

European challenges in SSA. Poland example

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EUROPEAN ENVIRONMENT

- ▶ **European Legislation on Space Security:**
- ▶ **Consortium Governance Decision 541/2014/EU for a Support Framework**
- ▶ „Ensuring the long-term availability of European and national space infrastructure, facilities and services which are essential for the safety and security of the economies, societies and citizens in Europe” (Art.3)
- ▶ With the aim to (Art. 4):
- ▶ „Establish a SST capability at European level and with an **appropriate level of autonomy**”:

EUROPEAN ENVIRONMENT cont.

- ▶ (a) The establishment and operation of a **sensor function** consisting of a network of Member State ground-based and/or space based sensors, including national sensors developed through ESA, to survey and track space objects and to produce a data base thereof;
- ▶ (b) The establishment and operation of a **process in function** to process and analyse the SST data at national level to produce SST information and services for transmission to the SST service provision function;
- ▶ (c) The setting up of a function to provide **SST services** as defined in Article 5(1) to the entities referred to in Article 5(2).

EUROPEAN ENVIRONMENT cont.

- ▶ Brussels, 6.6.2018 SWD(2018) 327 final PART
- ▶ COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT accompanying the document establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU {COM(2018) 447 final} - {SWD(2018) 328 final} ...To develop Space Situational Awareness activities in order to give the European Union more autonomy and expertise in the field of space hazard prevention and mitigation. Into SSA, the first priority will be to continue and develop SST services at European level. In addition to SST, if additional funds are available, the programme could be completed by initial Space Weather services and, subsequently, by activities in support of Near Earth Object service....

EU CONSORTIUM- objectives:

- ▶ In 2015 The European Commission has set up the SST Consortium to coordinate this initiative, whose task is to combine the capabilities of European States in order to secure European and national space infrastructure.
- ▶ Member States contributed to the consortium national optical and radar sensors capable of observing artificial objects moving around the Earth and analyzing the data provided by these sensors.
- ▶ On the basis of the processed data, SST services in the form of risk assessment and information and warnings on actual and predicted events in space involving artificial space objects shall be implemented. Such events may be e.g. collisions and fragmentation of objects in orbit or uncontrolled entry into the Earth's atmosphere of artificial space objects. Information is made available to stakeholders, including EU institutions, Member States and satellite operators.
- ▶ Initially, the consortium consisted of leading European States: Germany, France, Spain, Italy and the United Kingdom, represented mainly by national space agencies. At the end of 2018, Romania, Portugal and Poland joined the group.

EU CONSORTIUM- objectives cont.

- ▶ Particularity of governance to answer specificities of the space sector:
- ▶ **Dual nature of systems**, services and actors: military legacy, civilian orientation
- ❑ **National security** dimension: collaboration at national level between civilian, military and security actors
- ❑ **National control, operation and ownership** retained over SST sensors\
- ❑ Delegates and experts from MoDs (Ministries of Defense) and Space Agencies

EUROPEAN ENVIRONMENT cont.

- ▶ **Communication COM(2016)705 of 26 October 2016-
Space Strategy for Europe**
- ▶ **CONCLUSIONS:**
- ▶ Enormous potential of space for Europe and the world
- ▶ Europe faces huge global challenges which require global responses.
- ▶ Europe must contribute to this collective responsibility.
- ▶ The EU cannot afford to fall behind in this domain. It must remain in the first rank, building on Europe's talents and expertise, capitalising on its investments and anticipating the opportunities of tomorrow.

EUROPEAN ENVIRONMENT cont.

- ▶ **Main actions: The Commission will:**
- ▶ - enhance the current EU SST services and consider comprehensive Space Situational Awareness services (such as space weather, cyber alerts). In doing so, it will work to establish partnerships, particularly with the US.
- ▶ - help raise awareness of space weather risks at European and international level, and of the emerging cybersecurity risks to critical European space infrastructure.

EUROPEAN ENVIRONMENT cont.



EUROPEAN
COMMISSION

Brussels, 3.5.2018
COM(2018) 256 final

**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND
THE COUNCIL**

**on the implementation of the Space Surveillance and Tracking (SST) support
framework (2014-2017)**

EUROPEAN ENVIRONMENT cont.

▶ CONCLUSIONS AND RECOMMENDATIONS:

- defining an effective future EU SST architecture and suitable arrangements for service delivery
- a common EU database of orbital objects, building on national data
- outreach to, and active engagement with, potential users, supported by further development of EU SST services
- consideration of the needs for, and possible means of realising, synergies
- formulation of a long-term vision, strategic objectives and general guidelines at the EU level
- further simplification of the EU SST grant management scheme
- governance changes to ensure the cost-effective management

SPACE SECURITY IN POLAND- POLSA

- ▶ The Polish Space Agency is a governmental executive body, subject to the Prime Minister. It was established by the Act of 26 September 2014 and became fully operational at the end of 2015.
- ▶ The agency participates in fulfilling the strategic goals of the Republic of Poland by supporting the utilization of satellite systems and the development of space technologies. The main tasks of POLSA cover the 5 following areas: coordinating the activity of the Polish space sector on the national and international level, representing Poland in relations with international space sector organizations, supporting national science and business projects associated with space technologies, popularising the usage of satellite data by public administration and increasing the defensive capabilities of the country.

SECURITY- NATIONAL LEGISLATION- POLAND

POLISH SPACE STRATEGY (published by the Polish Ministry of Economic Development in February 2017).

Objectives:

- ▶ Increasing competitiveness of the Polish space sector and its share in turnover (increasing participation in the EU space programs: SST Support Framework)
- ▶ Development of satellite applications
- ▶ Strengthening capacities in the area of security and defense using space (establishment of Space Situational Awareness System)
- ▶ Creating favorable conditions for the development of space sector in Poland
- ▶ Building human resources for the Polish space sector
- ▶ **STRATEGIC ISSUE: 3% EU MARKET in 2030**

SECURITY- NATIONAL LEGISLATION- POLAND **cont.**

- ▶ **NATIONAL SPACE PLAN (2019-2021)** from 2018
- ▶ Establishment, development and operation of a National Space Situational Awareness system (SSA) in cooperation with the EU SST consortium.
- ▶ The objective of the project is to enhance the security of citizens and infrastructure (Earth and space) in the context of space threats, to build national Space Situational Awareness (SSA) capabilities and to prepare for commercial exploitation of services provided in the area of SSA.
- ▶ The first stage of the activity is to launch basic functionalities of the national SST system (Space Surveillance and Tracking), inter alia, through the development of infrastructure and capabilities enabling the implementation of tasks envisaged within the framework of Poland's future membership in the European SST consortium.

SECURITY- NATIONAL LEGISLATION- POLAND **cont.**

- ▶ **Polish National Space Programme** (from December 2018- in public consultations)
- ▶ Polish Space Agency (POLSA) will be responsible for the implementation of the programme
- ▶ POLSA has considered a few areas of public support within the programme, such as, „Development of satellite systems” – with one of the priority projects: „**Space Situational Awareness System**”. The vital goal of the project is to provide a long-term access to the European and national space infrastructure and the services crucial for securing its operations.
- ▶ As a consequence, a network of sensors (telescopes, lasers, radars) responsible for space object observation and tracking is to function on the territory of Poland and staff is to be trained in order to perform tasks in the frame of SST.

NATIONAL SSA -GOVERNMENTAL INVOLVEMENT



MINISTRY
OF ECONOMIC
DEVELOPMENT



MINISTRY
OF NATIONAL DEFENCE



Ministry of Science
and Higher Education

Republic of Poland



Ministry
of Foreign Affairs
Republic of Poland



POLISH
SPACE
AGENCY



NATIONAL
SECURITY AGENCY

SSA- ACADEMIA AND INDUSTRY

Academia



Space Research Centre
of the Polish Academy of Sciences



ADAM MICKIEWICZ UNIVERSITY IN POZNAŃ

Industry



Poland IN SSA- MAIN FACTORS

- ▶ **Space environment and its evolution**
 - security and sustainability of the space environment: space debris (crushed debris, satellites, disposed rocket, released parts), allocation of scarce space resources, vulnerability to SWE and NEO events
- ▶ **Changes in space actors landscape**
 - New Space/Space 4.0, new governmental and commercial actors: mega constellation, STM
- ▶ **Growing dependence of societies on space systems**
 - GNSS (GPS, GALILEO), SATCOM, GEOINT

POLAND IN SSA- MAIN FACTORS

cont.

- ▶ **Security and defense aspects of space systems**
- threats (kinetic physical attack –direct ascent ASAT, co-orbital ASAT, ground stations, non-kinetic physical attack: high power laser, high power microwave, EMP; electronic attacks: uplink/downlink jammer, spoofing, cyber attack – data intercept/monitoring, data corruption, seizure of control (space objects identification and characterization, spacecraft manoeuvres, ASAT, anomalies detection and identification

POLAND IN SSA- MAIN FACTORS

cont.

- ▶ **CONGESTED, CONTESTED & COMPETITIVE SPACE ENVIRONMENT**
- ▶ National Space Strategy, EU Policies and Space Programs, Allied Interests and National Commitments, International Guidelines/Arrangements/Actions (UNCOPUOS, ICAO, IADC etc.)

SSA DEVELOPMENT IN POLAND

- ▶ **Detection, Tracking and Identification**
 - cataloguing of space objects, collision avoidance, fragmentation, re-entry predictions
- ▶ **Threat Warning and Assessment**
 - maneuvers detection, mission support
- ▶ **Characterization**
 - mission characterization
- ▶ **Data Integration and Exploitation**

CURRENT STATUS OF ACTIVITIES IN POLAND

▶ **Sensors**

- ▶ operationality: optical telescopes 19, laser station (2 lasers), laser-telescope station
- ▶ new optical telescopes development
- ▶ R&D activities at national level and within ESA

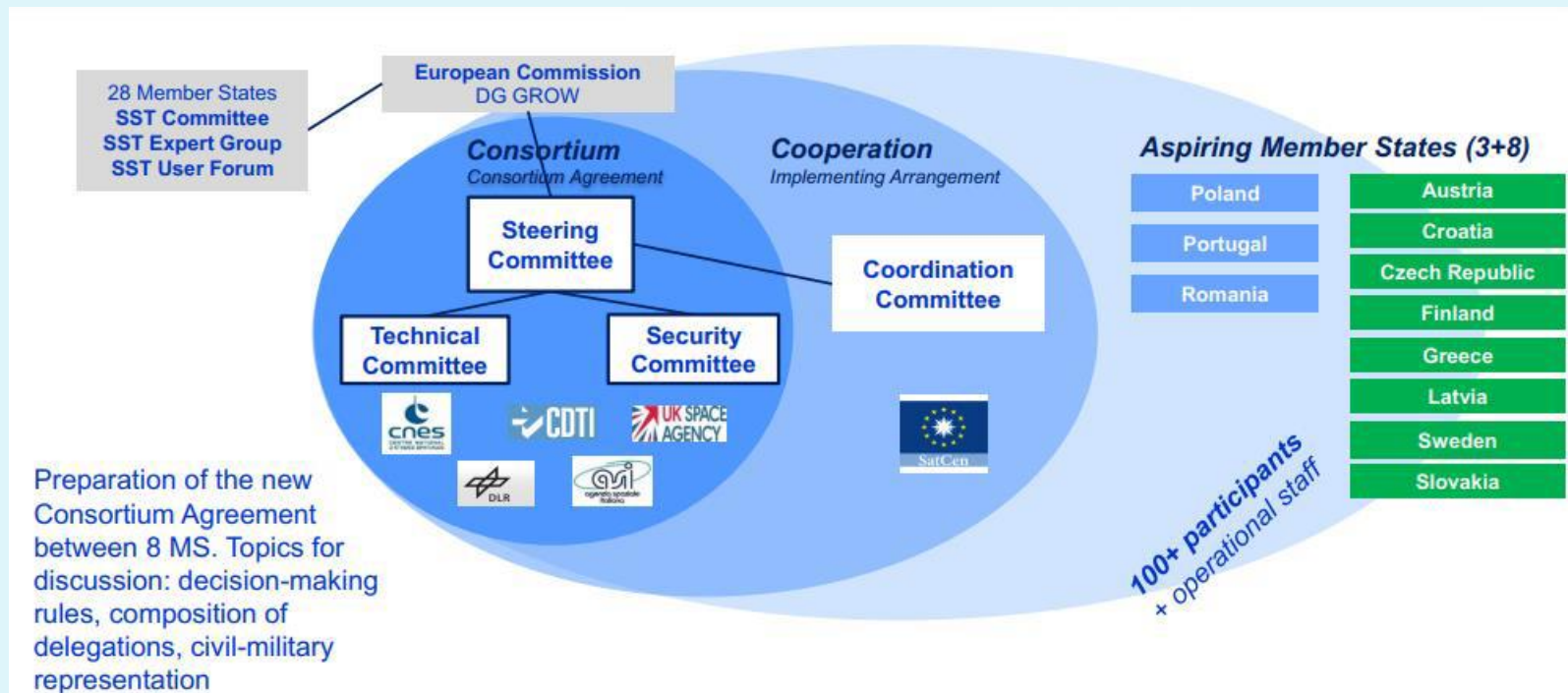
▶ **Processing**

- ▶ existing academia degree software
- ▶ new software development
- ▶ FG (fragmentation) and RE (re-entry) as a priority

CURRENT STATUS OF ACTIVITIES IN POLAND **cont.**

- ▶ **Service delivery**
- ▶ preliminary based on allied information and selected academia solutions

POLAND IN EU SST MODUS OPERANDI



POLAND IN EU CONSORTIUM

- ▶ **19th of December 2018-** Poland joined the European SST Consortium related to the tracking of space debris threatening infrastructure in space and on Earth.
- ▶ Poland has become a full member of the European Space Surveillance and Tracking Consortium.
- ▶ The accession agreement was signed on 19 December 2018 at the seat of the Polish Space Agency in Warsaw.
- ▶ Joining the consortium will enable national entities to participate in projects financed by the EU, whose budget in the current and future financial perspective may amount to more than EUR 350 million. www.polsa.gov.pl

POLAND- PLANNED ACTIVITIES

- ▶ **2015-2017**
- ▶ Capability assessment,
- ▶ assets coordination, assessment and validation,
- ▶ software selection,
- ▶ modalities of cooperation,
- ▶ ESA SSA growth,
- ▶ action plan,
- ▶ application submitting,
- ▶ allocation of funds on national level,
- ▶ personnel training.

POLAND- PLANNED ACTIVITIES

cont.

- ▶ **2018-2020**
- ▶ Transition phase, personnel designation,
- ▶ software implementation,
- ▶ embedding in SST Consortium,
- ▶ infrastructure preparation,
- ▶ OpCen inception,
- ▶ data integration,
- ▶ catalogue building.
- ▶ **IOC- Initial Operational Capabilities (service provision for EU assets)**
- ▶ collision prediction, re-entry; R&D, radar capability development

POLAND- PLANNED ACTIVITIES

cont.

- ▶ **2021-2028**
- ▶ **FOC- Full Operational Capabilities (service provision for EU and own assets)**
 - collision prediction,
 - re-entry,
 - break-ups, separations, sensors upgrade, R&D
 - object identification,
 - mission characterisation,
 - launch detection

POLAND- R&D PRIORITIES AND ACTIONS

▶ **PRIORITIES**

- ▶ National-civilian, EU-civilian, national-military, requirements alignment
- ▶ Military SSA operational capabilities approval
- ▶ National optical network establishment
- ▶ New technologies development(radar)
- ▶ Independent service delivery optimization
- ▶ Cooperation with EU and allied partners

POLAND- R&D PRIORITIES AND ACTIONS- cont.

- ▶ **SPECIFIC ACTIONS:**
- ▶ tests and validation of existing assets, modeling and simulation of network
- ▶ network gap filling -development of new telescopes and worldwide deployment
- ▶ uniform retrofitting of existing sensors including security domain and redeployment of existing telescopes to new locations;

POLAND- R&D PRIORITIES AND ACTIONS- cont.

- ▶ laser upgrade, new laser operationality,
- ▶ optical, laser, phase array radar, passive radar and space SSA technologies development
- ▶ preparatory studies for future radar system(ESA SSA)
- ▶ mission characterisation developments
- ▶ software gap filling, processes streamlining

POLAND- R&D MECHANISMS

- ▶ Existing national general R&D mechanism(NCBR)
- ▶ Dedicated National Space Plan
- ▶ ESA-SSA programme and ESA Polish Industry Incentive Scheme
- ▶ EUSST Consortium collaboration
- ▶ H2020Activities

POLISH COOPERATION INTERNAL AND EXTERNAL

- ▶ **EXISTING:**
- ▶ supporting policy dialogue and decisions (UN, US, EU)
- ▶ cooperation within ESA projects
- ▶ observer status in EU SST Consortium
- ▶ bilateral dialogue with EU SST Consortium Member States
- ▶ US SSA Data Sharing Agreement Negotiations

POLISH COOPERATION INTERNAL AND EXTERNAL **cont.**

- ▶ **CONSIDERED:**
- ▶ Cooperation with EU SST Consortium MS and cooperation states (eg. Japan, South Korea)
- ▶ Dialogue with US (training courses, Global Sentinel ex, liaison officer)
- ▶ Cooperation with Allied States

SSA IN POLAND AND NATIONAL SECURITY

- ▶ **SSA system influence on national security in space**
- ▶ Protection of military operations and national interest
- ▶ Safety of space operations (European and Allied systems first, ultimately national systems as well)
- ▶ Ensuring safety of citizens depending on space systems and terrestrial infrastructure and civil protection against all threats related to space
- ▶ Implementation and monitoring of international treaties and agreements
- ▶ Protection of space capabilities by allied cooperation

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