EU or Euratom grants}

The 'hourly rate' is calculated as follows:

{actual annual personnel costs for the person divided by number of annual productive hours}

The beneficiaries must use the annual personnel costs and the number of annual productive hours for each financial year covered by the reporting period concerned. If a financial year is not closed at the end of the reporting period, the beneficiaries must use the hourly rate of the last closed financial year available.

For the 'number of annual productive hours', the beneficiaries may choose one of the following:

- (i) 'fixed number of hours': 1720 hours for persons working full time (or corresponding pro-rata for persons not working full time);
- (ii) 'individual annual productive hours': the total number of hours worked by the person in the year for the beneficiary *{annual workable hours of the person plus overtime worked minus absences}*. If the contract (or applicable collective labour agreement or national working time legislation) does not allow to determine the annual workable hours, this option cannot be used;
- (iii) 'standard annual productive hours': the standard number of annual hours generally applied by the beneficiary for its personnel in accordance with its usual cost accounting practices. This number must be at least 90% of the 'standard annual workable hours'. If there is no applicable reference for the standard annual workable hours, this option cannot be used.

'Annual workable hours' - means the period during which the personnel must be working, at the employer's disposal and carrying out his/her activity or duties under the employment contract, applicable collective labour agreement or national working time legislation.

For all options, the actual time spent on parental leave by a person assigned to the action may be deducted from the number of annual productive hours.

Important:

Activities that **cannot** be deducted for the calculation of the annual productive hours and that cannot be charged to the project are: Sales and marketing; Preparation of proposals; Administrative time (often means "unsold" time).

1.2 The **costs of natural persons working under a contract with the beneficiary other than an employment contract** (e.g. in-house consultants) may be assimilated to such costs of personnel, provided that the following conditions are fulfilled:

- there must be a **direct contract** between the natural person (individual) and the beneficiary;
- the natural person works under the instructions of the beneficiary and, unless otherwise agreed with the beneficiary through a teleworking agreement, in the premises of the beneficiary;
- the result of the work belongs to the beneficiary;
- the costs are not significantly different from the costs of personnel performing similar tasks under an employment contract with the beneficiary; and
- The remuneration must be based on working hours, rather than on delivering specific outputs/products. (This implies that the beneficiary must keep records of the hours worked for the action.) Costs of natural persons working under a direct contract for a beneficiary must be calculated according to the formula: hourly rate multiplied by the number of actual hours worked on the action where hourly rate:
 - a. if the contract specifies an hourly rate: this hourly rate must be used;
 - b. if the contract states a fixed amount for the services of the natural person and the number of hours to be worked: this global amount must be divided by the number of hours to be worked for the beneficiary under that contract.

2. Other direct costs

Other costs in general: **only costs of those items which are directly linked to the performance of the operation, identifiable and assigned to the action shall be considered under this heading.**

Those costs should include the costs of implementation contracts for ancillary services, goods etc. needed to carry out the project (e.g. dissemination of information, specific evaluation, translations, reproduction...), including purchase of consumables and supplies. They do not cover contract that imply any externalisation of activities included in the action described in the proposal, which should be included as subcontracting in the relevant form.

Please note that the fact that the costs are specific to the action is the key factor that makes these costs eligible for European Union funding. More general office supplies, stamps or other stationary is comprised in the indirect costs and cannot be considered under this heading.

All documents supporting the above costs (e.g. invoices) have to be kept from the very beginning of the project. The GSA will require them to verify the request for payment validity.

2.1 **costs of travel** and related subsistence allowances for employees, provided that these costs are in line with the beneficiary's usual practices on travel;

Only the costs for the employee's travel and subsistence allowances can be introduced in the budget form. Travel costs of external service providers, if applicable, are to be included in their contracts.

Subscription fees to conferences or events, where relevant, should be included in **C1** form (section 2.1) Travel costs.

Reimbursement of travel costs can be requested for meetings, European conferences, etc. provided that they are in line with the usual practices of the beneficiary and pre-approved by the GSA. The travel policy of the beneficiary must be made in writing and apply to all business trips of the organisation. Alternatively, in case when a beneficiary has not formalised an internal travel policy or established travel practice, they should not exceed the scales approved annually by the European Commission. These European Commission rates can be consulted on this address:

http://ec.europa.eu/europeaid/work/procedures/implementation/per_diems/index_en.htm

In all cases, the costs reported should comply with the principle of economy and efficiency, meaning that travelling should be performed by the most direct and most economic route;

The costs reported should comply with the following:

- travel by the most direct and most economic route;
- travel by rail: first class;
- travel by air: economy class, unless a cheaper fare can be used (e.g. Apex);
- travel by car: reimbursed on the basis of the equivalent first class rail fare.

Flat-rate subsistence allowances cover all subsistence expenses during travel, including hotels, restaurants and local transport (taxis and/or public transport). They apply for each day of a mission at a minimum distance of 100 km from the normal place of work in the context of the project forming the subject of the grant agreement.

Please note that tips will not be considered as eligible costs.

Beneficiaries who want to declare travel costs as eligible costs of the project will have to provide the following information for each travel:

- Names or functions of the people involved;
- Journey and dates (even tentative);
- Purpose of the travel (this must refer clearly to one activity of the project);
- Subsistence costs: total number of days of the travel x flat rate subsistence allowance (per diem) or an estimate of the real costs per day (per person);
- Cost of travel (estimation).

All necessary supporting documents, in accordance with the beneficiary's travel policy, have to be kept from the very beginning of the project (e.g. travel tickets, boarding passes, invoices from the travel agency, etc.) The GSA will require them to verify the validity of the request for payment. For the per diem allowances, no supporting documents are required; only a declaration of the applicant on the applicable per diem in its organisation is needed.

2.2 for equipment and other assets (new or second-hand) **procured** specifically for the action and in accordance with Article II.10 of the Grant Agreement]

- a) **the full purchase costs** provided that they are treated as capital expenditure in accordance with the tax and accounting rules applicable to the beneficiary and are recorded in the fixed assets account of its balance sheet OR the purchase in itself is the purpose of the action **[not-applicable to this call]**

or

- b) **the respective depreciation costs** provided that the asset has been purchased in accordance with the conditions applicable to implementation contracts and that it is written off in accordance with the international accounting standards and international financial reporting standards, IAS/IFRS, regardless whether the beneficiary has to apply them or otherwise has diverging accounting practices.

- 2.3 **costs for equipment or other assets** (new or second-hand) not procured specifically but **directly used** for the action in **proportion to the usage for the action and only during its duration** as **depreciation costs** recorded in the accounting statements of the beneficiary over the period of implementation of the action, provided that the asset is written off in accordance with the international accounting standards and the usual accounting practices of the beneficiary.

Only depreciation for equipment which is strictly necessary for the purposes of carrying out the action can be charged as direct costs. This thus excludes any computer equipment, office material, furniture, etc. that the applicant needs for his daily activities and that will be normally covered by indirect costs.

Only the portion of the equipment's depreciation corresponding to the duration of the project and the rate of actual use for the purposes of the project can be taken into account by the GSA.

- 2.4 **the costs for rental or lease of equipment or other assets only to the portion of use and limited to the duration of the action**, provided that these costs do not exceed the depreciation costs of similar equipment or assets and are exclusive of any finance fee;
- 2.5 when **using technical facilities or laboratories the above rules (2.2) to (2.4) for eligibility of costs apply accordingly**;
- 2.6 **costs of consumables and supplies**, provided that they are purchased in accordance with the conditions applicable to the award of contracts necessary for the implementation of the action and are directly assigned to the action;
- 2.7 **costs arising directly from requirements imposed by the grant agreement** (dissemination of information, specific evaluation of the action, audits, translations, reproduction), including the costs of requested financial guarantees, provided that the corresponding services are purchased in accordance with the conditions applicable to the award of contracts necessary for the implementation of the action;
- 2.8 **costs entailed by subcontracts**, concluded for the externalisation of specific tasks or activities which form part of the action **as described in the proposal**, provided that the conditions applicable to implementation contracts are met;

Please refer to Section 5.5 for further details.

- 2.9 **costs of financial support to third parties** within the meaning of Article II.12 of the grant agreement provided that the conditions laid down in that article are met **[not-applicable to this call]**;
- 2.10 **duties, taxes and charges** paid by the beneficiary, notably non-deductible value added tax (VAT), provided that they are included in eligible direct costs, and unless specified otherwise in the Agreement. In particular, **ONLY** non-deductible VAT is eligible, except for the activities which the

beneficiaries that are public bodies engage in as public authorities (prerogatives of public powers under national law).

➤ **Eligible *indirect* costs**

A flat-rate amount of 7% of the total eligible direct costs of the action excluding subcontracting costs¹⁸ is eligible under indirect costs, representing the beneficiary's general administrative costs which can be regarded as chargeable to the action/project.

Indirect costs may not include costs entered under another budget heading.

Indirect costs are not eligible for beneficiaries that receive an operating grant.

➤ **Non-eligible costs**

In addition to any other costs which do not fulfil the conditions set out above, the following costs shall not be considered eligible:

- a. return on capital or return generated by an investment;
- b. debt and debt service charges;
- c. provisions for future losses or debts;
- d. interest owed;
- e. doubtful debts;
- f. currency exchange losses;
- g. bank costs charged by the beneficiary's bank for transfers from the Agency;
- h. costs declared by the beneficiary in the framework of another action receiving a grant financed from the EU budget (including grants awarded by a Member State and financed from the EU budget and grants awarded by the European Commission or other EU bodies than the GSA for the purpose of implementing the EU budget); in particular, indirect costs shall not be eligible under a grant for an action awarded to a beneficiary which already receives an operating grant financed from the EU budget during the period in question;
- i. contributions in kind from third parties;
- j. excessive or reckless expenditure;
- k. deductible VAT;
- l. participation by any staff of the European Union institutions in the action
- m. costs incurred during the suspension of the implementation of the action;
- n. cost categories explicitly excluded in the work programme/call.

Calculation of the final amount of the grant

The draft grant agreement annexed to this Call for proposals specifies the calculation of the final grant and the payment arrangements. Applicants' attention should particularly focus on the General Conditions of the draft agreement, where the eligibility conditions of costs are described.

The EU grant may not have the purpose or effect of producing a profit¹⁹ within the framework of the action.

The final amount of the grant to be awarded to the consortium is established after completion of the action, and upon approval of the request for payment containing the following documents²⁰ *[including relevant supporting documents where appropriate]*:

¹⁸ Indirect costs = 7% * (total eligible direct costs - subcontracting)

¹⁹ See reference to Section 12.2 of this Call for Proposal.

- a final report providing details of the implementation and results of the action;
- the final financial statement of costs actually incurred,
- *[where applicable, a certificate on the financial statements of the action and underlying accounts²¹].*

The authorising officer may also waive the obligation to provide a certificate on the financial statements and underlying accounts where an audit has been or will be directly done by the GSA's own staff or by a body authorised to do so on its behalf, which provides equivalent assurances about the costs declared.

12.3. Payment arrangements

Arrangements for pre-financing payment corresponding to 30% of the grant amount will be further detailed in the grant agreement (see ref. to Article I.5.2).

An interim payment shall be paid to the coordinator (who receives it on behalf of the consortium) and is intended to cover the consortium's expenditure on the basis of a request for payment when the action has been partly carried out.

The interim payment must clear 50% of the amount of the pre-financing payment(s) previously made. The interim payment shall not exceed 40% of the maximum grant amount. The cumulative amount of pre-financing(s) and interim payment(s) must not exceed 70% of the *maximum amount of the grant*.

Payment	Amount	Note
Pre-financing payment	30%	
Interim payment	max 40%	Based on the actual requested grant amount (i.e. actual expenditure).
Final payment	min 30%	

GSA will establish the amount of the final payment to be made to the coordinator (who receives it on behalf of the consortium) on the basis of the calculation of the final grant amount (see section 12.2 above). If the total of earlier payments is higher than the final grant amount, the consortium (represented by the coordinator) will be required to reimburse the amount paid in excess by the GSA through a recovery order²².

Please refer to the grant agreement for the terms and conditions of the payment arrangements (see ref. to Article I.5).

12.4. Pre-financing guarantee

A pre-financing guarantee for up to the same amount as the pre-financing may be requested, on a case by case basis, in order to limit the financial risks linked to the pre-financing payment. The financial guarantee, in euro, shall be provided by an approved bank or financial institution established in one of the Member State of the European Union. When the beneficiary is established in a third country, the authorising officer

e s

²⁰ Art. 135 FR

²¹ Art. 207.3 RAP

²² Art. 109, 110 RAP

responsible may agree that a bank or financial institution established in that third country may provide the guarantee if he considers that the bank or financial institution offers equivalent security and characteristics as those offered by a bank or financial institution established in a Member State. Amounts blocked in bank accounts shall not be accepted as financial guarantees.

The guarantee may be replaced by a joint and several guarantee by a third party or by a joint guarantee of the beneficiaries of an action who are parties to the same grant agreement.

The guarantee shall be released as the pre-financing is gradually cleared against interim payments or payments of balances to the beneficiary, in accordance with the conditions laid down in the grant agreement.

13. PUBLICITY

13.1. By the Beneficiaries

Beneficiaries must clearly acknowledge the European Union's contribution in all publications or in conjunction with activities for which the allocated grants are used.

In this respect, beneficiaries are required to give prominence to the name and emblem of the GSA and of the European Union on all their publications, posters, programmes and other products realised under the grant agreement.

If this requirement is not fully complied with, the grant may be reduced in accordance with the provisions of the grant agreement.

13.2. By the GSA

The GSA will publish the following information:

- a. name of the awarded consortium and its beneficiaries;
- b. address of the beneficiary (legal persons) or reference to the region (natural persons);
- c. subject of the grant agreement;
- d. amount awarded.

Upon a reasoned and duly substantiated request by the awarded consortium (represented by the coordinator), the publication shall be waived if such disclosure risks threatening the rights and freedoms of individuals concerned as protected by the Charter of Fundamental Rights of the European Union or harm the commercial interests of the beneficiary.

14. OWNERSHIP

The ownership of the results generated by the action is specified in the grant agreement.

15. DATA PROTECTION

The reply to any call for proposals involves the recording and processing of personal data (such as name, address and CV). Such data will be processed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, the questions and any personal data requested are required to evaluate the application in accordance with the specifications of the call for proposals will be processed solely for that purpose by the GSA. Applicants / beneficiaries are entitled to obtain access to their personal data on request and to rectify any such data that is inaccurate or incomplete. Applicants / beneficiaries shall address queries concerning the processing of personal data to the GSA. Applicants / beneficiaries have the right of recourse at any time to the European Data Protection Supervisor for matters relating to the processing of their personal data.

Details concerning the processing of personal data are available on the privacy statement at:

http://ec.europa.eu/dataprotectionofficer/privacystatement_publicprocurement_en.pdf.

Applicants are informed that for the purposes of safeguarding the financial interest of the European Union, personal data may be transferred to internal audit services, to the European Court of Auditors, to the Financial Irregularities Panel and/or to the European Anti-Fraud Office (OLAF).

Your personal data may be registered in the Early Detection and Exclusion System (EDES) if you are in one of the situations mentioned in Article 106 of the Financial Regulation²³. For more information, see the Privacy Statement on: http://ec.europa.eu/budget/explained/management/protecting/protect_en.cfm

16. PREPARATION AND STRUCTURE OF THE PROPOSAL

Proposals shall be prepared in accordance with the scope of the Call (section 2.2), with clear definition of the roles (Form A1), demonstrating that the consortium is composed of all the necessary competencies needed to achieve the objectives of the Call (section 2.1).

Proposals must be submitted in accordance with the formal requirements and by the deadline set out under section 17.

Applicants will be informed in writing about the results of the selection process.

Proposals shall be prepared along the following structure:

Administrative Proposal (A1-A6):

A1 – Proposal Overview

A2 – Proposal Summary

A3 – Coordinator profile including:

- a) Legal Entity Form (LEF) together with supporting documents as described in Section 7.3
- b) Financial Identification Form (FIF) signed by the coordinator plus signed and stamped by the bank
OR a bank statement relating to the bank account

²³ Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 (OJ L 298 of 26.10.2012, p. 1) as amended.

A4 – Co-Applicant profile (+ LEF) together with supporting documents as described in Section 7.3

A5 – Declaration of honour

A6 – Financial capacity ratios (A6 Form shall not apply to public bodies and international organisations)

Technical Proposal (B1-B2):

B1 – Technical proposal (additional documents can be annexed to this form to complement the information)

B2 – Operational capacity

Financial Proposal:

C1 – Preliminary Budget

The technical proposal (B1-B2 Forms) constitutes the core of your proposal. These forms shall be submitted by and along with the various and duly completed templates provided with this call, consisting of a list of headings. It is recommended to follow this structure when presenting the technical content. The templates are designed to highlight those aspects that will be assessed against the evaluation criteria. They cover, among other things, the nature of the proposed work, the participants and their roles in the proposed project, and the impact that might be expected to arise from the proposed work. Additional information or descriptive document may be provided by applicants as an annex.

The C1 form shall be submitted in excel (.xls) format.

Forms (as presented below in the table) shall be **submitted by the coordinator** and every **related actor is responsible to fill them in** (coordinator and/or co-applicants and/or affiliated entity) duly. The table below reflects on who has to fill out what kind of forms. Please note each that actor (including the coordinator, the co-applicants and affiliated entity) has to fill certain forms as described below in the table, and this information shall be reflected in the A1 Form prepared by the coordinator.

Responsibility / Forms	Coordinator	Co-applicant	Affiliated entity
A1 – A2 – A3 – B1	X		
A4		X	
A5 – A6 – B2 – C1	X	X	X
FIF and supporting docs	X		
LEF and supporting docs	X	X	X

17. SUBMISSION OF PROPOSALS

Proposals must be submitted in accordance with the formal requirements and by the deadline set in this section.

The beneficiaries are not allowed - in any respect - to change the scope and the content of the proposal(s), till the signature of the grant agreement. However, if there is a need to clarify certain aspects or for the correction of clerical mistakes, the GSA may contact the applicant for this purpose during the evaluation process.

The proposal may be submitted in any of the official languages of the European Union but **English version** would be appreciated. If the proposal is not in English, the applicant should provide a translation of the full proposal or of an extract of it, in particular to the supporting documents requested, such as registry excerpts etc. Costs incurred by the applicant for providing the translation shall not be subject to reimbursement by the GSA.

The proposal shall always be submitted in a paper version (please see the important note below).

IMPORTANT NOTE (5): The mandatory submitted proposals shall always also contain 2 (two) copies of USB storage devices containing the full set of proposal documents in machine readable format (standard Office 2003 and Adobe PDF 2008 or later). In case of doubt or outright divergence between the physically submitted proposal and the content provided in electronic format (on the USB-storage devices or via the platform) the physical documents shall always take precedent.

Unless notified otherwise by the GSA, the proposals (including USBs) shall be submitted by letter:

- a) either by post or by courier not later than **31/05/2017**, in which case the evidence of the date of dispatch shall be constituted by the postmark or the date of the deposit slip, to the address indicated below;
- b) or delivered by hand not later than **31/05/2017 at 17:00** Prague local time to the address indicated below. In this case, a receipt must be obtained as proof of submission, signed and dated by the GSA official who took delivery.

The GSA is open from 09.00 to 17.00 Monday to Thursday, and from 9.00 to 16.00 on Fridays. It is closed on Saturdays, Sundays and national holidays.

Proposals must be placed inside a sealed envelope. The envelope, addressed as indicated below, should be marked as follows: "**CALL FOR PROPOSALS GSA/GRANT/01/2017 – NOT TO BE OPENED**". If self-adhesive envelope is used, it must be sealed with adhesive tape and the sender must sign across this tape.

CALL FOR PROPOSALS

GSA/GRANT/01/2017

DEVELOPMENT OF AN ADVANCED RAIM MULTI-CONSTELLATION RECEIVER

GSA – Legal and Procurement Department

Janovského 438/2

170 00 Prague 7- Czech Republic

18. EVALUATION OF PROPOSALS, AWARD AND RESERVE LIST

18.1. Evaluation of Proposals

All applications will be examined and assessed by an Evaluation Committee. The assessment of each proposal will be based on the information provided by the applicants in the proposal submitted in reply to the call for proposals. In addition, the GSA reserves the right to use any other information from public or specialist sources. The information will be assessed in light of the admissibility, eligibility, exclusion, selection and award criteria set out in the Call for Proposals.

The Evaluation Committee may ask an applicant to provide additional information or to clarify the supporting documents submitted in connection with the application, in particular in the case of evident material errors.

- At the end of the evaluation, the best proposal(s) will be proposed for award,
- Placed on the reserve list in case of not available funding,
- Rejected, stating the reasons for rejection.

After the completion of the evaluation, applicants will be informed in writing about the results of the evaluation.

18.2. Award of the grant agreement

The GSA may decide to request the applicant(s), whose proposal has been recommended for award by the Evaluation Committee, to make minor adaptations and/or corrections to the proposal. In that case, applicant will receive a letter setting out the requested modifications which must stay within the limits of the request. This phase will not lead to a re-evaluation of the proposal.

A decision to reject an application can be based on the following grounds:

- the application was submitted after the closing date;
- the application is incomplete or otherwise non-compliant with the stated administrative conditions or in any other way does not comply with the eligibility criteria as set out the call for proposals;
- the coordinator or one or more co-applicants are ineligible;
- the technical capacity is considered insufficient;
- the financial capacity is considered insufficient;
- the proposal has not reached the minimum scores as indicated in the award criteria detailed in the call for proposals;
- the score obtained by the proposal is not ranked amongst the best proposal considered for the award.

The GSA's decision to reject an application is final.

18.3. Reserve list

The GSA may place proposals – which were not considered for award of the grant due to inferior score or lack of budget – on a reserve list. Should additional budgetary appropriations become available, the applicants will be informed according to their ranking on the reserve list for potential award of the grant.

19. REFERENCE DOCUMENTS

- [RD.1]. EU-U.S. Cooperation on Satellite Navigation Working Group C, ARAIM Technical Subgroup, Interim Report²⁴, December 2012
- [RD.2]. EU-U.S. Cooperation on Satellite Navigation Working Group C-ARAIM Technical Subgroup, Milestone 2 Report²⁵, February 2015
- [RD.3]. EU-U.S. Cooperation on Satellite Navigation Working Group C-ARAIM Technical Subgroup, Milestone 3 Report²⁶, February 2016
- [RD.4]. EC CALL FOR TENDER No 439/PP/GRO/RCH/15/8383 – R&D for Advanced Receiver Autonomous Integrity Monitoring: ARAIM Demonstrator²⁷
- [RD.5]. European GNSS Agency Invitation to Tender GSA/NP/04/15 – Aviation DFMC SBAS Receiver Prototype²⁸

20. CONTACTS

Contacts between the GSA and potential applicants can only take place in certain circumstances and under the following conditions only:

Before the final date for submission of proposals:

- At the request of the applicant, the GSA may provide additional information solely for the purpose of clarifying the nature of the call. The request cannot be done after 5 April 2017.
- Any requests for additional information must be made in writing only to the coordinates stated below.
- The GSA may, on its own initiative, publish corrigenda in case of inaccuracy, omission or other clerical error in the text of the call for proposals.
- Any additional information including that referred to above will be published on the GSA internet page (<http://www.gsa.europa.eu/gsa/grants>) on which the call for proposals is published.

After the deadline for submission of proposals:

- If clarification is requested or if obvious clerical errors in the proposal need to be corrected, the GSA will contact the applicant provided the terms of the proposal are not modified as a result.
- If the GSA finds that the proposal, chosen for award, could be improved by limited adaptations. In such case, these applicants will receive a formal letter setting out the proposed modifications.

Contact coordinates for the call:

GSA: Legal and Procurement Department

E-mail address: gnss.grants@gsa.europa.eu

Office address: GSA, Janovského 438/2, 170 00, Prague 7, Czech Republic

REMINDER: when sending any correspondence to GSA, please refer in the subject (of the email or of the letter) to the relevant reference number of the Call: **GSA/GRANT/01/2017** – failure of doing so – might delay the timely response of GSA.

²⁴ <http://www.gps.gov/policy/cooperation/europe/2013/working-group-c/ARAIM-report-1.0.pdf>

²⁵ <http://www.gps.gov/policy/cooperation/europe/2015/working-group-c/ARAIM-milestone-2-report.pdf>

²⁶ <http://www.gps.gov/policy/cooperation/europe/2016/working-group-c/ARAIM-milestone-3-report.pdf>

²⁷ http://www.iserd.org.il/Uploads/dbsAttachedFiles/EN_Tender_specifications_439.pdf

²⁸ <http://www.gsa.europa.eu/aviation-dfmc-sbas-receiver-prototype>