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CapTech SPACE

– technologies in the Strategic Research Agenda

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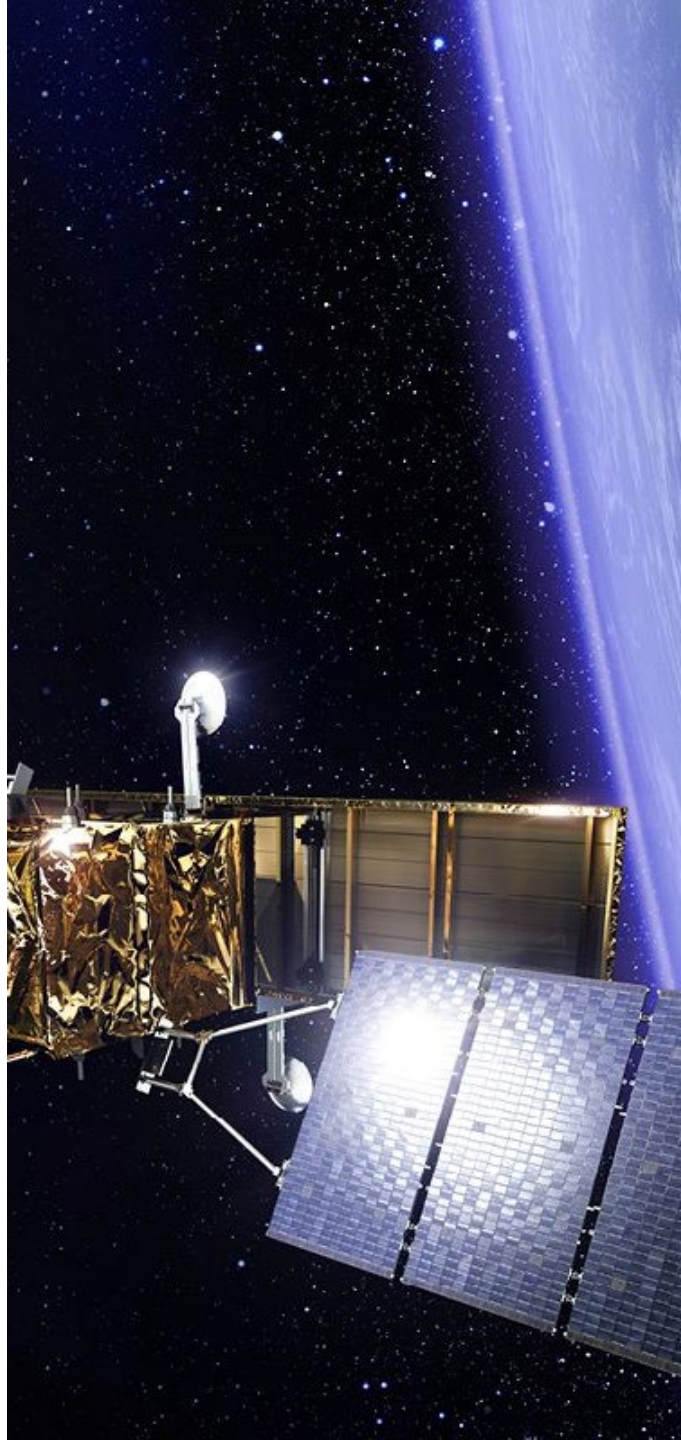
GOAL OF THIS PRESENTATION

- Introduce EDA R&T Directorate and the CapTech Space
- User needs and technologies
- Cooperation



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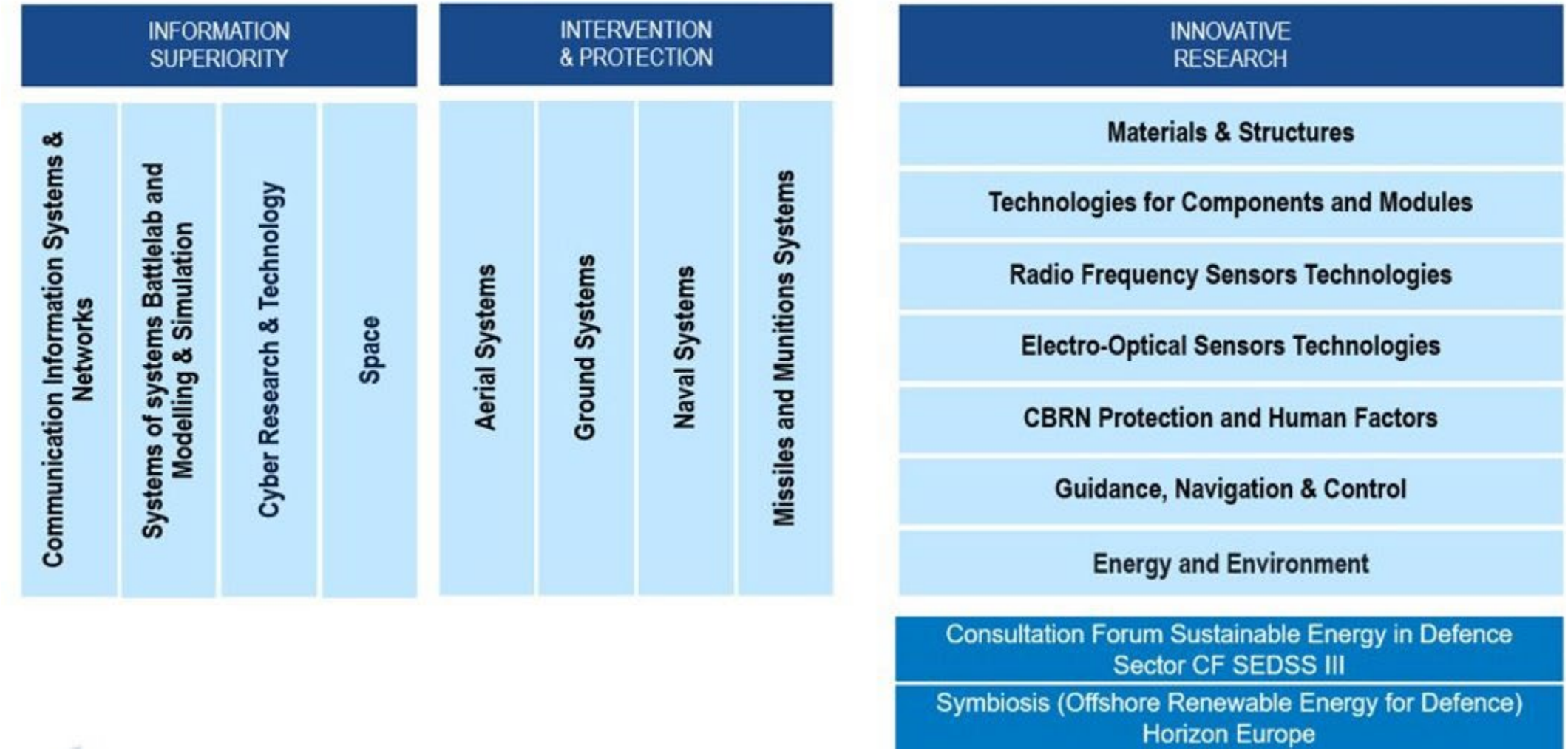
WHAT IS A CAPTECH?

A CAPABILITY TECHNOLOGY GROUP ("CAPTECH") IS A WORKING GROUP OF THE EDA DEDICATED TO A PARTICULAR TECHNOLOGY AREA (AREA OF RESPONSIBILITY)

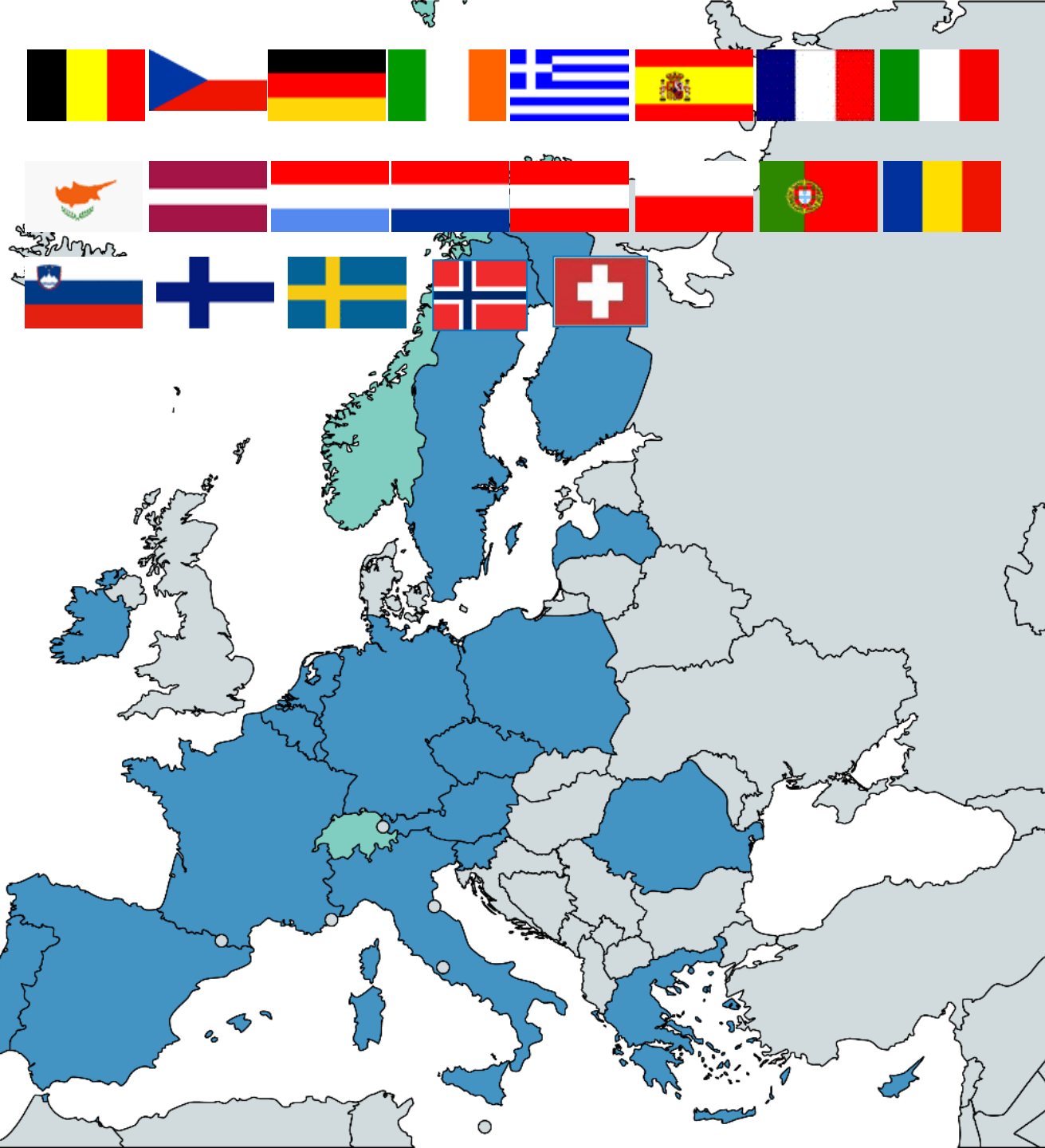
MAIN OBJECTIVES

- Prepare and maintain the Strategic Research Agenda (SRA)
- Define and maintain TBBs and ensure they are relevant and kept up to date
- Develop pMS collaborative ad-hoc R&T Projects and Programmes within the Area of Responsibility
- Propose topics for EDA-funded (OB) studies in specific areas to form a common understanding on research requirements
- Contribute with the necessary expertise when required in preparing projects and programmes from wider policy areas
- Perform technology watch and foresight activities
- Serve as a networking body, to facilitate the before-mentioned activities

EDA R&T - CAPABILITY TECHNOLOGY GROUPS - CAPTECHS



PARTICIPATION



The CapTech Space is the biggest R&T defence community for space in Europe

21 Member States (inc. NO + CH)

>350 Participants (MS, industry & academia)

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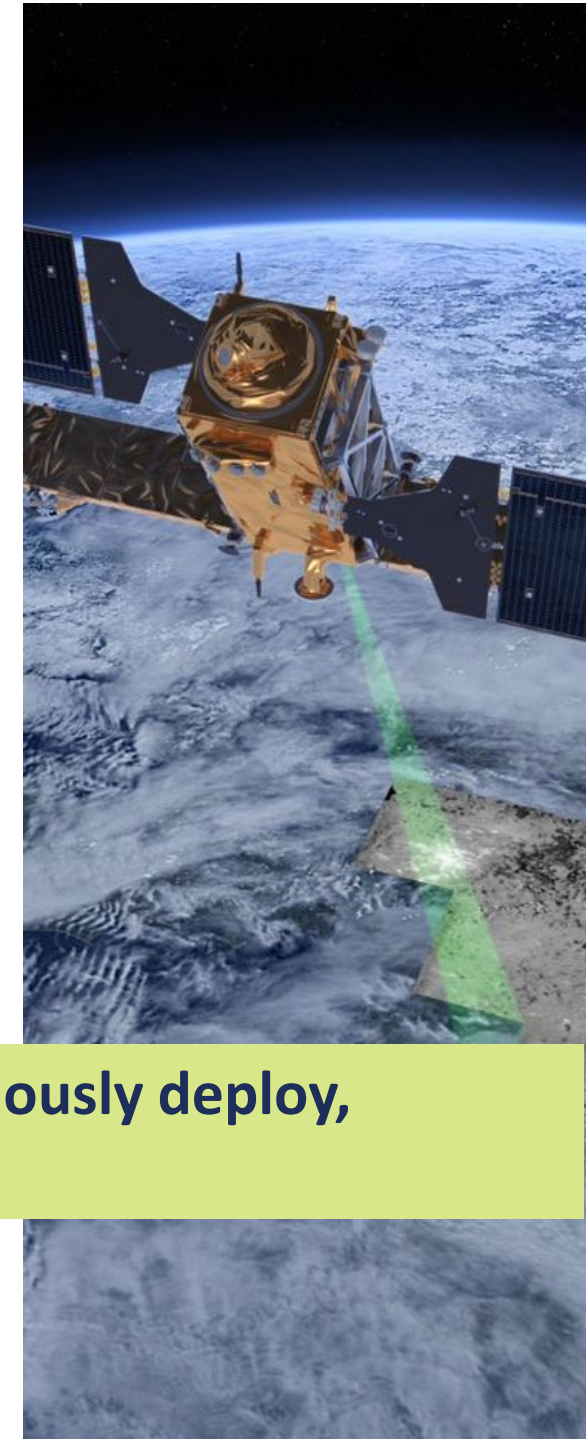
CAPTECH SPACE - OBJECTIVES

- Coordinate and strengthen R&T for Space Defence in Europe.
- Overcome shortfalls and support new defence and security capabilities in the space domain.
- Foster innovative cooperation among the Member States in R&T.
- Act as an interface between MoDs and industry for achieving European autonomy.
- Generate innovative collaborative R&T projects.



R&T for space defence for Europe to autonomously deploy, operate, and benefit from space capabilities.

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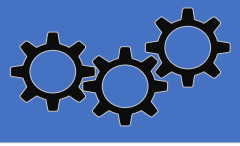
PROCESS OF FORMING STRATEGIC RESEARCH AGENDA

Inputs:
8 AHWG Space meeting with Member States (MS).

5 industry workshops with more than 100 participants.

Process

- Identifying MS needs
- Identifying technological gaps
- Identifying projects
- Prioritization



Approved* Space Strategic Research Agenda

Technical Building Blocks

Technical Building Blocks

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Technical Building Blocks

* Approved by the RTI steering board

Carried out over the 2 year Ad-Hoc Working Group Space period

POSSIBLE INVOLVEMENT

- Member States can pursue collaboration for R&T in CapTech Space

  - through their participation in Category-B (CATB projects)
    - using the TBB roadmaps (the 159 projects);
    - propose new projects not included in the roadmaps;
    - projects are co-funded by the MS and supported with industrial contribution.

- Industry can submit a request to join the CapTech Space to the moderators

CATB matchmaking with MS and Industry continuously ongoing coordinated by EDA

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CAPTECH SPACE STRATEGIC RESEARCH AGENDA

Finalised in October 2022

9 TBBs

110 New Projects

159 Project Phases:

- EDA OB Studies: 3
- Cat B proposals: 68
- Cat B or EDF proposals: 52
- EDF: 36

- TBB 1 – Defence Space Architecture
- TBB 2 – Earth Observation and Reconnaissance
- TBB 3 – SSA and Space Operations
- TBB 4 – Space-based PNT Applications
- TBB 5 – Satellite Communications
- TBB 6 – Quantum and other disruptive techs for space applications
- TBB 7 – Data processing
- TBB 8 – Launch, Space and Ground segment
- TBB 9 – Detection, Mitigation and Protection by Space systems

DEFENCE NEEDS ADDRESSED IN CAPTECH SPACE STRATEGIC RESEARCH AGENDA

Space support to military operations

Complementary R&T developments for defence

TBB 2 Earth Observation & Reconnaissance

TBB 5 Satellite Communications

TBB 4 Space-based PNT applications

TBB 6 Quantum & disruptive technologies

TBB 1 Defence Space Architecture

TBB 7 Data processing

TBB 3 SSA and space operations

TBB 8 Launch, space and ground segments

TBB 9 Detection, mitigation & protection by space systems

Space security, avaliability and sustainability

Indication/ warning → Assessment → Planning → Execution

Cooperation and sharing

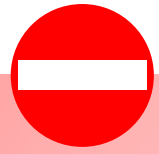
Provides future processing and analysis capabilities to space based data

EXAMPLE EARTH OBSERVATION

GROWING MILITARY DEMAND AND FORCE MULTIPLYING EFFECT OF EO.

EU Defence sector should improve its EO:

- Day or night.
- Regardless of cloud cover.
- Detect unnoticed changes in a complex and hostile environment.
- Utilize better radar and optical sensors.
- Automating the combining process of optical and radar imagery.



Main barriers

- Access and control to sensors coming from non-EU countries.
- Development of compact sensors to ensure the collection/capture of enough photons for SBEO.
- Presence of only specific architectures for radar application (RF).

CapTech Space	**TBB02. Improvement of existing and/or development of EU high performance sensors** **TBB02 AI-powered EO data processing to improve defence imagery access (in support of ISR)**
CapTech Components	**TBB1 RF Photonic** **TBB2 IR Imaging Detector & Sources** **TBB6 Enabling components for advanced antennas** **TBB8 Signal Generation and Time Reference** **TBB10 High Voltage Sic devices and related energy storage for pulsed power generation**
CapTech Electro Optical Sensors Technologies (EOST)	**TBB1 Hyperspectral/Multispectral Imaging Systems** **TBB2 Passive Imaging Systems** **TBB3 Novel Optical Configuration**
CapTech RADAR	**TBB4 Multi-Platform RF Systems**

EXAMPLE EARTH OBSERVATION - CAPTECH SPACE

- TBB02. Improvement of existing and/or development of EU high performance sensors
  - Spaceborne multi-frequency SAR (Synthetic Aperture Radar) - Introducing the potential of fully-digital multi-band processing into advanced Radar for highest target detectability

- TBB02 AI-powered EO data processing to improve defence imagery access (in support of ISR)
  - Hyperspectral and other Space assets (Optical, SAR) exploitation with intelligent data processing to support military commander's decision-making process.
  - Hyperspectral sensors for the chosen classes of objects observation.

COOPERATIONS - ESA

- Administrative agreement in place

- Collaboration with ESA & investigation of Joint CATB projects.
  - ESAs accelerator initiative for Rapid and Resilient Crisis Response (R3)

- Cooperation with ESA on common technologies, common supply chain (EDA participated in ESA harmonization process) e.g., on Gallium Nitride (GaN) for RF, photonic integrated circuits (PIC), on Time / frequency generation...

- EDA Innovation Prize 2022
  - “Space-based surveillance and reconnaissance defence technologies (space domain) focusing on debris and artificial orbiting objects”.
  - In collaboration with ESA

Images in courtesy of ESA

COOPERATIONS - CRITICAL COMPONENTS FOR SPACE APPLICATIONS

- CapTech Space is carrying out a project to identify the critical components in the TBBs
- Questionnaire to MoD and industry within the CapTech community.
- Outcome will feed Joint Task Force.
- Supported by EY (EDA OB contract)

Critical components means where EU has dependencies

ANNOUNCEMENTS

- The next CapTech Space meeting and Industry Workshop will be in Vienna 28-30 March.

The European Defence Agency (EDA) issued on 1 February 2023 its call for applications to its first ever EDA Research, Technology, and Innovation Papers Awards.

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Thanks for your attention!