AWARE

ENABLING EWS GALILEO MARKET UPTAKE IN WIDESPREAD PWS

D4.01
INITIAL AWARE IVV PLAN

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WP4 – AWARE integration & validation

D4.01 – Initial AWARE IVV plan

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CHANGE RECORD

Issue	Date	Change	Author
0.1	15/05/2024	First draft for consortium review and PDR	FDC
1.0	19/06/2024	First official release of the document	FDC
1.1	28/06/2024	Modification of the introduction to take into account the remarks made during the IVV presentation	FDC

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LIST OF ABBREVIATIONS

AD: Applicable Document
AR: Acceptance Review
CAP: Common Alerting Protocol
CDR: Critical Design Review
CNES: Centre National d'Etudes Spatiales
CPA: Civil Protection Authority
CRED: Centre for Research on the Epidemiology of Disasters
CST: Centre Spatial Toulousain
DD: Due Diligence Document
EC: European Commission
EENA: European Emergency Number Association
ESA: European Space Agency
ETSI: European Telecommunications Standards Institute
EU: European Union
EUSPA: European Space Programme Agency
EWM: EWS Message
EWM-REC: EWM Recipient
EWS: Emergency Warning Service
FMCC: French Mission Control Centre
FR: Final Review
G1G: Galileo 1st Generation
GMS: Galileo Mission Segment
GNSS: Global Navigation Satellite System
GSAP: Galileo Security Accreditation Panel
GSF: Galileo Security Facility
GSMC: Galileo Security Monitoring Centre
GRALLE: Galileo Reliable Automatic Low Latent Emergency warning service
HMI: Human Machine Interface
HQ: HeadQuarters
HW: Hardware
ICD: Interface Control Document
IGS: Information Gathering Satellite
INFORM: INdex FOr Risk Management
IoT: Internet of Things
ISL: Ingénierie et Solutions Logicielles
IT: Information Technology
ITT: Invitation To Tender
IVQ: Integration Verification Qualification
IVV: Integration Verification Validation
KOM: Kick-Off Meeting
MEO: Medium Earth Orbit
MEOLUT: MEO Local User Terminal
NMEA: National Maritime Electronics Association
OPS: Operation
OS: Open Service
PDR: Preliminary Design Review
PP: Prototype Platform
PoC: Point of Contact
PRIS: Power Reactor Information System
PWS: Public Warning System
Q&A: Question & Answer
QR: Qualification Review
QZSS: Quasi-Zenith Satellite System
R&D: Research & Development
RD: Reference Document
REGINA: REseau GNSS pour l'IGS et la NAvigation
RLM: Return Link Message
RLS: Return Link Service
RLSP: Return Link Service Provider
SAB: Security Accreditation Board
SAR: Search And Rescue
SBAS: Space Based Augmentation System
SDD: Service Definition Document
SiS: Signal-in-Space
START: Study of Terrorism And Responses to Terrorism
STELLAR: demonSTrations of thE upcoming gaLiLeo emergency wArning seRvice
SW: Software
TASF: Thales Alenia Space France
TPZF: Telespazio France
TUT: Test User Terminal
TWC: Two Way Communication
UC: Use Case
UX: User eXperience
WP: Work Package
WPL: Work Package Leader

1 INTRODUCTION

This initial IVV plan presents the strategy that will be applied for the Integration Verification and Validation of all the components developed or updated in the frame of the AWARE project (AWARE module, AWARE Service Centre, Public Warning Devices).

This document includes:

- An overview of the IVV process,
- A presentation of each Verification, Integration and Validation steps,
- An introduction to the verification methods,
- An introduction to tests coverage,
- A presentation of the documentation associated with IVV.

This initial, high level, version (D4.01) is provided before the start of IVV activities.

A final version (D4.02) will be delivered after the development phase (WP3) at the beginning of the IVV activities.

A IVV report (D4.03) will be delivered after the IVV phase (WP4), before the end-to-end demonstrations (WP5).

The foreseen schedule is as follows:

- T0 – Initial IVV Strategy ➔ **D4.01**
- T0+2M – End of the design / Start of the development (MS2 – CDR)
- T0+8M – End of the development / Start of the IVV (MS3 – TRB Sub-System) ➔ **D4.02**
- T0+12M – End of IVV / Start of end-to-end demonstration (MS4 – TRB System) ➔ **D4.03**

2 IVV PLAN

2.1 IVV OVERVIEW

IVV process is used to ensure that the AWARE system meets its specifications and fulfills its intended purpose. The IVV process applied to the AWARE project covers the following items:

1. Planning:

A comprehensive plan outlining the scope, approach, resources, schedule, and deliverables is created to manage the IVV activities for AWARE project.

2. Requirements analysis:

- Requirements review: during the requirements writing, they are regularly reviewed by the partners in order to ensure they are complete, clear, consistent, and testable.

- Traceability matrix: a matrix is created to map the requirements to their corresponding verification and validation activities (see section 2.6).

3. Verification:

Each AWARE component is tested individually to verify that each is functioning properly (see section 2.2).

4. Validation:

- Integration testing: the AWARE components are combined to form a PWD and tested to ensure they work together as intended (see section 2.3).

- System testing: the complete AWARE system is verified to ensure that it meets the specified requirements and performs as expected in an operational environment (see section 2.4).

5. Reporting:

A comprehensive report summarizing the IVV activities, including test results, discrepancies, and issues encountered is released (see section 2.7).

6. Issue Tracking and Resolution:

- Prioritize and resolve: issues are prioritized based on severity and impact and then resolved. This may involve debugging, reworking design, or updating requirements.

- Retesting: after issues are resolved, the affected components or system are tested again to ensure the problems have been correctly.

7. Closure:

A final review is conducted to ensure all IVV activities are complete, and all requirements have been verified and validated.

2.2 VERIFICATION UNIT TESTS

The objective of this step is to have the prototype main components tested separately in laboratory. The components considered are the AWARE module, the Public Warning Devices and the AWARE service center. No deliverable is associated with this step.

2.2.1 AWARE module

The Figure 1 shows a preliminary view of the AWARE module hardware, software and interface components.

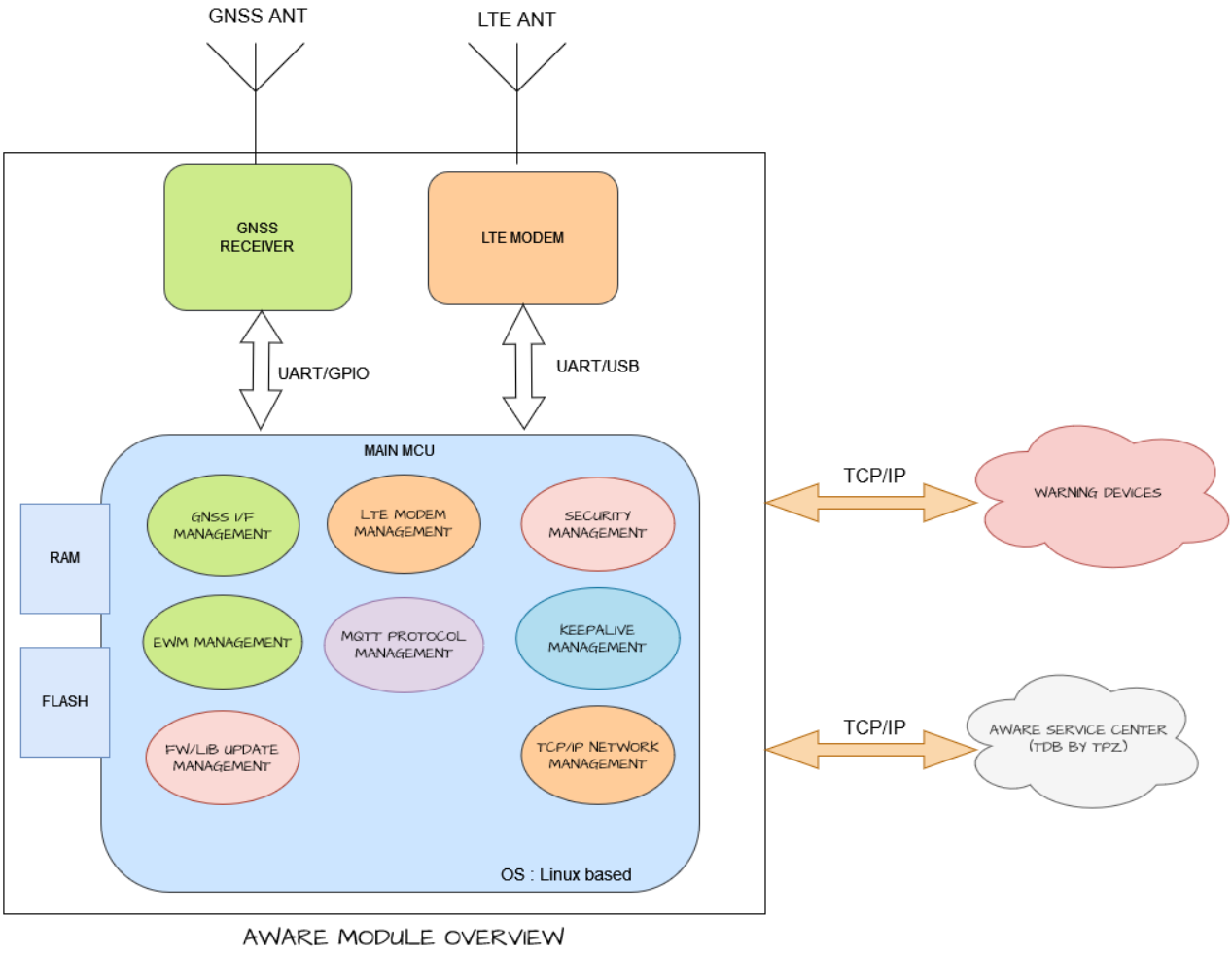

Figure 1 – AWARE module overview

For AWARE module, the tests are focused on:

- Functional (GNSS receiver, LTE modem, software componants, …),
- External interfaces (power interface, communication interface, protocol, …),
- Environment (temperature, power conditions, …),
- Key measurements (GNSS RF sensitivity, consumption, …).

2.2.2 Public Warning Devices

For Public Warning Device, the tests are focused on:
- Functional,
- External interfaces.

2.2.3 AWARE service centre

For AWARE service centre, the tests are focused on:
- Functional (firmware update management, …),
- External interfaces (protocol, …),
- Cybersecurity (pentest, fuzzing, …).

2.3 DEVICES INTEGRATION AND VALIDATION

During this step, the AWARE module is refined and integrated in the hosting devices. This step is performed in laboratory.

The subsystems taken into consideration are:
- a Long Range Acoustic Device associated with an AWARE module (WP4.3),
- a display panel associated with an AWARE module (WP4.4),
- a indoor warning device based on an AWARE module (WP4.5).

The tests are focused on:
- Functional (alert reception and display, firmware and library update, data monitoring…),
- Key measurements (RF sensitivity, …),
- Electrical interface between PWD and AWARE module,
- Mechanical and connection check.

2.4 SYSTEM INTEGRATION AND VALIDATION

At the system level, the aim is to provide for the WP5 demonstrations an AWARE system end-to-end tested. For this step, the tests involve the entire processing chain and must be performed, if it is possible, in real conditions. The system is composed by:
- A simulator to send alerts (to simulate national authority),
- An AWARE service center,
- Display panels,
- LRAD,
- Indoor warning devices.

The tests are focused on:
- Functional,
- Performance,
- Stress testing.

2.5 VERIFICATION METHOD

For each requirement, a verification method is defined according to the IADT model.

The **inspection** (I) is a physical examination of an AWARE component to ensure that its physical characteristics are compliant with the requirements.

The **analysis** (A) is the validation of a requirement which only use calculations or models.

The **demonstration** (D) is the verification of a functional requirement of a component not requiring the use of instruments, special equipments, or subsequent analysis.

The **test** (T) is the verification of a functional requirement of a component using instruments or special equipments.

For demonstration and test, a "black box" approach is used. This aims to ensure that each functionality works according to requirements.

2.6 TEST COVERAGE

The requirements defined in WP2.1 and the decomposition into sub-requirements are followed during all project phases. That allows to check all requirements are covered by tests, analysis, demonstration or inspection.

At the end of WP4.6, a matrix is established to check the requirements coverage by the tests.

2.7 DOCUMENTATION

In the WP4 three documents must be delivered:

- D4.01 – Initial AWARE Integration and validation plan,
- D4.02 – Final AWARE Integration and validation plan,
- D4.03 – AWARE Integration and validation report.

The Final AWARE Integration and validation plan provides:

- If relevant, the definition of key performance indicators (KPI) that should be used to evaluate the performance of the AWARE system.
- The test set-up that defines the environmental needs and tools to be used for the tests execution.
- The test definition that describes the test in high level point of view, the specific test tools, the steps required to carry out the test and the result expected.

Each test result is reported in the AWARE Integration and validation report document.

END OF DOCUMENT