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Advanced Shipborne Galileo Receiver Double Frequency (ASGARD) - Objectives, activities and expected added value

IALA ENG15

Virtual meeting, 7th March 2022

Introduction to ASGARD project and objectives

ASGARD Context

- Nowadays, there are different GNSS satellites **constellations** for computing the position. One of them is **Galileo**, the European GNSS system.
- Using Galileo with other constellations increases the **robustness** and **availability**, especially in areas where is difficult to receive signals from GNSS satellites
- Galileo will additionally provide an **Authentication** service in the navigation message (OSNMA): currently with **SiS** (test phase). This provides protection against **spoofing** attacks.
- **IMO** resolution MSC.401(95) and MSC.432 adopted performance standards for multi-system shipborne radionavigation receivers (**MSR**) indicating that the shipborne equipment should use at least **two independent** GNSS sources.
- The ASGARD project has been launched by **EUSPA** with the main objective of developing a multi-constellation (Galileo and GPS) and double frequency (E1/E5, L1/L5) maritime receiver including OSNMA capabilities.

Introduction to ASGARD project and objectives

ASGARD Consortium

- Project coordinator
- Proven experience on **GNSS** standardization aspects and on the design, development and integration of positioning algorithms, products, SW and GNSS **receivers**

- One of the most important **manufacturers** of high performance **shipborne** navigation receivers

For providing support in verification and validation activities there are two laboratories identified:

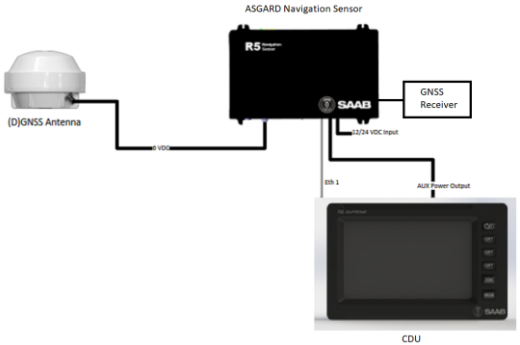
- **BSH** (Bundesamt für Seeschifffahrt und Hydrographie), a recognized laboratory for maritime navigation and radio equipment testing and approval. (formal **IEC** certification tests)
- **JRC**, the European Commission's science and knowledge service which employs scientists to carry out research in order to provide independent scientific advice and support to EU policy. (**spoofing** tests)

Introduction to ASGARD project and objectives

ASGARD objectives

Three main objectives define the complete scope of ASGARD project:

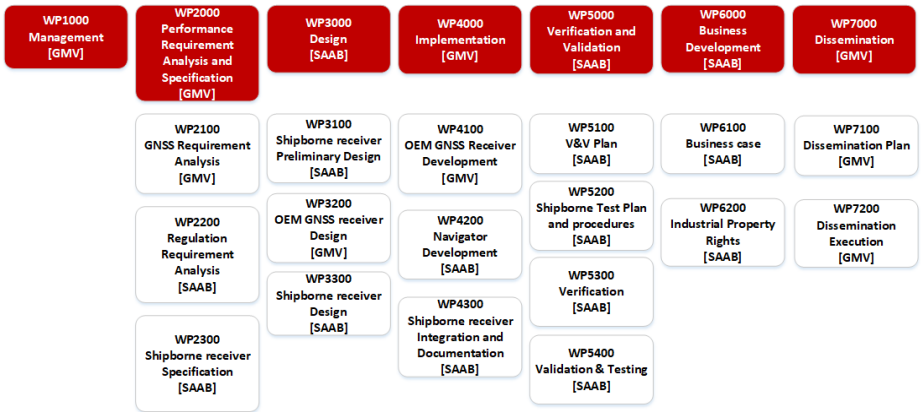
- **Objective 1**: Develop and test a **dual-frequency** (E1/E5a) shipborne **multi-constellation** receiver implementing **Galileo**, compliant with
  - IMO Performance standards for MSR: MSC.401(95) and MSC.432(98)
  - Galileo multi-frequency receiver in IMO MSC.233(88)
- **Objective 2**: Demonstrate that the dual frequency shipborne receiver developed in the frame of the project is compliant to **IEC 61108-3** and **IEC 61108-1**. Aiming to obtain a TRL-7 equipment that will be aligned with MED/4.56
- **Objective 3**: Implement the algorithms to use **OSNMA** to support **resilient PNT** in maritime navigation following Galileo OSNMA specifications issued by EC.



ASGARD activities and planning

ASGARD Activities

Seven Work Packages were identified to cover the activities to be performed to achieve the objectives:



- Encompassing OEM GNSS Receiver
- Verification activities

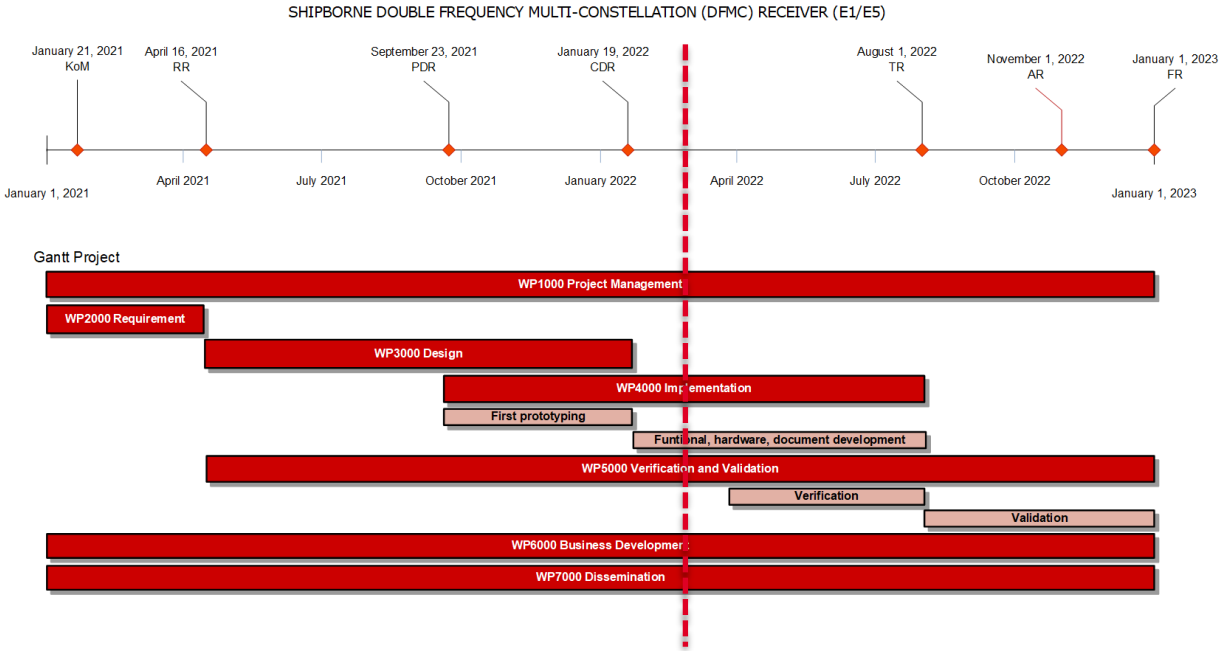
- Certification Laboratory Tests
- Spoofing Laboratory Tests

- On board field tests

ASGARD activities and planning

ASGARD Planning

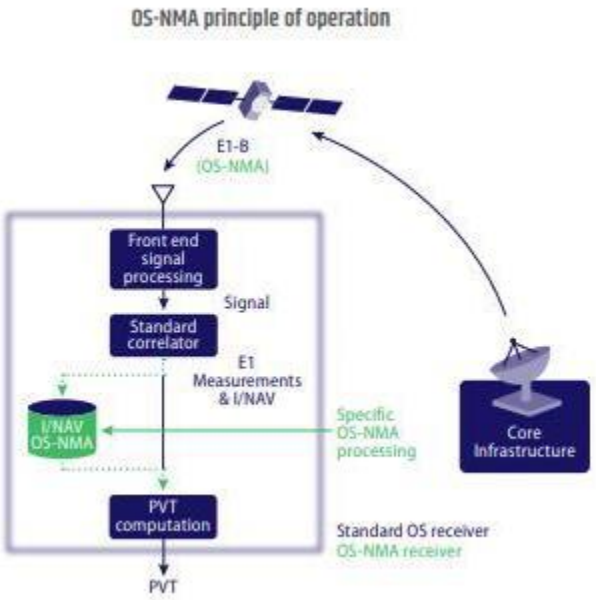
The activities are planned to be developed during the 24 months of the Project duration



ASGARD added value of project outcomes

ASGARD added value

- It is expected that ASGARD project will fulfil its requirements of developing a **new multi constellation**, double frequency and OSNMA processing capable **maritime navigation equipment**.
- It will follow the current **international maritime regulations** and standards, such as IMO 122, IMO 233 and IEC 61108-1, IEC 61108-3 and most of those related with MED4.56.
- A proposal of implementation following other new regulations (still without IEC test) such as IMO MSC.401/432 that provides an MSR approach for more robust resilient PNT, **better performances** and **integrity** functionalities.
- Despite not specifically included in any current maritime regulation, ASGARD new equipment will include the **implementation of OSNMA** processing capabilities



Thank you for your attention

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ASGARD Project
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