HADG Infrastructure for HAS Phase 2 – Statement of Work

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1 Introduction

This document is the Statement of Work (SoW) for the contract under procurement EUSPA/OP/17/23 (the "Contract"), for the HADG Infrastructure for HAS Phase 2. The Contract covers the design, development, installation, qualification, support to accreditation, acceptance, maintenance of the HADG Infrastructure and engineering support to the Contracting Authority. Technical specifications are included in the CISL (including but not limited to sections 2.1, 2.2 and 2.4).

HADGp2-SoW-0001 Annexes

There are 7 Annexes applicable to the HADG infrastructure for HAS Phase 2 SoW, listed in order of precedence, forming an integral part of this SoW and therefore complementing the requirements expressed herein:

- Annex I, Contractual Index Status List (CISL), ref. EUSPA,GAL-GSC-CISL-A26387;
- Annex II, Deliverables Requirements List (DRL), ref. EUSPA-GAL-GSC-DRL-A26388;
- Annex III, Document Content Guidelines (DCG), ref. EUSPA-GAL-GSC-DCG-A26389;
- Annex IV, KPI regime, ref. EUSPA-GAL-GSC-KPI-A26390;
- Annex V, List of Contracting Authority Undertakings and Handover Assets, ref. EUSPA-GAL-GSC-LI-A26391;
- Annex VI, List of Reference Documents, ref. EUSPA-GAL-GSC-LI-A26392;
- Annex VII, List of acronyms, ref. EUSPA-GAL-GSC-LI-A26393.

2 Acronyms and Abbreviations

Acronyms and abbreviations are listed in Annex VII to this SoW.

3 Applicable and Reference Documents

Applicable Documents are listed in Annex I to this SoW.

Reference Documents are listed in Annex VI to this SoW.

4 Overview of the scope of the work

The following list summarizes the tasks to be developed and implemented in this Contract. In the next sections, these tasks are broken down in detailed requirements. Applicable processes are listed in CISL (including but not limited to sections 2.3 and 2.4). Technical specifications are included in the CISL (including but not limited to sections 2.1, 2.2 and 2.4).

- Project Management:
  - contractual management;
  - project control;

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- risk management;
- documentation and configuration management;
- management of lower level activities to ensure the full system, including subcontracted sub-systems, is delivered on time and within specification;
- interfacing with the Contracting Authority for the purposes of regular reporting, progress meetings, reviews, and management of change requests;
- identify needs for interfaces with external entities and ensure coordination between the different activities and entities as necessary;
- establish and maintain consistency of the schedule with respect to the major programme milestones, reviews and delivery milestones;

- PA/QA and RAMS:
  - Recurring PA/QA and RAMS activities, such as non-conformance and anomaly management, configuration management, quality control, inspections etc.;
  - Internal audits;
- Design and Development tasks
  - System and interface specification;
  - Architectural design and justification
  - Traceability from mission specifications to lower-level specifications
  - Production/development, update, and delivery of necessary design documentation for hardware, software, tools, and all other items;
  - Obsolescence strategy;
- Qualification:
  - Infrastructure assembly and installation of the different platforms and in the different sites (E-GSC main site, and backup site)
  - Integration activities with external elements;
  - Verification and validation activities against technical baseline (including provision of the Verification Control Document);
  - Support system resilience tests' preparation and execution (organised by EUSPA);
- Preparation for operations/maintenance:
  - Concept of Operations design and analysis;
  - Maintenance and ILS planning and preparation;
  - Installation, Operation and Maintenance manuals and procedures;
  - Core-of-trust recovery procedure, as defined in cyber-security applicable documents (see CISL in Annex I);
  - Training material and provision of courses for the HADG operator;
  - Support to the Operational validation to be done by a third party (Galileo Service Operator);

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- Acceptance:
    - Define the migration strategy to the operational system (subject to SAB authorisation);
    - Implementation of the steps under the HADG for HAS Phase 2 contractor responsibility (the migration could have steps to be implemented by GSOp). It is expected that most of the migration activities are to be done by the HADG contractor, while only for those activities which GSOp involvement is strictly necessary, the migration plan can count with GSOp support. EUSPA shall approve the proposed migration plan and the proposed task to be implemented by GSOp.
    - Support to the service monitoring phase;
    - Correction of all anomalies/vulnerabilities under HADG for HAS Phase 2 contractor responsibility.
- Security tasks:
    - security activities, including cyber security and obsolescence related activities, supporting activities leading to accreditation of the infrastructure and operations evolutions, and any necessary security measures for protection of products, documentation, infrastructures and personnel, including the definition of security measures;
    - performance of internal penetration test and support of independent penetration testing campaigns/security configuration audits (as a minimum one independent pen-test campaign organized by EUSPA and a SADEP security configuration audit) ;
    - compliance with the programme security requirements, certification of the security equipment and support on the System Security Accreditation;
    - support to security monitoring and control during the acceptance activities.
- Engineering support to the Contracting Authority;
    - to provide either on-site or off-site engineering support services **(maximum 500 man-days: 210 man-days on-site at GSC prime at Madrid, 40 man-days at GSC back up site at Toulouse, and 250 man-days off-site)** at request of the CA as defined in see Section 7.9 of this document;
    - These services support shall be partially/fully assignable to the Service Operator;

In addition to the above, the Contract foresees the following options, which may be activated by the Contracting Authority:

- Option #1: HADG maintenance
- Option #2: HADG maintenance extension
- Option #3: On call L2 support
- Option #4: Engineering Support extension of 500 Man days (160 man-days on-site at GSC prime at Madrid, 40 man-days at GSC back up site at Toulouse, and 300 man-days off-site) for support services.
- Option #5: Deployment and acceptance of **an additional** qualified HADG unit in the GSC Back-up site (Toulouse)

The HADG Infrastructure for HAS phase 2 baseline contract comprises a minimum number of 5 HADG P2 platforms (see 7.4.1). In this context, a platform is defined by a set of hardware and software implementing

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HADG functionalities, with the purpose of supporting the HADG operation, development, qualification and/or maintenance activities.

The envisaged starting conditions of the HADG Infrastructure for HAS Phase 2 (as a result of the execution of GSA-OP-09-18), which may not be used or may be partially or fully reused by the Contractor (see conditions and **delivery time** of the different platforms in the "Contracting Authority Undertakings and Handover Assets", Annex V to this SoW), is the HADG for HAS phase 1 which is composed of the following platforms:

- GSC Prime site (Madrid-Torrejón de Ardoz)
  - HADG OPE platform (under Galileo Service Operator custody and operation);
  - HADG VAL (under Galileo Service Operator custody and operation);
- GSC Back up site (Toulouse):
  - Back-up HADG platform
- HADG for Phase 1 Contractor premises:
  - HADG platform for maintenance activities (at GSA-OP-09-18 contractor premises).

The Contractor is informed that, as per contractual provisions (Art. 13.3 of the Contract), the platforms are provided in 'as-is' conditions, and therefore the Contractor is responsible for ensuring their suitability for purpose and their full operability, e.g. by carrying out any necessary action to correct possible obsolescence issues requiring resolution.

In addition to the above, the Contractor may propose other platforms for any other activities necessary for the implementation of the contract requirements, which will be freely assessed by the Contracting Authority.

5 Requirements logic

In conjunction with other supporting documentation, this SoW defines the main objectives, phases and tasks expected of the contractor during the execution of the Contract.

The following convention is used to identify requirements listed in this SoW:

HADGp2-SoW-xnnn	**[Title of the requirement]**
[Requirement text]	

Where:

- **x** is the identifying work package according to the following numbering:
  - 0 General requirements (transversally applicable to work packages)
  - 1 Project Management
  - 2 PA, QA and RAMS
  - 3 Design and Development Engineering
  - 4 Qualification, including Assembly, Integration and Verification
  - 5 Preparation for operations/maintenance.

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6 Acceptance

7 Security

8 Maintenance

9 Engineering Support

- **nnn** is an incremental number to uniquely identify requirements.
- **Title of the requirement:** short description of the requirement.
- **Requirement text**: requirement definition.

6 Organisation and project breakdown structure

HADGp2-SoW-0002 High-level Work Breakdown Structure

The Contract shall be executed according to the work breakdown structure in Figure 1.

HADGp2-SoW-0003 Work Breakdown Structure

The Contractor shall establish and maintain a “Work Breakdown Structure” (WBS) for the total scope of the contract, based on the requirements in the SoW.

HADGp2-SoW-0004 Work Packages

Each Work Package in the WBS shall:

- have a unique number,
- be measurable and manageable in its scope, to allow planning, monitoring and controlling of progress, with KPIs associated to the key targets,
- have clearly identified inputs and outputs, forming interfaces with other tasks or Work Packages,
- be allocated to a single Work Package Manager (several Work Packages can be allocated to a single Work Package Manager),
- result in supply of services, products or documents, corresponding to accomplishment of the task of the Work Package,
- have clearly identified planning constraints (duration, starting event, finishing event, intermediate events if applicable) or time plan for service activities,
- identify the responsible company,
- have an estimate of the level of resources necessary for the execution of the WP task/s per company involved (prime and subcontractors) such as working hours/effort in man-year, involved use of internal facilities and laboratories, procurement of materials, mechanical parts, components, products, external services, transports, insurances, travels, etc).
- be defined by a Work Package Description (WPD).

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HADGp2-SoW-0005 Cost Breakdown Structure

The Contractor shall maintain for each node of the WB the cost categories for resources, including labour, equipment, facilities, etc, in the form of a Cost Breakdown Structure (CBS).

HADGp2-SoW-0006 Applicability and Conflicting Requirements

Unless otherwise stated, Applicable Documents as indicated in Annex I, Contractual Index Status List (CISL), are applicable in their entirety. Any inconsistency identified by the Contractor, shall be brought immediately to the attention of the Contracting Authority for resolution.

HADGp2-SoW-0007 Nested Applicable Documents

Applicable documents may call up further documents, or parts thereof, which are applicable to the extent defined within the reference documents. If the Contractor identifies any such nested applicable document as being required to implement any contractual tasks (in particular, but not limited to, technical requirements), it shall request it to the Contracting Authority (who will assess whether it needs to be provided to the Contractor or not). Any inconsistency identified by the Contractor, shall be brought immediately to the attention of the Contracting Authority for resolution.

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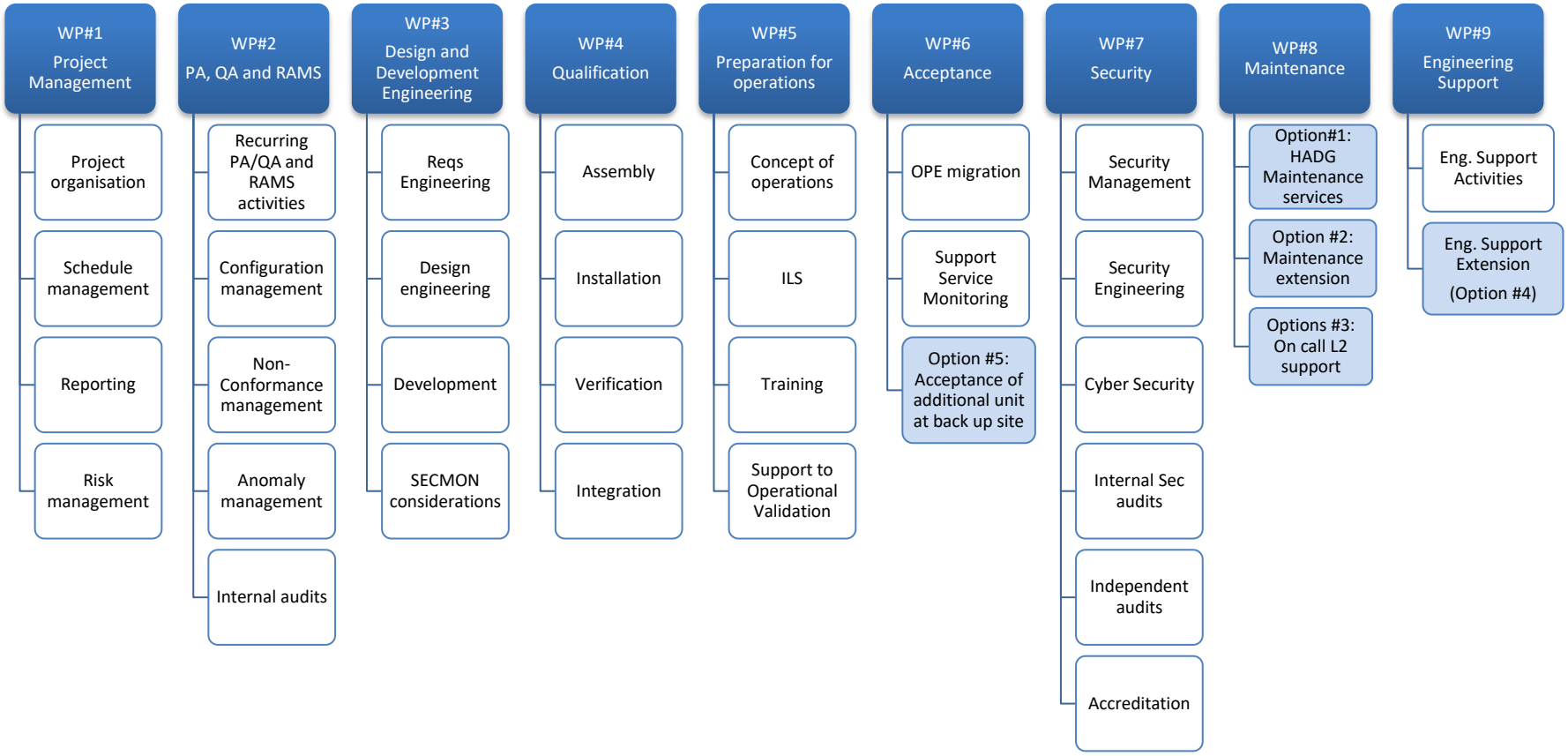

Figure 1: High-level Work Breakdown Structure

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HADGp2-SoW-0008 Contract schedule and main milestones

The activities of Contract cover the period from kick-off (KOM) through end-of-contract (EoC). The following table summarises the baseline milestones and schedule of the contract execution, with the corresponding payment plan associated to the success of each milestone, as a percentage of the total value of the contract.

Table 1 - Contract schedule and payment plan

MPP ID	Milestone	Timeline	Prerequisites	Objectives	Payment
MS000	Kick-Off Meeting (KOM)	T0	HADGp2-SoW-0009	HADGp2-SoW-0010	5%
MS001	Preliminary Design Review (PDR)	T0 + 2 months	HADGp2-SoW-0011	HADGp2-SoW-0012	10%
MS002	Critical Design Review (CDR)	T0 + 6 months	HADGp2-SoW-0013	HADGp2-SoW-0014	15%
MS003	Qualification Review (QR)	T0 + 12 months	HADGp2-SoW-0017	HADGp2-SoW-0018	30%
MS005	Acceptance Review (AR)	T0 + 19 months	HADGp2-SoW-0021	HADGp2-SoW-0022	25%
MS006	Delta-Acceptance Review for backup site platform	T0 + 21 months		HADGp2-SoW-0023	10%
MS007	End-Of-Contract (EoC)	T0 + 45 months if maintenance options are not activated Subject to option activations		HADGp2-SoW-0025	5%

The Contractor is encouraged to propose schedule optimisations if possible.

Complementing the above timeline, a reference timeline for the accreditation milestones and events is provided in Appendix A. For avoidance of doubt, the accreditation milestones are not considered milestones of the Contract; nevertheless, their impact on the contractual activities and, in particular, the milestones of the Contract (i.e. either as preconditions or for evaluation of objectives) is noted.

HADGp2-SoW-0009 Prerequisites of the Kick-Off Meeting (KOM)

The prerequisites for the KOM shall be the following:

1. Contract signature;
2. Delivery of KOM DP (no later than 2 weeks after the contract signature and no later than 2 weeks before the review).

HADGp2-SoW-0010 Objectives of the Kick-Off Meeting (KOM)

The objectives of the KOM shall be the following:

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1. Presentation of the Contractor and Contracting Authority teams;
2. Presentation of the overall development and qualification/validation processes (DDVP);
3. Presentation and approval of the relevant plans;
4. Presentation of the milestones and objectives;
5. Confirmation of the compliance matrices to CISL in case any option is activated before KO impacting SOCs;
6. Confirmation of the Deliverable Item List/Deliverable Documents List;

Note: In the event that the Contractor identifies a potential inconsistency between Applicable Documents, the Contractor shall provide an analysis of the inconsistency to the Contracting Authority at KO so that the Contracting Authority can decide which interpretation shall prevail.

HADGp2-SoW-0011 Prerequisites for the Preliminary Design Review (PDR)

The prerequisites for the PDR shall be the following:

1. Successful KOM
2. Delivery of DP (no later than 2 weeks before the review);

HADGp2-SoW-0012 Objectives of the Preliminary Design Review (PDR)

The objectives of the PDR shall be the following:

1. Baseline and approval of the preliminary technical specification, including traceability to lower level components and interfaces;
2. Approval of the preliminary design*, including without limitation:*
    a. Architectural design;
    b. The modelling/physical interpretation of the estimated parameters (HAS products defined in the Technical Specifications) as part of the design;
    c. The preliminary HAS IDD proprietary message format definition (Satellite Correction Error, iono, authentication, ERP and SAGA) based on SIS ICD format to be provided by the Contracting Authority at KOM.
3. Approval of the security approach;
4. Approval of the development and qualification/validation processes (DDVP);
    a. Approval of the proposal for the Requirements Verification Methods
    b. Approval of the proposal for the Verification plan
5. Confirmation that the HADG architectural design (including data flows) and the HADG assets enable the organisation of the Threat scenario security key point

HADGp2-SoW-0013 Prerequisites for the Critical Design Review (CDR)

The prerequisites for the CDR shall be the following:

1. Successful previous milestones;
2. Delivery of DP (no later than 3 weeks before the review);

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3. Approval of the corresponding lower-level milestones (e.g. SW-DDR).

HADGp2-SoW-0014 Objectives of the Critical Design Review (CDR)

The objectives of the CDR shall be the following:

1. Approval of the detailed architectural design, including without limitation traceability to lower-level components, interfaces, specifications, approach to obsolescence and design choices due to legacy anomalies (if applicable) and other operational inputs; Including:
    a. Approval of the *final* HAS IDD proprietary message format definition (Satellite Correction Error, iono, authentication, ERP and SAGA) based on SIS ICD format to be provided by the Contracting Authority at KOM and to be validated by the Contractor as part of this milestone CDR.
    b. Feasibility assessment of HAS SIS ICD implementing at user segment level based on the User Algorithm specifications (HADGp2-RD-PR05 in Annex VI to this SoW) to comply with the requested user performance and the available bandwidth.
    c. The approval of the HARPY specifications (CLA and UNCLA). To be noted that the currently available technical specifications already include some high-level requirements for the checks that should be further developed by the contractor in a way that the proposed design supports an acceptable implementation from technical and security compliance point of view.
2. Approval of as-designed security documentation (including cybersecurity-related and accreditation documentation);
3. Approval of the qualification and validation strategy (plan, test cases and procedures);
4. Approval of PA/QA processes and plans;
5. Approval of the operations and maintenance documentation detailed in the DRL (including concept of operations, ILS, training plan, etc);
6. Approval of assessment of the HADG performance with different networks (e.g. GSS, EGNOS V3 RIMS, GESS) by using adequate and reliable engineering methods and tools;
7. Readiness and approval of continuation to the development phase, including the HW and SW procurements and development;
8. Acceptance of submitted RFDs by the Contracting Authority as per applicable process, or alternatively confirmation by the Contracting Authority that the submitted RFDs are not blocking the next phase.

    Note: in the latter case, should the RFDs be rejected by the Contracting Authority at a later date, the Contractor shall be responsible for the recovery of the level of compliance without impact on subsequent milestones.

HADGp2-SoW-0015 Objectives of the Test Readiness Reviews (TRR)

Before each test campaign, the Contractor shall organize and chair a TRR (to which the Contracting Authority will be invited to participate as observers, but the responsibility of **this internal contractor milestone** outcome stays in the Contractor) with the following objectives:

1. Readiness of the configuration baseline, including lower level components;
2. Confirmation of deployment and integration in the target platform;

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3. Endorsement of verification specifications for the test campaign;
4. Confirmation of the list of requirements to be verified and alignment of the VCD with the test campaign;
5. Approval of verification plan;
6. Approval of Test Procedures and test cases.

Note: DP shall be provided to the Contracting Authority two weeks before the TRR

HADGp2-SoW-0016 Objectives of the Test Review Board (TRB)

At the end of each test campaign, the Contractor shall organize and chair a TRB (to which the Contracting Authority will be invited to participate as observers, but the responsibility of **this internal contractor milestone** outcome stays in the Contractor) with the following objectives:

1. Completeness of verification campaign and presentation of its results;
2. Identification of problems: review of all still open NCRs raised during test in order to assess that there is no impact on the test objectives achievement;
3. Presentation of CISL requirements coverage and as-built status of compliance;
4. Completeness of VCD;
    a. Identification of requirements for which Request for Waivers will be issued
5. Proof of changes traceability (as built status list).
6. Presentation of security audit results and approval of way-forward;

Note: DP shall be provided to the Contracting Authority two weeks before the TRB.

HADGp2-SoW-0017 Prerequisites for the Qualification Review (QR)

The prerequisites for the QR shall be the following:

1. Successful previous milestones (including applicable internal TRB);
2. Delivery of DP (no later than 3 weeks before the review);
3. Approval of the corresponding lower-level milestones (e.g. SW-QR).

HADGp2-SoW-0018 Objectives of the Qualification Review (QR)

The objectives of the QR shall be the following:

1. Proof of compliance of the infrastructure to applicable requirements and completeness of VCD;
2. Proof of the correct integration of HADG with external interfaces in PreOPE configuration in VAL domain;
3. Proof of execution of PA/QA activities and compliance to applicable standards (as per CISL);
4. Availability and completeness of as-built inventory;
5. Proof of correction of identified problems (including without limitation legacy anomalies if applicable), or approval of way-forward;
6. Proof of correction of NCRs, or approval of way forward for remaining NCRs.

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7. Proof of correction of vulnerabilities, or approval of way-forward;
8. Approval of as-built security documentation (including cybersecurity-related and accreditation documentation);
9. Approval of operations, ILS and maintenance documentation; including evidences of the readiness of the infrastructure to support the operational validation to be executed by the Galileo Service Operator, as well as the validation of the IOM procedures (including the procedures for the Core of Trust Reinstallation).
10. Acceptance of submitted RFWs/RFDs by the Contracting Authority as per applicable process, or alternatively confirmation by the Contracting Authority that the submitted RFWs/RFDs are not blocking the next phase.

    Note 1: in the latter case, should the RFWs/RFDs be rejected by the Contracting Authority at a later date, the Contractor shall be responsible for the recovery of the level of compliance without impact on subsequent milestones.

HADGp2-SoW-0019 HADG operational validation

After successful qualification, the HADG infrastructure will be handed over to the GSOp to run the operational validation of the platform, including the validation of the procedures for the Core of Trust reinstallation. Before handover to the operator a check point will be held between EUSPA, HADG contractors and GSOP to confirm that the infrastructure has been deployed and integrated properly and the operational validation phase can start (HADG Early Access). The HADG infrastructure will be under control of the GSOp, and the Contractor shall work with them to support the operational validation process. Contractor shall support HADG operational validation. Operational validation, including test cases, will be specified and executed by the GSOp.

HADGp2-SoW-0020 HADG migration to OPE and service monitoring

Upon confirmation from the SAB (Pre-Authorization to Operate the HADG infrastructure for HAS Phase 2), the HADG contractors shall lead the connection to OPE as per agreed HADG migration plan.

Once connected to the operational system, the HADG contractor shall support the monitoring of the performances during the service monitoring phase (~6 weeks).

HADGp2-SoW-0021 Prerequisites for the Acceptance Review (AR)

The prerequisites for the AR shall be the following:

1. Successful previous milestones with closure of all identified actions.
2. Completion of the migration to OPE and service monitoring phase, including the organization of the final migration checkpoint (GSOp milestone presenting the results of the service monitoring phase);
3. Delivery of DP (no later than 3 weeks before the milestone).

HADGp2-SoW-0022 Objectives of the Acceptance Review (AR)

The AR assesses whether the HADG infrastructure (minimum HADG OPE, HADG VAL and HADG maintenance platform) can be accepted by the Contracting Authority, and is structured as per the following objectives:

1. Acceptance by the Contracting Authority of as-built compliance status as demonstrated by the Contractor, including RFDs/RFWs accepted by the Contracting Authority;

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2. Evidences that there are no regressions in OPE experienced in the service monitoring phase compared to the operational validation in VAL or to the previous HADG infrastructure services (for Phase 1), when applicable;
3. Evidences of the fulfilment of HADG performances in the operational environment for HAS.
4. Closure of Anomalies, or identification of any remaining anomaly to be addressed by the deadline set by the Contracting Authority, the correction of the Anomalies and their approval by the Contracting Authority are prerequisites to EoC ;
5. Closure of NCRs, or identification of any remaining to be addressed under maintenance and approval by the Contracting Authority;
6. Closure of security issues (e.g. remaining vulnerabilities in the scope of the contract), or identification of any remaining security issue to be addressed by the deadline set by the Contracting Authority, the correction of the security issues and their approval by the Contracting Authority are prerequisites to EoC; and
7. Evidence of the availability, completeness and representativeness of the tools and platforms for maintenance (including VAL chain).

Note: should it be the case that Anomalies, NCRs or other issues (including documentation updates) remain open at the time of the milestone due to incompatible timelines (e.g. if an anomaly is raised immediately before the milestone), the Contracting Authority will assess whether there is impact on the HADG service monitoring (therefore on the acceptance). The acceptance review may be declared successful if no blocking issues are identified by the Contracting Authority at its own discretion, with the understanding that these remaining Anomalies, NCRs or open issues shall be addressed by the Contractor by the deadline set by the Contracting Authority and are subject to the approval of the corrections by the Contracting Authority

HADGp2-SoW-0023 Acceptance review for other HADG platforms (D-AR)

For platforms excluded from the Acceptance Review objectives (HADG platform for GSC back up site and HADG INT unless differently proposed by the contractors) due to the deployment timeline (as per approved DDVP) a Delta-Acceptance Review for these platforms shall be held, with the following objectives:

1. Evidence of completeness and equivalence of the platform with regard to the compliance status of the OPE platform (and confirmation that there are no regressions from it);
2. Closure of anomalies or other issues specific to the platform;
3. Confirmation of the configuration control status and processes in place.
4. Readiness of the backup platform to take over the HADG P2 service delivery over the prime platform.

As in the case of the Acceptance Review, the Contracting Authority may, at its own discretion, accept the platform following the same process referred in the requirement for the Objectives of the Acceptance Review (AR).

It is noted that the requirements in this document referring to AR shall be understood as applicable to D-AR for what concerns the corresponding platforms.

Note: The prerequisites for the D-AR shall be the following:

1. Successful previous AR milestones;
2. Completion of the successful integration of the HADG back up platform in the GSC back up site);

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3. Delivery of DP (no later than 2 weeks before the milestone)

HADGp2-SoW-0024 Maintenance of the HADG Infrastructure

After successful completion of the AR, the maintenance phase commences (subject to activation of Option #1, see Section 10.1).

HADGp2-SoW-0025 Objectives of the Maintenance Reviews

The Maintenance Reviews assesses whether the HADG contractor has implemented their maintenance obligations (if related options are activated), and is structured as per the following objectives:

1. Proof of the timely resolution of the NCRs, anomalies and vulnerabilities under maintenance in accordance with the applicable KPI regime (Annex IV to this SoW).
2. Update of the project documentation regarding the use of spares and its replenishment, as well any maintenance action affecting the project documentation.

HADGp2-SoW-0026 End-of-Contract (EoC)

The Contract shall end once all its milestones have been declared successful and accepted by the Agency and there are no outstanding actions for the Contractor to be performed (EoC will be delayed accordingly if maintenance options are activated).

HADGp2-SoW-0027 Review responsibility

The Contracting Authority will review the performance of the Contractor in the Contract milestones, in regard to the objectives presented in this SoW.

HADGp2-SoW-0028 Milestone success criteria

Milestones shall be considered, at the Agency's own discretion:

- "Successful" if:
  a) all objectives are achieved,
  b) all deliverables duly submitted by Contractor and accepted by the Agency, and
  c) there are no remaining open actions of any kind whatsoever;
- "Successful with actions" if:
  a) all deliverables are duly submitted by Contractor,
  b) all objectives are substantially but not fully met, and
  c) specific minor actions are identified to make one or more deliverables fully compliant and/or to fully achieve all the objectives. In that case, the milestone will be successful once these actions are closed but the Contracting Authority may authorize in the meantime the Contractor to proceed with the activities (subsequent milestone).
- "Partially successful" if:
  a) one or more deliverables are not duly submitted by Contractor or accepted by the Agency, and/or
  b) one or more objectives are not met, and

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c) specific actions/obligations are identified to fully submit and/or achieve, as the case may be, missing/non-compliant deliverables or unachieved objectives. In that case, the milestone will be successful once all deliverables are accepted and all objectives achieved and the Contractor cannot proceed with activities (subsequent milestone) before the milestone is fully achieved (i.e., successful or successful with actions).

- "Unsuccessful", if the missing or non-compliant deliverables and/or the unachieved objectives are of such an importance –at the Agency's full discretion– that they cannot be declared as "partially successful".

HADGp2-SoW-0029 Responsibility despite approval

Approval by the Contracting Authority does not relieve the Contractor from any of its obligations as per Contract provisions. For example, the endorsement by the Contracting Authority of the verification specifications presented by the Contractor shall not be understood as a limitation in the quality of the subsequent verification activities.

7 Tasks of the Contractor

7.1 WP#1: Project Management

The Contractor shall plan, implement and maintain an effective project management in accordance with the list of applicable standards listed in the Contractual Index Status List (CISL, Annex I to this SoW).

HADGp2-SoW-1001 Project Management activities

The Contractor shall plan, implement and maintain an effective project management in accordance with the list of applicable documents listed in the Contractual Index Status List (CISL, Annex I to this SoW

7.1.1 Project organisation

HADGp2-SoW-1002 Activities Definition

The Contractor shall reflect the tasks defined in the SoW, and the additional tasks identified by the Contractor, in the Work Package Descriptions.

HADGp2-SoW-1003 Project Management organisation

The Contractor shall establish and maintain a project management organisation throughout the execution of the Contract. Such organisation shall monitor all technical, managerial and administrative activities and provide the directive necessary to comply with the Contract, and expedite resolution of problems, in order to manage and control adequately all the Contract activities, to provide the proper control of the lower tier Subcontractors (if any) and ensure the required feedback. It shall also be the responsible unit for interfacing with the Contracting Authority. The Contractor's project management organisation shall be suitably structured in a work breakdown structure detailed to the appropriate level to secure the Contract performance. The Organisational Breakdown Structure (OBS) shall be described as part of the Project Management Plan.

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HADGp2-SoW-1004 Project Management system

The Contractor shall implement and operate a Management System so that all project requirements shall be met in a timely and cost-effective manner. This system shall be uniform in all functions and procedures across the Contractor Industrial Structure where they interact with the Contracting Authority. In particular the system shall provide visibility of the Contractor's Project effort and provide the means of monitoring the execution of all tasks. It shall be capable of detecting potential problems so that the appropriate corrective action can be taken.

HADGp2-SoW-1005 Project Management Plan

The contractor shall establish and maintain up to date throughout the execution of the contract a Project Management Plan (PMP, HADGp2-DD-PM01) further elaborated from its tender, and related plans and documents as defined in DRL (Annex II to this SoW). Any change to the PMP and related plans shall be approved by the Contracting Authority. The Project Management Plan shall describe the Contractor project governance to the overall Contractor organisation of the company and, where the Contractor is working on more than one aspect of this project, a consolidated project organisation showing the inter-relationships and shared personnel where applicable. It will also describe all management tasks to be performed in the frame of SCs, compliant with the corresponding SoW. Management tasks shall be performed according to this plan, once approved by the Contracting Authority.

The Project Management Plan and related plans and procedures shall document the following areas in detail:

- Organisation, including Industrial Organisation
- Management Process & Procedures
- Facilities, Management Systems & Tools as appropriate
- Configuration and Documentation Management
- Cost and schedule management
- Risk management
- Assets management
- Security

7.1.2 Schedule management

HADGp2-SoW-1006 Baseline Schedule management

The Contractor shall plan their activities according to their Baseline Schedule. The Baseline Schedule shall require approval by the Contracting Authority, including any potential deviations from the Baseline or other modifications (typically confirmed by CCN).

HADGp2-SoW-1007 Schedule Management

The Contractor shall present at the Kick-off Meeting and maintain throughout the Contract a "Schedule Management Plan", which shall be subject to approval by the Contracting Authority and shall include a full description of all schedule management processes and procedures, and identify a function in its project organisation responsible for the management of schedule.

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Note: The Schedule Management Plan can be a separated document annexed to the Project Management Plan or a dedicated section of the Project Management Plan.

HADGp2-SoW-1008 Project Schedule

The Contractor shall implement schedule management processes and maintain its schedule, by the integration, at the agreed level of detail, of schedules and interface milestones, connected with relationships, dependencies and up-to-date progress, for all its work and all its lower tier subcontractors. An activity numbering scheme shall be used in accordance with the WBS.

The Contractor shall ensure that a coherent set of scheduling techniques is used by its lower tier subcontractors.

HADGp2-SoW-1009 Baseline Schedule document

The Contractor shall establish and maintain the Baseline Schedule (HADGp2-DD-PM05) defined in the Contract, i.e. update the Contract Schedule whenever formally agreed with the Contracting Authority. This schedule shall include as a minimum:

- The detailed schedule bar chart reflecting the schedule,
- The scheduling calendars information assumed for the baseline schedule including shift patterns (whenever relevant),
- Integrated major subcontractor milestones and tasks on which Contract schedule is based,
- Critical path analysis,
- List of project milestones,
- Links/constraints between activities.

In addition to the Baseline Schedule, the Contractor shall provide the Schedule bar chart source data in MS Project or compatible format.

HADGp2-SoW-1010 Working Schedule document

The Contractor shall establish and maintain the “Working Schedule” (HADGp2-DD-PM06). The schedule shall include as a minimum:

- Narrative part explaining the current status of the contract execution outlining the major achievements, delays and risks,
- Detailed schedule bar chart reflecting current status of all the tasks scheduled,
- Scheduling calendars information assumed for the schedule including shift patterns if relevant,
- Integrated major subcontractors’ milestones and tasks on which the schedule is based,
- Critical path analysis (including necessary details at lower tier Contractor levels),
- Milestones trend chart and trend information including as a minimum, baseline date, last reported working date, current working date,
- Analysis of the trend including an indication of added or deleted activities or logic changes which may have occurred and the reason for such changes,
- Status of remedial actions: definition, status: decision point/triggering event if pending,

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- An analysis of any critical items which may jeopardise the schedule.

The working schedule shall be traceable to the Contract Project Schedule (and its updates), and include all relevant milestones and dependencies. Activities in the schedule shall be traceable to the work breakdown structure.

The Contractor deliver the Project Working Schedule at the minimum with each Progress Report.

In addition to the "Project Working Schedule", the Contractor shall provide the bar chart source data in Microsoft Project Format.

HADGp2-SoW-1011 Schedule tasks and milestones

All activities of the project WBS identified during the implementation of the project and critical components and materials order and delivery, shall be included in the "Project Working Schedule" for each baseline and optional activity included in the Contract.

As minimum, contractual milestones, payment milestones, delivery dates and main reviews shall be included in the Milestone lists and bar chart of the "Contract Schedule" and "Project Working Schedule".

7.1.3 Reporting and Reviews

HADGp2-SoW-1012 Intermediate Milestones

The Contractor shall complement the milestones presented in HADGp2-SoW-0008 with additional milestones and reviews at HADG segment level and sub-system (element, component) level as required to effectively monitor the development and implementation progress and as per applicable standards. The Contractor shall invite the Contracting Authority and potentially other interested third parties if designated by the Contracting Authority to these intermediate milestones in an observer role.

HADGp2-SoW-1013 Lower-level milestones

The Contractor shall organise lower level reviews for each component in accordance with GSWS lifecycles (see HADGp2-AD-PA07).

HADGp2-SoW-1014 Preparation of Plans and Execution

The Contractor shall prepare for Contracting Authority's approval the project plans as required by the Deliverable Requirements List and Documentation Content Guideline. After approval (at KOM, or whenever updated), the plans shall be the baseline for the execution of the related work.

HADGp2-SoW-1015 Progress Report

The Contractor shall deliver the first week of every calendar month a Progress Report (HADGp2-DD-PM06). The content of the progress report shall include at least the status of ongoing contractual tasks, actions, risks, inventory, resources, subcontractors' management, financial management, working schedule and any topic to be highlighted to the Contracting Authority (e.g. for decision-making process or approval).

Note: As of AR/D-AR, the Progress Reports will be delivered on a Quarterly basis.

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HADGp2-SoW-1016 Progress Meetings

The Contractor shall organise and present a Monthly Progress Meeting (MPR), reviewing the progress of the Contract as reported in the Monthly Progress Report. Unless otherwise agreed with the Contracting Authority, the meeting shall take place at E-GSC premises or remotely if no RUE topics are to be discussed, one week after delivery of the corresponding Progress Report, and shall be attended by appropriate team members of the Contractor (including relevant subcontractors), the Contracting Authority and potentially third parties if deemed necessary by the Contracting Authority (e.g. ESA, EC, national authorities…).

Note: As of AR/D-AR, the Progress Meetings will be held on a Quarterly basis (QPR, Quarterly Progress Reviews).

HADGp2-SoW-1017 Bi-Weekly Status Meeting

The Contractor shall organise and present bi-weekly status meetings with the Contracting Authority. The purpose of the meetings is to provide an executive summary of the status of the project and coordinate the activities part of the Contract as necessary.

HADGp2-SoW-1018 Organisation notes

The Contractor shall provide inputs to the Organisation Notes (HADGp2-DD-PM11) for the milestones, presenting the objectives, roles, schedule, documentation and main processes of the review, no later than four weeks before the milestone (excluding KOM). These inputs will be used by the Contracting Authority to formalise the Organisation Notes.

If requested by the Contracting Authority, the Contractor shall produce the formal Organisation Notes. In this case, the Contractor shall submit a draft for review no later than four weeks before the milestone, with the final document delivered no later than three weeks before the milestone (excluding KOM).

HADGp2-SoW-1019 Deliverable Acceptance Sheet

The Contractor shall submit a Deliverables Acceptance Sheet for Contracting Authority approval, where the contents are derived from the approved Payment Milestone definitions and indicating the value of the milestone achieved.

HADGp2-SoW-1020 Missions

The Contractor shall perform missions to European locations in order to fulfil the tasks in the Contract, including at least the following destinations:

- EUSPA facilities:
  - mainly E-GSC site, Torrejón de Ardoz, Spain;
  - EUSPA HQ, Prague, Czech Republic;
  - E-GSC back up site, Toulouse, France;
  - GSMC(s), France and Spain;

  The personnel of the contractor providing the services shall follow any security rules as may be set by the Agency for anyone entering into or staying in the premises of EUSPA. In particular, access forms may be required to be filled in duly in advance of any visit (e.g. refer to HADGp2-RD-MI06 for the E-GSC).

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- Different EU locations should the contract implementation require it (for instance: WP1x premises, EC/JRC premises…)

HADGp2-SoW-1021 Language

All documents, reviews and meetings shall be conducted in the English language.

7.1.4 Risks Management

HADGp2-SoW-1022 Risk Management Plan

The Contractor shall maintain throughout the Contract a Risk Management Plan (HADGp2-DD-PM09), which shall be subject to approval by the Contracting Authority and shall include a full description of all risk management processes and procedures, and identify a function in its project organisation responsible for the management of risk. The Contractor's Risk Management activities shall include the necessary tasks to ensure risks are regularly assessed and that appropriate mitigation actions are implemented.

The organisation for risk management described in the Risk Management Plan shall be set according to a risk management standard listed in ECSS, or equivalent.

Note: The Risk Management Plan can be a separated document as annex to the Project Management Plan or a dedicated section of the Project Management Plan.

HADGp2-SoW-1023 Risk identification

The Contractor shall identify all risks linked to the Contract and maintain their status throughout the duration of the Contract in the form of a Risk Register (HADGp2-DD-PM10), to be reported in line with the progress reporting requirements. It shall identify and register risks of technical, schedule or financial nature with:

- The risk designation and explanatory description
- The Work Package(s) affected
- A risk identification matrix (including occurrence probability and impact severity on a scale of 5 for each risk);
- The name of the owner for the control of the risk
- Mitigation actions (to reduce risk likelihood) and/or contingencies plans (to reduce severity of impact) with identification of conditions and timing for their execution and of the associated financial provision
- Status of contingencies plans execution

HADGp2-SoW-1024 Risk Alerts

Contractor shall continuously evaluate contract risks and ensure the timely implementation of all risk mitigation actions.

The Contractor shall report to the Contracting Authority as a minimum any unacceptable or severe risk or which may induce a schedule delay of any contractual delivery of half month or more.

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HADGp2-SoW-1025 Risk reporting

The Contractor shall update the "Risk Register" (HADGp2-DD-PM10) and present it at the Progress Review meeting and provide it to the Contracting Authority as an input to the Progress Report, together with the status of all risk mitigation actions.

HADGp2-SoW-1026 Ad-hoc updates

The Contractor shall assess project risks before any review and, for risks owned by the Contractor, ensure that appropriate mitigation actions are implemented timely.

7.2 WP#2: PA, QA and RAMS

7.2.1 General

HADGp2-SoW-2001 PA/QA and RAMS activities

The contractor shall perform the PA/QA and RAMS activities according to the requirements identified in the CISL (Annex I to this SoW), in particular PA/QA Requirements (see HADGp2-AD-PA04).

HADGp2-SoW-2002 Applicability of the Galileo Software Standard (GSWS)

All software used or developed in the frame of the Contract shall be specified, designed, procured/developed and validated in accordance with the GSWS-G [HADGp2-AD-PA07], when:

- running in the OPE and VAL chains
- communicating with OPE and VAL chains
- used to validate the OPE and VAL chains

HADGp2-SoW-20033 Compliance to Galileo Software Standard (GSWS)

The Contractor shall produce and maintain a duly justified Statement of Compliance (SoC) to the GSWS-G [HADGp2-AD-PA07].

7.2.2 Configuration control

HADGp2-SoW-2004 Configuration management responsibilities

The Contractor's configuration management responsibilities shall include the configuration of the infrastructure and operational products (procedures, plans, databases, etc.) and all items necessary for the execution of their tasks.

HADGp2-SoW-2005 Configuration management system

The Contractor shall implement a centralised Configuration Management system) that maintains all hardware, software, procedures and other documentation under configuration control.

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HADGp2-SoW-2006 Configuration items list

The Contractor shall define the list of Configuration Items (CIs) to be under Configuration Control.

HADGp2-SoW-2007 Change management

The Contractor shall establish a Change Procedure to regulate the process to apply a change to a deployed configuration baseline as of TRR.

The Contractor shall record all changes to configured items, which shall be duly approved by the relevant configuration control boards at Contractor level.

Note: approval of configuration changes to be approved by EUSPA after the handover to GSOp. and GSOP in the GSOp GSC CCB and EUSPA OPS CCB

7.2.2.1 Inspections

HADGp2-SoW-2008 Inspection Plan

The Contractor shall deliver an Inspection Plan (HADGp2-DD-PA16) identifying all the inspections planned during the complete course of the contract. The Plan shall include and describe inspections at the time of handover of the product to the Galileo Service Operator/EUSPA (for operational validation phase) as well as inspections when handback of the product to the Contractor is expected for any reason.

The Plan shall include references to the internal procedures available at the Contractor to perform the inspections.

The participation of the Contractor PA manager to all the inspections shall be mandatory and this shall be reflected in the Inspection Plan/Procedures.

The contracting authority PA manager shall be invited to all the inspections organized by the Contractor.

HADGp2-SoW-2009 Inspection procedure and report

The Contractor shall deliver an inspection procedure (HADGp2-DD-PA17) for every inspection organized and led by the contractor, prior to the inspection. The procedure shall include the methods, means and tools needed to perform the inspection.

The Contractor shall deliver an inspection report (HADGp2-DD-PA18) for every inspection performed, including all the findings, evidences, and actions opened to correct the problems found.

7.2.3 Non-Conformance management

HADGp2-SoW-2010 Production of RFDs

During the design phase, the Contractor shall produce RFDs (HADGp2-DD-PA13) for the requirements (or sections of any applicable document) where full compliance will not be achieved, following the template in HADGp2-AD-PA06. The RFDs shall require approval from the Contracting Authority following applicable

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processes (HADGp2-AD-PA05), in particular for a successful CDR milestone. If any RFD were not approved, the Contractor remains responsible to recover the level of compliance as per contractual SoC.

HADGp2-SoW-2011 Non-conformance reports

From CDR up until AR (or until the end of the maintenance options if activated), the Contractor shall deliver non-conformance reports (NCRs) for the requirements for which partial or non-compliances are detected, no later than one week after detection. The reports shall include an analysis of the problem and traceability to higher level requirements.

Note: for NCRs identified outside this scope, the Contracting Authority may request support as per Support WP (section 7.9).

Till AR (or till the end of the maintenance options if activated), NCRs may be raised by EUSPA as a result of the infrastructure operational validation, migration to operations, service testing and monitoring. The contractor shall support the resolution of the NCR and provide the necessary fixes.

HADGp2-SoW-2012 Non-conformance Review Board

The Contractor shall organise Non-Conformance Review Boards (NRB), which will be chaired by the Contracting Authority and where non-compliance reports (NCRs) to requirements shall be discussed in order to identify their impact and way-forward, e.g. corrective release or waiver.

The Contractor shall call for the NRB no later than 5 days since the detection of the problem.

Note: For NCRs raised by EUSPA after the AR and whenever the contract is still active the Contractor shall attend the EUSPA NRB and support the resolution of the NCRs impacting the infrastructure requirements (support may involve, when maintenance options are active, to provide a fix).

HADGp2-SoW-2013 Production of RFWs

When agreed at NRB, the Contractor shall submit the RFWs (HADGp2-DD-PA14) for the requirements deviating from the SoC, following template HADGp2-AD-PA06. It is noted that NRB outcome to submit an RFW shall not be an implicit acceptance by the Contracting Authority of the RFW, which is based on the RFW contents (analysis of impact, etc.) and the completion of Contracting Authority's RFW processes (HADGp2-AD-PA05). If not accepted, the status shall be further reviewed at NRB to find a new way-forward; the Contractor remains nevertheless fully responsible for the recovery of the level of compliance as per contractual SoC, in case the relevant RFW were not accepted.

HADGp2-SoW-2014 NCR reporting time

The Contractor shall report NCRs to NRB within five working days from the identification of a problem (e.g. test execution).

HADGp2-SoW-2015 Major NCR Analysis Time

The Contractor shall analyse all Major NCRs (as per definition in HADGp2-AD-PA04) reported in NRB with an initial analysis within five working days from the time they were raised.

HADGp2-SoW-2016 Minor NCR Analysis Time

The Contractor shall analyse all Minor NCRs (as per definition in HADGp2-AD-PA04) reported in NRB with an initial analysis within ten working days from the time they were raised.

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HADGp2-SoW-2017 Major NCR workaround

The Contractor shall identify workarounds to all Major NCRs (as per definition in HADGp2-AD-PA04):

- within ten working days from the initial analysis before start of migration to OPE;
- within five working days from the initial analysis after migration to OPE.

HADGp2-SoW-2018 NCR Permanent Fix

The Contractor shall provide corrections to all non-waived NCRs within twenty working days from initial analysis.

HADGp2-SoW-2019 Fixes quality

All software fixes shall be subject to the same design and development controls, testing and documentation as the software component being repaired.

HADGp2-SoW-2020 Regression testing

The Contractor shall perform appropriate regression testing on all changed software and hardware components.

HADGp2-SoW-2021 Regression testing records

The Contractor shall justify the choice of regression tests and record their results in the documentation accompanying the updated software.

HADGp2-SoW-2022 RFD/RFW discussion at EUSPA EB/CSP

The Contractor shall support the EUSPA Engineering Board or Cyber-Security Panel for presentation and discussion of any of raised RFDs or RFWs.

7.2.4 Anomaly Management

The Galileo Service Operator will nominally raise anomaly reports whenever they encounter a problem or require a possible minor enhancement. The Contracting Authority, and any other authorised entity by the Contracting Authority (i.e. the Contractor) may request the Galileo Service Operator to raise anomaly reports too. These anomaly reports will be reviewed by an Anomaly Review Board (ARB) run by the Galileo Service Operator.

HADGp2-SoW-2023 Support to ARBs

The Contractor shall support the ARBs as per Terms of Reference (HADGp2-AD-OP07) till the end of contract.

HADGp2-SoW-2024 Anomaly reporting time

The Contractor shall request the Galileo Service Operator to raise anomalies to ARB within five working days from the identification of a problem (e.g. test execution).

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HADGp2-SoW-2025 ARB Tool

The Contractor shall have access to the E-GSC/HADG ticketing tool (ARTS, as supplied by the Galileo Service Operator, or other tool as designated by the Contracting Authority) as the Anomaly Reporting and Tracking tool.

HADGp2-SoW-2026 Change Control Process

The Contractor shall adhere to the change control procedures in place in order to maintain the system under configuration control.

HADGp2-SoW-2027 Change Control Process Tool

The Contractor shall have access to the available E-GSC/HADG Change Control Process tool (CMAT or other tool designated by the Contracting Authority) used at E-GSC CCBs.

HADGp2-SoW-2028 Anomalies Report Criticality

An Anomaly report shall be categorised in accordance with applicable requirements in HADGp2-AD-PA04, HADGp2-AD-OP06 and HADGp2-AD-OP07.

HADGp2-SoW-2029 Anomalies Report analysis

The analysis of an Anomaly Report shall include analysis of the problem, identification of the faulty components(s) and proposal of a way forward (workaround or fix).

HADGp2-SoW-2030 CAT-1 and CAT-2 Anomaly Analysis Time

The Contractor shall analyse all CAT-1 and CAT-2 (as per definition in HADGp2-AD-PA-04) Anomaly Reports with an initial analysis within five working days from the first ARB in which they are discussed.

HADGp2-SoW-2031 CAT-3 and CAT-4 Anomaly Analysis Time

The Contractor shall analyse all CAT-3 and CAT-4 (as per definition in HADGp2-AD-PA-04)) Anomaly Reports with an initial analysis within ten working days from the first ARB in which they are discussed.

HADGp2-SoW-2032 CAT-1 and CAT-2 Anomaly interim-Fix / Work-around Time

The Contractor shall accept actions at ARB in order to provide interim fixes or workarounds to all CAT-1 and CAT-2 Anomaly Reports:

- within ten working days from initial analysis before the start of the migration to OPE;
- within five working days from initial analysis after the start of the migration to OPE.

HADGp2-SoW-2033 CAT-1 and CAT-2 Anomaly Permanent Fix Time

The Contractor shall provide permanent corrections to all CAT-1 and CAT-2 Anomaly Reports within twenty working days from initial analysis.

HADGp2-SoW-2034 CAT-3 and CAT-4 Anomaly Permanent Fix Time

The Contractor shall provide permanent corrections to all agreed CAT-3 and CAT-4 Anomaly Reports within thirty working days from initial analysis.

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HADGp2-SoW-2035 Fixes quality

All software fixes shall be subject to the same design and development controls, testing and documentation as the software component being repaired.

HADGp2-SoW-2036 Regression testing

The Contractor shall perform regression testing on all changed software and hardware components to demonstrate that the implementation of the fixes does not add any regression.

HADGp2-SoW-2037 Regression testing records

The Contractor shall justify the choice of regression tests and record their results in the documentation accompanying the updated software, proving that the new fixes do not create any regression.

7.2.5 Corrective and maintenance releases

In the event of NCRs or anomalies being identified after the segment is qualified (at QR), Corrective or Maintenance Releases may be required if the resolution of these issues requires significant changes at system or subsystem level (for example, updates of bespoken SW, or any other update/upgrade with severe impact on the infrastructure or the provision of service).

These system updates shall be referred to as Corrective Releases if they are deployed before AR, and as Maintenance Releases during the maintenance period (if the dedicated maintenance options are activated).

HADGp2-SoW-2038 Cost of corrective and maintenance release deployment

Should any Corrective or Maintenance Release be required in the frame of the Contract, the following requirements are applicable. These activities shall be performed by the Contractor at its own cost, including deployment activities at GSC prime and back up sites.

HADGp2-SoW-2039 Corrective and maintenance release deployment

Once the system is qualified (at QR), the introduction of any Corrective or Maintenance Release shall require the approval of the Contracting Authority (also SAB after migration to OPE).

HADGp2-SoW-2040 Qualification of Corrective and Maintenance Releases

The Contractor shall be responsible for the qualification of Corrective and Maintenance Releases (if needed).

The Contracting Authority reserves the right to require additional testing of the change or regression testing before approving the release of an update.

HADGp2-SoW-2041 Validation of Corrective/Maintenance Releases

The Contractor shall support any delta operational validation activities to be executed by the Galileo Service Operator due to Corrective/Maintenance Releases.

The Contracting Authority reserves the right to require additional testing of the change or regression testing before approving the release of an update.

Note: the scope of the delta operational validation is on new or modified operational/maintenance procedure due to the corrective/maintenance release or operational non-regression tests.

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HADGp2-SoW-2042 Corrective/Maintenance Release documentation

The Contractor shall deliver all necessary deliverables (see "MRAB Terms of Reference" HADGp2-AD-OP10 at CISL for reference) to prove the correction of the problems (at segment, element and component level) and to support the acceptance of the SAB of the corrective/maintenance release deployment (if applicable). All deliverable documents shall be updated to reflect the modifications, and re-delivered for the Contracting Authority approval with the update, the updated source code and all configuration changes and CRs required for its deployment jointly with a proposed deployment plan.

HADGp2-SoW-2043 Corrective/Maintenance Release Justification File

The Contractor shall provide inputs for the preparation of a Corrective/Maintenance Release Justification File, including a description of:

- the anomalies or other issues corrected, their description and associated changes;
- the impact, if any, at technical, operational, service and security levels;
- qualification and non-regression strategies and evidences;
- deployment strategy (including CRs and time for its execution);
- assessment of SAB criteria (if applicable).

HADGp2-SoW-2044 Corrective/Maintenance Release Acceptance Review

The Contracting authority will review the Corrective/Maintenance Release documentation in a dedicated review called Corrective/Maintenance Release Acceptance Review.

The objectives of this review are:

1. Confirm that the Release corrects all the anomalies or non-conformances (planned to be corrected in that Release) and is fit for purpose;
2. Confirm that the Release does not impact negatively the qualification status;
3. Confirm that the Release does not introduce any new functional or operational regression;
4. Confirm the adequacy and completeness of configuration file;
5. Confirm of the adequacy and completeness of operation, maintenance and security products (including the corresponding operational validation);
6. Confirm that the Corrective/Maintenance Release is compatible with the eight SAB criteria (applicable for OPE chain):
    I. No new elements inside the accreditation perimeter will be deployed as part of this version;
    II. There are no interface and service changes at the boundary of the accreditation perimeter;
    III. No new functionalities, technologies or services are included as part of this version;
    IV. No additional evaluated component;
    V. No change of an evaluated component which has required new/delta evaluation;
    VI. There are no new security risks;
    VII. There is no increase of the existing risks level;

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VIII. There is no regression in the service provision;

7. Evaluate the plan for deployment up to the operational chain.

Note: As a prerequisite, the DP for the review needs to be provided 2 weeks in advance.

HADGp2-SoW-2045 Maintenance Release processes and Maintenance Release Acceptance Board (MRAB)

For Maintenance Releases, the processes described in Applicable Documents (HADGp2-AD-OP10) shall apply.

HADGp2-SoW-2046 Impact on service delivery

All the corrective interventions shall be planned and organised to have no impact on the Service provision and minimal impact on the System Operations and Operations team. All interventions on the operational system shall be subject to the approval of the Contracting Authority.

HADGp2-SoW-2047 Maintenance Reference Platform

The Contractor shall ensure that a representative maintenance platform (with respect to the operational one) exists under the Contractor's control (this platform could be decided by the Contracting Authority to be handed over to GSOp if the HADG maintenance responsibilities would be also handed over to GSOp at any point after the HADG Acceptance Review), with all the necessary means and maintenance tools including licences status as per contract provision, allowing for corrective/validation activities.

7.2.6 Internal audits

HADGp2-SoW-2048 Internal PA/QA audits

The Contractor shall perform in-house PA/QA audits as per applicable documentation, in particular HADGp2-AD-PA04 (PA/QA Requirements Document).

HADGp2-SoW-2049 Audit Preparation and Implementation Plan

The Contractor shall propose and maintain updated an Audit Preparation and Implementation Plan (HADGp2-DD-PA04) to address the detailed content and schedule for the audits as per HADGp2-SoW-2048. This plan shall require approval by the Contracting Authority.

HADGp2-SoW-2050 Additional audits

In the event of new (corrective) releases not foreseen in this SoW or identification of major problems in the execution of the engineering tasks, and if requested by the Contracting Authority, the Contractor shall perform additional purpose-specific audits.

HADGp2-SoW-2051 PA/QA audit reports

The Contractor shall deliver audit reports (HADGp2-DD-PA05) after the execution of each audit performed as required by HADGp2-SoW-2048. The report shall include deviations, observations, corrective measures, potential improvements and lessons learnt.

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7.3 WP#3: Design and Development

HADGp2-SoW-3001 Design and development activities

The contractor shall perform the Design and Development activities according to the applicable requirements identified in the CISL (Annex I to this SoW).

HADGp2-SoW-3002 System, segment and element definition

The HADG design blocks shall follow the following definitions, from higher to lower level of functionality:

- The HADG as a whole, implementing the full technical baseline, shall be considered segment-level.
- The segment may be subdivided into sub-segment elements, each of which implement a subset of HADG functionalities. Elements act as design blocks whose interfaces with each other are specified in an internal ICD (HADGp2-DD-EN07).
- Each element may comprise a number of components, with the particular case of SW components, which are developed to implement a subset of functionalities.

In generic terms, system may also be used for the higher tiers (segment, or even the wider Galileo system), while subsystem may be used to describe any of the lower tiers (element, component).

7.3.1 Requirements engineering

HADGp2-SoW-3003 Requirements engineering

The following activities shall be performed:

a. Maintenance of the Statement of Compliance to each of the Applicable Document as defined in CISL (Annex I to this SoW), see HADGp2-SoW-3004, HADGp2-SoW-3005 and HADGp2-SoW-3006.

b. Assurance of the correct propagation of HADG requirements down to element and component levels.

c. Traceability and coherence between the HADG requirements baseline and lower level requirements (including Classified Annexes) as well as the design and their verification.

HADGp2-SoW-3004 As-contracted Statement of Compliance

In case of any contractual change, including without limitation option activations, the Statement of Compliance shall be updated accordingly. The updated tenderer`s Statement of Compliance to the Applicable Documents shall have to be submitted with the existing delivery procedures HADGp2-AD-PA02 with KOM DP.

HADGp2-SoW-3005 As-designed Statement of Compliance

At CDR, the Contractor shall deliver the ‘as-designed’ SoC, which may include changes from the ‘as-contracted’ as a result of changes in compliance accepted in design phase, typically as RFDs (see HADGp2-SoW-2010).

HADGp2-SoW-3006 As-built Statement of Compliance

At QR, the Contractor shall deliver the ‘as-built’ SoC, reflecting any change in the compliance status to technical baseline after the design phase, typically as a result of RFWs (see HADGp2-SoW-2013).

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HADGp2-SoW-3007 Requirements analysis activities

The Contractor shall analyse the requirements at segment, element and component levels, ensuring consistent interpretation and traceability through to the lower-level design and verification documentation. The analysis shall address all requirements and shall also consider open issues from previous HADG releases (if applicable).

In the event that the Contractor identifies a potential inconsistency between Applicable Documents, the Contractor shall provide an analysis of the inconsistency to the Contracting Authority, who will decide which interpretation shall prevail. Any inconsistency shall be addressed during the KO meeting.

HADGp2-SoW-3008 Low-level requirements

The requirement traceability shall be submitted to the Contracting Authority for approval whenever changes occur; in particular they shall be delivered to the Contracting Authority at the specified milestones.

HADGp2-SoW-3009 Requirements management tool

The requirement engineering, including maintenance, compliance (including RFDs and RFWs), flow-down to lower level, traceability to verification cases and verification status, shall be performed using a requirements management tool (e.g. DOORS). The database shall be delivered in each milestone to the Contracting Authority with the corresponding requirements documents and traceability.

HADGp2-SoW-3010 Performance commitments

If the Contractor's Tender included any commitment on performance targets more demanding than requirements, the Contractor shall deliver in KOM a DCP to the relevant requirements document specifying the committed performance level. These additional performance commitments shall be considered the as-contracted baseline (e.g. if a target is not reached in qualification, it will be subject to RFW acceptance by the Contracting Authority).

Note: in the DCP the Contractor shall also include a first proposal for all the parameters that are configurable, to be defined or to be consolidated in the HADG technical specifications [HADGp2-AD-TR01] in the CISL (Annex I to this SoW).and its applicable documents (e.g. HAS SIS ICD).

7.3.2 Design engineering

7.3.2.1 General design

HADGp2-SoW-3011 Provision of DDVP

The Contractor shall update and maintain a Design, Development and Verification Plan (DDVP, HADGp2-DD-EN01). The DDVP shall be updated for every review, and whenever a significant change in planning occurs.

The DDVP shall contain a detailed plan of facility deployment, upgrade and any necessary operations migration, including transitions between major releases. This includes detailed description of the activities and sequence of events on each of the platforms and their inter-dependencies.

The Contractor shall show an efficient logic including schedule and critical path, highlighting the objectives for each step, identifying any external constraints with impact on the plan, defining the role and responsibilities between all actors (Contracting Authority, ESA, Galileo Service Operator, and Hosting Services Provider), coordination needs and highlighting any anticipated optimisations. The Contractor shall identify the main risks,

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mitigation activities and key schedule drivers associated with this SoW. The DDVP shall include as well the deployment and migration strategy and steps for all HADG platforms.

HADGp2-SoW-3012 Schedule coherence

The DDVP shall ensure compatibility between the schedule and tasks for all the design, development, verification and validation activities in the Contract.

HADGp2-SoW-3013 Preparation and update of Design Documentation

The Contractor shall prepare and update all the design and related documentation required by the DRL (Annex II to this SoW) and according to content defined in DCG (Annex III to this SoW). Design documentation in DRL shall be split in volumes when relevant:

- One volume for segment-level documentation;
- One volume for each of the (sub-segment) elements, if more than one.

HADGp2-SoW-3014 Justification of HADG Design

The HADG Design Justification File shall contain information proving that the design meets all the applicable requirements and demonstrating how the requirements are fulfilled by the sub-systems.

HADGp2-SoW-3015 Maintenance of HADG Design

The Contractor shall ensure that the HADG design and configuration remain consistent and cohesive across all sub-systems and platforms comprising the HADG.

The Design Files shall reflect the actual status of the design and shall be maintained up-to-date, including the incorporation of recommendations from HADG or sub-system level reviews.

HADGp2-SoW-3016 Justification of Critical Design Issues

The Design Justification File (HADGp2-DD-EN04) shall highlight critical issues associated with the sub-system design. This is particularly important for the performance requirements (e.g. processing times, latencies) which should be initially addressed at the CDR.

HADGp2-SoW-3017 Single Point Failure/Critical Item List

Single point failures which cannot be eliminated from the design (or fault tolerance requirements which cannot be met) shall be summarized in a Single Point Failure/Critical Item List (HADGp2-DD-PA06).

HADGp2-SoW-3018 Incorporation of PA and RAMS results into design

The Contractor shall ensure the continuous incorporation of the results of PA and RAMS activities into the design documentation. The Contractor shall pay particular attention to the impact of safety and failure tolerance requirements on the design.

Whenever diversification and/or redundancies are needed, it shall be described in detail, duly justified and supported by all the necessary analyses.

HADGp2-SoW-3019 Design Justification by analysis and simulation

The Contractor shall justify its design with analysis and simulations when needed. Analysis and Simulations tools procurement are under Contractor's responsibility and licenses are to be granted to EUSPA for its use.

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HADGp2-SoW-3020 Traceability of design and justification results

Each analysis shall list the source documents, including their issue status, used in its preparation. The list shall include in particular the design definition documents (drawings, list, etc.) so that the relevance of the analysis to the actual hardware/software design and build status can be correlated and traced.

HADGp2-SoW-3021 Concept of operations/maintenance workshops

The Contractor shall organize two Operations/Maintenance Workshops, with the Contracting Authority and GSOp, to exchange and discuss on the HADG concept of operations (including handover from prime to back up)/maintenance (before PDR and before CDR milestones).

Note: The main objective is to ensure the operability/maintainability of the HADG by incorporating the EUSPA conclusions of the above workshops into the design/development cycle whenever compatible with the tender scope.

HADGp2-SoW-3022 Incorporation of operation and maintenance constraints in the design

The Contractor shall ensure the proper incorporation of Operation and Maintenance constraints in the design documentation.

HADGp2-SoW-3023 Incorporation of evolutions to HA SIS ICD and HAS IDD ICD into HADG design

The Contractor shall ensure the proper incorporation of inputs/changes to the HA corrections format, content and /or scheduling versus [HADGp2-AD-TR03] (to HA SIS ICD) and [HADGp2-AD-TR04] (to HAS IDD ICD) in the CISL (Annex I to this SoW) in the HADG design documentation to support the ranging and user positioning performance required. Updates shall be provided by the Contracting Authority at Kick Off (for the SIS ICD) and at PDR (for the IDD ICD), and the Contractor shall ensure the HADG design will support it.

At CDR the contractor shall provide a critical assessment on the HAS SIS ICD and HAS IDD ICD and the feasibility to comply with the bandwidth and ranging and user positioning performance required. The Contractor will also provide their justification on the assessment on the open points of the HAS SIS ICD and HAS IDD ICD and a justification for all the parameters that are configurable, to be defined or to be consolidated in the HADG technical specifications.

The Contractor shall participate on HA Workshops, with the Contracting Authority and other relevant stakeholders to exchange and discuss relevant information as per support activity identified in section 9.

HADGp2-SoW-3024 Hosting site constraints

The proposed infrastructure shall comply with the constraints of the E-GSC sites (HADGp2-AD-TR17, HADGp2-AD-TR18), their operations, and hosting services. In particular, the number of racks and workstations shall be minimised for compatibility with the available space. Within and no later than PDR milestone the Contractor shall inform the Contracting Authority of the proposed number of racks and workstations, duly justifying the relevant needs.

In case the infrastructure would require changes/modifications on the E-GSC sites or Hosting Services, limited to those strictly necessary to enable the functioning of the infrastructure (such as network connectivity or working positions), these changes/modifications shall be identified, listed and justified. The Contractor shall provide and justify the final details of any potential impact no later than PDR, requiring approval from the Contracting Authority.

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Note: when referring to E-GSC sites, this includes both the main E-GSC site (Madrid-Torrejon de Ardoz), and the backup E-GSC site (Toulouse).

HADGp2-SoW-3025 Migration-proof design

The Contractor shall avoid by design the disruption to the HADG services during migrations, including optimal synchronisation of data, configuration and internal state between platforms.

HADGp2-SoW-3026 Strategy for future migrations

The HADG design shall ensure forward operational compatibility, i.e. that the system allows extraction of all operational data (including crypto material) for use in the following one HADG release, without impact on business continuity.

7.3.2.1.1 Procured and reused HW and SW

HADGp2-SoW-3027 Equipment compliance to sites regulations

The Contractor shall ensure that the HADG and its sub-systems are compliant with the E-GSC sites' regulations (e.g. national regulations on electric compatibility, safety regulations, etc).

Note: when referring to E-GSC sites, this includes both the main E-GSC site (Madrid-Torrejon de Ardoz), and the backup E-GSC site (Toulouse).

HADGp2-SoW-3028 Hardware and Software COTS harmonisation

The Contractor shall maximise the harmonisation of hardware and software COTS products used throughout the HADG, e.g. preferably avoiding the selection of multiple different COTS for the same or similar functionalities.

HADGp2-SoW-3029 Minimum time for vendors support on procured HW/SW

All HW and SW (including COTS) to be provided by the Contractor pursuant to the Contract shall be supported from a maintenance and security support point of view by the vendors at least for 3 years following the AR (for each release).

Note: this requirement does not require the Contractor to procure maintenance and security support for 3 years after acceptance; rather it aims to ensure that the HW and SW to be provided by the Contractor will be supported from the vendors for at least three years after the relevant AR acceptance. The actual procurement of the HW and SW (including COTS) maintenance and security support is to be ensured by the HADG P2 contractor if the maintenance options are activated.

HADGp2-SoW-3030 Third party SW IPRs

The Contractor shall optimise the level of external dependencies, with regard to the overall autonomy of the design with limited reliance on single providers of COTS.

The Contractor shall confirm the validity of the analysis of the intellectual property rights for each SW product proposed for procurement or reuse (including COTS and OSS), and shall ensure that no IPRs infringements are committed. This analysis shall include at least the owners of the IPRs, license scheme, constraints for transferability, sublicensing, need for re-procurement and license terms and conditions including duration, etc. In the analysis the Contract shall indicate any request of waiver to the Contractual provisions' application.

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The analysis be submitted to the Contracting Authority for approval at CDR. If the Contracting Authority does not approve the use of any software due to intellectual property rights risks or other lack of compliance with the Contract, the Contractor shall obtain an alternative or develop an equivalent piece of software, at no additional cost for the Contracting Authority.

HADGp2-SoW-3031 Reused HW/SW assumptions

For HW and SW intended to be reused (e.g. from a previously deployed platform such as a former OPE), the Contractor shall notify the Contracting Authority for any discrepancy found with regard to the assumptions for reuse as per technical proposal.

This Requirement and the relevant obligation to notify possible discrepancies is without prejudice to the Contractor's obligation to deliver any HW and SW in compliance with the Contract and its technical requirements for each release, such as without limitation, the obligation to ensure that all HW and SW are up-to-date –as per CYB-INF-0290 in HADGp2-AD-SA13– and replacing any obsolete HW and SW.

HADGp2-SoW-3032 Reused SW Maintenance

In the event that the Contractor reuses software code from an existing project, then they shall assume full responsibility for its maintenance and security support, bearing the relevant costs at least to ensure compliance to HADGp2-SoW-3029. Therefore, the Contractor undertakes to:

- Fix any problems on the reused software, even if it can be demonstrated that the problem was already present in the original software.
- Perform independent validation in the event that the Contractor decides to use an existing fix from another source.

HADGp2-SoW-3033 Identification of reusability details of Procured/reused SW

If applicable, the Contractor shall provide details (as part of deliverable inventory list document HADGp2-DD-CD11) for the reusability of BIPR software in the HADG, including licence transferability, licence operability, licence duration, licence support period and end dates, etc.

HADGp2-SoW-3034 Authorisation to Proceed with Infrastructure Procurement

The procurement of all infrastructure equipment shall be authorised by the Contracting Authority at CDR, prior to the placement of committing orders by the Contractor.

HADGp2-SoW-3035 Inventory management

Any Deliverable Items such as without limitation hardware and software, must be identified in the deliverable inventory list as per HADGp2-AD-PA09 and updated monthly (the "Inventory List", HADGp2-DD-CD11).

7.3.2.1.2 Legacy anomalies

Should the existence of Legacy anomalies (coming from previous HADG releases) applicable to the new HADG infrastructure for HAS Phase 2 (for instance in the case the new HADG infrastructure for HAS phase 2 would be based on an evolution of the existing HADG infrastructure for HAS phase 1) then the Contractor shall implement the 3 following legacy anomaly related requirements (HADGp2-SoW-3036, HADGp2-SoW-3037, HADGp2-SoW-3038).

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HADGp2-SoW-3036 Inclusion of CAT 1-2 Anomaly Resolutions from HADG Legacy Infrastructures

The Contractor shall include resolutions to anomalies coming from the HADG Legacy releases in the HADG development of new releases.

Anomalies CAT 1 and CAT 2 shall be included up to Acceptance Review (AR) minus 1.5 months.

Anomaly fixes will be made available by the Contracting Authority (or the legacy HADG maintainer on its behalf) on the corresponding management tools (or, in absence, by other means), and the Contractor may decide to incorporate that fix or propose a new one.

HADGp2-SoW-3037 Inclusion of CAT 3-4 Anomaly Resolutions from HADG Legacy Infrastructures

The Contractor shall incorporate the resolutions to anomalies CAT 3-4 coming from the HADG Legacy releases in the HADG development of new releases up to Qualification Review (QR) minus 3 months.

Anomaly fixes will be made available by the Contracting Authority (or the legacy HADG maintainer on its behalf) on the corresponding management tools (or, in absence, by other means), and the Contractor may decide to incorporate that fix or propose a new one.

HADGp2-SoW-3038 Inclusion of Workaround Resolutions from HADG Legacy Infrastructures

The Contractor is entitled to include workaround resolutions to anomalies coming from the HADG Legacy releases (e.g., from previous contracts or from previous releases) in the development, upon condition that the Contracting Authority provides its consent in advance in writing.

The Contractor shall include workarounds coming from HADG Legacy releases up to:

- Workarounds for CAT 1-2 up to AR minus 1.5 months
- Workarounds for CAT 3-4 up to QR minus 3 months

7.3.2.1.3 Engineering Tools

HADGp2-SoW-3039 Engineering tools

The Contractor shall identify in the DDVP the tools to be used in support of the Engineering activities. This list of tools shall include as a minimum the tool name, purpose, development status (reused, IPRs, COTS or to be developed), and specification / description suitable to procure the tool.

HADGp2-SoW-3040 Tools Maintenance

All maintenance and test equipment and tools shall be kept operational and available up to the end of the contract.

HADGp2-SoW-3041 Tools Documentation

The Contractor shall provide all the necessary documentation and equipment that is required for the operation and maintenance of the delivered tools (e.g. verification tools, scripts, etc.).

HADGp2-SoW-3042 Tool Development Standards

Tools and equipment needed for HADG or sub-system acceptance shall be developed to the standards specified in this SoW.

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HADGp2-SoW-3043 Tools Delivery

The Contractor shall deliver at QR the test tools necessary to support the system integration and acceptance activities. Specific maintenance tools would be handed over to the HADG maintainer when the L2/L3 maintenance activities are handed over.

Note 1: for instance, tools that could be necessary to support the operational validation.

Note 2: should these tools be also necessary for the acceptance of the Backup chain, these tools will be also deployed at the GSC back up site

7.3.2.1.4 Interface consolidation

HADGp2-SoW-3044 Overall interface management

The Contractor shall implement an interface management process, part of the DDVP (HADGp2-DD-EN01), aiming at consolidating or defining all interfaces of HADG implementation from the segment level down to the component level.

Interface management encompasses definition, contribution and control of **external and internal interfaces** (to be implemented as external and internal ICDs, HADGp2-DD-EN06 and HADGp2-DD-EN07 respectively).

HADGp2-SoW-3045 Involvement of lower tier Contractors in interface Consolidation

The Contractor shall ensure lower tier Contractor participation to the Interface Consolidation Process if needed.

7.3.2.2 Performance Engineering

HADGp2-SoW-3046 Low-level performance budgets

The Contractor shall allocate performance budgets to each component in any information flow with performance requirements or constraints as per technical baseline.

HADGp2-SoW-3047 Performance Budget Management

The Contractor shall implement and maintain a performance budget management process (to be detailed in DDVP, HADGp2-DD-EN01). The feedback from sub-system level design activities shall be considered to support possible re-allocation of performance budget allocations across sub-systems.

HADGp2-SoW-3048 Performance Budget analyses

The Contractor shall gather as part of the verification documentation the essential information related to performance in order to present to the Contracting Authority a clear quantitative picture of the Contractor commitment on performance requirements with associated justifications.

All Performance Budgets shall clearly indicate the origin of the data (simulations, measurements, assumptions, experimentation, etc.) and shall clearly show all margins considered. During the development cycle, the margins shall be managed in a consistent and visible manner.

The Performance analyses shall include the processing of specific input data sets and/or configurations provided by EUSPA.

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HADGp2-SoW-3049 Performance Analysis Tools

Analysis, Simulation Models and Tools used to generate Performance Budgets shall be deliverable items to the Contracting Authority.

7.3.2.3 Obsolescence

HADGp2-SoW-3050 Obsolescence Plan

During contract implementation, the Contractor shall deliver, implement and update an Obsolescence Plan HADGp2-DD-EN08, including, without limitation, monitoring, HW re-qualification, and decision-making and implementation processes, based on the as-designed/as-to-be-deployed design data.

HADGp2-SoW-3051 Obsolescence Addressed through Design

The Contractor shall analyse how obsolescence issues can be addressed through design and implementation choices, e.g. selection of HW/SW with long-term support commitments.

HADGp2-SoW-3052 Obsolescence Data

The Contractor shall provide and update obsolescence data (e.g. End of Sale, End of Maintenance, End of Support, drivers' compatibility (for HW components)) for all HW and SW to be procured pursuant to the Contract, as part of the Obsolescence Plan HADGp2-DD-EN08.

HADGp2-SoW-3053 SW and HW Harmonization level in case of obsolescence

The Contractor shall maintain the level of software and hardware harmonisation in case of obsolescence, e.g. using consistent hardware/software parts when a given functionality is replicated to ease its operability and maintainability.

HADGp2-SoW-3054 Long-term supply and maintenance contracts

The Contractor shall advise (e.g. identify, analyse, trade-off, report) the Contracting Authority on the long term supply and maintenance contracts, for elements and LRU's subject to certification, for the next 20 years.

HADGp2-SoW-3055 Impact on spares due to obsolescence

The Contractor shall analyse the impact on the spares caused by the obsolescence strategy.

HADGp2-SoW-3056 Replacement of obsolete items

The Contractor shall be responsible for the replacement of obsolete/non-repairable (as defined by applicable requirements, including CYB-INF-0290 in HADGp2-AD-SA13) hardware and software until AR with new hardware and software fully functioning and fit for the purpose.

HADGp2-SoW-3057 Removal and disposal of obsolete items

The Contractor shall be responsible for the removal and disposal of obsolete items from the operational sites during the implementation of this contract (e.g. from previously operational platforms after migration to a new release). A policy shall be defined for the removal of data from the obsolete items. The Contractor shall follow disposal procedures as per HADGp2-AD-OP05 and detailed by the Galileo Service Operator.

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For avoidance of doubt, this Requirement does also apply to items produced and used for previous HADG releases (HADG for HAS Phase 1) developed by the incumbent contractor, whether obsolete or not, in case the Contractor decides not to take over such items.

HADGp2-SoW-3058 Obsolescence RFD

The Contractor shall verify duly in advance before CDR milestone the compliance of the all HW and SW (including COTS) to applicable requirements, such as, without limitation, for obsolescence requirement CYB-INF-0290.

7.3.3 Development

HADGp2-SoW-3059 Development activities

The Contractor shall implement the HADG system and subsystems in accordance with the design agreed at PDR and CDR.

HADGp2-SoW-3060 SW Component Development following GSWS

The SW components shall be developed according to the Galileo Software Standards (GSWS, HADGp2-AD-PA07) and as per HADGp2-SoW-2002.

HADGp2-SoW-3061 Configurable parameters of HADG

The HADG shall allow the configuration of all those elements marked as configurable in the technical specifications of the HADG [HADGp2-AD-TR01] in the CISL (Annex I to this SoW) and its respective applicable documents which need to be validated during the validation campaign.

7.3.4 Design and development considerations of the integration with SECMON

As part of normal design and development work to satisfy the applicable requirement baseline, the Contractor will have to adapt the HADG elements in order to be able to interface with the relevant SECMON Enclave.

As Monitored Entity (ME), the HADG contributes to the overall Security Monitoring by providing the necessary data to SECMON for the detection of potential security incidents.

HADGp2-SoW-3062 Monitored Entity Scope

The Contractor shall cover the activities related to:

- Contribution to SECMON, as developer of Monitored Entities, for HADG;
- Interface activities with the SECMON Provider to keep the security solution up-to-date.

HADGp2-SoW-3063 Monitored Entity Inputs for the Activity

The Contractor shall provide to the Contracting Authority (and designated third parties) at least the following inputs for SECMON Provider:

- COTS list (see DRL for the delivery dates),
- Preliminary Estimation of log volumes to be produced by the Monitored Entity's infrastructure (for CDR),

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- Design Documentation (see DRL for the delivery dates, i.e. DDF, DJF, etc.),
- Plan for the availability of VAL Chain: high level description of the timeline for their availability, their location, and their representativeness of the OPE Chain,
- Network Maps (see DRL for the delivery dates),
- Element Security Profiles (ESP): The Galileo Element Security Profiles (ESP) define the criticality of components from a cyber-security point of view, by estimating the impact level (high/medium/low) on confidentiality, integrity and availability of the system, if the component was affected by a vulnerability. ESP are primarily used to analyse the severity of vulnerabilities in the context of Galileo (see DRL for the delivery dates),
- Monitored Entities Critical Threat Scenarios: a processed version of the SSP information, identifying the Threat Scenarios to be monitored via SECMON (at CDR),
- Log data samples (as soon as possible but not later than TRR),
- Tailored log collection strategy (e.g. log sources, log types, log formats, etc.) in order to minimise the impacts to the SECMON Threat Detection Strategy (not later than TRR).

The need dates for the items listed in this requirement will be agreed at KOM. The Contractor shall provide support to the discussion of the items with the Contracting Authority and potentially third parties.

HADGp2-SoW-3064 "HADG-SECMON" ICD

The Contractor shall provide the "HADG-SECMON" ICD (HADGp2-DD-EN13), with all the required log related specifications (i.e. log syntax and protocols) as per SECMON Monitored Entity Requirements (HADGp2-AD-SA06). The ICD will be reviewed and shall require approval from the Contracting Authority.

Note: the SECMON infrastructure provider will develop the required parsers.

HADGp2-SoW-3065 Backwards Compatibility

For any corrective/maintenance releases with SECMON integration, the Contractor shall maintain backwards compatibility to the maximum extent possible, allowing for a gradual introduction of elements with no impact to the monitoring capabilities.

HADGp2-SoW-3066 Representative log samples

The Contractor shall provide support the SECMON provider in their development of log parsers, delivering representative logs' samples generated by the HADG elements in consistency with the ICD and supporting their analysis and discussion.

HADGp2-SoW-3067 Network Map for Coverage Demonstration

The Contractor shall demonstrate in particular the full monitoring coverage of HADG infrastructure. The Network Map shall be used to demonstrate the coverage of the monitored entity log collection.

HADGp2-SoW-3068 Physical/Logical interface of Galileo Elements

The Contractor shall provide all the required information regarding the physical/logical interfaces of the Galileo elements that shall be used for log collection.

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HADGp2-SoW-3069 Monitored Entities Infrastructure

The Contractor shall make available the relevant network interfaces for log collection and traffic capture as specified in SECMON Monitored Entity Requirements.

HADGp2-SoW-3070 Monitored Entities Configuration

The Contractor shall ensure the proper configuration of the Monitored Entity's elements for generation and routing of the relevant logs to the SECMON Enclave.

HADGp2-SoW-3071 Support to SECMON milestones

If designated by the Contracting Authority, the Contractor shall provide support to the SECMON reviews and key points, i.e. reviewing documentation, supporting HADG-related discussions, etc.

7.4 WP#4: Qualification, including Assembly, Integration and Verification

HADGp2-SoW-4001 Qualification and AIV activities

The contractor shall perform the Qualification including Assembly, Integration and Verification activities according to the requirements identified in the CISL (Annex I to this SoW).

7.4.1 Platforms' assembly

HADGp2-SoW-4002 HADG platforms to be delivered

The deliverables in terms of HADG platforms of this contract shall include:

- HADG Operational (OPE) platform for HAS Phase 2 deployed in the GSC main site (Madrid – Torrejon de Ardoz). This platform will act as pre-OPE before becoming OPE platform.
- HADG Validation (VAL) platform for HAS Phase 2 deployed in the GSC main site (Madrid – Torrejon de Ardoz)
- HADG platform for HAS Phase 2 deployed in the GSC back up site (Toulouse)
- HADG INT platform fully representative of the OPS and VAL instances for HAS Phase 2 to be deployed at the Contractor's premises, although the Contracting Authority may also request its deployment on-site during the lifetime of the Contract.
- HADG platform to support maintenance activities to be deployed at the HADG maintainer facilities.

Note: The deployment in VAL and OPE domains are subject to an authorization from the competent Security Authority Board (VAL/OPE SATO and PreATO), that EUSPA will request and the result of which will be communicated to the HADG contractor.

HADGp2-SoW-4003 Reuse of existing platforms and equipment

The Contractor is free to propose the best design to implement the Contract requirements. If this design implies the reuse of elements of existing platforms (refer to Annex V), it needs to be done respecting the limitations imposed by the service activities (equipment in operation, validation or supporting maintenance activities) activities of the previous release until the new release is available.

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HADGp2-SoW-4004 INT environment

The contractor shall provide an Integration (INT) platform to support system and segment qualification activities.

Note: This platform shall initially be located at the Contractor's premises, although the Contractor shall deploy it at the GSC site if requested by the Contracting Authority.

HADGp2-SoW-4005 VAL environment

The Contractor shall provide a Validation (VAL) environment fully representative of the OPE environment.

HADGp2-SoW-4006 OPE/PreOPE environment

The Contractor shall provide an OPE/PreOPE platform that will replace the operational HADG currently delivering HAS Phase 1 services, following a migration plan agreed with the Contracting Authority.

HADGp2-SoW-4007 Backup site platform

The Contractor shall provide a redundant operational platform for the E-GSC backup site (Toulouse, France).

HADGp2-SoW-4008 Platform usage

The Contractor shall propose a clear task breakdown between the platforms, ensuring the representativeness of the qualification and operational validation at each stage, while respecting the ongoing usage by the Galileo Service Operator of the HADG unit currently supporting the HAS phase 1 service delivery (until the HADG for HAS Phase 2 preOPE platform becomes the next HADG OPE platform) and VAL (minimising the period of unavailability of the platform for maintenance) and the fulfilment of the rest of the tasks and constraints in this SoW.

The proposed approach shall require approval by the Contracting Authority at each milestone.

The plan should be optimised at least in what regards:

- Avoiding impact on operational and maintenance activities before the migration to OPE of a new release is executed.
- Avoiding OPE services downtime during the migration.
- Maximising the availability of VAL platform with the same release as OPE at any point in time.
- Maximisation of the availability of operational chains at both E-GSC sites.
- Minimisation of cost, for example by reusing non-obsolete equipment from previous release.
- Efficient design, development and validation logic, ensuring technical quality.
- Overall schedule optimisation and mitigation of risks.

The plan shall be reviewed at each milestone of the contract execution.

HADGp2-SoW-4009 Inputs to CCB

The Contractor shall prepare the relevant procedures and CCRs to enable the connections to external elements (e.g. E-GSC, SECMON enclave).

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HADGp2-SoW-4010 Inputs to MTP/STP

The Contractor shall generate and deliver planning requests for activities in VAL, preOPE/OPE under the scope of the Contract (refer to Inputs to Planning HADGp2-AD-OP04 and Operations planning HADGp2-AD-OP03).

7.4.2 On-site installation

HADGp2-SoW-4011 Compliance with Hosting Site ICDs

The Contractor shall ensure, through verification activities, that all the supplied platforms comply with the applicable HAS ICDs (HADGp2-AD-TR17 and HADGp2-AD-TR18).

Note: Compliance in this case is understood as compatibility, hosting site development is outside the scope of the contract.

HADGp2-SoW-4012 Space available at E-GSC site

The Contractor shall ensure that the on-site deployments are compatible with the available space at the E-GSC sites (Prime and Back up sites), considering other infrastructure deployed on the same site (e.g. E-GSC) and operational constraints.

Note: Both E-GSC sites (prime and back up) and their current hosting capacity are described in the applicable Hoisting sites ICD part of the CISL..

HADGp2-SoW-4013 Deployment Responsibility

The Contractor shall be responsible for the safe shipping and installation of the equipment at the E-GSC sites (Prime and Back-up).

HADGp2-SoW-4014 Configuration Control During Deployment

The Contractor shall maintain strict configuration control of the platforms when deployed within the operational environment in the HADG. The deployment process shall include as well hardening and lock-down of the platforms.

HADGp2-SoW-4015 Coordination of Deployment

The Contractor shall co-ordinate with the Contracting Authority and the Galileo Service Operator the deployment of the HADG for all aspects related to site availability and access to GSC sites (Prime and Back up sites).

HADGp2-SoW-4016 Site Installation Procedures

The Contractor shall prepare the Installation Procedures compliant with the technical requirements and the on-site installation constraints. This Installation Procedure shall be prepared taking as inputs the Sites, Site ICDs, the Deployment Plan and the related deployment information. The Installation Procedure shall describe the deployment activities per site, their schedule, and the interface activities with the Hosting Services Providers.

HADGp2-SoW-4017 Deployment and Installation Time

The Contractor shall minimize the time needed for the deployment, installation and initial configuration of the infrastructure.

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A detailed plan for the deployment of the infrastructure on the different sites (prime and back up) shall be included in the DDVP and baselined at PDR. This plan shall describe all the necessary activities (HW deployment, SW deployment, configuration of platform including security configuration, etc) and the associated time.

HADGp2-SoW-4018 Local Standards and Legislation

Before executing any deployment activity on E-GSC sites, Occupational Health and Safety measures shall be fully coordinated with EUSPA and the operators and hosting service providers of the different sites, provided that the responsibility for compliance to such measures lays with the Contractor.

The Contractor shall ensure that all deliverable items and deployment activities are compliant with the local standards and legislation at the deployment location.

HADGp2-SoW-4019 DCPs for deployment of equipment

Prior to any installation of equipment on-site, and with sufficient anticipation to ensure compatibility with the Site Accreditation Review data-package as per LSAP, the Contractor shall produce a DCP (HADGp2-DD-CD08) to the HS ICDs (HADGp2-AD-TR17 and HADGp2-AD-TR18) specifying the positions of the related equipment (racks and workstations) to be deployed.

7.4.3 Verification

HADGp2-SoW-4020 Verification Plan

The Contractor shall provide Verification Plan, part of the DDVP (HADGp2-DD-EN01), that fully describes the AIV activities to be carried out during the period of the contract and the specific platforms used to perform them, including the verification plan per environment (INT, VAL, PreOPE/OPE, back up), as further detailed in subsequent requirements. This plan shall be followed for the corresponding activities (in scope and schedule).

Note: the verification plan shall include different tests for characterisation of TBD/TBD parameters or parameters stated as configurable and validation of these parameters.

HADGp2-SoW-4021 Assembly Activities

The Contractor shall describe and perform the activities necessary to deliver the platforms to each site and prepare and qualify them for the integration phase.

The Contractor shall include in the AIV plan a description of the activities to be carried out per platform and its associated time to complete every single assembly process.

Before any test campaign is executed, a detailed plan must be provided to the Contracting Authority to ensure complete visibility of the process.

HADGp2-SoW-4022 Integration Activities

The Contractor shall describe the integration phases and activities to be performed in factory and on site (Prime and Back up sites), including a detailed description of the sequence of integration, the scope of each integration test (with links to the Verification Specifications HADGp2-DD-EN10), and the links to subsequent verification test campaigns.

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The Contractor shall provide the tools and equipment required to perform the integration of the platforms on-site and with the systems on-site, e.g. cabling to connect the platform with E-GSC and the HS connectivity racks.

HADGp2-SoW-4023 Verification campaigns

The Contractor shall propose the optimal number and schedule of verification campaigns required for the system qualification. Each campaign shall be preceded by a TRR (see HADGp2-SoW-0015), and shall conclude with a TRB (see HADGp2-SoW-0016).

The Contractor shall describe the step-wise verification processes to be carried out, including a detailed description of the test campaigns, objective (characterisation or verification), their environment (INT, VAL, preOPE/OPE, back up), location (in-factory or in E-GSC main or back up premises), the breakdown of requirements verification activities per test campaign and per test case, and the links to site and/or facility delivery points.

HADGp2-SoW-4024 Scope of verification testing

The Verification tests (to be detailed in HADGp2-DD-EN10) shall cover the following:

- Verification of each applicable requirement (e.g., technical, security or cyber-security) according to the test method agreed in the Requirements Verification Matrix (HADGp2-DD-EN12).
- Verification of compliance to interface documentation (e.g. ICDs for external entities and users).
- Load, performance and end-to-end scenario(s) testing of the infrastructure to demonstrate the robustness of the design, installation and configuration.
- Testing of each procedure contained within the Installation, Operation and Maintenance document (IOM, HADGp2-DD-OP09) to demonstrate the infrastructure operability and maintainability. Evidences shall be presented to prove that after the conclusion of the verification activities, the HADG infrastructure is ready to support the operational validation and the validation of the Core of Trust reinstallation procedures.
- Testing of the scalability of the infrastructure to confirm it is possible to extend the configuration without impact.

HADGp2-SoW-4025 Performance verification

The Contractor shall verify the compliance of each component to its performance budget (latency, availability, etc.) (as per HADGp2-SoW-3046), ensuring the overall achievement of the performance requirements in technical baseline. This shall be performed initially by performance analysis during design phase, and starting from TRR milestone by test, as per HADGp2-SoW-4036.

HADGp2-SoW-4026 Stubs for the qualification

The Contractor shall develop stubs supporting the qualification process of the HADG. As a minimum, stubs shall be developed for external interfaces. The developed stubs shall be representative of the real external interfaces, ensuring that all functionalities can be fully verified in an isolated context, including their use for operational validation if necessary.

HADGp2-SoW-4027 Qualification of tools, processes and procedures

The Contractor shall ensure that the tools, processes and procedures are duly qualified and that this qualification is maintained in time.

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HADGp2-SoW-4028 INT verification campaign(s)

The Contractor shall perform one or more verification campaign(s) verifying to the maximum extent possible the functionalities on the INT platform.

The Contractor shall present the campaign results, with supporting evidence, at a TRB.

HADGp2-SoW-4029 VAL verification campaign

After successful conclusion of the INT verification campaign and authorisation to deploy in VAL, the Contractor shall perform the connection to VAL chains (E-GSC, etc.) in order to perform a VAL integration campaign using real external interfaces, including also comprehensive regression testing to ensure the validity of the qualification credits from INT. The result of the integration, with supporting evidence, shall be evaluated in QR.

HADGp2-SoW-4030 Backup site verification campaign

The Contractor shall perform verification campaigns targeting the infrastructure redundancy features, in particular regarding the synchronisation of data between sites and the handover of the active chain. The features shall be verified both before the connection to VAL chain and after.

HADGp2-SoW-4031 Regression strategy

The Contractor shall implement a comprehensive and effective regression testing strategy that shall include automatic regression testing.Note: each time a new release is generated, regression testing is to be done

HADGp2-SoW-4032 Non-regression from previous releases

Before the entry into operations of HADG P2 release, the Contractor shall demonstrate that all the products/services available in the previous release will be available in the new one.

HADGp2-SoW-4033 Use of tool for requirements verification engineering

The Contractor shall use a management tool as specified in HADGp2-SoW-3009 (e.g. DOORS) to define and maintain the verification information.

As a minimum, the tool shall allow the full traceability of requirements, verification matrices, test cases, test procedures, test results and qualification status and evidence (including RFDs and RFWs, if any).

The tool shall also allow database export to ensure that the Contracting Authority and/or third parties can also manage the traceability and the verification control records in the Contracting Authority DOORS database.

HADGp2-SoW-4034 Delivery of requirements and verification tool

The Contractor shall deliver the requirements and verification tool database to the Contracting Authority for each review.

HADGp2-SoW-4035 Delivery of Requirements Verification Matrix (part of VCD)

For each applicable document containing requirements, a Requirement Verification Matrix shall be delivered as an initial version of the Verification Control Document (HADGp2-DD-EN12) at PDR, using the tool specified in HADGp2-SoW-3009.

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HADGp2-SoW-4036 Preferred Method for Requirement Verification

By default, the preferred method of requirement verification is by test. The choice of other methods of verification shall be fully justified by the Contractor in the Verification Matrix.

For some applicable documents, the Contracting Authority may provide to the Contractor a matrix specifying the expected verification method for each requirement (to be confirmed no later than PDR). For these cases, the Contractor shall comply with the requested verification method, and maintain the corresponding statement of compliance.

HADGp2-SoW-4037 Incremental Verification in the Verification Matrix

Where the testing at an intermediate verification milestone does not fully verify a requirement, this shall be reflected in the Verification Matrix (HADGp2-DD-EN12) by stating the level of compliance achievable at each milestone.

Note: An example could be performance verification that is dependent upon the deployed hardware.

HADGp2-SoW-4038 Verification Specifications

The Contractor shall define the verification specifications (HADGp2-DD-EN10) necessary to verify the compliance to requirements.

The verification specifications shall include as a minimum:

- The verification strategy;
- the selected test datasets;
- the configuration at segment and element level that will be tested according with the plan;
- the type of the tests performed (e.g. functional, interface, design, performance, etc.);
- the verification procedures (test procedures as per HADGp2-SoW-4036).

Verification specification, including a set of pass/fail criteria for each requirement, shall be delivered for final approval at CDR.

Test Procedures shall be delivered at CDR and also prior to the TRR for each campaign, as input to the campaign's Test Readiness Review.

HADGp2-SoW-4039 Load and performance tests

The Contractor shall propose a set of load and performance tests within the Verification Specifications (HADGp2-DD-EN10) to demonstrate the robustness of the design, installation and configuration. These tests shall be planned to take place after each successful requirement verification test campaign. The tests shall be delivered for final approval by the Contracting Authority at CDR.

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HADGp2-SoW-4040 Use of real system data in the Qualification

The infrastructure qualification activities shall include the use of real system data, to be identified by the contractor and provided by EUSPA whenever technically possible and as early as possible as part of the infrastructure qualification approach.

HADGp2-SoW-4041 IOM Procedure Validation

The Contractor shall validate the correctness and completeness of the Installation, Operations and Maintenance (IOM, HADGp2-DD-OP09) procedures by step-by-step execution tests. All procedures shall be verified in a representative scenario. The tests shall be subject to approval by the Contracting Authority at QR.

7.4.3.1 Integration with other entities

HADGp2-SoW-4042 Inter-site integration

The Contractor shall fully integrate the infrastructure deployed at both the E-GSC main and backup sites.

HADGp2-SoW-4043 Integration with other E-GNSS elements (E-GSC, SECMON, etc.)

The integration between the HADG and other E-GNSS elements shall be under the responsibility and control of the EUSPA and ESA (SIV tests). The Contractor shall provide technical support for the integration activities, including test preparation, support to reviews and on-site technical support and expertise. The support of the Contractor will be requested by the Contracting Authority once the EUSPA and ESA plans are approved.

Note: These integration tests are expected to last 2 weeks.

HADGp2-SoW-4044 Support integration with E-GSC

The Contractor shall perform the integration and verification tests with the E-GSC infrastructure in the different GSC sites.

HADGp2-SoW-4045 Integration with GSMC/SECMON

The Contractor shall perform the necessary activities to ensure that the interface between the HADG and the SECMON/GSMC functions correctly, through a process of integration and verification (see 7.3.4)

HADGp2-SoW-4046 Verification of External Interfaces

The Contractor shall integrate, verify by test and qualify the other external interfaces using, as far as possible, the real External Entity equipment. Where these are not available then suitable stubs shall be developed (as per HADGp2-SoW-4026).

HADGp2-SoW-4047 SIV tests

The Contractor shall support the System Integration and Verification activities (typically 2 weeks per campaign per VAL, pre-OPE/OPE platform)), coordinated by EUSPA-ESA, which involve the integration of the HADG with the E-GSC within the Galileo system, including non-regression testing to ensure that the introduction of the release continues meeting system requirements. The scope of this support includes reviewing the corresponding test plan DPs, test reports and technical support enabling the execution of the integration tests (on-site, including from E-GSC backup site when applicable).

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HADGp2-SoW-4048 Independent functional verifications

The Contractor shall provide support to functional or performance verifications by the Contracting Authority or third-parties designated by the Contracting Authority.

Should the Contracting Authority request it at any time during or after qualification phase, the Contractor shall provide required test inputs, outputs and intermediate data necessary for these external verifications.

In addition, should these verifications result in any observation, anomaly or non-conformance to applicable documentation, the Contractor shall be responsible for their analysis and correction.

HADGp2-SoW-4049 Resilience Test

The contractor shall support the Resilience test preparation and test execution as requested by the contracting authority and according to Resilience Test Methodology HADGp2-RD-MISC-01.

Note: the resilience tests are meant to verify the operator readiness and system expected behaviour in case of contingencies.

HADGp2-SoW-4050 Backup site platform qualification

The Contractor shall perform the necessary qualification tasks for the platform to be deployed at the GSC backup site, including at least non-regression and the validation of the related procedures.

7.5 WP#5: Preparation for operations

7.5.1 Operations concept and procedures

HADGp2-SoW-5001 Concept of Operations/Maintenance Workshop

The Contractor shall organise two Operations/Maintenance Concept Workshops, with the Contracting Authority and GSOp, to exchange and discuss on the concept of operations/maintenance (before PDR and CDR) including dual site aspects. A mock-up shall be developed as an input to the first workshop prior to the PDR and, as a result, an implementation plan shall be provided as an output of the first workshop. The execution of the actions agreed in the first workshop implementation plan shall be verified in the second workshop (before CDR).

The purpose of these workshops is to present to the Contracting Authority the operations and maintenance concepts developed, and the inclusion of related considerations in the design and later in the developed system.

Note: The concept of operations for the handover activities from the GSC prime site to GSC back up site and vice versa is to be presented and agreed in these workshops.

HADGp2-SoW-5002 Inputs to System Operations Concept

The Contractor shall provide operational and maintenance scenarios in an “Inputs to Operations Concept” (HADGp2-DD-OP01) and a “Inputs to ILS Concept” (HADGp2-DD-OP03).

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HADGp2-SoW-5003 Installation, Operations and Maintenance Manual

The Contractor shall provide, update and maintain the Installation, Operations and Maintenance Manual (HADGp2-DD-OP09) containing all the procedures needed to install (and reinstall, including Core of Trust), configure, operate and maintain the HADG. This document shall contain a full list of procedures at CDR, with the actual procedures' definition available at TRR.

Note: The IOM shall also include all the operational procedures for the handover activities between the GSC prime and GSC back up site and vice versa.

HADGp2-SoW-5004 Maintenance Procedures

The Contractor shall identify and define the Maintenance Procedures (HADGp2-DD-OP11). The approach to categorize the maintenance procedures in L1, L2 or L3 shall be agreed with the Contracting Authority at the Operational Workshops.

HADGp2-SoW-5005 Operational and Maintenance Procedures delivery format template

The Contractor shall utilise the detailed template for the operational & maintenance procedures previously agreed with the EUSPA for the generation of procedures.

HADGp2-SoW-5006 Operational and Maintenance Procedures Linkage

The Contractor shall manage documentation derived/received from sub-system/subcontractor level, establishing linkages and consistency between content coming from different manuals/sources, and maintain those links as revisions are applied.

HADGp2-SoW-5007 Procedures for Core of Trust reinstallation and its validation

The Contractor shall validate the core of trust reinstallation procedure and provide evidence to support that it is possible to perform the reinstallation as per applicable requirements. The Contractor shall support the HADG maintainer in the maintainer's validation of these procedures.

HADGp2-SoW-5008 Provision of HADG infrastructure SW

The Contractor shall provide the developed HADG SW source code to the Contracting Authority at different milestones (QR and AR) as per DRL:

- The Contractor shall make available the intermediary source code to the Contracting Authority at the latest at the time of QR;
- The Contractor shall make available the final source code to the Contracting Authority at the latest at the time of AR.

Note: Foreground IPR ownership shall be vested to the European Union from the moment of its generation as per the Contract. Documentation or software generated by the Contractor under the Contract shall be immediately marked "EU Proprietary information. Unauthorised distribution, dissemination or disclosure not allowed. EUSPA has the right to make available the intermediary and the final source code to the HADG L2/L3 Maintenance Provider and may request the Contractor to send the intermediary source code or the final source code to the HADG Maintenance Provider as well.

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HADGp2-SoW-5009 GSC Prime-Backup platforms related procedures

The Contractor shall define the procedures to operate the dual (prime and back up) sites (data and/or configuration synchronisation, site switching, etc.) as part of the corresponding preparation for operations documentation.

7.5.2 Integrated Logistic Support activities

HADGp2-SoW-5010 Inventory management

The inventory (HADGp2-DD-CD11) shall be provided according to the Inventory Management ICD (HADGp2-AD-PA09).

HADGp2-SoW-5011 ILS Plans

The Contractor shall deliver, maintain and implement an ILS Plan (HADGp2-DD-OP04).

Note: ILS also includes the Maintenance and Obsolescence.

HADGp2-SoW-5012 ILS Standards

The Contractor shall base its ILS program of activities on the relevant industry standards, such as the European Cooperation for Space Standardization (ECSS), the International procedure specification for Logistics Support Analysis, or the Military Standards and should consider the best practices defined in the Information Technology Infrastructure Library (ITIL). The Contractor shall identify the relevant standards that will be used.

HADGp2-SoW-5013 Preventive Maintenance Analysis

The Contractor shall perform preventive maintenance analysis as input to the ILS plan.

HADGp2-SoW-5014 Obsolescence Maintenance Analysis

The Contractor shall perform obsolescence maintenance analysis as input to the ILS plan

HADGp2-SoW-5015 Spare Parts Identification

The Contractor shall identify spare parts for the 1st/ 2nd/3rd levels of maintenance of the HADG (HADGp2-DD-OP05).

HADGp2-SoW-5016 Spare Parts Optimization

The Contractor shall support the update and assist in the optimisation the HADG spare parts inventory and availability.

HADGp2-SoW-5017 Supplies Delivery

All deliverables, spares and other support equipment and materials (e.g. test equipment, consumables) shall be delivered as defined in the Packing, Handling, Storage and Transportation Plan.

HADGp2-SoW-5018 Period for Supplies Delivery

The Contractor shall deliver the spares and other support equipment and materials (e.g. test equipment, consumables) necessary to support the HADG P2 service delivery continuity to be ensured by the HADG operator and L1 maintainer.

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HADGp2-SoW-5019 Equipment spares delivery to the sites

The Contractor shall deliver the equipment (e.g. sub-systems), spares and other support equipment and materials (e.g. test equipment, consumables) directly to the E-GSC sites (main and back up).

HADGp2-SoW-5020 Spares supply

The Contractor shall supply at QR sufficient on-site spares to provide the availability levels specified in the applicable documents.

HADGp2-SoW-5021 Spare part storage

The Contractor shall provide all spares to the Contracting Authority (and the Galileo Service Operator on its behalf) for storage in a secure and controlled area (provided by the Galileo Service Operator) until they are required.

HADGp2-SoW-5022 Shipping, removal and disposal of items at the end of the contract

The Contractor shall be responsible for shipping any assets procured within the Contract that remain in their premises at the end of the Contract (e.g. INT chain) to an EU location upon request of the Contracting Authority, or for the disposal of any item not requested to be transferred without additional cost.

HADGp2-SoW-5023 Provision of ILS data

The Contractor shall provide the ILS data (LSAR, Logistic Support Analysis Record) for all LRU/SRU parts of the HADG in a format to be agreed with EUSPA.

7.5.3 Training activities

The Contractor is responsible for the production of all the HADG-related training material and for providing the first training session to EUSPA and the HADG operator and maintainer (trainers, maintainers, administrators and operators). Training material should be updated by the Contractor whenever there are updates on the HADG functionality.

HADGp2-SoW-5024 Preparation of Training Plan

The Contractor shall prepare and deliver a Training Plan (HADGp2-DD-OP06), including training need analysis, regarding all HADG-related operational, maintenance and ILS tasks and in order to refine the content and scope of the training sessions.

HADGp2-SoW-5025 Inputs for the Training Plan

The Training Plan shall specify for each set of training as a minimum:

- the training objectives,
- the prerequisite qualifications and skills of the attendees,
- the course structure,
- the detailed content,
- the means of measuring the success of the training.

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HADGp2-SoW-5026 Content of Training Material

The Contractor shall prepare the training material (HADGp2-DD-OP07) for all the HADG-related operational and maintenance tasks covering the needs defined in the Training Need Analysis and Training Plan.

HADGp2-SoW-5027 Organization and implementation of training sessions

The Contractor shall organise at least two trainings campaigns:

1. One campaign focused on the operations, L1 maintenance procedures and ILS aspects;
2. One for L2/L3 maintenance procedures including ILS related aspects for maintenance.

The duration of each campaign is expected to be 3 days with the location of each at the GSC prime premises. The table of contents of each training campaign will be presented and agreed at the first operation workshop prior to PDR. Lastly, the execution of the training campaigns shall take place at a minimum of two weeks prior to the QR and once the IOM manual has reached a sufficient level of maturity as proven by its validation. The Contractor shall coordinate the schedule of the training with the Contracting Authority, in order to allow sufficient time for the GSOp to familiarize with the updated IOM manual and prepare the relevant questions and clarifications.

Note: Training sessions shall typically be composed of presentations from the Contractor or subcontractors coupled with hands on sessions (when relevant) and provide for questions and answer sessions.

7.5.4 Support to Operational System Validation

The scope of the GSOp Operational System Validation activities includes the demonstration that the system (either at GSC primer site or back up site), in conjunction with the use of the associated operational products (plans, procedures, databases, timelines, etc.) and operated by trained and representative operational and ILS teams, is capable of delivering the required service in a safe, reliable and sustained manner.

All requirements included in this section are to be understood applicable for the GSC prime site and for the GSC back up site and for the handover procedures.

HADGp2-SoW-5028 Support to the Operational System Validation

The Contract shall support the GSOp operational validation activities at GSC prime and back up site of the HADG, from its preparation to its execution.

HADGp2-SoW-5029 Handover of HADG Infrastructure

The HADG infrastructure operations handover is divided into the following phases:

1. After Qualification Review (QR), the HADG infrastructure shall be provided to the GSOp for early access to support the preparation of Operational Validation activities;
2. After completion of the preparation of the Operational validation activities, a GSOp Operational Validation Readiness Review (OVRR) will be held triggering the handover of the HADG infrastructure to the GSOp for the execution of the Operational Validation (OV);
3. After successful completion of the Acceptance Review (AR), the ownership of the infrastructure is transferred to the EU (represented by EC).

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HADGp2-SoW-5030 Review and feedback on Operations Plans

The Contractor shall review and provide feedback on the GSOp HADG Operations Plan (OP&VP, CONOPS, HADG Operational Procedures) prepared by the HADG Operations Contractor/GSOp as part of the HADG OVRR and OVR (GSOp milestones).

HADGp2-SoW-5031 Observation and Anomaly Reports

Starting in QR, and until the end of the maintenance phase or AR (D-AR for the backup platform) if any of the maintenance options are not activated, the Contractor shall:

- Duly and timely submit Observation Reports and Anomaly Reports;
- Conduct investigations and analysis for Observations Reports and Anomaly Reports, regardless of their origin (whether submitted by the Contractor, GSOp or EUSPA).

HADGp2-SoW-5032 Use of VAL chain

The Contractor shall identify the needs for the use of the validation chain for HADG infrastructure activities in accordance with the approved DDVP.

The validation chain usage planning shall define the access periods/timing for the sharing of the VAL Chain for the different usages (e.g. operator training, validation of evolutions, evolution development, etc.).

HADGp2-SoW-5033 Non-interference with existing operations and maintenance

The Contractor shall ensure the seamless implementation of the HADG releases under development, making sure that any ground infrastructure release activities do not interfere with the routine operations or service provision Galileo Service Operator.

HADGp2-SoW-5034 Local Security Operations update

The Contractor shall update the “Local Security Operations” in line with the new HADG infrastructure release for HAS Phase 2.

7.6 WP#6: Acceptance

7.6.1 OPE migration

HADGp2-SoW-6001 Migration Plan

The Contractor shall provide a migration plan HADGp2-DD-OP12, which shall contain a detailed sequence of events for achieving the migration to the operational system (OPE). This plan shall include, but is not limited to:

- Description of how the provision of HAS services will be ensured during the migration in the Operational Chain;
- Roles and responsibilities for incorporation of the HADG release with the understanding that the HADG contractor is responsible for implementing all actions not requiring GSOp;
- Detailed schedule and timeline of the incorporation;

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- Process and decision points for the incorporation;
- Operations support to be provided by the GSOp Contractor, and applicable procedures for the support;
- Technical support to be provided by the developing entity (HADG contractor), including provision of an on-call service during the migration;
- Contingency scenarios, including a detailed procedure for the roll back of the GIR in case of need.

The plan shall be reviewed and approved by the Contracting Authority at the milestones identified as per DRL (Annex II).

Note: It is expected that most of the migration activities are to be done by the HADG contractor, while only for those activities which GSOp involvement is strictly necessary, the migration plan can count with GSOp support. EUSPA shall approve the proposed migration plan and the proposed task to be implemented by GSOp.

HADGp2-SoW-6002 Preparation of migration

The Contractor shall prepare the relevant related procedures and CCRs and inputs to planning and operations to enable the HADG to migrate to OPE.

HADGp2-SoW-6003 Validation of migration procedure

The migration procedures shall be validated on a representative chain prior to being exercised on OPE. The Contractor shall provide evidence of this validation.

HADGp2-SoW-6004 Preparation for potential rollback

Duly in advance of the migration, the Contractor shall provide the necessary tools and procedures to support the roll back to an HADG previous release should any major problem be encountered during the migration to OPE or during the service monitoring (until AR).

HADGp2-SoW-6005 Migration kick-off

With the prerequisites of successful qualification and operational validation (QR, OVR), and considering the accreditation process constraints (section 7.7.6), the Contractor shall support the organization and shall participate in the migration kick-off meeting, chaired by the Contracting Authority, where the readiness to execute the migration shall be assessed and approved by the Contracting Authority , in particular:

- Readiness of the infrastructure components (absence of blocking anomalies or other issues);
- Approval of the migration plan procedures and roles as per HADGp2-SoW-6001;
- Availability of the CCRs required for the migration as per HADGp2-SoW-6002;
- Readiness of the teams involved in the migration;
- Status of the accreditation process.

HADGp2-SoW-6006 Seamless transition to new HADG releases

The Contractor shall ensure that, from an end user point of view the transition from previous release to the next is smooth, avoiding any impact on the existing services provision and that all the available services of a previous HADG version remain available, unless otherwise agreed with the Contracting Authority.

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HADGp2-SoW-6007 Final Migration Checkpoint

After completion of the migration activities and six weeks in operation (service monitoring phase), a final migration checkpoint shall be organised by the Contracting Authority and shall be supported by the Contractor.

7.6.2 Service Monitoring

HADGp2-SoW-6008 Support HADG service monitoring

The Contractor shall support the HADG infrastructure service monitoring (6 weeks upon completion of the HADG migration to OPE) in the operational chain (OPE).

Note: GSOp will operate the HADG in OPE during the HADG service monitoring phase.

HADGp2-SoW-6009 Acceptance plan

The Contractor shall provide an acceptance plan (part of DDVP HADGp2-DD-EN01) no later than QR, listing the Acceptance approach to be executed during the Service Monitoring phase.

Acceptance activities shall provide the means to achieve the objectives of the Acceptance Review, providing associated evidence, in what regards the functional, performance and operational aspects that the infrastructure is required to comply with.

Note: For the purpose of the provision of the acceptance evidences, the Contractor shall consider that only GSOp will operate the HADG in OPE during the HADG service monitoring phase.

HADGp2-SoW-6010 Potential rollback

Should any major problem – at Contracting Authority's own discretion - be encountered during the migration or during the Service Monitoring Phase, the Contractor, upon request of the Contracting Authority, shall support the rollback to the previous HADG Infrastructure Release as per HADGp2-SoW-6004 and subsequent requirements.

Rollback may only be performed before the end of the Service Monitoring phase. Rollback shall be performed by the Galileo Service Operator under the GSOp contract.

As a result of the rollback, the Contractor shall be responsible for solving the issues leading to the rollback and to restart the migration and Acceptance process, as per this SoW.

HADGp2-SoW-6011 Acceptance Process

The Acceptance of the HADG infrastructure shall have place at the Acceptance Review and it shall be the starting day of the maintenance phase under HADG contractor responsibility (should the maintenance options be activated by the Contracting Authority).

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7.6.2.1 Support to Incident management during HADG service monitoring

HADGp2-SoW-6012 Support to Incident management

In case of an Incident report during the Service Monitoring phase, the HADG Contractor shall support the Contracting Authority and GSOp. Incident management is regulated by the requirements of this section and related applicable documents, included in CISL (Annex I).

Note: Incident reporting provides the Contracting Authority with immediate visibility of very significant problems affecting the system or service delivery during the service monitoring phase and is to be addressed with the maximum urgency and at the highest levels of the management of the Contract, both by the Contractor and the Contracting Authority.

HADGp2-SoW-6013 Incident reporting

The HADG Contractor shall support GSOp to report all Incidents to the Contracting Authority immediately after the incident is detected (Incident report).

HADGp2-SoW-6014 Security incident process

For incidents that have a security component, e.g. as a root cause or a resulting impact, the HADG Contractor shall support a parallel security incident process, in accordance with the applicable security requirements.

HADGp2-SoW-6015 Incident workarounds

The HADG Contractor shall support GSOp to implement temporary workarounds to restore services and safeguard the HADG assets as rapidly as possible.

HADGp2-SoW-6016 Incident root-cause analysis

The Contractor shall support a thorough root cause analysis, with the involvement of the relevant Design Authorities and Contracting Authority to confirm the incident and assess the measures that can be taken to avoid future reoccurrence.

HADGp2-SoW-6017 Incident Reviews

The HADG Contractor shall support an Incident Review to be organised by GSOp within 3 calendar days of the occurrence of the incident. The main input to this review shall be the Incident Report generated by the GSOp with the support of the HADG Contractor, distributed 1 day prior to the review, which shall describe:

- The circumstances of the incident (nature, timeline, impact on services and operational

infrastructure, recovery measures, security aspects, etc.);

- The root cause analysis;
- The incident confirmation;
- The implemented recovery measures and proposed activities to complete the recovery;
- The proposed measures to avoid a repeat of the incident (e.g. change to operational procedures, change to system configuration, training, etc.).

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HADGp2-SoW-6018 Incident Review participation

The HADG Contractor shall participate to the Incident Review, which shall be chaired by the Contracting Authority.

HADGp2-SoW-6019 Incident Review Board actions

The HADG Contractor shall support the implementation and tracking for the actions assigned to them arising from the Incident Review..

HADGp2-SoW-6020 Incident Report

Following completion of the agreed Incident Review actions and full recovery of the services, the HADG Contractor shall support an update the Incident Report to reflect the final outcome. Any associated Observation/Anomaly reports shall be kept up to date as the Incident investigation and close-out progresses.

7.7 WP#7: Security

7.7.1 Security management

HADGp2-SoW-7001 SAL compliance

The Contractor shall comply with the SAL (annex to the Contract) terms, conditions and requirements.

HADGp2-SoW-7002 Classification of EUCI Handled by HADG Equipment

The contractor shall handle the EUCI according to the applicable rules to COMMISSION DECISION (EU, Euratom) 2015/444 and COMMISSION DECISION (EU, Euratom) 2015/443 EUCI, and Tailored Security Classification Guide (HADGp2-AD-SA04).

HADGp2-SoW-7003 Non-degradation of Security

The Contractor shall ensure no impact to security controls, operations, and accreditation before, during or after deploying, integrating, verifying, and qualifying any evolved, upgraded, or new HADG infrastructure at the E-GSC sites (main and back up).

HADGp2-SoW-7004 Security Management Plan Definition

The Contractor shall maintain updated a dedicated Security Management Plan (HADGp2-DD-SA01), based on ISO 27001 and content guideline that specifies how the Contractor (and their sub-contractors) defines and/or implements:

- Security Policy and strategy
- the security measures in term of organization, procedures, roles, responsibilities (RACI matrix) and tasks
- the European GNSS Programme Security Instruction (PSI) HADGp2-AD-SA01;
- the Security Classification Guide (SCG) HADGp2-AD-SA04 and COMSEC Security Instructions.

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HADGp2-SoW-7005 Security Management Plan Implementation

The contractor shall implement the Security Management Plan, according to ISO 27001, during all activities covered by the contract.

HADGp2-SoW-7006 Implementation of Information Security Policy for HADG Equipment

An information security policy for any security function shall be defined and implemented during the full life-cycle of the equipment addressing:

- Planning of security activities for the deployment and management of equipment;
- Handling procedures and operations for staff to perform operation of the equipment;
- Validation and verification testing routines to ensure equipment is secure;
- Corrective actions that are required to ensure equipment is performing and lifetime requirements are met

In addition, these items will provide input to the Business Continuity Plan (BCP) HADGp2-DD-SA07.

7.7.2 Security engineering

7.7.2.1 General requirements

HADGp2-SoW-7007 Identification of Security Needs

The security needs for HADG equipment/functionalities/interfaces must be identified through:

a) An analysis in term of confidentiality, integrity and authentication

b) An impact assessment in the loss to service availability that can result from the failure of that equipment/functionalities/interfaces;

c) A business continuity strategy that provides the options for ensuring service availability is maintained.

HADGp2-SoW-7008 Security Baseline Compliance

The contractor shall comply with the security baseline (including cyber and accreditation) as listed in the CISL, Annex I, and shall demonstrate the as build compliance status providing a detailed Verification Control Matrix HADGp2-DD-EN12 at Qualification Review milestone.

HADGp2-SoW-7009 Identification and Classification of Assets

Any HADG asset handling EUCI (as well as the relevant EUCI data) must be identified and shall undergo a formal asset classification on the basis of the Security Classification Guide HADGp2-AD-SA04, this shall include (HADGp2-DD-SA03):

a. Unique identification number of the asset;

b. Record of the associated manufacturer, model, make, and version;

c. Registered owner of the asset;

d. Physical marking on the asset to identify it;

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e. Records of EUCI classification and data contained;

f. Change control approval procedures and processes;

g. Business impact assessment based on risk assessment and impact to Service

HADGp2-SoW-7010 Interface Controls and Connections

The Contractor shall ensure interfaces are managed and controlled such that only authorised operators and systems can connect over secure networks, in accordance with interface control specifications, policies, and protocols.

HADGp2-SoW-7011 Implementation of Security Measures

All mandatory security measures as determined by the security operational concept (SECOPS), procedures (SOP) and policies related to any HADG equipment handling EUCI shall be implemented.

HADGp2-SoW-7012 Continuity of Security Operations

The Contractor shall support GSOp to ensure continuity of on-going security operations when deploying, integrating, verifying, qualifying, validating, migrating and supporting initial service operations with the HADG infrastructure for HAS Phase 2 at the E-GSC sites (main and back up).

HADGp2-SoW-7013 Monitoring and Reporting of Security Events

The HADG shall be able to monitor the system security status and the services continuity and shall be able to report and store the identified Security Events.

HADGp2-SoW-7014 Monitoring by GSMC (SECMON)

The HADG security functionalities shall be monitored by GSMC (according the implementation of Monitored Entity Requirements, HADGp2-AD-SA06) through the collection and analysis of events, logs and data.

See section 7.3.4

7.7.2.2 Controlled COMSEC Item (CCI) & CRYPTO Asset Management

HADGp2-SoW-7015 COMSEC account

The Contractor shall manage the CCI and Crypto assets of the HADG System through use of one or more COMSEC accounts issued by the hosting Member State National Distribution Authority or National Security Authority. This/these account(s) shall be registered with the EU GNSS Distribution Authority.

HADGp2-SoW-7016 CCI and crypto asset management

The Contractor shall manage the CCI and Crypto assets of the Galileo System under its responsibility in accordance to the national legislation for protection of COMSEC GFR (EUCI), the requirements stipulated by the EU GNSS COMSEC Instructions and any other applicable documentation governing COMSEC management established by the National Security Authorities.

HADGp2-SoW-7017 Reception of CCI and crypto assets

The Contractor may receive EU GNSS CCI and Crypto assets with the associated Crypto inventory. The Contractor shall accept the custody of the CCI and Crypto assets upon verification performed by the Contractor

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of the completeness of the Crypto inventory as part of normal COMSEC accounting procedures for the transfer of COMSEC assets into the Contractor's COMSEC account(s).

HADGp2-SoW-7018 Contingency equipment restoration

The Contractor shall restore CRYPTO (GRCP) and CLA (NTW Equipment) on-site in case of key loss or reconfiguration.

7.7.3 Cyber security

HADGp2-SoW-7019 Cyber Security

The Contractor shall implement applicable Cyber Security requirements, as per the Applicable Documents as per CISL (Annex I to this SoW) and this SoW.

HADGp2-SoW-7020 Key personnel for cyber security

The Security Management Plan shall identify CSM and CIA for its organization and for sub-contractors, and associated curriculum vitae.

HADGp2-SoW-7021 Technical Solution

The Security Management Plan HADGp2-DD-SA01 shall describe how the applicable Security and Cybersecurity Technical Specifications in CISL (Annex I to this SoW) shall be implemented.

The deliverable documentation shall answer to the following aspects (according to Cybersecurity requirements for Management HADGp2-AD-SA12.

- Compliance reporting strategy;
- Cybersecurity assurance for subcontractors;
- Cybersecurity Training and awareness;
- Cybersecurity audit strategy and plan;

Proposal for infrastructure development (according Cybersecurity requirements for service infrastructure HADGp2-AD-SA13) shall provide details at least on following aspects:

- Network map management;
- Vulnerability Management;
- Patch Management;
- Obsolescence management;
- Infrastructure Acceptance Audit;
- Infrastructure Security Hardening;
- Infrastructure Security Lock Down;
- Support to Incident response;

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Note: Be aware that the attribute called “component name” from “Network Map” template shall be identical with the one from the “Element Security Profiles for Provider” template. The Element Security Profiles for Provider shall be managed in the same way as the documents contained in the list above.

HADGp2-SoW-7022 Cyber Request for Waiver

For any non-compliances or partial-compliances to cyber requirements, and also for unresolved vulnerabilities (as per applicable cybersecurity requirements), a risk assessment shall be provided in the form of a Cyber Request for Waiver (as a particular case of HADGp2-DD-PA14).

Cyber Request for Waivers shall be provided as soon as the relevant non-compliance or vulnerability is identified. Only requests for waivers resulting from exceptional circumstances can be submitted and must have to be duly justified, for the Contracting Authority’s assessment, which will decide whether accept or not the waiver at its own discretion. In case of rejection, the Contractor shall have to ensure compliance to the relevant cyber requirement.

HADGp2-SoW-7023 Cyber Request for Waiver content

A cyber request for waiver shall include at least (as a particular case of HADGp2-DD-PA14):

- The justification for the statement of partial or non-compliance to a cyber requirement;
- An assessment of the security risks resulting from the partial or non-compliance to a cyber-requirement;
    - the description of the task(s), including impact in terms of schedule, budget and service provision, required to:
        - recover the compliance to the concerned cyber requirement;
        - mitigate the assessed risk;
        - identify potential attacks scenarios that may benefit from the partial or non-compliance to the concerned cyber requirement;
    - A recommended way forward (e.g. operational mitigations);
        - The justification for the recommendation;
- Validity date of the RFW (typically current HADG release or with recovery plan as part of a corrective release).

HADGp2-SoW-7024 Infrastructure hardening

The Contractor shall perform infrastructure hardening following general and COTS-specific guidelines. The guideline to be implemented in order of preference are the following:

1. National Security Authority guidelines (from EU countries) or other EU guidelines;
2. Guidelines from trusted third parties such as the COTS manufacturer;
3. Self-developed guidelines to be detailed.

HADGp2-SoW-7025 Hardening report

The Contractor shall provide a detailed list of the performed hardening activities, including the detailed list of guidelines applied. Any exceptions or deviations shall be detailed and justified.

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HADGp2-SoW-7026 Hardening evidence

The Contractor shall provide evidence for the applied system hardening.

7.7.4 Internal security audits

HADGp2-SoW-7027 Cyber-security audits

The Contractor shall provide the plans and corresponding reports as detailed in applicable cyber-security requirements as per CISL (Annex I). The plans shall be submitted to the Contracting Authority no later than two months before their execution, and shall require approval.

HADGp2-SoW-7028 Internal security audits/pen tests

The Contractor shall perform a security audit before QR in order to identify potential vulnerabilities. The timing of the audit shall be compatible with HADGp2-SoW-7029.

HADGp2-SoW-7029 Correction of internal security audit findings

The Contractor shall correct or mitigate the security findings, as per the approved correction plan, before QR.

7.7.5 Independent security audits

HADGp2-SoW-7030 Independent security audit(s)

The Contractor shall support the execution of independent security configuration audit(s)/penetration test campaign(s) by third parties designated by the Contracting Authority (on-site personnel). As a minimum this includes one independent pen-test campaign organized by EUSPA and a SADEP security configuration audit.

HADGp2-SoW-7031 Independent security audit(s) for the chain to be deployed in GSC the back-up site (Toulouse)

The Contractor shall support the execution of independent security configuration audit(s)/penetration test campaign(s) by third parties designated by the Contracting Authority (on-site personnel) in the GSC back up site. As a minimum this includes one independent pen-test campaign organized by EUSPA and a SADEP security configuration audit.

HADGp2-SoW-7032 Security findings correction plan

The Contractor shall provide the correction plan for security findings, no later than two weeks after the corresponding security report is delivered to the Contractor, which shall be updated as necessary (in particular after the independent audit). This plan shall require approval from the Contracting Authority.

HADGp2-SoW-7033 Correction of security audit findings

The Contractor shall correct or mitigate the security findings, as per the approved correction plan. The Contractor shall collect evidence of each correction. Should any findings require corrections to be performed after QR milestone but affecting the system qualification (e.g. due to new SW releases or redesign), the Contractor shall requalify the system, including a verification campaign of the affected functionalities and non-regression tests. The Contractor shall be fully responsible for these corrections, i.e. in terms of cost and schedule.

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Note: The Contractor shall provide the evidences that the HADG P2 infrastructure HW/SW/CONF in GSC prime or back up sites are identical. Should any deviation be present, this shall be justified and approved by the Contracting Authority.

7.7.6 Accreditation

HADGp2-SoW-7034 Security Accreditation Tasks

The Contractor shall perform all the necessary security activities as defined in the applicable accreditation documents (see CISL, Annex I to this SoW).

Note: an estimated timeline for the accreditation milestones is provided in Appendix A.

For avoidance of doubt, this includes both prime and backup sites.

HADGp2-SoW-7035 Security Risk Analysis

The Contractor shall provide the following information related to the security risk management process:

a. threat and vulnerability identification,

b. risk assessment,

c. risk treatment.

The risk assessment and the risk treatment shall prove that a sufficient level of protection of the equipment handling EUCI, and of the EUCI handled in it, has been achieved.

HADGp2-SoW-7036 Threats Scenario Coverage

The Contractor shall provide a Threats Scenario Coverage as designed and as built according to the Threats Scenarios described in the System Security Plan Configuration FOC vol1B - Annex P documents listed in the CISL (HADGp2-AD-SA21).

HADGp2-SoW-7037 SAR Accreditation Data Package

The Contractor shall support the preparation of the SAR Accreditation Data Packages (for E-GSC main and backup sites) (ADP) providing all the requested information as specified in the Galileo Sites Local Security Accreditation Plan (HADGp2-AD-SA22).

In particular the Contractor shall provide at least the following deliverables as part of the CDR DP to support the SAR ADP:

- Inputs to local Security Plan (HADGp2-DD-SA05);
- Local SECOPS (HADGp2-DD-SA06);
- HW/SW inventory as-designed (HADGp2-DD-CD11);
- Lockdown report as-designed (HADGp2-DD-CS13).

The Contractor shall also analyse if inputs to other SAR ADP documents are relevant and provide them. The Contractor shall also support the Contracting Authority with these inputs upon request from the Contracting Authority.

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HADGp2-SoW-7038 Equipment installation after SAR

The Contractor shall perform equipment installation on-sites after SAR, in accordance with Galileo Sites Local Security Accreditation Plan (HADGp2-AD-SA22).

HADGp2-SoW-7039 VAL SAM Accreditation Data Package

The Contractor shall deliver the Installation Reports HADGp2-DD-EN09 and updated issues of any of the SAR ADP documents to support the VAL SAM ADPs, in accordance with the Galileo Sites Local Security Accreditation Plan (HADGp2-AD-SA22).

HADGp2-SoW-7040 Connection to VAL

The Contractor shall perform the connection to VAL chain no earlier than the VAL SATO is issued, in accordance with the Galileo Sites Local Security Accreditation Plan (HADGp2-AD-SA22).

HADGp2-SoW-7041 OPE SAM Accreditation Data Package

The Contractor shall deliver the qualification and operational validation reports, VCDs, and updated issues of any of the SAR and VAL SAM ADP documents —in particular Lockdown Report HADGp2-DD-CS13— to support the OPE SAM ADPs, in accordance with the Galileo Sites Local Security Accreditation Plan (HADGp2-AD-SA22).

HADGp2-SoW-7042 Connection to OPE

The Contractor shall perform the connection to OPE chain no earlier than the OPE SATO and preATO are issued, in accordance with the Galileo Sites Local Security Accreditation Plan (HADGp2-AD-SA22).

HADGp2-SoW-7043 Operations of Accredited Equipment Handling EUCI

Any equipment handling EUCI shall be certified by the EU Council General Secretariat.

HADGp2-SoW-7044 Support to PreATO

The Contractor shall support the Contracting Authority in the achievement of the PreATO (preliminary Approval to Operate) accreditation milestones. This support includes, but is not limited to, the provision of the relevant evidences and associated support documents whenever requested, and the participation in the associated key point(s) and review(s) as necessary.

The Contractor shall provide all the information required to fulfil the objectives of the PreATO accreditation milestones in order to demonstrate to the Security Accreditation Board for the European GNSS (SAB):

- Compliance to the requirements set out in CISL (Annex I);
- That operational procedures are in place for the implementation of the requirements set out in CISL;
- SECOPS and corresponding VCD.

The PreATO is a pre-requisite for the AR, which will not be declared successful until the PreATO accreditation milestone is passed and the relevant PreATO accreditation is granted by the Security Accreditation Board (SAB).

HADGp2-SoW-7045 Impact of ARs/NCRs on security

The Contractor shall identify and assess the impact of Anomalies/Non-conformances on the compliance to applicable security requirements and perform the corresponding risk analyses.

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HADGp2-SoW-7046 Other SACP deliverables

The Contractor shall provide any other documentation required by the applicable accreditation documents in CISL, including potential inputs as required by the Contracting Authority for the accreditation processes.

HADGp2-SoW-7047 Support to the Maintenance of VAL System Accreditation

The Contractor shall support the Contracting Authority in the maintenance of the VAL System Accreditation. This support includes but is not limited to the provision of the relevant evidences and associated support documents whenever requested, and the participation in the associated key point(s) and review(s) as necessary.

7.8 WP#8: Maintenance Options

For the purposes of maintenance levels, the following definitions are used:

- 2nd Level (L2) of Maintenance: This consists of in-depth fault analysis and troubleshooting requiring large field of expertise and system knowledge to identify the root cause of the problem and determine the appropriate solution. It is performed on-site and beyond the scope of L1 maintenance as L2 generally assist OPS or L1 remotely but may be on-site if necessary. L2 can also execute dedicated L2 procedures as specified in the maintenance manual. It is relevant to maintenance activities requiring more specific/specialised skills and tools. L2 interventions on the deployed infrastructure can be conducted following existing L2 procedures. L2 Hardware maintenance includes tasks that are more complex, for example replacement of Shop Replaceable Units (SRUs), which are typically modules within LRUs. L2 Software maintenance requires engineering support skills as well as software familiarity. Some work is procedure-based, for example when dealing with private configuration files of elements.
- 3rd Level (L3) of Maintenance: This consists in actions encompassing one element or component modification to correct defects. This work is usually performed off-site at the L3 premises and requires a high level of expertise and/or industrial tools, but it might also foresee L3 on-site interventions. Level 3 maintenance activities include, but are not limited to, troubleshooting activities on source-code level as well as problem resolution for critical and urgent software/hardware anomalies.

Maintenance activities can be categorised as follows:

- Corrective Maintenance: Reactive handling and modification of a deployed HW/SW product performed to correct discovered problems. For SW it deals with fixing bugs in the code;
- Preventive maintenance: Handling and modification of a deployed HW/SW product to correct latent faults in the HW/SW product before becoming effective faults. It might include as well-planned activities required to keep the operability of the system, like cleaning DBs, performing Backups, restarting services, cleaning logs, replacing degraded HW, maintaining HW in good conditions (e.g. applying grease to mechanical parts) etc.

Corrective and preventive L2/L3 maintenance activities may be activated by the Contracting Authority subject to Option #1, #2, #3 and #5.1 (see section 9).

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7.9 WP#9: Engineering Support

HADGp2-SoW-9001 Scope of the support

On request by the Contracting Authority, the Contractor shall provide engineering support or perfective/adaptative maintenance activities as below defined. The scope of this support (on-site(s) and off-site) includes topics such as:

- Support to HAS service engineering activities (including evolution of applicable ICDs and potential impact on the HADG infrastructure for HAS Phase 2 and the HAS Phase 2 service);
- Technical analyses related to the provided service;
- Support to additional testing required by the Programme;
- Review of Programme documentation evolutions and/or production of DCPs (related to HAS);
- Adaptive and perfective maintenance activities, including resolution of obsolescence problems;
- Attendance to meetings related to any of the topics above;

For avoidance of doubt, the scope of this support WP excludes tasks already defined within this SoW and other technical specifications, i.e. any baseline activities shall not be quoted within this support WP.

NOTA BENE: the following definition applies:

- Adaptive maintenance: The adaptive maintenance is the modification of a HW/SW product performed after delivery to keep a product usable in a changed or changing environment. It deals with adapting the HW/SW to new environments.
- Perfective maintenance: The perfective maintenance is the modification of a HW/SW product after delivery to improve performance or maintainability. It deals with updating the HW/SW according to changes in user requirements.

HADGp2-SoW-9002 Technical Assistance effort envelope

The contractor shall provide either on-site or off-site engineering support services (maximum 500 man-days: 210 man-days on-site at GSC prime at Madrid, 40 man-days at GSC back up site at Toulouse, and 250 man-days off-site) at request of the Contracting Authority.

HADGp2-SoW-9003 Technical Assistance Descriptions

Before starting any of the activities, a Technical Assistance Description (TAD, HADGp2-DD-PM13) shall be defined by the Contractor based on the Contracting Authority's request providing, as a minimum, the description of the activity, its duration (start date, end date), the documents to be delivered, CFIs (if any), the type of activity, the estimated effort and the TAD manager.

The TAD shall be provided to the Contracting Authority within five working days upon its request. Once approved by the Customer, the related activity shall start.

At the end of the activity, the Contractor shall deliver a report (HADGp2-DD-PM14) containing as a minimum: a summary of the tasks performed, the actual effort spent and the total remaining effort over the initial amount of effort. Only the actual spent effort shall be paid if the maximum effort estimated in the TAD is not fully consumed. In no cases the actual effort can exceed maximum effort estimated in the TAD.

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HADGp2-SoW-9004 Reporting on support consumption

The Contractor shall provide the status of the consumptions of the effort in each Monthly progress report till AR/D-AR, and in the Quarterly Progress Reports after the AR/D-AR till EoC.

HADGp2-SoW-9005 Engineering Support invoicing, acceptance and payments

The Contractor shall provide related Engineering Support invoices on a Quarterly basis. Subject to the successful completion of the relevant TAD activities and reporting as described above in HADGp2-SoW-9003 and HADGp2-SoW-9004 the Agency shall accept the related engineering support activities in the different Progress Meetings. Payments related to TAD activities shall me made according to Section 5.6 of the Contract.

HADGp2-SoW-9006 Duration of the Engineering Support services

The Contractor shall provide the Engineering Support till the consumption of the agreed financial envelope for these activities or the end of the contract whichever is earlier.

8 Contractor deliverables and services

HADGp2-SoW-0030 Deliverable Hardware and Software

The Contractor shall deliver hardware and software as per dates and destination in DRL (Annex II to this SoW).

Should the performance of the tasks under this SoW requires the production of additional items not listed in DRL, these items shall also be considered Deliverable Items by default.

HADGp2-SoW-0031 Documentation Supplied by the Contractor

The Contractor shall deliver the documentation as defined in the DRL (Annex II to this SoW) in line with the guidelines defined in the DCG (Annex III to this SoW) and the requirements specified in this document. The Contractor shall perform the deliveries as per Delivery Rules HADGp2-AD-PA02.

In case the performance of the tasks under this SoW requires the production of additional documentation not listed in DRL, it shall also be considered a deliverable document by default.

The Contractor is invited to propose optimisation of deliverables' list, e.g. merging documents, as long as the full information required by applicable documentation and full traceability is provided (in particular this SoW and DCG) is provided, and if approved by the Contracting Authority.

HADGp2-SoW-0032 Operations and maintenance tools

Any tool, including HW and SW items, that is necessary for the execution of operations or maintenance activities by the Galileo Service Operator, as per the corresponding IOM manual (HADGp2-DD-OP09), shall be a deliverable item. This includes IT equipment assumed by the maintenance procedures, e.g. laptop with any necessary SW tools.

HADGp2-SoW-0033 Other deliverables

Any hardware, software, document, service or data developed or generated under the Contract shall be by default a deliverable item, whether or not included in DRL, in particular including any item necessary to fulfil the tasks described in this SoW.

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HADGp2-SoW-0034 R-UE/EU-R deliveries

The Contractor shall be able to transmit EUCI up to R-UE/EU-R by electronic means protected by cryptographic product using Spider Network according related CONOPS and SECOPS (HADGp2-AD-SA02 and HADGp2-AD-SA03).

HADGp2-SoW-0035 ITAR/EAR

The Contractor's deliverables shall be ITAR/EAR free, with no ITAR and EAR restrictions.

9 Options

9.1 Option #1: Maintenance

HADGp2-SoW-10001 Scope of the HADG maintenance

HADG maintenance shall cover L2 and L3 corrective and preventive maintenance tasks, including fixing of security issues as per the corresponding cyber-security requirements (in particular HADGp2-AD-SA-14). This includes by way of example and without limitation to the mandatory provision of law:

- Defects in material and defects due to workmanship regardless of the origin of the material,
- Defects due to the design, including defects resulting from the choice of material and/or components,
- Defects in the manufacturing or SW development/qualification processes,
- Unstable performance.

HADGp2-SoW-10002 Maintenance duration

The Contractor shall provide maintenance for all delivered HADG infrastructure for a period of one year starting from successful Acceptance Review.

Note: this period may be extended as per contractual option in section 9.2.

HADGp2-SoW-10003 Maintenance Report

The Contractor shall deliver at the end of every period of six months during the maintenance duration (including potential activation of option in section 9.2) a Maintenance Report.

The Maintenance Report shall list the activities performed in the scope of the maintenance, timeline, KPIs of the activities (with evidence) and open issues at the end of the period.

HADGp2-SoW-10004 Maintenance Review(s)

In the Maintenance Reviews (MR), the Contracting Authority shall evaluate the performance of the Contractor for what concerns the timely resolution of NCRs, anomalies and vulnerabilities under maintenance in accordance with the applicable KPI regime (Annex IV to this SoW).

The Maintenance Reviews shall take place after delivery of each Maintenance Report for the corresponding reporting period.

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Table 2 – Milestone reviews and payment plan linked to option 1

MPP ID	Milestone	Timeline	Prerequisites	Objectives	Payment
MS008	Maintenance Review 1	T0 + 25 months		HADGp2-SoW-0025	40% of maintenance option cost
MS009	Maintenance Review 2	T0 + 31 months		HADGp2-SoW-0025	60 % of maintenance option cost

HADGp2-SoW-10005 Shipment of Defected/Repaired Items

The maintenance shall cover all travel expenses, packing and transport charges incurred in connection with the repair and all licence fees.

HADGp2-SoW-10006 Spares maintenance

The Contractor shall replenish and maintain all the spares holdings until the end of maintenance, to ensure the spares holdings are at their baseline levels to support system availability in the service delivery.

HADGp2-SoW-10007 Spares replenishment

The Contractor shall undertake to replenish the on-site spares holding, when required, with a lead time of 5 working days maximum.

HADGp2-SoW-10008 Interface with the operator

For what concerns the analysis, discussion, and resolution of issues in the scope of the maintenance, the Contractor shall exchange information with the Galileo Service Operator as needed. This includes the use of adequate tools and procedures for efficient communication.

HADGp2-SoW-10009 Participation in EUSPA CRB

The Contractor shall provide support the Cybersecurity Review Board as per applicable Terms of References (HADGp2-AD-SA19), including the attendance to the periodic meetings (typically monthly, in GSMC Spain or other location), providing technical expertise as L2/L3 maintainer, responding actions, etc.

9.1.1 Maintenance KPI

HADGp2-SoW-10010 KPI regime

The Contractor shall execute the identified activities according to the KPI regime (Annex IV to this SoW), parameters and rules defined in the Contract (including its annexes).

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HADGp2-SoW-10011 KPI Monitoring and Management Plan

The Contractor shall maintain and implement a "KPI Monitoring and Management Plan" (HADGp2-DD-OP13) that describes the methods for system data collection, analysis, recording and reporting of all KPIs within the scope of the contract.

HADGp2-SoW-10012 KPI reporting

The contractor, upon start of the execution of the activities under KPI regime, shall provide performance reports containing requested KPI information including an analysis of the current KPI results (HADGp2-DD-OP14).

9.2 Option #2: Maintenance extension

HADGp2-SoW-10013 6 Optional extensions of maintenance

The Contractor shall be available for extending the maintenance activities in up to six sequential periods of six months each after the end of the first optional maintenance period specified in 9.1. The Contracting Authority may request the activation of this option (for each six-month period) no later than 14 days before the start of each period.

The scope of the activities shall be as described in section 9.1.

Each extension (if activated) shall conclude with a Maintenance Review, which shall release the payment for the value of the option if successful. It is noted that liquidated damages may be deducted as per KPI regime (Annex IV to this SoW).

9.3 Option #3: On call L2 support

Definitions of critical events and non-critical events:

- **Critical events**: A Critical event is an event causing impact in the HAS service (SIS/Ground) provision within the HADG perimeter. The impact shall be directly traced to:
    - Availability degradation: a degradation in the number of corrected satellites losing at least 50% of the available satellites for more than 60 minutes (two ODTS executions) with no identified root cause (e.g.: lack of input data).
    - Performance degradation: a degradation (at least 30%) in the performance with respect to the HAS Corrections Accuracy MPL for a period of more than 24 hours.

  Normally, if these events should be directly traced to an anomaly classified as CAT-1 or CAT-2 with service impact when treated at ARB level.
- **Non-critical events:** Events not causing unavailability or detrimental degradation on the performances are not considered critical events.

The execution of these options is subject to KPI evaluation as per KPI regime (Annex IV to this SoW).

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9.3.1 Option #3.1: On call L2 support during the HADG service monitoring

HADGp2-SoW-10014 On call L2 support during the HADG service monitoring

The Contractor shall provide an on-call support (available 24x7) for urgent technical assistance and interventions during the HADG service monitoring according to the following response times:

Table 3.- On call L2 response time

Intervention level	Acknowledgment	Work-Around[1]	Patch (if required)	Fix
Critical event	1 hour	12 hours	Subject to maintenance options	Subject to maintenance options
Non-Critical event	24 hours (8x5 office hours)	5 working days	Subject to maintenance options	Subject to maintenance options

9.3.2 Option #3.2: On call L2 support during the HADG 12 months maintenance

HADGp2-SoW-10015 On call L2 support during the HADG maintenance in Option #1

The Contractor shall provide an on-call service (available 24x7) for urgent technical assistance and interventions during the HADG maintenance in Option #1 according to the response times described in Table 3.

9.3.3 Option #3.3: On call L2 support during optional extensions of maintenance

HADGp2-SoW-10016 On call L2 support during optional extensions of maintenance

The Contractor shall provide an on-call service (available 24x7) for urgent technical assistance and interventions (on call L2 support) during the HADG optional extensions of maintenance (i.e. this option can be activated six times) according to the response times described in Table 3.

9.4 Option #4: Engineering Support Extension

HADGp2-SoW-10017 Engineering Support Extension

The Contractor shall provide additional Engineering Support (see 7.9) for a total effort of 500 Man-days (160 Man-days on-site at GSC prime at Madrid, 40 Man-days at GSC back up site at Toulouse, and 300 Man-days off-site) for support services in a period of 22 months.

[1] Including implementation of the work-around, unless not possible due to ARB/CCB processes, in which case at least the identification and submission of the work-around is necessary.

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The Contracting Authority may request the activation of this option no later than 1 month before the start of the provision of the Engineering Support extension.

Note: In case of activation, the use of the Engineering Support extension will be driven in the same manner than in baseline WP 9.

9.5 Option #5: Additional HADG unit at back up site

HADGp2-SoW-10018 Provision of an additional HADG unit at back up site

The Contractor shall provide and deploy an additional qualified and capable of being integrated with external elements HADG unit at the GSC back up site.

The Contracting Authority may request the activation of this option no later than 1 month before the End of Contract.

Note: This additional chain shall be a replica of the HADG unit deployed in the GSC main site as part of baseline contract activities consequently the same requirements are applicable

HADGp2-SoW-10019 Schedule for the provision of an additional HADG unit at back up site.

Table 4 - Option #5 schedule and payment plan

MPP ID	Milestone	Timeline	Prerequisites	Objectives	Payment
OPT#5: MS001	Option #5: Kick-Off Meeting (KOM)	T0	HADGp2-SoW-0009	HADGp2-SoW-0010	25%
OPT#5: MS002	Option #5: Qualification Review (QR)	T0 + 5 months	HADGp2-SoW-0017	HADGp2-SoW-0018	50%
OPT#5: MS003	Option #5: Acceptance Review (AR)	T0 + 8 months	HADGp2-SoW-0021	HADGp2-SoW-0022	25%

9.5.1 Option #5.1: Maintenance extension

HADGp2-SoW-10020 6 Optional extensions of maintenance

The Contractor shall be available for proving the maintenance activities for the additional unit to be deployed at the GSC back up site in up to six sequential periods of six months each (without extending the contract further than baseline or other activated options). The Contracting Authority may request the activation of this option (for each six-month period) no later than 14 days before the start of each period.

The scope of the activities shall be as described in section 9.1.

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Each extension (if activated) shall conclude with a Maintenance Review, which shall release the payment for the value of the option if successful. It is noted that liquidated damages may be deducted as per KPI regime (Annex IV to this SoW).

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Appendix A Estimated accreditation timeline

Considering the Contract milestones timeline specified in HADGp2-SoW-0008 and the applicable accreditation processes (in particular HADGp2-AD-SA22 and HADGp2-AD-SA24), the Contractor shall consider the following estimated (non-binding) timeline for the corresponding accreditation milestones and events.

Table 5 - Estimated accreditation timeline for the HADG units to be deployed at the GSC prime site

Event	Estimated timeline	Comment
CDR	T0 + 6 months	
Delta-SAR Accreditation DP	T0 + 6.5 months	Documents part of this DP should be provided in CDR DP.
Delta-SAR	T0 + 7.5 months	
LSAA certificate	T0 + 8.5 months	Enables installation of equipment on site
Delta-VAL SAM Accreditation DP	T0 + 9.5 months	After equipment installation
Delta-VAL SAM	T0 + 9.6 months	
VAL SATO certificate	T0 + 10 months	Enables connection to VAL
QR	T0 + 12 months	
Delta-OPE SAM Accreditation DP	T0 + 14.25 months	
Delta-OPE SAM	T0 + 15.25 months	
PreATO, OPE SATO certificate	T0 + 16.5 months	Enables connection to OPE
AR	T0 + 19 months	

Note: The Contractor shall support as well the same accreditation related milestones for the back-up chain deployed in the GSC back up site.

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End of Document

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