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SOFTWARE DEVELOPMENT PLAN FOR HMA FOLLOW ON TASK 4 – ORDER

SUMMARY

The current plan is a constituent of management of the management file (MGT). Its purpose is to describe the established management and development approach for the software items to be defined by a software supplier to set up a software project in accordance with the customer requirements.

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1 INTRODUCTION

This document provides the Software Development Plan for the HMA Follow On Task 4 – Order , giving general information about Management procedures put in place in the SW Engineering domain.

HMA Follow On Task 4 – Order deals with the following topics:

- Evolution of the HMA Ordering ICD 06-141 with respect to inputs coming from the companion HMA Programming ICD 07-018 specification. Pushing the specification through the OGC standardization process via the establishment of a dedicated OGC Standard Working Group.
- Supporting the standardization process by setting-up the procedures for verifying the compliance of order server implementations with respect to the specification.
- Setting-up an order server to use as a reference for the other implementations.
- The information provided in this document is compliant with the requirements specified in ECSS-E-ST-40C standard and as tailored in chapter 5.6 Standard tailoring traceability .

2 APPLICABLE AND REFERENCE DOCUMENTS

The following table provide list of applicable documents:

Id.	Title	Reference	Issue	Date
[AD-1]	HMA Follow on activities SOW	SGSE-DFPR-EOPG-SW-08-0001	1.2	Nov 2009
[AD-2]	Proposal for HMA Follow On Task 4 - Order		1.0	13 Mar 2009
[AD-3]	Space Engineering Software	ECSS-E-ST-40C	-	06 Mar 2009
[AD-4]	Technical Committee Policies and Procedures	OGC 05-020r10	3.0	21 Aug 2007
[AD-5]	Software Product Assurance Plan for HMA Follow On Task 4 – Order	P-P50638/DSAQUD-3046-09/00	1.0	20 Nov 2009

Table 2-1: Applicable documents



The following table provide list of reference documents:

Id.	Title	Reference	Issue	Date
[RD-1]	Reference Model of Open Distributed Processing	ISO/IEC 10746	-	1988
[RD-2]	Ordering Services for Earth Observation Products	OGC 06-141	0.9.4	05 Sep 2008
[RD-3]	OpenGIS® Sensor Planning Service Application Profile for EO Sensors	OGC 07-018	0.9.5	19 Nov 2007
[RD-4]	OGC™ Catalogue Services Specification 2.0 Extension Package for ebRIM Application Profile: Earth Observation Products	OGC 06-131	0.2.4	07 Apr 2009
[RD-5]	OpenGIS® Sensor Web Enablement Architecture Document	OGC 06-021r1	1.0	04 Mar 2006
[RD-6]	User Management Interfaces for Earth Observation Services	OGC 07-118r1	0.0.4	30 Jun 2009
[RD-7]	Earthnet Online Xml Front-End: Order And On-Line Access Extension Interface Control Document	EOLI/Order-XML-ICD	3.4	07 Apr 2008
[RD-8]	Earthnet Online Xml Front-End Interface Control Document	EOLI-XML-006-ICD	2.8	21 Jan 2008
[RD-9]	RFC Submission Process: FAQ, Guidelines and Timeline	OGC 06-065r5	2.3	05 Sep 2009

Table 2-2: Reference Documents.

3 TERMS, DEFINITIONS AND ABBREVIATIONS TERMS

Acronyms	Meaning
AR	Acceptance Review
COTS	Commercial Off-the-shelf
CR	Change Request
DSM	Distributed Service Manager
ECSS	European Cooperation for Space Standardization
EO	Earth Observation



Acronyms	Meaning
EOFC	Earth Observation Frame Contract
ESA	European Space Agency
FP	Final Presentation
HMA	Heterogeneous Mission Accessibility
HMA-I	Heterogeneous Mission Accessibility - Interoperability
HW	Hardware
ICD	Interface Control Document
IDS	Inventory Data Server
IP Report	Interoperability Program Report
MoM	Minute of Meeting
MTR	Mid Term Review
MUIS	Multi Mission User Information Services
NCR	Non Conformance Report
OAB	OGC Architecture Board
OGC	Open Geospatial Consortium, Inc.
ORR	Operational Readiness Review
OSAT	On-Site Acceptance Test
OS EO	Ordering Service for Earth Observation Products
PR	Preliminary Review
RFC	Request for Comment
SDP	Software Development Plan
SOW	Statement Of Work
SPA	Software Product Assurance
SPAP	Software Product Assurance Plan
SPS EO	Sensor Planning Service Application Profile for Earth Observation Products
SVTS	System Validation Testing Specification
SW	Software
SWG	Standards Working Group
TBC	To Be Confirmed
TBD	To Be Defined

Table 3-1: List of acronyms.



4 SOFTWARE PROJECT MANAGEMENT APPROACH

4.1 Managements objectives and priorities

The objective of HMA Follow On Task 4 - Order is to continue the work initiated with HMA-I study and carried on with HMA-T, DAIL Implementation and HMA-E projects in order to:

- Keep aligned the HMA Ordering specifications with respect to the evolution on OGC SPS and SWE Common specifications.
- Update as well the order servers set-up in the prototype activities of HMA-I and in the integration activities of HMA-E.
- Allow a wider adoption of the ordering specification making available as open source the order server code.
- Push the order specification through the OGC standardization process.
- Take into account possible new requirements from GSC Data Access activities involving the Ordering process.

4.2 Master schedule

This section presents the project schedule including:

- Time span of significant activities;
- Dates of progress meetings;
- Dates of review meetings;
- Final Presentation date;
- Other milestones;



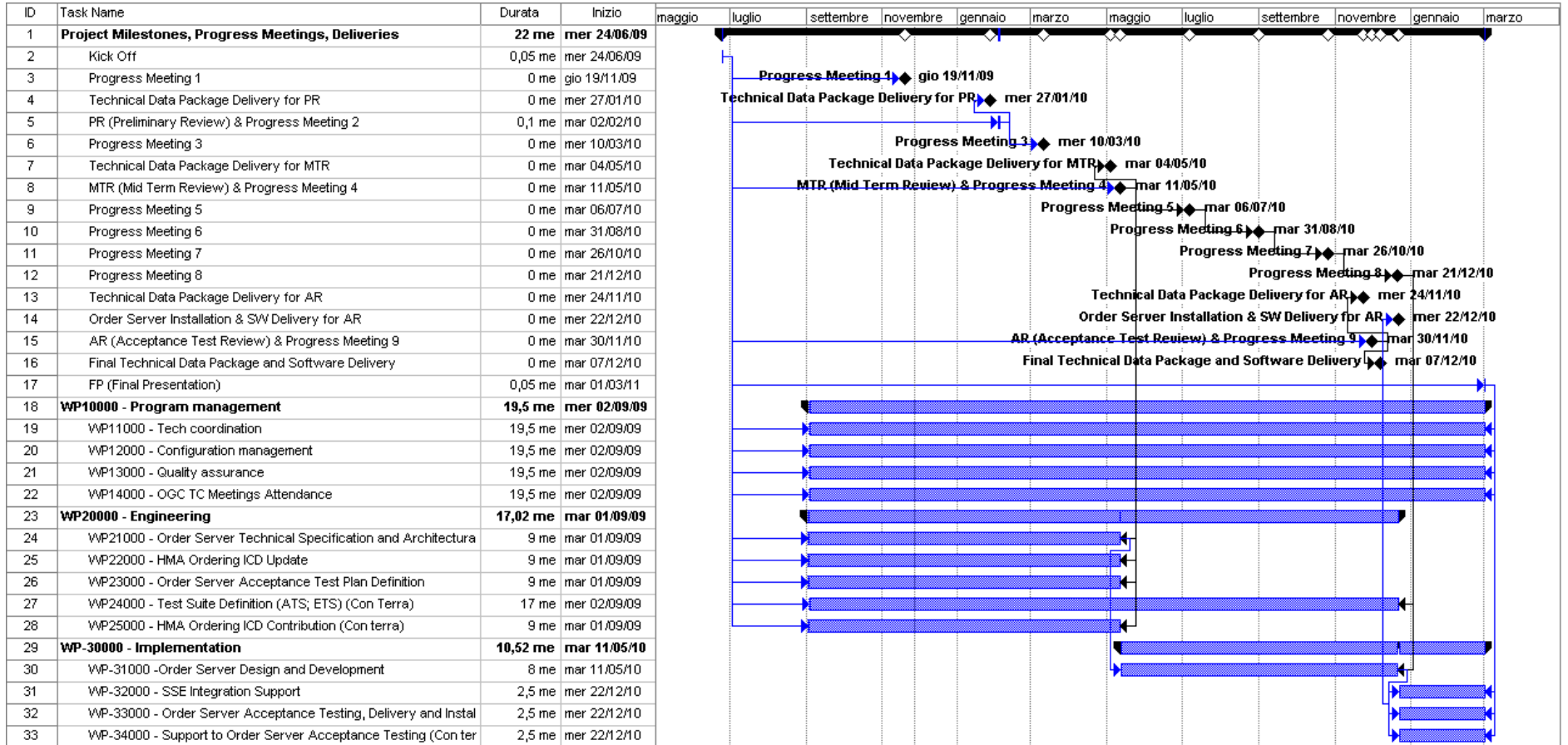


Figure 4-1. HMA Follow On Task 4 - Order - Planning



4.3 Relations with other projects

HMA Follow On is part of the thread of HMA projects:

- HMA-I
- HMA-T
- DAIL Implementation Project
- HMA-E

Hereafter a brief introduction of the listed projects is provided:

4.3.1 HMA-I

Heterogeneous Mission Accessibility – Interoperability (HMA-I) project has defined the interoperability framework and architecture for the operational provision of the necessary data for the GMES Services from National and Eumetsat missions. In the framework of the HMA-I project, the Agency has defined, in collaboration with the “GMES contribution missions”, the ground segment architecture and interoperability standards for an across-missions harmonised data access, including data quality and product formats. The GMES ground segment architecture has been conceived to integrate these missions from the beginning, so that they can be used for GMES objectives within the limitations of their availability outside their national/Eumetsat obligations.

In the frame of HMA-I the following specifications have been prepared:

- OGC 06-131 OGCT[™] Catalogue Services Specification 2.0 - EO Products Extension Package for ebRIM (ISO/TS 15000-3) Profile of CSW 2.0.
- OGC 06-080r2 GML Application Schema for EO products.
- OGC 06-141r1 Ordering Services for Earth Observation Products.
- OGC 07-018r1 Sensor Planning Service Profile for Earth Observation Sensors.
- OGC 07-118 OGCT[™] User Management Interfaces For Earth Observation Services.

Additionally several prototypes have been implemented:

DAIL prototype: the prototype of the operational system going to be implemented in the frame of DAIL implementation project

ESA GS Prototype: the prototype of HMA interfaces implemented via translation towards EOLI XML (i.e. the first version of OPGW).

4.3.2 HMA-T

The HMA Testbed – HMA-T ESA project has been established in order to:

- Permit consolidation/evolution of HMA standards in parallel with DAIL implementation.
- Permit conformance testing of HMA standards.
- Support take-up of standards by European users and software developers.
- Permanent testbed based on SOA architecture, located at ESRIN.

4.3.3 EO Data Access Integration Layer - DAIL Implementation Project

The aim of this work is to implement and prepare for operation the EO Data Access Integration Layer (EO DAIL) of the future European Earth Observation Ground Segment (G/S). This layer will provide a harmonized interface between the GMES Service Users and the EO data providers. The EO DAIL will allow a user to communicate with the GSs of several missions through a single set of interfaces.



4.3.4 HMA Implementation for ESA G/S (HMA-E)

The aim of this project is to replace the currently operational User Services with new components in line with the SOA approach and compliant with the specification defined in the frame of HMA-I project.

4.4 Assumptions, dependencies and constraints

This section describes the assumptions made for performing the described work:

- ESA GS User Services installations (reference, operational and back-up platforms) will be available on the ESA ODAD network and will be reachable from the VPN network set-up at Elsig Datamat premises up to the end of this project, so even beyond EO FC Phase 5 end (31/07/2010).
- Any updates needed to SSE system for complying with the updated HMA Ordering specification will be performed outside of this project. The integration activities that will be carried out in the frame of this project (WP-32000) do not include any update to the SSE system.

4.5 Work breakdown structure

This section lists the activities to be performed in order to develop the configuration item. The Work Breakdown Structure to cover the above activities is given in the table below (light yellow **Elsag Datamat** work-packages; in orange '**con terra**' work-packages):

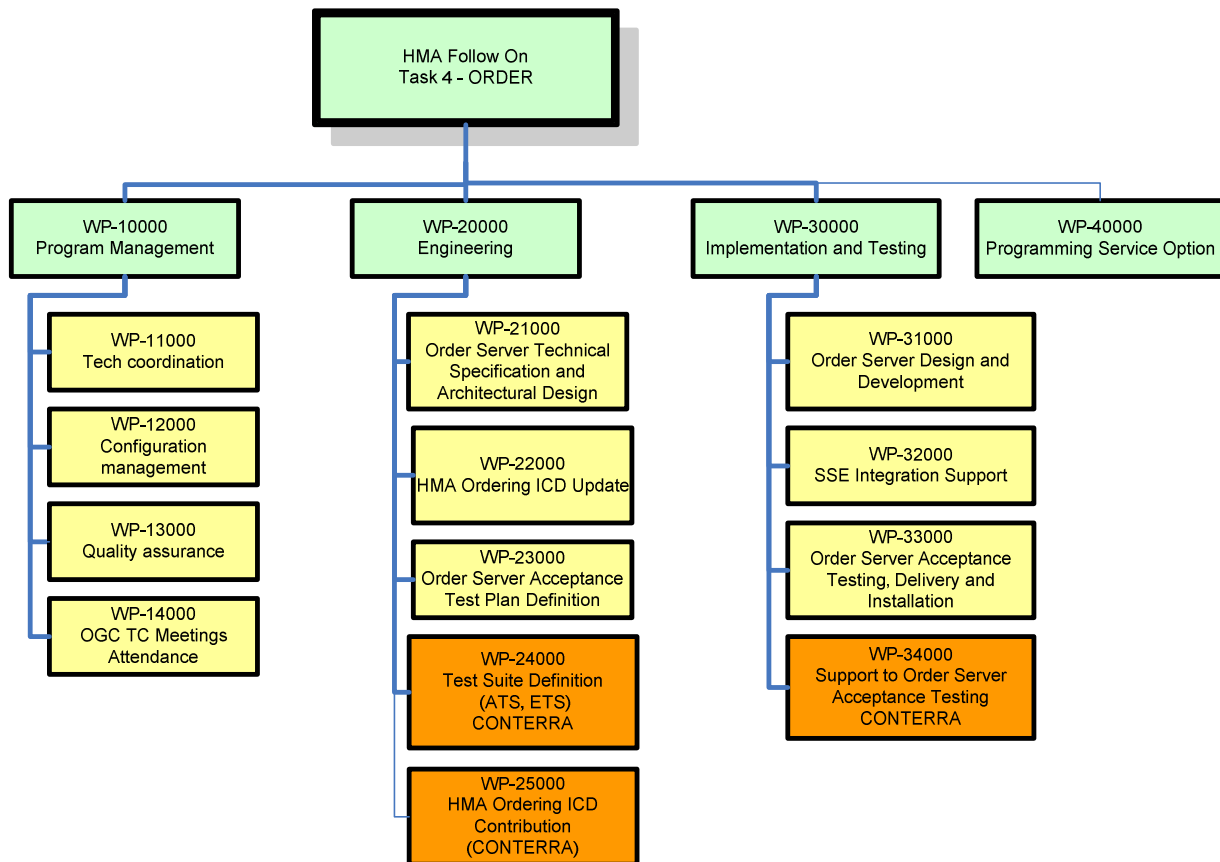


Figure 4-2: WBS for HMA Follow On Task 4 - Order



Following a description of work packages description.

– **WP-10000 Project Management**

WP 10000 represents the Program Management and is fully under Elsag Datamat responsibility. It includes technical coordination, configuration management, quality assurance and OGC TC meetings attendance.

– **WP-11000 Technical coordination (ED)**

Outputs: Software Development Plan (SDP), Progress Reports, Minutes of Meetings, Project Executive Summary

– **WP-12000 Configuration Management (ED)**

Output: Configuration Item Data List

– **WP-13000 Quality Assurance (ED)**

Output: Software Product Assurance Plan, management of RIDs, management of NCRs

– **WP-14000 OGC TC Meetings Attendance (ED)**

Participate to 2 Open Geospatial Consortium Technical Committee meetings in Europe.

Define, set-up and manage a new OGC Specification Working Group (SWG) dedicated to the OGC 06-141:

- Write the ad hoc charter
- Launch within the OGC & HMA communities the SWG
- Manage the SWG
- Lead the SWG
- Prepare and attend to SWG teleconferences monthly
- Attend to SWG meetings during OGC TC meetings

– **WP-20000 Engineering**

WP 20000 represents the Engineering activities and includes HMA Ordering ICD Update (ED, with 'con terra' support), Order Server Technical Specification, Architectural Design and Test Plan (ED), Test Suite Definition ('con terra')

– **WP-20000 HMA Ordering ICD Update (ED)**

The aim is the maintenance of the OGC 06-141 for taking into account new requirements (e.g. Alignment with the latest version of SWE Common, alignment with the SPS EO)

Outputs: updated HMA Ordering ICD and posting to the OGC Web Site

– **WP-21000 Order Server Technical Specification and Architectural Design (ED)**

The aim is the definition of requirements and architecture of the reference Order Server in charge of demonstrating the updated OGC 06-141 specification.

Outputs: Order Server Requirements Baseline, Operation Manual, Architecture Design

– **WP-23000 Order Server Acceptance Test Plan Definition (ED)**



The aim is the definition of test designs, test cases, test procedures for validating the Reference Order Server.

Outputs: Order Server Acceptance Test Plan, Traceability of Acceptance tests to Requirements Baseline, Order Server Installation Plan

- **WP-24000 Test Suite Definition (ATS, ETS) ('con terra')**

The aim is the Preparation of the Abstract Test Suite (ATS) for verifying the compliance with respect to the OGC 06-141 and the preparation of the Executable Test Suite (ETS) based on TEAM Engine for actually testing an Ordering server

Outputs: HMA Order ICD Test Suite Technical Note containing ATS and ETS, RIDs on HMA Ordering ICD

- **WP-25000 HMA Ordering ICD Contribution ('con terra')**

The aim is the review of the updated OGC 06-141 exploiting the knowledge of ISO & OGC standards of 'con terra' and the support to the management of the Ordering SWG to be defined in the frame of WP-14000.

Outputs: Review list of HMA Ordering ICD

- **WP-30000 Implementation & Testing**

WP 30000 represents the Order Server implementation and testing (ED, with 'con terra' support).

- **WP-31000 Order Server Design and Development (ED)**

The aim is the design, the development and unit test of the Reference Order Server.

Outputs: Order Server unit tested, SPRs reports

- **WP-32000 SSE Integration Support (ED)**

The aim is the support to the SSE team for adding the Order Server to the list of Service Providers of SSE portal.

- **WP-33000 Order Server Acceptance Testing (ED)**

The aim is the installation the Reference Order Server to ESA premises, the execution of Order Server acceptance tests and the fixing possible bugs.

Outputs: Order Server Acceptance Test Reports, Software Delivery

- **WP-34000 Support to Order Server Acceptance Testing ('con terra')**

The aim is the execution of ETS against the Order Server

Outputs: HMA Order ICD test Suite technical Note containing plan and report of the tests executed with the TEAM engine

4.6 Risk management

4.6.1 Risk Register and Mitigation

The definition of a risk management approach is part of the duties of the Project Manager. The analysis of the activities to be carried out in the current framework allows the identification of some risks potentially jeopardising the achievement of project goals.

The management of risks related to the present project is carried out by the Project Manager with the accomplishment of the following activities:

- Risk Identification



- Risk Estimation
- Definition of Risk Mitigation activities
- Definition of Risk Ownership, Monitoring and Reporting

These activities are briefly described hereinafter.

4.6.1.1 Risk Identification

To identify possible future events, give them an identifier and a description, assign to the risk a corresponding class (project management, product definition, product specification, development process, organization). A risk form shall be used to host the risk description and relevant attributes (likelihood, impacts...) as well as the track of the project events that have influence on the risk assessment.

Each identified risk refers only to a class type, nevertheless it has to be noticed that the same cause can originate different risks (within the frame of the above provided classification).

Risk Class	Characterisation
Project Management	Likelihood of failure to meet Project milestones
Product Definition	Likelihood of failure to meet Product Definition
Product Specification	Likelihood of failure to meet Product Specifications
Development Process	Likelihood of failure during the Implementation of development process (WBS)
Organisation	Likelihood of failure for management of project organisation (OBS)

Table 4-1: Risk Class

The risk identification activity is not bounded at the beginning of the project life. Each time a new risk is detected, it shall be managed (identified, assessed...). Nevertheless, the biggest effort has to be put at the beginning in order to anticipate, as far as possible, the monitoring of possible risks and plan, if the case, mitigation actions.

4.6.1.2 Risk Estimation

This risk estimation is carried out on the basis of the likelihood of concerned events and the relevant impact on the project in terms of costs. Risk likelihood has been estimated considering three possible values, namely: low, medium and high. In the same manner the impact evaluation related to each risk has been estimated.

The exploitation of the performed estimations is described following the criteria depicted hereinafter. Each risk is referenced within a table having as rows the risk likelihood and as columns the possible impact on the project.



impact ↑	high	1	2	3
	medium	0	1	2
	low	0	0	1
		low	medium	high
		likelihood →		

Figure 4-3: Risk Level Matrix

In the table is reported the risk level for each case.

- Level 0: for these risks, no action is required. They are just included in the risk form folder and reviewed by the Project Manager to check possible variation of its estimations
- Level 1: an owner is appointed which is in charge of monitoring the risk evolution and reporting to the Project Manager
- Level 2: like level 1 plus definition of specific mitigation actions. These actions are defined by the Project Manager who identifies also possible trigger events to start them. The owner monitors the risks and these trigger events
- Level 3: planned mitigation actions are timely started. The risk is in charge of the Project Manager who closely follows-up the effectiveness of the in-progress mitigation actions

4.6.1.3 Risk Mitigation Activities

Mitigation activities are meant actions undertaken at management level to smooth the impacts of events identified as risks. They should be planned for level 2 and level 3 risks and their description will be provided within the risk forms.

The Project Manager shall manage a Critical Issues Status List tracing the evolution of the status of each risk identified, as part of the progress report.

4.6.1.4 Risk Ownership, Monitoring and Reporting

Each identified risk shall have an owner, which is responsible for its monitoring and reporting.

The Project Manager shall identify the proper owner (itself included) for all the risks that have been identified with level 1 and 2. Level 0 risks do not have owner, level 3 ones are managed directly by the Project Manager.

4.7 Monitoring and controlling mechanisms

Monitoring mechanisms are required for managing the present project. Together with the reviews and relevant meetings, monitoring and control mechanisms are used for the following reasons:

- progress and schedules need to be regularly monitored against plan, both in terms of achievement to date and estimates for the future.



- requirements need to be actively managed to ensure that the volume of work and schedules do not creep upwards as a result of gradual unmanaged expansion of requirements
- risks need to be actively managed to ensure that the risks are controlled and mitigated where possible
- the subcontractor needs to be carefully managed, and this will be achieved through monthly progress reports issued by 'con terra', technical meetings and teleconferences. All deliverables provided by 'con terra' will be reviewed and analysed by Elsag Datamat in order to check their completeness and consistency, before being accepted by Elsag Datamat.

4.7.1 Progress Meeting

Progress meetings will be held every month by teleconference and will be agreed between Elsag Datamat and the ESA Technical Officer according to the project content and milestones.

The purpose of the progress meetings will be both to control the progress of the project and to verify the directions chosen. For each progress meeting Elsag Datamat will prepare and deliver, at least 5 working days before the meeting:

- The agenda, to be agreed with the ESA Technical Officer
- A report highlighting the status of the development
- Documentation as required to support decisions, changes etc. to be discussed in the course of the meeting.

4.7.2 Progress Reports

Progress Reports are the first measure used to ensure timely monitoring of Project progress.

Elsag Datamat will produce and deliver to the ESA Technical Officer for approval a Progress Report at the end of each month. It will contain:

- Management status
- Technical status
- Progress since last report
- Delays identified / foreseen
- Encountered / anticipated problems
- Corrective actions
- Updated planning
- Action Items List
- Delivery status
- Invoice Status

4.7.3 Review Meetings

Reviews are in general key milestones concluding major project stages. The recommendations arising from the reviews and agreed among the different players shall become part of the baseline work and such recommendations will be also addressed in the relevant Minutes of



Meeting. The reviews are normally held at milestone date in order to be ready to deliver the required items as well as to give visibility of the project progress. The project reviews and progress meetings identified for this project are described in the following table.

Reviews/Progress Meetings	Place
Kick Off	Esrin
Progress Meeting 1	Esrin
PR (Preliminary Review) & Progress Meeting 2	Elsag Datamat
Progress Meeting 3	Esrin
MTR (Mit Term Review) & Progress Meeting 4	Elsag Datamat
Progress Meeting 5	Esrin
Progress Meeting 6	Elsag Datamat
Progress Meeting 7	Esrin
Progress Meeting 8	Elsag Datamat
Order Server Installation	Esrin
AR (Acceptance Test Review)	Esrin
FP (Final Presentation)	Esrin

Table 4-2: Project Milestones and Progress Meetings

Technical Data Package and SW Delivery dates are summarized in the following table

Reviews/Progress Meetings
Technical Data Package Delivery for PR
Technical Data Package Delivery for MTR
Technical Data Package Delivery for AR
Order Server Installation & SW Delivery for AR
Final Technical Data Package and Software Delivery

Table 4-3: Technical Data Packages

The Technical Data Package will be delivered at least one week before the reviews. During the review, the RIDs raised by ESA Technical Officer will be discussed. Any RID and/or closeout action arising from such review will be managed by ED. The updated Technical Data Package will be re-issued 2 weeks after the review containing implementation of agreed RIDs. The approval from ESA Technical Officer will constitute the authorisation to proceed and to hold the milestone.

4.7.4 Internal Status Meetings

The internal status meeting are aiming to provide to Project Manager the status of the relevant activities performed by the sub-contractor 'con terra'. The status meeting will be managed by teleconference.



4.7.5 Minutes of Meeting

The output of each meeting will be a short Minute of Meeting on which major issues, project achievement, and action status will be recorded. Eltag Datamat will keep the minutes of all the meetings (i.e.: progress, review ...). A copy of the minutes of each meeting, signed by the Project Manager and the ESA Technical Officer, will be delivered at the end of the meeting.

4.7.6 Information and Communication Systems

Facilities to be used for exchange of information are defined:

- telephone: for informal exchange of technical and managerial information; for teleconference management it will be used a web tool called "powwownow" available to <http://www.powwownow.com/>.
- fax: for formal exchange of technical and managerial information; dialing codes will be provided in the Project Directory section of the Technical Reports
- e-mail: for informal exchange of technical and managerial information as well as for document transfer; e-mail addresses of the project key-persons will be reported in the Project Directory section of the Technical Reports

4.8 Action Management

This section defines the project actions and critical issues management as far as the relevant control rules, procedures, reports and responsibility, tools and techniques are concerned. Actions will be managed with a spread sheet provided by ESA Technical Officer and update at each teleconference.

4.8.1 Project Action Generation

Actions are raised during and the monthly progress teleconference and the status updated in the same meetings. Status changes may be decided directly by the ESA Technical Officer in agreement with the Task 4 Team during Progress Meetings.

A Corrective Action shall be mandatory associated to:

- One Action's identifier
- One (and not more than one) Action's responsible
- One (and not more than one) Action's Dead Line

The Project Manager shall verify the completeness of the previous information for each identified action.

4.8.2 Project Action Status

An action can be assigned to different defined Action States, which depend on the current level of accomplishment:

- **NEW:** Action is open and it is not yet managed. This is the default status assigned during actions generation. In this state due date can be changed and therefore it can be use un case a re-scheduling is needed.
- **OPEN:** Action is taken in charge by the owner
- **MANAGED:** Action is managed when exist a proof of that (e.g.: Fax, Purchase Order, etc)



- **SOLVED/STALLED/REJECTED:** a written statement into the applicable minutes of meeting shall declare Actions in such state

The action state transition has to adhere to the rules provided in the following diagram:

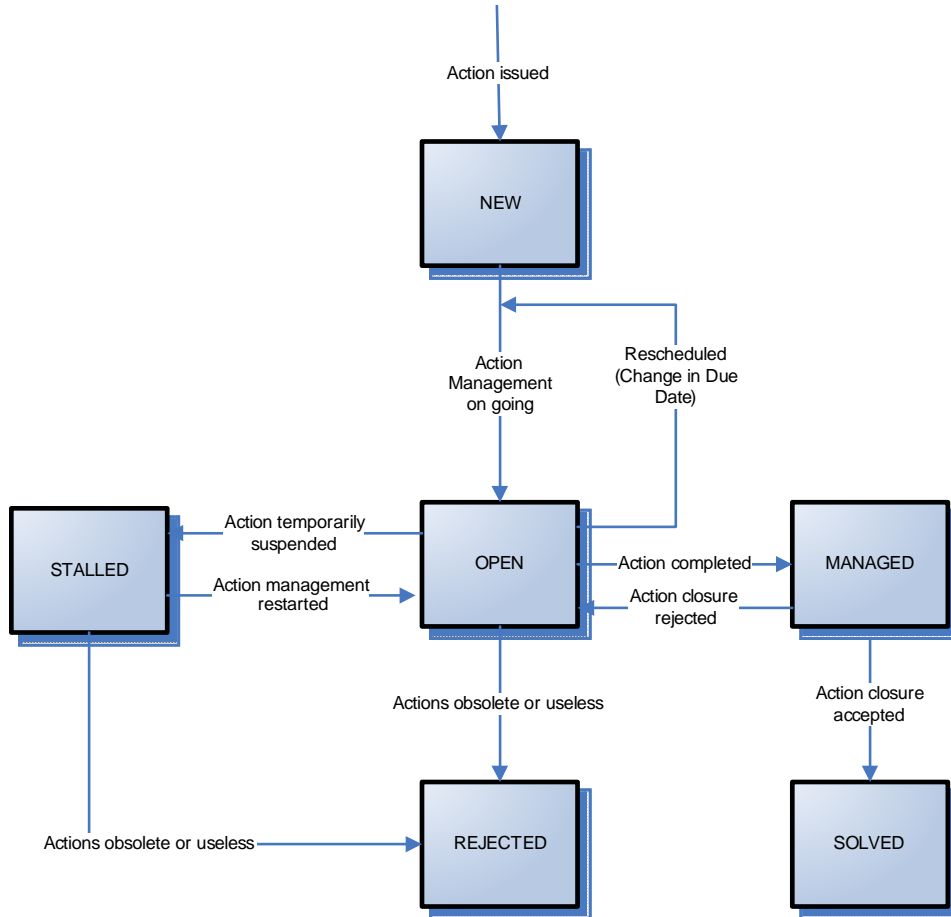


Figure 4-4: Actions State Transition



The actions transition is summarized in the table below:

State	Comments
New	The action has been issued
Open	The action management is on going
Managed	The action has been managed and is ready to be formally closed at the board
Stalled	The action cannot be completed due to circumstances beyond your control (waiting for the requestor to respond, waiting for another action closure, waiting for external input, etc.)
Solved	The action is formally declared closed by the board
Rejected	The action is obsolete or recognized to be useless.
Deleted	Action inserted by error

Table 4-4: Action status definition

An action can be rescheduled in case it is necessary to review the due date. Decision to close the Action is normally taken during the meeting.

The Project Manager is in charge of controlling the action item list management and of monitoring the action follow-up by the project team.

4.8.3 Action Item List

The Action Item List shall be handled with a spread sheet provided by ESA Technical Officer and updated throughout the whole project life. The Action Item List reports: new actions since last print request, all open actions, all expired actions, all actions completed since last print request for both internal and external actions.

4.9 Change Requests Management

The overall change requests process will be managed using a tool called PMT (Problem Management Tool).

This tool allows to store and manage all the anomalies checked about each software under configuration control and all the System Delivery and Release. It allows also to check in every moment the current status of a PRs, NCRs, CRs, System Delivery and System Release. In particular it is used by Configuration Manager to make periodic reports with statistics about the status of the PRs, NCRs, CRs, System Deliveries and System Releases. After the reviews this tool is used to update the statuses of these items.

The Change Control process starts from identification of a problem (PR) or new requirement requiring a major configuration and/or software change that needs to be disposed as NCR or CR. The process generates System Releases.

The software changes management process foresees five phases: Disposition, Approval, Implementation, Validation and Release& Installation. The Joint Change Control Board (CCB) manages these phases. For HMA Follow On Task 4 – Order the Joint CCB is composed by ESA Technical Officer and Project Manager.



Disposition: The Joint CCB reviews all the submitted problems and new requirements, if necessary, assigns actions of investigation aiming at establishing:

- the source of the problem in terms of application software modules and configuration;
- the system(s) to be changed and disposition as NCR or CR;
- the documentation impacted by the change;
- change approval or rejection in terms of benefits and negative impacts;
- if the change is in line with the other ongoing or planned evolutions.

Rejected SW Changes trigger re-assessment of the relevant PRs.

Approval: The Joint CCB approves NCRs and CRs, in particular for :

- disposition as NCR or CR, including the requested effort;
- schedule (i.e. inclusion into a planned System Release);
- proposed technical implementation.

Implementation: the responsible for application software maintenance, implements all reported changes through a System Release according to approved planning. The classification of the SW change priority is used to prioritise and plan the System Release process according between the Agency and the Contractor.

Validation: once the SW is delivered, it is validated on the reference platform. The validation test result is reported in the Test Validation Report (TVR). The Joint CCB reviews these TVRs and agrees on changes status accordingly. Should this review show that a correction has not been performed as specified, the consortium has to re-deliver a corrected SW. Otherwise the Joint CCB declares the CR or NCR as successfully validated.

Release & Installation: after validation, the Joint CCB may authorize the System Release to the operations and the consequent installation.

Verification: once the system is installed, the effectiveness of the implementation is verified straight on the operational platforms. Upon verification confirmation, the Joint CCB disposes the NCR or CR closure and consequently the PRB agrees on the relevant PR closure.

All these phases are managed by involved people with the aid of the PMT and Wiki.



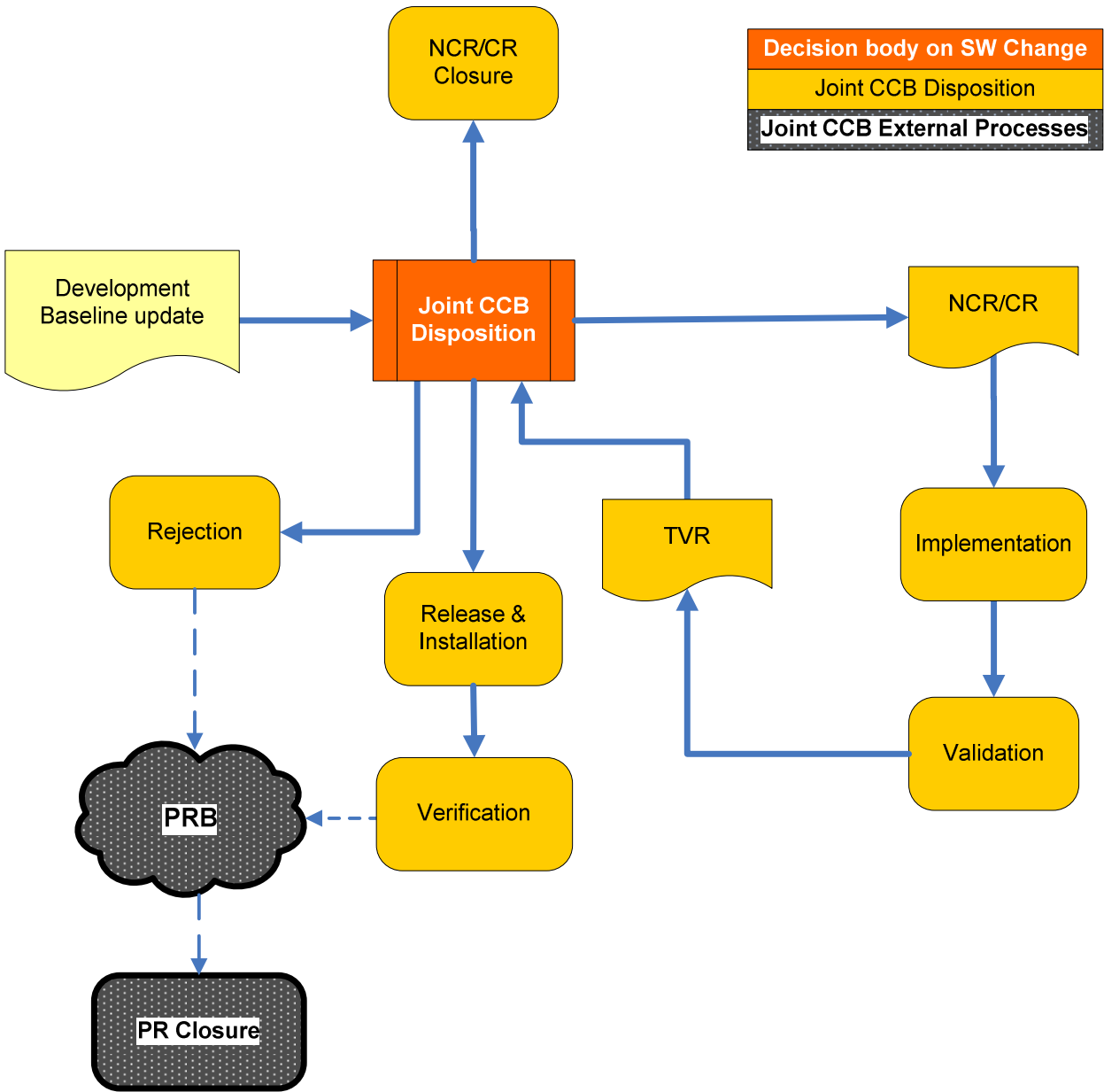


Figure 4-5: Software Change Review Process Flow Diagram



4.10 Staffing plan

In order to provide the Agency with the best response in terms of technical excellence, timely delivery, overall quality and cost-effectiveness, Elsag Datamat intends to build the project team as depicted in the following chart:

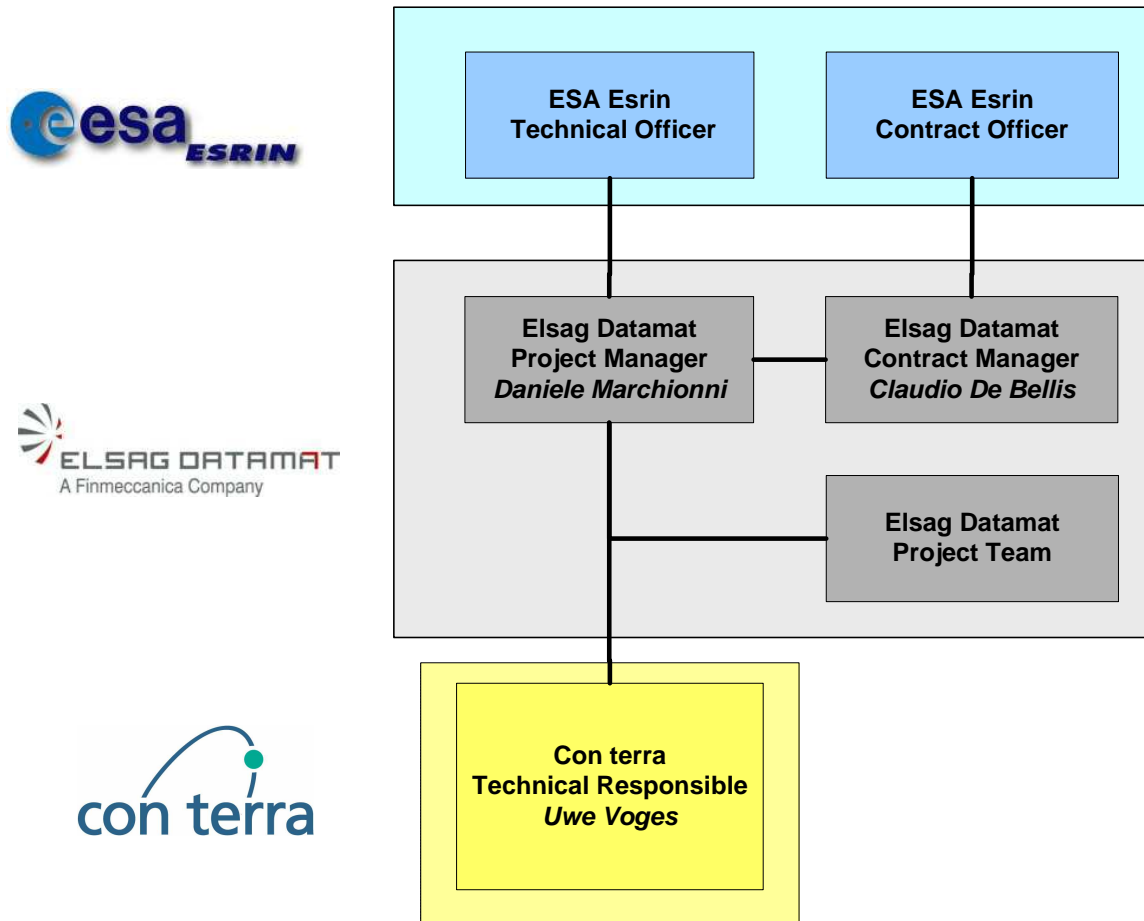


Figure 4-6: HMA Follow On Task 4 – Order Project Team Organisation

Elsag Datamat is responsible for:

- Project Management
- Technical Coordination
- HMA Ordering ICD OGC 06-141 Update
- Standardization Process

The Project Manager is fully responsible for all the activities and he is the main interface with ESA for SW Engineering domain.

con terra is responsible for:

- Support to HMA Ordering ICD OGC 06-141 Update
- Preparation of ATS & ETS



- Support to Reference Order Server validation

Next table reports the Organisation in terms of Key Persons.

Name	Company	Position
Pier Giorgio Marchetti	ESA Esrin	Technical Responsible
Daniele Marchionni	Elsag Datamat	Project Manager
Raffaele Barbati	Elsag Datamat	Quality Manager
Claudio De Bellis	Elsag Datamat	Contract Manager
Uwe Voges	con terra	Technical Responsible

Table 4-5: Key Personnel

4.11 Software procurement process

This section describes all information about the software procurement process implementation. For accomplishing all activities relate to each macro activity identified in the HMA Follow On Task 4 – Order it is defined the list of envisaged software items that will be procure:

- Evolution of the HMA Ordering ICD 06-141 with respect to inputs coming from the companion HMA Programming ICD 07-018 specification

This sub-project doesn't need a development phase, so it needs only instruments for documents management:

Microsoft Office Word for writing the document;
Altova XML Spy 2009 for editing the XML schema

- Supporting the standardization process by setting-up the procedures for verifying the compliance of order server implementations with respect to the specification (HMA Order ICD Test Suite) . This sub-project has two components ATS and ETS.

Preparation of the ATS needs

Altova XML Spy (2007 or higher);
UML tool

Microsoft Office Word for writing the document;

Preparation of the ETS needs

Altova XML Spy (2007 or higher);

ERGO TEAM Engine (<http://wiki.services.eoportal.org/tiki-index.php?page=ERGO+TEAM+ENGINE+>)

The web accessible Elsag Datamat Order Reference Server

- Setting-up an order server to use as a reference for the other implementations (OPGW).

For this sub-project it can be defined a development phase and testing phase.

Development of the Order Server (OPGW):

- Altova XML Spy 2009 for XML development
- Sun Netbeans as integrated development environment
- Java JDK 1.5.0.17 or higher
- TOMCAT for deploying the software
- HSQLDB for hosting the OPGW database
- Operating System: Linux Red Hat ES 5.2; Windows XP

Testing of Order Server (OPGW):



- Linux Red Hat ES 5.2 server with the network set-up specified in the HMA Follow On – Order [AD-2]

4.12 Supplier management

Internal Audits might be conducted in order to verify if the SW Engineering processes are compliant with the rules defined in the related plans. Audits may be conducted on subcontractor Con Terra, to verify if the activities are performed in accordance with the approved plans.

To overcome failure, consistent poor quality or other problems, audits will be executed at any moment the project success can be considered jeopardized by risks factors.

They will be documented in quality evaluation records and problems resulted will be reported to higher management with recommended solutions.

External Audits, may be carried out, on the current project, once agreed upon times and modalities (i.e. audit notice, audit planning, subject of the audit) between customer representatives and ED Contractor, in order to verify if the activities are performed in accordance with the contractual applicable documentation.

5 SOFTWARE DEVELOPMENT APPROACH

5.1 Strategy to the software development

The strategy chosen for the software development relate to HMA Follow On Task4 - Order is the reuse of the Ordering & Programming Gateway - OPGW component already implemented in the frame of HMA-I and HMA-E projects and detailed into HMA Follow On Task4 - Order ED proposal [AD-1].

5.2 Software project development life cycle

Because cost and schedule constraints prevent planning for every possible contingency associated with a project during its lifecycle, the software life management process promotes flexibility and a stable framework by:

- supporting the selection of a paradigm that fits the unique needs of a project;
- clearly identifying the roles of the stakeholders;
- establishing verification and certification checkpoints for each milestone;
- facilitating the capture of project activity results through documents;

There are different life cycle paradigm that it can be used, each of them is close to the nature of project.

5.2.1 Software development life cycle identification

Considering the nature of present project, it can be identify the presence of different sub-projects where for some of them it shall foresee a software development so it will use the standard life cycle paradigm where there will be followed these steps:

- System Analysis and Design
- System Implementation
- System Validation





Figure 5-1: Life cycle for software development

5.2.2 Relationship with the system development cycle

The chosen life cycle paradigm needs to be customised on a case-by-case basis. For this project it will go through the following main milestones:

- **M1:** Kick-off Contract start Software Development Plan (SDP), Product Assurance Plan
- **M2:** PR Preliminary Review First Issue of Task Deliverable Documents, Requirement Baseline Document
- **M4:** MTR Mid Term Review Second Issue of Deliverable Documents
- **M3:** AR Acceptance Test Review, Architectural Design document, Acceptance Test Document(s)
- **M4:** Final Presentation (FP) End of Contract Project Executive Summary

All activities of HMA Follow On Task 4 - Order can be deal with the following sub-projects (SP):

- **SP1:** Evolution of the HMA Ordering ICD 06-141 with respect to inputs coming from the companion HMA Programming ICD 07-018 specification
- **SP2:** Supporting the standardization process by setting-up the procedures for verifying the compliance of order server implementations with respect to the specification (HMA Order ICD Test Suite) .
- **SP3:** Setting-up an order server to use as a reference for the other implementations (OPGW).

5.2.2.1 SP1: Evolution and standardization of the HMA Ordering ICD 06-141

This sub-project has not a software development step but requires a process that respects OGC Policies and Procedures. For proposing and approving candidate standards OGC provides three possible options:

- The Request for Comment (RFC) Process ([AD-4] §9.4).
This is the approach for proposing a new candidate standard for consideration by the membership.
The RFC process is well suited for moving candidate standards, usually resulting for the IP Initiative environment, into the formal standard adoption process. The RFC process is managed by a SWG. This process does not apply to Profiles and Application Schemas.
- The Profile and Application Schema ([AD-4] §9.6) adoption process does not require an RFC submission. This part of the process is designed to speed-up the review and approval of profiles and application schemas for existing OGC Standards.
- Change Request Proposals (CRPs) ([AD-4] §9.10) for revisions to existing Abstract Specifications or Standards. A CRP describes proposed changes or enhancements to an existing Standard. A CRP may be submitted by one or more OGC member organizations.



For OGC 06-141 standardisation is applicable only the first option so all RFC process activities are classified in:

– RFC Submission Process

For submitting a candidate standard through the RFC, the submission team shall comply with the following requirements ([AD-4] §9.4.1 and §9.4.2) :

The primary submitter must be a TC voting member. ESA is TC member then the technical officer of HMA FO – Pier Giorgio Marchetti will have this role.

At least other 2 OGC members must be part of the submission team. At the moment there are: Eltag Datamat (Daniele Marchionni) -- Associate Member; 'con terra' (Uwe Voges) -- Associate Member; Eumetsat (Michael Schick) -- Associate Member

The submission team shall notify (via e-mail) the TCC that a new candidate standard is being submitted.

– Review by the OGC Architecture Board (OAB)

Once the TCC has checked the submission, the candidate standard is then reviewed by the OAB.

The OAB has the responsibility to insure that the RFC submission is relevant in terms of the rationale for how the candidate standard fits into the current adoption plans of the OGC (and/or the current Abstract Specification) and how the proposal is consistent with the current OGC standards baseline. Once the review is completed and the submission approved by the OAB, the TCC shall announce the formation of a new SWG.

– Formation of a new SWG to work on the RFC submission

A SWG - Standard Working Group is formed whenever a new RFC submission for a candidate standard is received or when one or more Change Request Proposals for a given adopted OGC standard have been submitted to the public Change Request repository on the OGC web site.

A SWG has to:

Prepare the Charter. The Charter reports the project time line, the scope of the work. Templates for the Charter can be found on the OGC Web Site. The charter is posted for member review. Eltag Datamat will prepare the Charter, 'con terra' will review it. The Charter will be sent to OGC and within 2 weeks it will be approved or not. The Ordering SWG work cannot be started until the Charter is approved. The Charter Members are RFC Submission team and any member participating in the development of the Charter. SWG Members are RFC Submission team and any member representative can join the SWG at any time ([AD-4] §7.6.4).

Manage

Chair & Co-Chair: chair and Co-chair are elected after the SWG set-up. For HMA Ordering ICD 06-141 the SWG will have the chair Eltag Datamat and co-chair 'con terra'. The responsibilities of chair and co-chair are specified in ([AD-4] §7.6.7).

Voting: only for SWG members ([AD-4] §7.6.8, §6.6).

Standard Editor: the Editor has the responsibility for managing the actual physical editing and maintenance of the standard document ([AD-4] §9.9). The editor is neither the author, nor the owner of the document. One or more members can fill the Editor position. The editor will be Eltag Datamat.



Work ([AD-4] §9.8.3)

Develop a plan and schedule for completion of the new revision of the given standard. The Plan and Schedule, also known as a Revision Road Map, will be made available to all OGC members as well as the Public.

Insure revisions to the Standard are consistent and harmonized with other related OGC standards

Insure new revision is – as best as can be accomplished – backwards compatible with the previous revision.

At completion of revisions to a standard and before the new version is voted on, provide a release notes document that describes all the changes to the standard. The revised standard will not be considered for adoption until this document is complete.

Provide a revision notes document using the standard revisions template that documents the revisions to the standard resulting from either public comments or CRPs. The revision notes include lists of deprecated capabilities, changes to capabilities, and new capabilities that are added over time.

Try to complete their work in a timely manner.

Endeavour to reflect their perception of the consensus of the TC.

- Review and Vote by SWG to release candidate standard for Public Comment

Upon a simple majority vote by the members of the SWG, the candidate standard will be released for a 30 day public comment period. This step is achieved when the specification has reached its final status, i.e. all major functionalities have been added to the specification and all comments raised by SWG have been implemented. Otherwise the spec that will be proposed to the TC will be too different from the one put for public comment.

- Release for Public Comment Period

The candidate standard is released for a 30-day public comment period. During the RFC comment period, any party (including all classes of OGC members, as well as any non-member of OGC) may send comments on the proposal to OGC Headquarters or to the address announced with the RFC issuance. OGC staff will manage collection of the comments. OGC Communications will insure that the SWG membership is informed regarding submitted comments. It is important to note that anyone may make a comment on an outstanding RFC. RFC's are available to the industry, not just members (as are other Requests), and are publicized just as are other requests. During this phase additional comments coming from HMA FO project can be taken into account, but after 30 days the comment period will close.

- SWG Review of the Received Comments

Once the RFC comment period closes, the RFC submission team collects the comments and integrates them into a single RFC comment document. The SWG reviews the comments and makes a decision as to the fate of the RFC. If the SWG decides that comments received are sufficient to halt the RFC, then the RFC "fails" and adoption of the proposal halts. The submitter(s) may then make changes and resubmit the RFC proposal. If, however, the comments received do not cause the SWG to halt the RFC, then the SWG edits the document based on the comments received during the comment period. The criteria for halting the process are not specified. However if SWG is composed by us or by our friends it should not happen in any case.

- Go to Standard Revision Process



The process is now the same as for editing and adopting an existing OGC Standard. For further information see ([AD-4] §9.8).

5.2.2.1.1 HMA Ordering ICD 06-141 – Formation of SWG

For HMA Ordering ICD 06-141 standardization a new OGC Standards Working Group is being formed and will operate under the OGC 2007 IPR Policy. The purpose of this SWG is to promote the “OGC 06-141 Ordering Services for Earth Observation Products” to the state of OGC adopted standard.

The candidate standard is currently an OGC “Best Practices” document.

The proposed candidate standard has been prepared in several years of activities in the frame of ESA Heterogeneous Mission Accessibility – Interoperability (HMA-I) project and further updated in the frame of ESA DAIL (Data Access Integration Layer) Implementation Project. The purpose of above projects was to define and then to implement the protocols for allowing a smooth integration between the ESA Ground Segment and the other partners Space Agencies. The scope of the candidate standard is to define the interfaces for implementing Web Services allowing the clients to issue order for archived, planned and future potential Earth Observation products. In the frame of this SWG activities, the candidate standard will be reviewed and commented by the OGC members, and the gathered comments will be processed in order to further improve the specification.

Once this SWG has been formally activate, the scope of the work of this SWG is:

- Gathering comments from the SWG opted-in members and from all other stakeholders;
- Processing the comments and applying the agreed changes to the candidate standard;
- Setting-up the Issue Tracker for tracking the received comments;
- Finalize the updated spec and issue of an updated document for the 30 days comment periods;
- Gathering comments from the OGC members;
- Processing of the comments and apply the agreed changes in the re-issued document;
- Finally the updated document will be proposed for membership adoption.

The only issues and comments on the candidate specification that will be taken into account are:

- those submitted by the SWG members
- those submitted by OGC members until the 30 days public comment period

Moreover these issues and comments shall be notified through the Issue Tracking system already available on the OGC portal under the “Ordering Service for Earth Observation Products SWG” project:

http://portal.opengeospatial.org/?m=projects&a=view&project_id=325&tab=5

This SWG will dissolve after the following three milestones have been achieved:

- The SWG has completed evaluation and incorporation into the candidate standard of all comments received during the public comment period.



- Approval by the SWG membership of a recommendation to submit the document to the TC for consideration as an OGC Adopted Standard.
- The candidate standard has been approved by the OGC Technical and Planning Committees as an Adopted OGC standard.

The OGC members listed below have proposed the OGC Ordering Services for Earth Observation Products Standards Working Group.

Name	Organization
Daniele Marchionni	Elsag Datamat
Uwe Voges	con terra
Pier Giorgio Marchetti	ESA
Michael Schick	EUMETSAT
Gasperi Jerome	CNES
Goor Erwin	VITO
Lucio Colaiacomo	EUSC
The Hoa Nguyen	Spacebel

Table 5-1: SWG members



5.2.2.1.3 HMA Ordering ICD 06-141 – Deliverable items

The following is the list of deliverables of this SWG:

- Ordering Service For Earth Observation Products V0.9.5, taking into account the first set of comments raised by the SWG itself and ready for being submitted to the 30 days public comment period: 19/02/2010
- Ordering Service For Earth Observation Products V0.9.6, taking into account the comments raised during the public comment period: 23/07/2010
- Final document to be submitted to OGC as V1.0

The Ordering Service For Earth Observation Products includes:

- The document itself, in Microsoft Word 2003 and PDF formats;
- A zip file regrouping all XML schema files corresponding to the interface specified in the document;
- The Abstract Test Suite - ATS, as annex to the document;
- The executable test scripts – ETS, as a zip file including the tests scripts and test messages for implementing the ATS

5.2.2.2 SP2: Supporting the standardization process verifying the compliance

According to the OGC guidelines testing is accomplished based on the guidelines of the “Compliance & Interoperability Testing & Evaluation (CITE)” initiative. This initiative provides a process for testing compliance of products to Implementation Specifications. This “Compliance Testing” determines that a product implementation of a particular Implementation Specification fulfils all mandatory elements as specified and that these elements are operable.

A compliance test “package” consists of a document (as defined in ISO 19105) which indicates in a textual format abstract test cases which define all the requirements to be satisfied for conformance. The abstract test cases are grouped in abstract test modules in a hierarchical structure. This document is called Abstract Test Suite (ATS). A second part is called Executable Test Suite (ETS). The ETS is a computational resource composed of executable test cases implementing the abstract cases specified in the ATS. The ETS includes the so called CTL (Compliance Test Language) scripts, any Java resource files they may depend on, and related files.

For the evolution and take up of the “Ordering Services for Earth Observation Products” (OGC 06-141) an OGC compliance test package containing an ATS and an ETS will be developed within this sub-project. This sub-project is composed of the following three macro activities :

- **Specification of an Abstract Test Suite (ATS):** for the “Ordering Services for Earth Observation Products” (OGC 06-141) specification (I42.1.1).
The description of the ATS will be done as defined by the ESA policies defined in the HMA-T phase by IGN
(see http://wiki.services.eoportal.org/tiki-download_wiki_attachment.php?attId=199&page=HMA-T%20Deliverables).
The abstract test cases will be grouped considering the different operations specified in the OGC 06-141. Possible errors or inconsistencies found during the review of the Order specification will be issued as RIDs. These RIDs will be managed also in the SWG that will be established for that specification.



The ATS will include about 20-25 test cases structured into different levels and sub-levels. The ETS provide the abstract ATS-test cases defined as CTL-scripts. The syntax of the CTL-scripts will be based on the latest TEAM ENGINE used within the ESA/HMA project.

- **Development of an Executable Test Suite (ETS)** for the “Ordering Services for Earth Observation Products” (OGC 06-141) specification (I42.1.2). Within WP-24000 it provides the “HMA Order ICD Test Suite Technical Note which shall contain the abstract test suite (ATS) and the executable test suite (ETS)”.
ETS is based on the ATS, it will be defined in the form of a list of CTL scripts which will represent the abstract test cases from the ATS. These scripts will be completed with a set of test messages representing the request messages and the expected responses.
- **Provision of the TEAM Engine** (as client) in order to run and test the defined interfaces as defined within the ETS and test execution (I42.2.2). Within this activity a plan and a report of the tests executed with the TEAM engine is provided.

After the ETS preparation is accomplished, the scripts will be preliminary executed by the CITE TEAM Engine against a web-accessible version of the OPGW, the reference order server set-up by Eltag Datamat. Formally the ETS has to be prepared in the WP-24000 and executed against the OPGW in WP-33000, then it would imply that the ETS is delivered to OPGW team without having performed any verification against a “live” server. For avoiding this risk, a preliminary but functional version of the OPGW will be set-up on public INTERNET for allowing some remote test sessions from the developer of the ETS. The results of these preliminary tests will be reported for taking the needed actions: either to fix the CTL, or the test message or the OPGW software.

For the development of the ATS and the CTL scripts it is considered and reviewed any existing ATS and test scripts (if available).

5.2.2.3 SP3: Setting-up an order server - OPGW

According to the OGC guidelines it shall be set up an order server to use as a reference to other applications for (OGC 06-141). This order server has to be set-up with the objectives of demonstrate the updated specification supporting the implementation of ordering clients and ordering servers.

The HMA Follow On Activities SOW ([AD-1]) requires that the developed software is made available as open source in order to allow others to develop an order search without starting from scratch. Following the open source philosophy, the development will be performed using INTERNET Project hosting web sites like:

- Google Code ([AD-2] §3.2.3)
- SourceForge ([AD-2] §3.2.3)

The order server will provide to the client an OGC 06-141 compliant interface, but the ordering functionality is accomplished by calling an actual order handling system. In particular, it will be able to call a compliant EOLI XML Ordering server (specifically the ESA GS User Services).

As proposed in HMA Follow On Task 4 – ORDER ([AD-2]) it will be re-used the Ordering & Programming Gateway - OPGW component already implemented in the frame of HMA-I and HMA-E projects.

During the HMA-I, OPGW has been used for prototyping an early version of the OGC 06-131 specification and also an early and limited version of OGC 07-018 (SPS EO). It has been used also for the demonstration with COMU project and for the “Federated Earth Observation Missions (FedEO) Pilot” OGC initiative. In the frame of HMA-E, project going on at the time of writing this proposal, the OPGW has been enhanced.



The OPGW system has been already integrated with the ERDAS Red Spider Catalogue, which is the "companion" OGC 06-131 Catalogue linked with the ordering, in the frame of HMA-E V2A activities. Later it will be integrated with the DAIL, which is "the new SSE".

OPGW provides the Ordering Service (OGC 06-141) and Programming Service (OGC 07-018).

For this sub-project OPGW shall be used only for Ordering Service with an EOLI XML Ordering server so the baseline of this component works only for the update of ordering part of OPGW.

5.2.2.3.1 OPGW Context

For HMA Follow On Task 4 – Order project, OPGW shall have the same context used for UMA-E, so OPGW shall interact with the following entities:

HMA Clients

It is a client in charge of sending SOAP requests compliant with OGC 06-141 and OGC 07-018 (note that the support for the latter specification is included with the optional work-package WP-40000).

The expected HMA Clients are:

- The TEAM engine, which will be used for validating the updated interfaces;
- SSE, which will be connected to OPGW and added to the list of available Service Providers.
- The exchanged interfaces are:
- OGC 06-131, for ordering interfaces;
- OGC 07-118, for the encoding of user management information (it is the protocol currently used from the DAIL).

External OGC 06-131 Catalogue

The ordering of products is performed after a catalogue search. The catalogue is not needed for the working of OPGW; the catalogue is needed for the supporting the user on selecting the product of interest. The External OGC 06-131 Catalogue must be loaded with a sub-set of the products stored in the EOLI XML Catalogue linked to OPGW, otherwise the OGC Catalogue can return products that cannot be ordered. The same has to be done for the configured collections: in fact the collection configured in OPGW, the collections configured in the linked EOLI XML Servers and those configured in the external Catalogue must be aligned.

EOLI XML Catalogue Server

It is a place holder for a Web Service implementing the EOLI XML Catalogue interface for ESA collections. At the moment this interface is provided by the MUIS system (via DSM + IDS), but MUIS will be replaced by M2EOS and this interface will be implemented natively by M2CS system. This catalogue is queried by OPGW for supporting the Programming interface implementation. In fact the ESA Catalogue is able to perform future products computation and then it is used for performing the feasibility analysis function of the HMA Programming Service.

EOLI XML Order Server

It is a place holder for a Web Service implementing the EOLI XML Ordering interface for ESA collections. At the moment of writing this interface is provided by MUIS system (via DSM + OFS and then MMOHS); but MUIS will be replaced by M2EOS and this interface will be implemented natively by MMOHS system. This server is called by OPGW for submitting orders for past and future products.

OPGW Operator

It is the entity in charge of operating the OPGW. It has to provide the following configuration items:



- Configuration files for the basic working of OPGW;
- Capabilities XML files for the implemented services;
- List of configured users, with profile, i.e. the users that allowed issuing orders via OPGW.

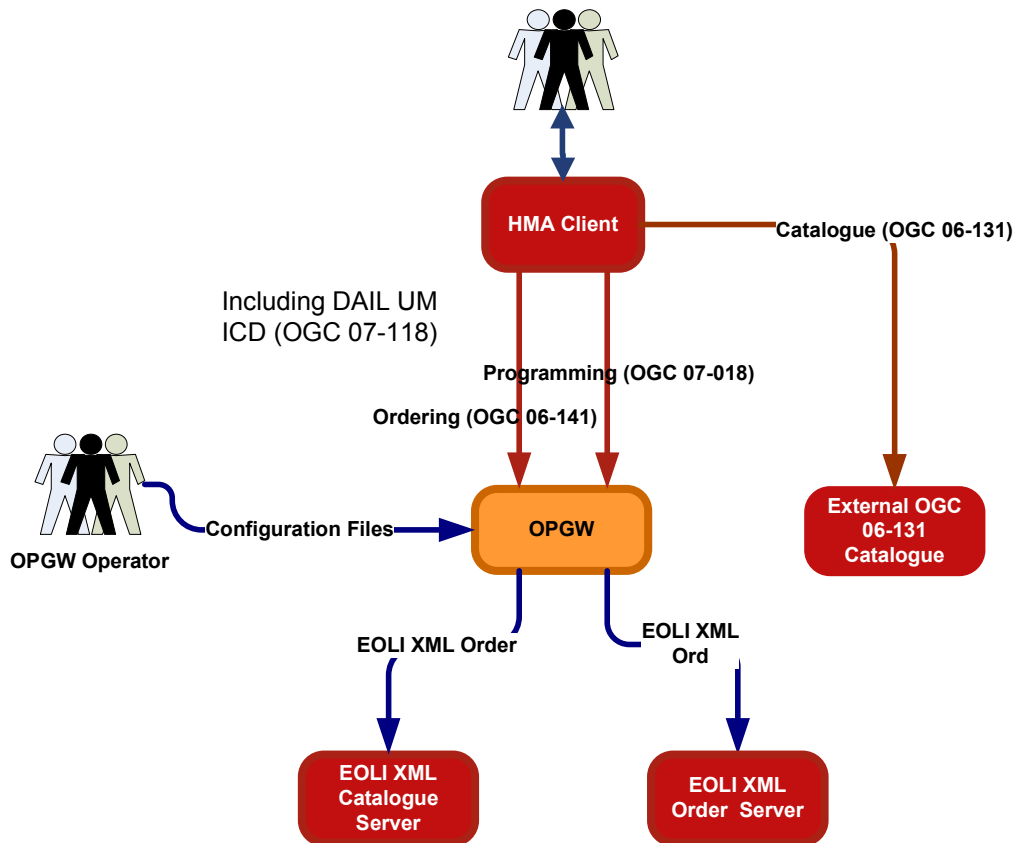


Figure 5-3: OPGW Context

5.2.2.3.2 OPGW Architecture

OPGW is composed by the following sub-components:

HMA Skeleton

It has been developed by Spacebel in the frame of HMA-I project for:

- Testing the EO DAIL: it can work as a server accepting requests coming from the EO DAIL and returning back predefined answers specified within test procedures.
- Testing the GSs Services: the Skeleton includes test pages able to call the HMA Catalogue and Ordering interfaces provided by GSs Services.
- Development GS Services: new services can be added just by adding new java classes implementing the operations of the services to add and properly configuring the Skeleton.

The HMA Skeleton is based on:

- Apache TOMCAT for hosting the Skeleton software and for accepting HTTP request and run Servlets;



- Apache Axis 1.x to serialize and de-serialize SOAP messages.

The technique of hosting new services using configuration files and deploying suitable java classes has been used for implementing OPGW services. All the software to be deployed into the Skeleton shall be developed using Java Language.

Ordering Service

It is composed by a set of java classes deployed on the Skeleton for managing the operations defined in HMA Ordering ICD. Ordering Service can already make the following operations:

- GetCapabilities: returning a pre-configured XML Capabilities document.
- GetOptions: returning the order options corresponding to the input collection. The whole set of order options are stored in a configuration file.
- Submit: the order submission is performed translating the request in the corresponding EOLI message. In order to allow the async notification an order database is set-up for tracking and notifying the status of the order to the client.
- GetStatus: the order search and retrieve functionality are provided by calling the corresponding order monitor operation of EOLI.
- Other operations are not implemented, but are simulated through the built-in testing capabilities of the HMA Skeleton:
- GetQuotation: order quotation is not supported by ESA GS.
- Cancel: order cancellation is not supported on-line by ESA GS;
- DescribeResultAccess: on-line access is not supported by OPGW and it is not the topic of HMA Follow On Task 4 – Order but of Task 3.

Database (Programming DB, User DB, Order DB)

This component provides the functions for querying and storing permanently: users, orders and programming requests. The database is managed by the HSQLDB COTS.

HSQLDB is the leading SQL relational database engine written in Java. It has a JDBC driver and supports a rich subset of ANSI-92 SQL (BNF tree format) plus SQL 99 and 2003 enhancements. It offers a small (less than 100k in one version for applets), fast database engine which offers both in-memory and disk-based tables and supports embedded and server modes. Additionally, it includes tools such as a minimal web server, in-memory query and management tools (can be run as applets) and a number of demonstration examples.

Order Notifier

It is a stand-alone tool in charge of providing the asynchronous notifications on submitted orders. Submit operation is asynchronous so the client could ask to be notified on order completion or for all status changes. Periodically the Order Notifier gets the list of orders not completed yet and then performs an order monitor request to the EOLI XML Order server: depending on the Submit request and on the status returned by the EOLI XML Order a notification is sent back to the client who sent the original Submit request.

Programming Notifier



This tool is very similar to the previous one: it has to notify a client that issued feasibility and submit requests (async requests) through the Programming Service interface.

Import Tool

This tool is in charge of loading the minimum user information needed for building an Order towards the connected EOLI XML Order server.

Support Tools

This is a set of Java classes providing the functionalities required by the Ordering and Programming Service components. They are:

- Tool for converting the order options of ServiceDirectory.xml
- SOAP client tool, for testing the system.
- KML converter tool, for generating KML files from HMA GetFeasibilityResponse files.
- Tool for converting in KML format (supported by Google Earth) the GetFeasibilityResponse messages generated by the OPGW itself.
- SAML Token handling, it is a set of Java classes in charge of reading the SAML token embedded in SOAP Header of incoming requests. The SAML Token carries on mainly the identifier of the user submitting the request.



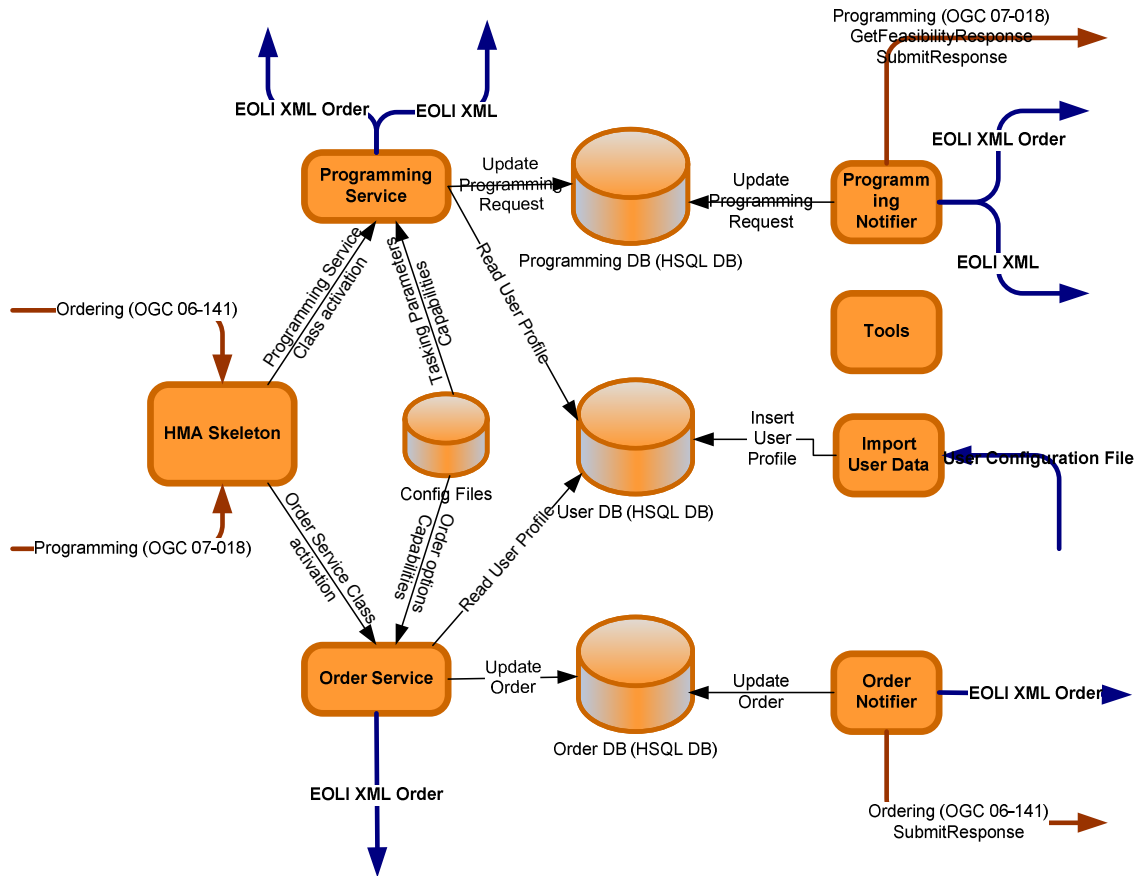


Figure 5-4: OPGW Architecture.

5.2.2.3.3 OPGW Testing Planning

OPGW shall use the WP-23000 to deal the preparation of test design, test cases, test procedures and test data with respect to the requirements listed in the OPGW Technical Specification. This activity will be done updating the OPGW Software Validation Test Specification – SVTS already prepared in the frame of HMA-E project activities.

OPGW SVTS will be organized in the following test designs:

- **TD_001: Installation & configuration**
This test design deals with the building of the software, installation on run time environment, configuration and then start-up of the system. The aim is to verify the correctness of the delivery kit i.e. software, installation & operation document
- **TD_010: Ordering Service Verification**
The aim is to verify the correct management of the supported HMA Ordering ICD interfaces:
 - GetCapabilities
 - GetOptions
 - Submit & SubmitResponse
 - GetStatus
 - GetQuotation
 - Cancel



- DescribeResultAccess

For user identification, the current assumption is that user information is encoded according to OGC 07-118 and it is assumed that this interface is maintained also in the frame of the activities of this document.

Because the WP-24000 Test Suite Definition (ATS, ETS) deals with the preparation of test plan, test procedures and test messages for verifying the compliance of an order server with respect to the new Ordering specification, which is roughly the same objective of TD-010, then the WP-24000 and WP-23000 activities will be coordinated in order to prepare a single set of test items.

The current release of OPGW have been tested using the built-in test page that allows issuing request messages and showing received responses (the test procedures defined in the current OPGW SVTS are written considering this test tool), then the OPGW validation will be performed still using this interface, therefore integrating the test messages specified in the ETS produced as output of WP-24000.

Regarding the TD-020, and TD-030, which are dealing with Programming (in case the optional WP-40000 is taken), it is assumed that the preparation will be done with some coordination with the team that will be in charge of the Task 2 activities of this document.

5.2.2.3.4 OPGW Testing Execution

The testing execution for OPGW is not so straightforward because it does not work stand-alone, but it needs a working instance of ESA GS User Services (i.e. currently the MUIS, but M2EOS in the future) for sending the EOLI XML requests generated from the incoming HMA requests.

ESA GS User Services installations (reference, operational and back-up platforms) are available on the ESA ODAD network and are reachable from the VPN network set-up at Elsag Datamat premises as part of the EOFC contract. It is assumed that such connection will be available up to the end of this project, so even beyond EO FC Phase 5 end (31/07/2010).

Stated that, the following is the approach for executing the tests of OPGW:

ESA will make available / purchase a server machine for hosting OPGW installation complying with these network requirements:

- This machine shall be accessible from the network where SSE is installed;
- This machine shall be access the network where MUIS / M2EOS is installed;
- This machine must be reachable from the ODAD VPN installed at Elsag Datamat premises;
- This machine must be reachable from the 'con terra' test client machine (form INTERNET) in order to allow preliminary executions of the ETS.

Because from the OPGW development environment SSE and MUIS / M2EOS are accessible, then the dry run will be performed installing the software and running the tests directly on this machine. During this phase the first execution of the ETS against a completed and working order server will be performed and then there will be support from both the OPGW developer team and the ETS team for fixing possible problems occurring on either the TEAM ENGINE, or the ETS or the OPGW software.

The server that host OPGW will be used also for fixing bugs found during the dry run, hence it implies that part of the development tools must be available e.g. at minimum the JDK and an XML editor must be there.

After the successful completion of dry run, the already installed OPGW software will be used also for the integration with SSE. Any updates needed to SSE system for complying with the updated HMA Ordering specification will be performed outside of this project. The integration activities that will be carried out in the frame of this project (WP-32000) do not include any update to the SSE system.



At the end this machine will be used for formal acceptance test execution: any possible installation of OPGW is removed and the software is installed from scratch and the tests will be executed again, but with ESA witnessing.

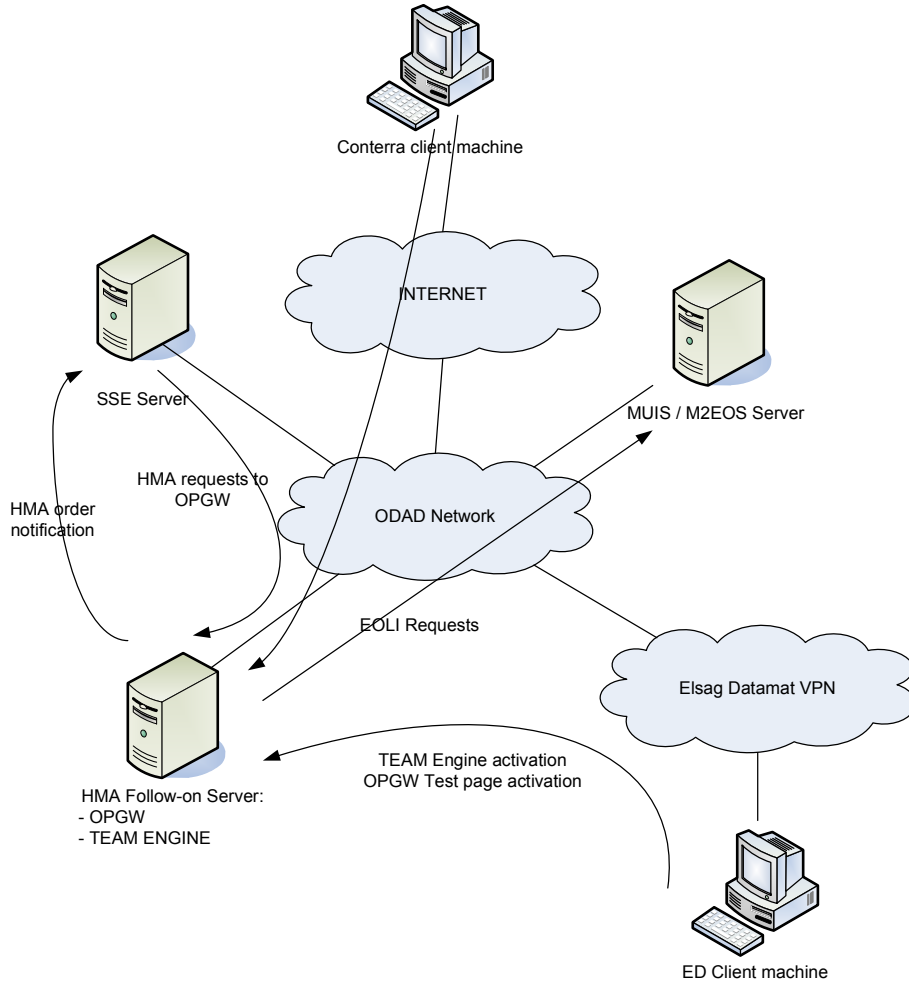


Figure 5-5: HW and network set-up

5.2.2.3.5 OPGW Problem and Risks

From the past experience on HMA projects the main risk of this kind of activities is the difficulty to converge towards an agreed specification because when there are many parties involved in the process there are also different and contradicting requirements that are added to the specification.

For example in HMA-I project the Catalogue specification has been rewritten in the middle of the project actually removing the GML and adding the ebRIM model. Up to now the ordering specification has evolved smoothly and the current specification, going to be implemented in several projects (in the ESA GS User Services via the HMA-E project; in the DAIL system; in the GMES contributing missions via the GSCDA project) seems rather stable and complete.

Nevertheless this risk has to be monitored because a later finalization of the updated specification will imply:

Later start of the implementation activities for the reference order server: the software development cannot be started until the specification is finalized.



Later development of the ETS for 2 reasons:

- Of course later definition of the specification;
- Later availability of the reference server to use for preliminary verification of written procedures.

5.2.3 Reviews and milestones identification and associated documentation

This section describes the scope and purpose of each review, relevant deliverable and expected outputs.

Milestone Name	Event	Deliverables	Date
Kick Off	Contract start	<ul style="list-style-type: none"> - Software Development Plan (SDP) - Minutes of Meetings - Software Product Assurance Plan (SPAP) 	24/06/09
PR	Preliminary Review	<ul style="list-style-type: none"> - Minutes of Meetings Review Item Discrepancies (RIDs) <p>SP1</p> HMA Ordering ICD <p>SP2</p> HMA Order ICD Test Suite Technical Note containing ATS and ETS <p>SP3</p> <ul style="list-style-type: none"> - OPGW Software Requirements Specification – SRS (Order Server Requirements Baseline) OPGW Software Design Document – SDD (Order Server Architectural Design)	2- 3/02/2010
MTR	Mid term Review	<ul style="list-style-type: none"> - Minutes of Meetings - Configuration Item Data List (CIDL) - Review Item Discrepancies (RIDs) <p>SP1</p> HMA Ordering ICD <p>SP2</p> HMA Order ICD Test Suite Technical Note containing ATS and ETS <p>SP3</p> <ul style="list-style-type: none"> - OPGW Software Requirements Specification – SRS (Order Server Requirements Baseline) - OPGW Software Installation Document (Order Server Operation Manual) - OPGW Software Design Document – SDD (Order Server Architectural Design) 	05/2010



Milestone Name	Event	Deliverables	Date
		<ul style="list-style-type: none"> - OPGW Software Validation Testing Specification –SVTS (Order Server Acceptance Test Plan; Traceability of Acceptance tests to Requirements Baseline) 	
AR	Acceptance Review	<ul style="list-style-type: none"> - Minutes of Meetings - Configuration Item Data List (CIDL) - Review Item Discrepancies (RIDs) Non Conformance Reports (NCRs) SP1 HMA Ordering ICD SP2 HMA Order ICD Test Suite Technical Note containing ATS and ETS SP3 - OPGW Software Installation Document (Order Server Operation Manual) - OPGW Software Design Document – SDD (Order Server Architectural Design) - OPGW Software Validation Testing Specification –SVTS (Order Server Acceptance Test Plan; Traceability of Acceptance tests to Requirements Baseline) - OPGW SW Delivery - Order Server Installation Plan OPGW Acceptance Test Reports 	11/2010
FP (Final Presentation)	End of Contract	<ul style="list-style-type: none"> - Software Development Plan (SDP) - Minutes of Meetings - Project Executive Summary 	03/2011

Table 5-2: Milestones and documentation for HMA Follow On Task 4 - Order

5.3 Software engineering standards and techniques

The design for software components into HMA Follow On Task 4 – Order will be done following UML object oriented methodologies and results of this phase will be used to enrich documents with further details at software component level (internal data structure definition, configuration data used, etc...) and further detailing software components internal interfaces. Further results of the Detailed Design phase will be directly incorporated within source code, during System Implementation phase, as software comments better detailing implemented algorithms and internal classes.



5.4 Software development and software testing environment

Information about software development environment and testing are previously defined into the paragraph 4.11 Software procurement process.

For software development it will be used English language (e.g.: for HMI, control files /tables, databases, key descriptions ...). Any COTS software item will be procured using the project's funds and according to the procurement plan. Any software package will be delivered on the electronic medium agreed with the ESA Technical Officer. The Software will be delivered as Open Source software.

Software package delivery shall include copies of the:

- Developed code as source code, object code, and executables
- Test scripts and test data
- COTS components, including libraries, necessary for the exploitation of the delivered system
- Copy of libraries or support packages necessary for the rebuilding, development and exploitation of the delivered system.

5.5 Software documentation plan

This section describes all documentation provided with the software project HMA Follow On Task 4 - Order.

5.5.1 Software documentation identification

During the Software Development Lifecycle the following software documents shall be identified:

- Functional Baseline: containing the Customer documentation
- Allocated Baseline: containing HMA Follow On Task4 - Order Specification
- Development Baseline: containing HMA Follow On Task4 – Order Design and Test documentation
- Product Baseline: containing the SW, the SW Release documentation (SRN) and the Test Report documentation
- Test Environment Baseline: containing HMA Follow On Task4 - Order Test Scripts, Test Tools, Test Data and all about test environment

The English language will be used for all project deliverable documents. All documents will be delivered in MS Office compatible or PDF format, permitting electronic insertion of comments. Documents will shall be delivered on electronic media only. We will use the HMA wiki, where HMA-FO project specific pages will be created, for information exchange, outreach and reporting. Where confidentiality is required, email will be used for the delivery of working versions of the deliverables.

We will deliver two (2) CD-ROM(s) with consolidated and/or accepted versions at each project review meeting.

5.5.2 Deliverable items

This section lists the items to be delivered. The following table summarises the project deliverables detailing the delivery milestone, the customer approval and the document file.



Deliverable Item	KO	PR	MTR	AR	FP	OTHER	Customer Approval On File	Doc File
Software Development Plan (SDP)	X				X	Progress Meetings		
Progress Reports						Progress Meetings		
Minutes of Meetings	X	X	X	X	X	Progress Meetings		
Project Executive Summary					X			
Configuration Item Data List (CIDL)			X	X				DDF
Software Product Assurance Plan (SPAP)	X					Updated when necessary		
Review Item Discrepancies (RIDs)		X	X	X				
Non Conformance Reports (NCRs)				X				
OPGW Software Requirements Specification –SRS (Order Server Requirements Baseline)		X	X				PR	RB
OPGW Software Installation Document (Order Server Operation Manual)			X	X				TS
OPGW Software Design Document – SDD (Order Server Architectural Design)		X	X	X				DDF
HMA Ordering ICD		X	X	X				TS
OPGW Software Validation Testing Specification –SVTS (Order Server Acceptance Test Plan; Traceability of Acceptance tests to Requirements Baseline)			X	X			AR	DJF
Order Server Installation Plan				X				
OPGW Acceptance Test Reports				X				DJF
HMA Order ICD Test Suite Technical Note containing ATS and ETS		X	X	X				DJF
HMA Order ICD test Suite technical Note containing plan and report of the tests executed with the TEAM engine				X				DJF
OPGW SW Delivery				X			AR	DDF

Table 5-3: DIL at each milestone for HMA Follow On Task 4 - Order



5.5.3 Software documentation standards

The aggregation of all technical documents to be delivered represents the Technical Data Package, and will contain the documents indicated as deliverables and marked in bold in the description of HMA Follow On SOW [AD-4].

The Order Server software development will be documented using the following standard document files

- Requirements Baseline (RB)
- Technical Specification (TS)
- Design Justification File (DJF)
- Design Description File (DDF)

The documents in this package will be updated as required during projects' execution, but at the end of the project this package will contain their final versions. The DJF shall include also the final version of all Technical Notes (TN) generated during project execution.

Before the delivery of a version, documents will undergo revision loops, following the agreed quality management mechanism.

Revisions of documents shall be as much as possible planned with the ESA Technical Officer, and documents will be provided at least 5 working before the review. Any version ready for delivery will be approved with signatures by the Project Manager and then by the ESA Technical Officer or their duly authorized delegates. Documents will be considered delivered after ESA Technical Officer's approval.

The planned dates for Technical Data Package deliveries are defined in the Project Planning.

5.6 Standard tailoring traceability

This section reports the compliance to ECSS-E-ST-40C clauses 5.3 relate to Software Management process.

ECSS-E-ST-40C Requirement		Section of this SDP	Compliance (C=Compliant; NC=Noncompliant; NA=Not Applicable)
5.3.2 Software life cycle management			
5.3.2.1a	Software life cycle identification	<5.2.1>	C
5.3.2.1b		<5.2.1>	
5.3.2.1.c		<5.1>, <5.2>, <5.4>	
5.3.2.1.d		<5.2.3>, <5.5>	
5.3.2.2	Identification of interfaces between development and maintenance.	<5.2.1>	C



ECSS-E-ST-40C Requirement		Section of this SDP	Compliance (C=Compliant; NC=Noncompliant; NA=Not Applicable)
5.3.2.3	Software procurement process implementation	<4.8>	C
5.3.2.4a 5.3.2.4b 5.3.2.4c 5.3.2.4d	Automatic code generation		NA No automatic code generation has been identified
5.3.3 Joint technical review process			
5.3.3.2a	Software project reviews	<5.2.3>	C
5.3.3.3a 5.3.3.3b 5.3.3.3c	Software technical reviews	<5.2.3> <5.2.3> <5.2.3>	C
5.3.6 Review phasing			
5.3.6.1.a 5.3.6.1.b	Review phasing for flight software	<5.2.2> <5.2.2>	NA
5.3.6.2	Review phasing for ground software	<5.2.2>	NA
5.3.9 Compliance to this Standard			
5.3.9.1	Compliance matrix	<5.6>	C
5.3.9.2	Documentation compliance	<5.6>	C

Table 5-4: SDP traceability to ECSS-E-ST-40C clauses

