

Call for pitches – Guidelines for R&T topics

Topic of interest: Real-Time Maritime Situational Awareness

Airbus Contact Person: Matthias Buderath

Short description of research topic:

New technology needs in the domain of Maritime Surveillance for Intelligence, Surveillance, and Reconnaissance (ISR) or Search and Rescue (SAR) operations are arisen which are based on the capability that system of system are generating common situational awareness picture [COP] in almost real time. Here, a system of system (SoS) is a group of multiple assets (e.g. drones, maritime patrol aircraft and satellites) which deliver within a network orchestration the required mission services.

The research topic will be the development of a so called “Maritime ISR -Digital Twin “with the objective to validate the performance and value contribution to a SoS mission operation.

Detailed areas of research proposed:

A useful way to drive maturation of algorithm algorithms in the domain of ISR and multi domain mission deployment what we call nowadays digital twin. In our case it will be a simulation based environment connecting several assets, provide cloud based services and using this infra structure as a validation platform for various type of applications e.g. sensor fusion, anomaly detection, image analyzer, ship risk ranking.....

The project should be defined as a collaboration project which brings several competences and skills from academia and research institutes and even operators together. The project can be divided into three major pillars:

Proposed approach:

Pillar #1: development of the simulation based Maritime ISR -Digital Twin platform

Pillar #2: development of the cloud based infrastructure

Pillar #3 development of intelligence / algorithm anomaly detection, Intelligence for Decision

Research focus to be expected:

Pillar #1:

- Virtual product engineering – Modelling and Simulation – Exploring use of artificial intelligence for hybrid modelling approaches.
- Development of cognitive modelling for prediction and automated detection of behavioral anomalies

Pillar #2:

- Development of functional service architecture
- Collect event data in real time from variety of sources (automatic identification system (AIS), Radar Data, Video Stream, SAR, ...
- Data integration and governance → quality of data
- Cross domain data fusion to create common situational picture

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Pillar #3:

- Development of advanced data processing and fusion technologies to extract automatically high value information (like threat and abnormal behaviour assessment), from various Intelligence data sources.
- Next Generation Tracking Techniques for complex aerial surveillance
- Development of HMI - cognitive assistance to support intelligence decision making

Target results foreseen (e.g. maturity level to reach, deliverables to produce, estimated timing, etc.):

- ISR-Digital Twin platform
- Cloud based Data Analytics and cloud based services for real time situational awareness
- Algorithm for/ Intelligence for Decision making according to the ISR and SAR application layer

Other relevant aspects to consider (e.g. previous experience required working in Defence and Space sector, access to specific facilities or laboratories, etc.)

- Good domain knowledge of each of the three pillars will be required