ACOS TRANSFORMATION - CAP INFORM - SPACE OFFICE
CDT LEBRUN DAMIEN

DEFENSIE
LA DÉFENSE

20 Nov 2024

Space @ Belgian Defence

Agenda

- Introduction
- The Seven Space Functional Areas
  - Current systems
  - Foreseen developments
- Focus on the War in Ukraine
- Conclusion
- Q&A

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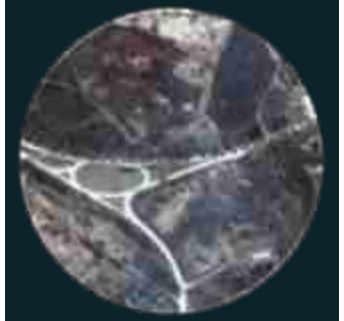
UNITED STATES SPACE FORCE

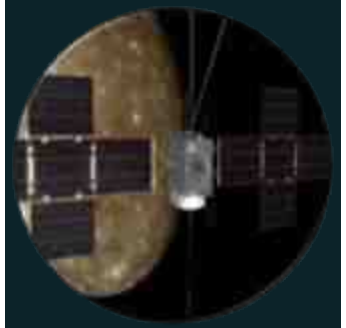
GENERAL CHANCE SALTZMAN:

“The world’s use of space is growing at an accelerating rate, making space simultaneously more important and more dangerous. The domain is no longer the benign expanse of the past. Counterspace threats continue to destabilize the environment and space-enabled attack increasingly holds the Joint Force and our homeland at risk”

The strategic context



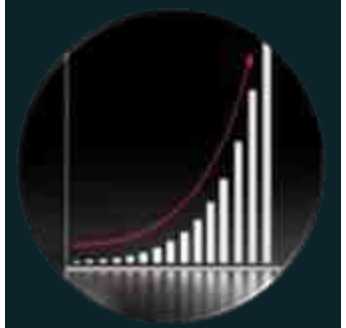
Strategic enabler for Defence & civil society



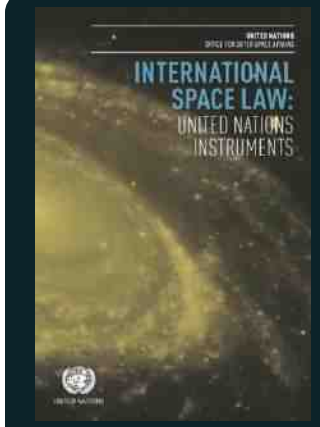
Vulnerable technology component

Essential domain for warfare supremacy

Cheaper access to space



Proliferation of disruptive actors



Lacunary international law

Complex surveillance

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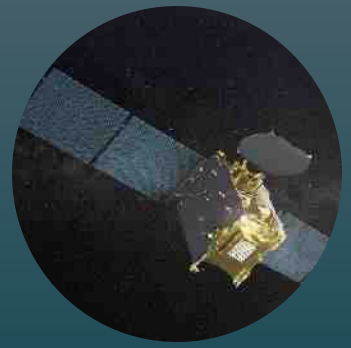
Belgian Defence Space Strategic Objectives

Robust & secure access to space capabilities to support Ops & Intel



Contribution to protection of national and allied assets and stakeholders

Contribute to a Safe, Secure & Sustainable Outer Space for all space users

Cooperation with international stakeholders to apprehend and mitigate risks and threats

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Space is contested

So What :
- Space threats come in many forms
- Space threats can be tackled in many ways

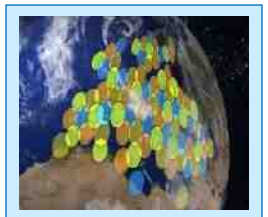
Electronic Warfare | Cyber | Kinetic Physical | Directed Energy Weapons | Long Term


Downlink jamming


Uplink jamming


Spoofing


Dazzling


Data interception


Data corruption


High power laser


Command intrusion


Ground-site attack/sabotage


High power microwave


Co-orbital Rendez-vous & Proximity Ops


Direct Ascent Anti Satellite


Nuclear detonation in Space

Frequency

Impact

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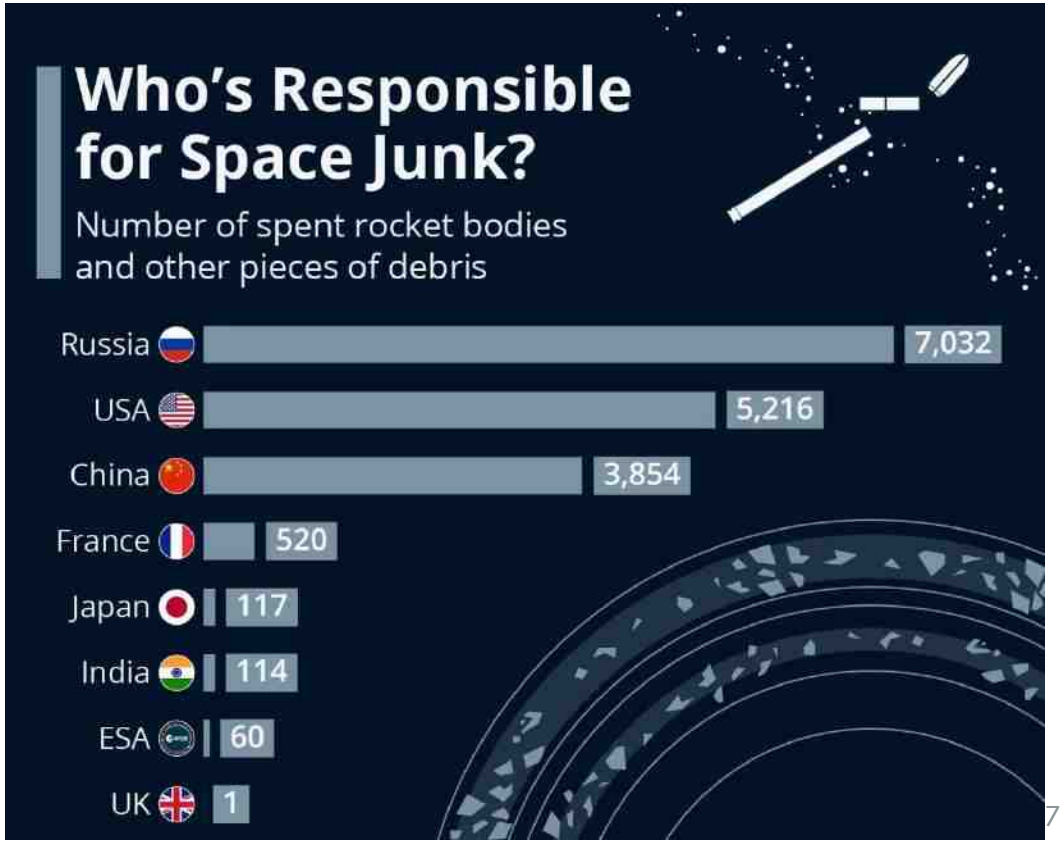
Launches since 1957

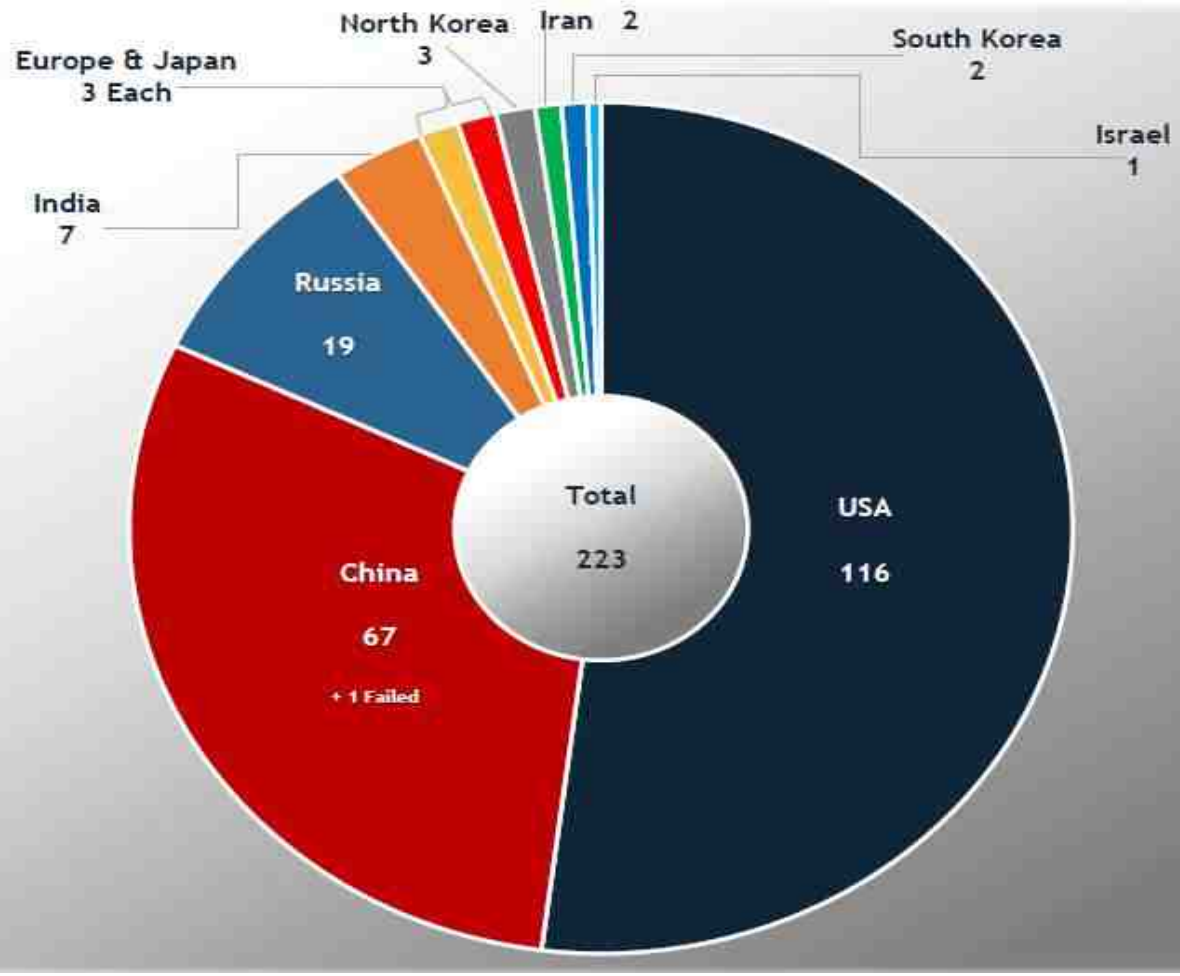
So What :
- Space is becoming more congested
- Space environment is fragile and evolves quickly

- More than 10,000 Satellites are currently active
- 2/3rd are from Starlink mega-constellation
- 30,000 debris of more than 10cm
- 600,000 debris of more than 1cm



2023 Space launch Zoom-in

Chinese Payloads	
Misc/Test/UI	42
Foreign	3
ISR	117
Scientific	5
SATCOM & Data Relay	20
Navigation	3
CSS Support	3
Weather	19
Spaceplane	1
Total	210



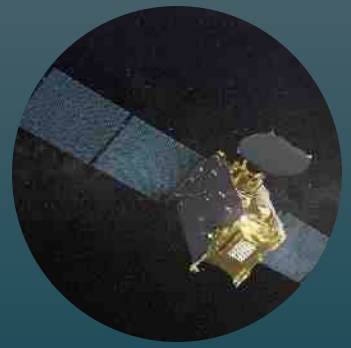
Russian Payloads	
Military UI	2
Foreign	3
ISR	8
Science/Civil	41
SATCOM	3
GLONASS	1
ISS Support	6
Weather	3
Total	67

So What :

- CHN is now a major player. Brings a lot of uncertainties in Space
- Space X is the main player in Space with the larger constellation
- EU is lacking behind*

Belgian Defence Space Strategic Objectives

Robust & secure access to space capabilities to support Ops & Intel



Contribution to protection of national and allied assets and stakeholders

Contribute to a Safe, Secure & Sustainable Outer Space for all space users

Cooperation with international stakeholders to apprehend and mitigate risks and threats

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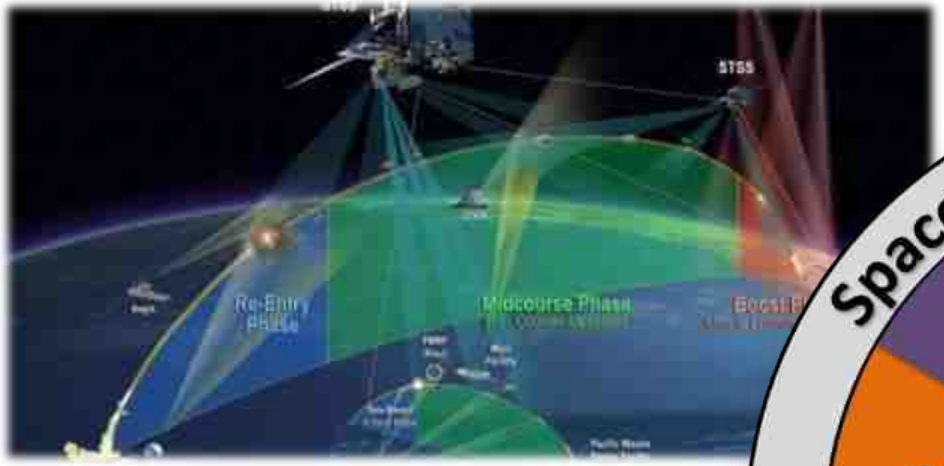
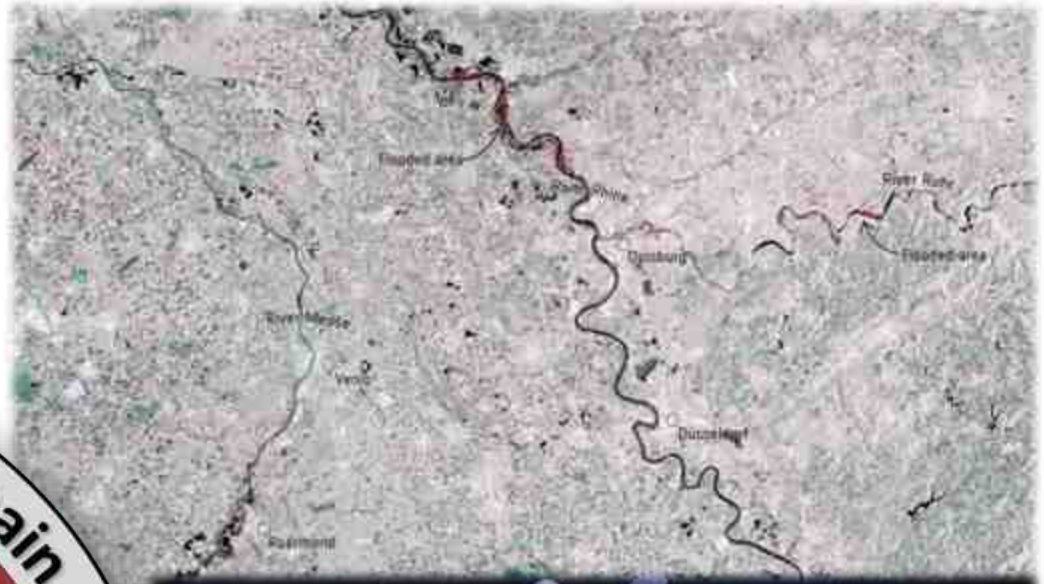
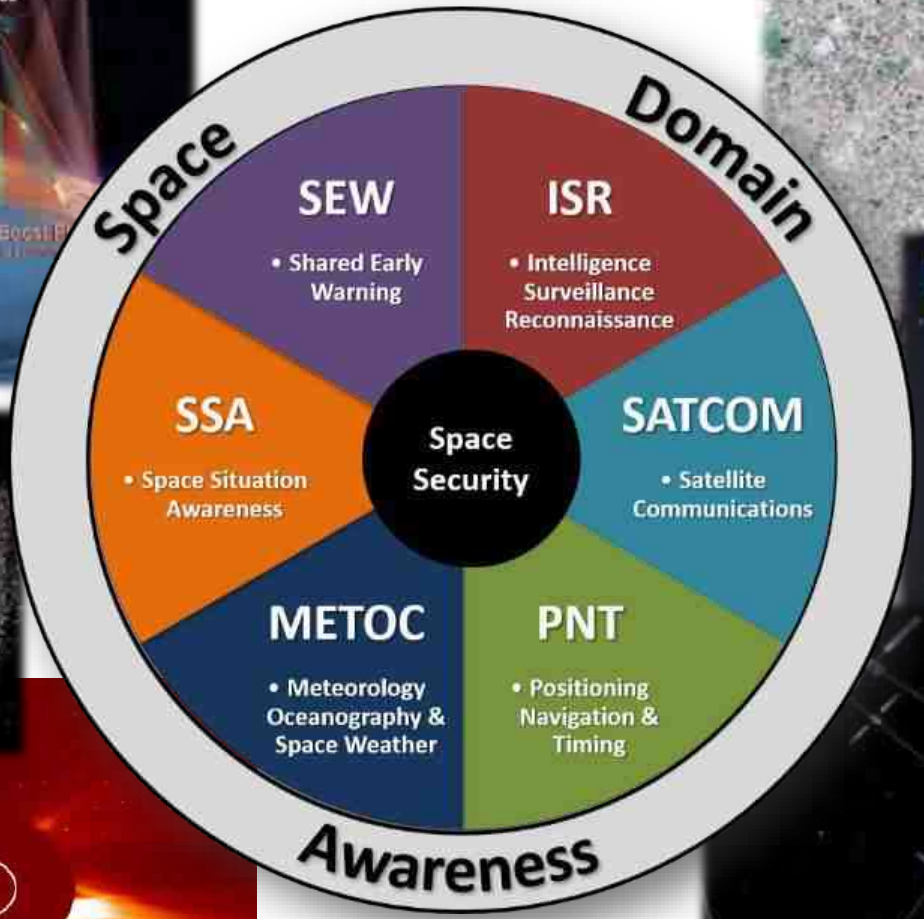
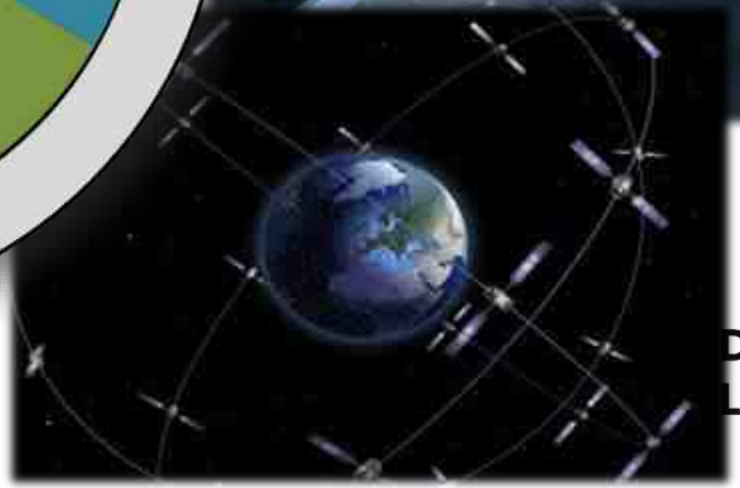
The Seven Space Functional Areas

The NATO definition of space









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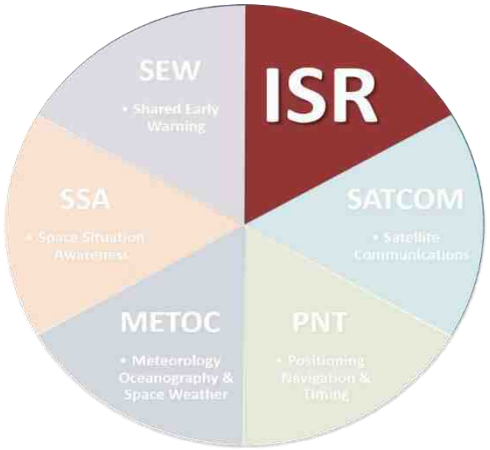
Space based ISR

CSO constellation

LUXEOSys - NAOS



NATO framework to share ISR products

SatCen

EUROPEAN UNION SATELLITE CENTRE

Analysis for decision making

EU framework to get EU ISR products

SPIDER

EDF Project

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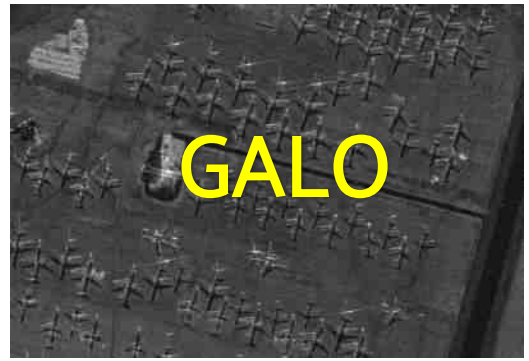
Space Based ISR Strategy

	2023/2024 Current Capability	2025-2027 Gap Filler + R&D	Post 2028 Future Capability	
Optical		Sensor improvement		Optical
Radar		Sensor improvement		Radar
RF	Not used			RF

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µSat Project

SpaceX déploie dans l'espace Riri, Fifi, et Loulou

- Aim :
  - Procurement of a small constellation of SB RF-monitoring µSat
  - Enlarge the SB collection capabilities of GISS
  - Build-up the know-how within BEL DEF
  - Support BEL industry

- Way ahead :
  - Test campaign (Sept 24- Jan 25)
  - Redaction of the file (Q1 25)
  - Procurement process (Q2 25)
- Risks :
  - Tech not yet mature enough in BEL
  - Lack of manpower within DGMR to support the procurement process
  - Lack of personnel within CSCU for the analysis of the products
  - Delays linked to federal elections

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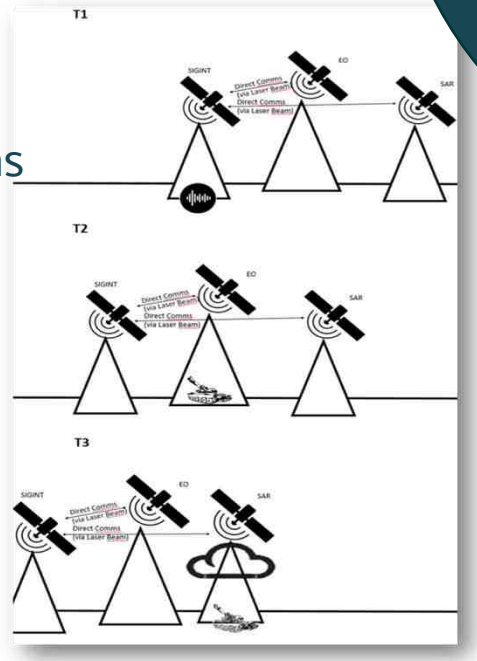
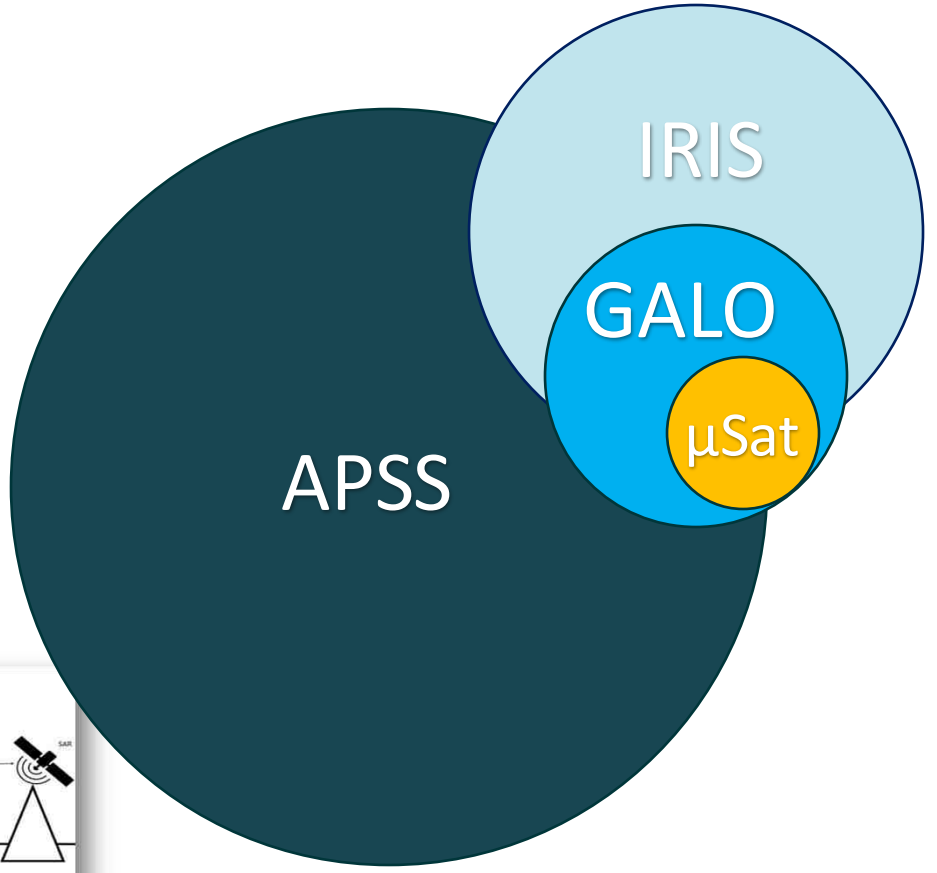
GALO

- Aim :
  - Procure a constellation of multisensory µSat
    - EO, SAR and RF-monitoring
    - High revisit
    - Trains of satellites and Smart-tasking
  - Interdependence with French IRIS constellation
    - FRA High resolution vs BEL high revisit
  - Interdependence with APSS
- Way ahead :
  - NDA with FRA and start of bilateral discussions
  - R&D within the ESA framework
    - Smart-tasking and Intersatellite links
  - µSat to enable RF-monitoring
- Risks:
  - No allocated budget
  - Decoupling with FRA IRIS constellation
  - Imagery analyst population





Visual representation of SB ISR programmes and their relations with each other

GALO : **G**lobal coverage **A**ll weather **L**ow earth orbit **O**bservation system

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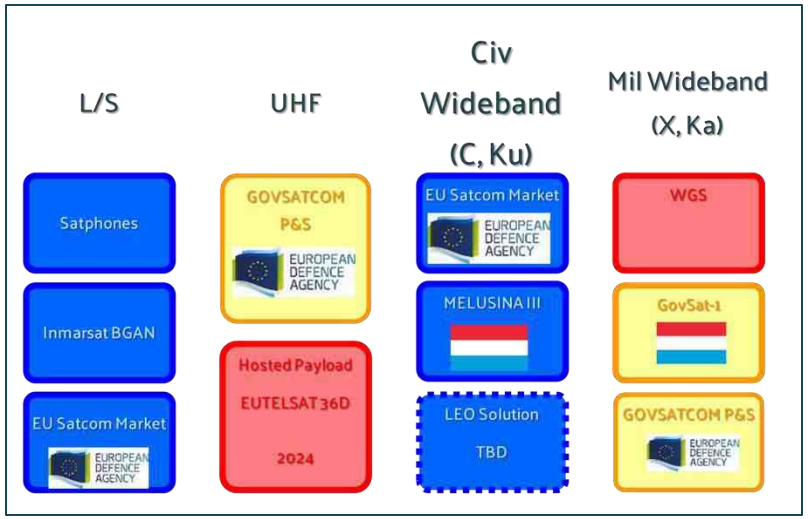
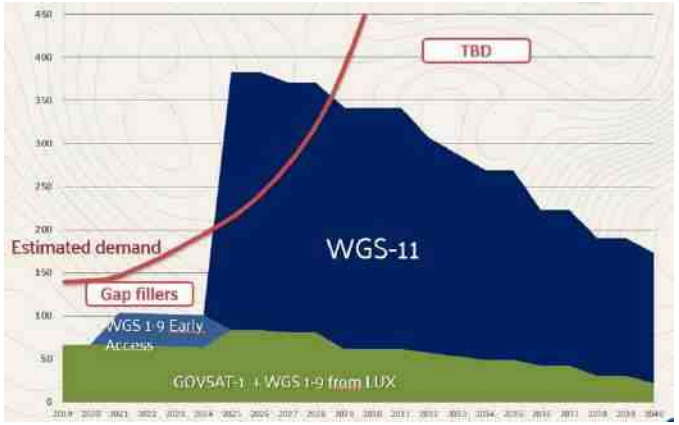
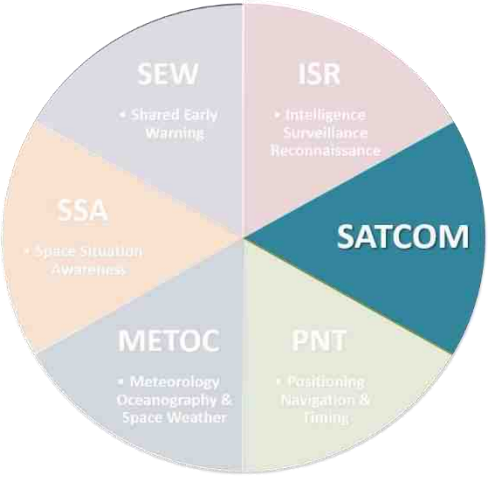
SATCOM

EDF Project





KUR for Wideband SatCom



WGS-11 (X, Ka)

NCI AGENCY

NATO OTAN

EUTELSAT 36 D (UHF)

EU programme for secure SATCOM

Future anchor station in MeF

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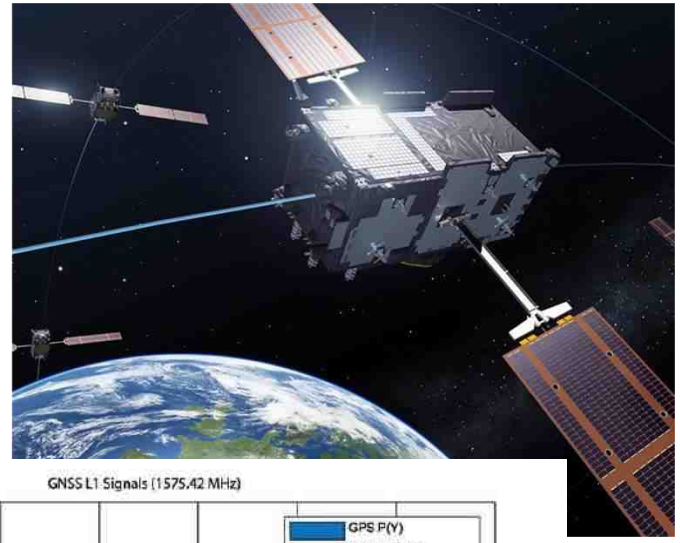
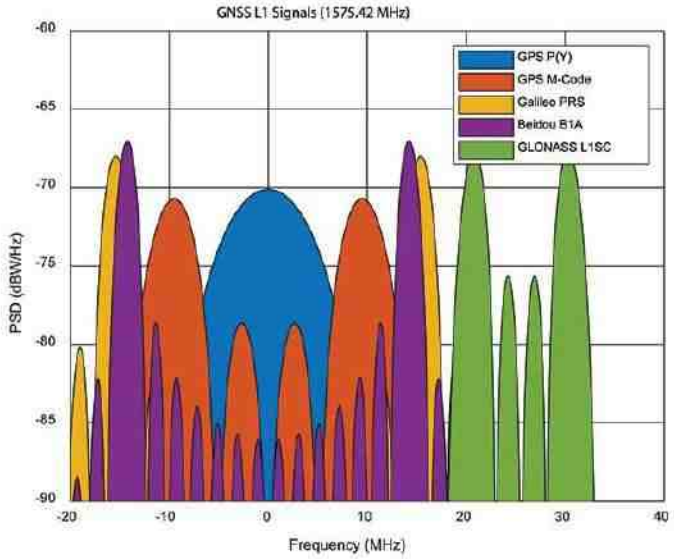
PNT

GALILEO FOR EU DEFENCE

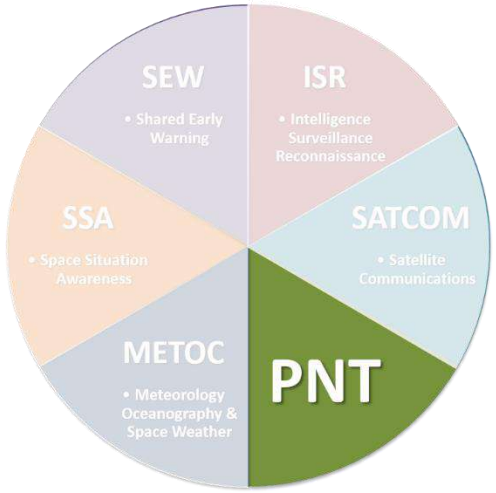
EDIDP Project

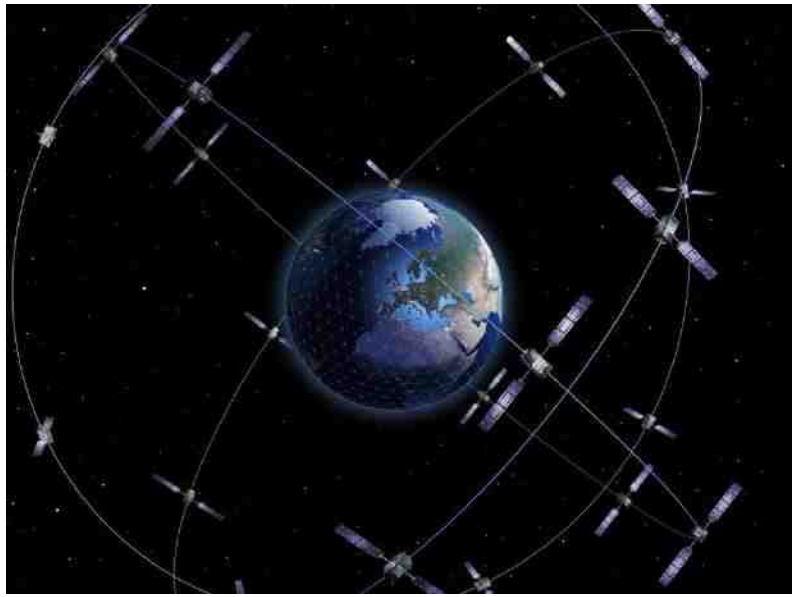
EDF Project





Freq bands for GNSS





Galileo Constellation

aerospacelab

BEL Industry

antwerpspace
An OHB Company

BEL Industry

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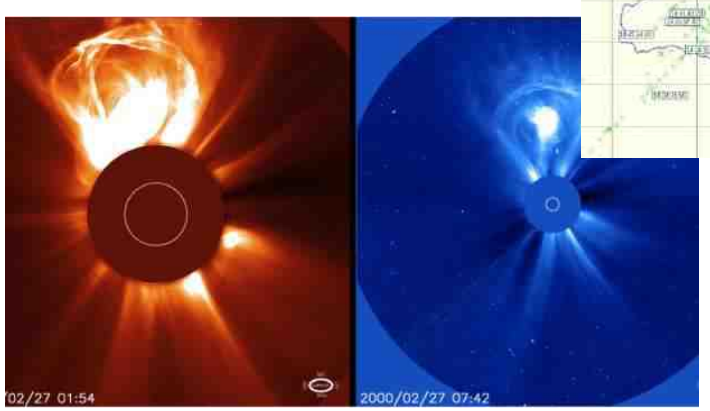
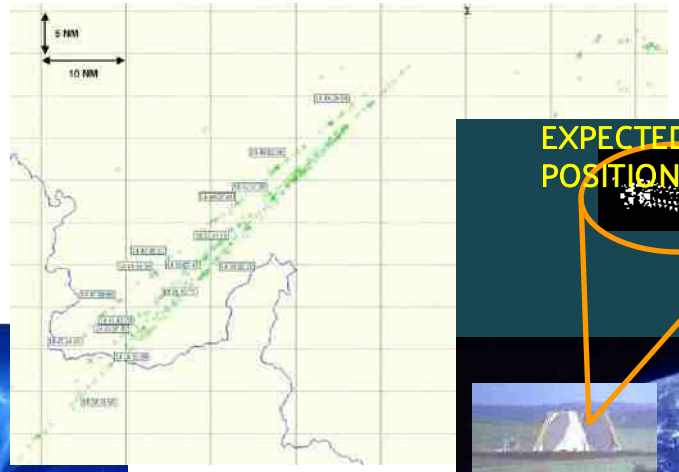
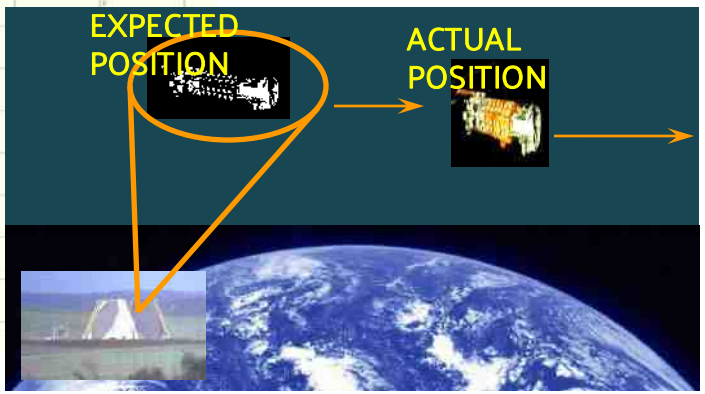
SWx

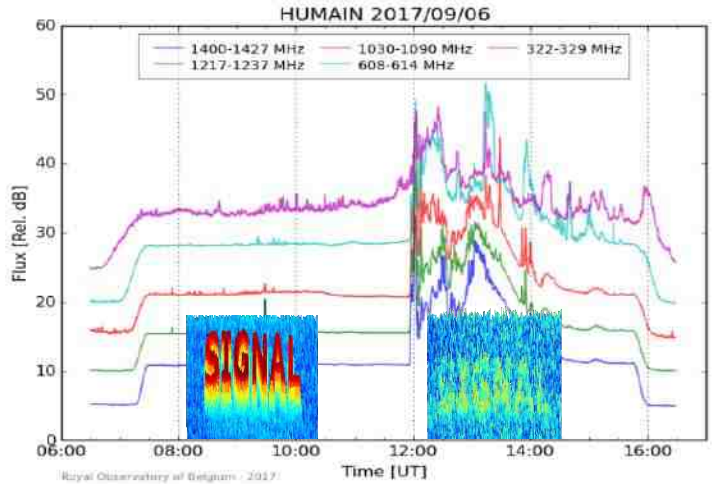


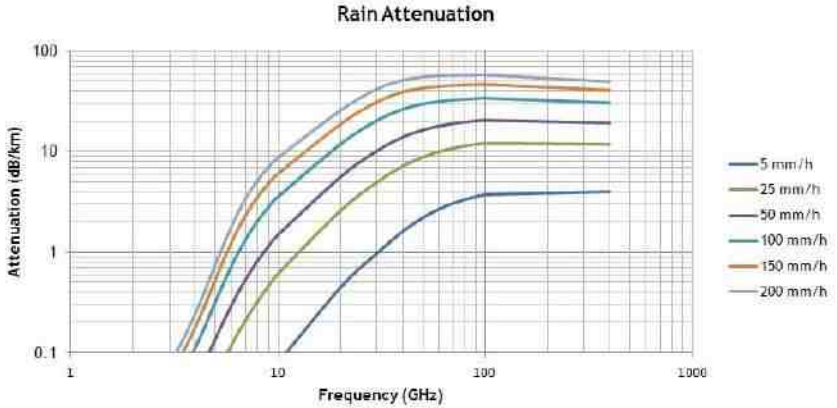
Coronal Mass Ejection

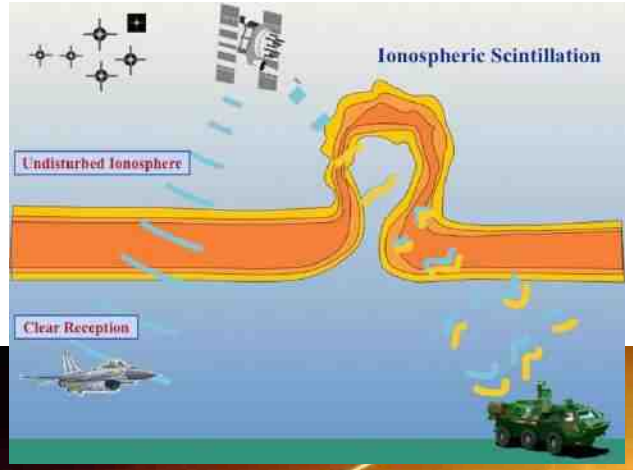


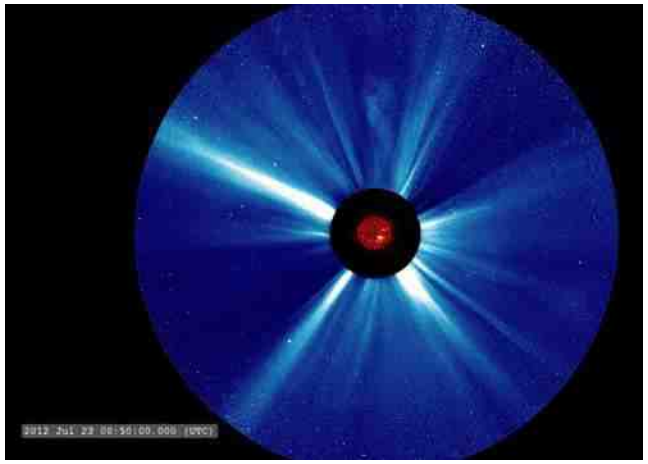
False radar echoes

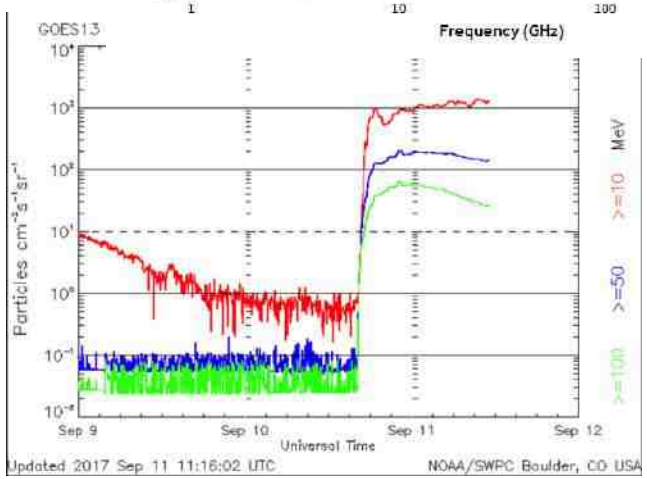




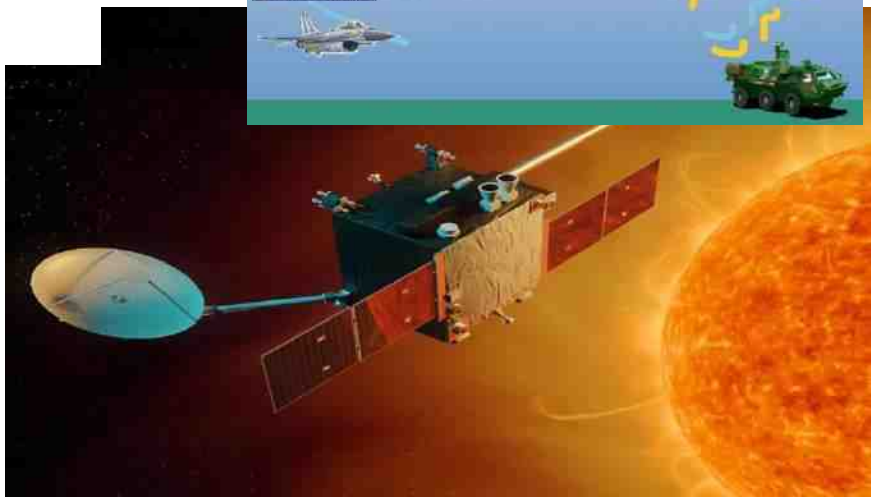






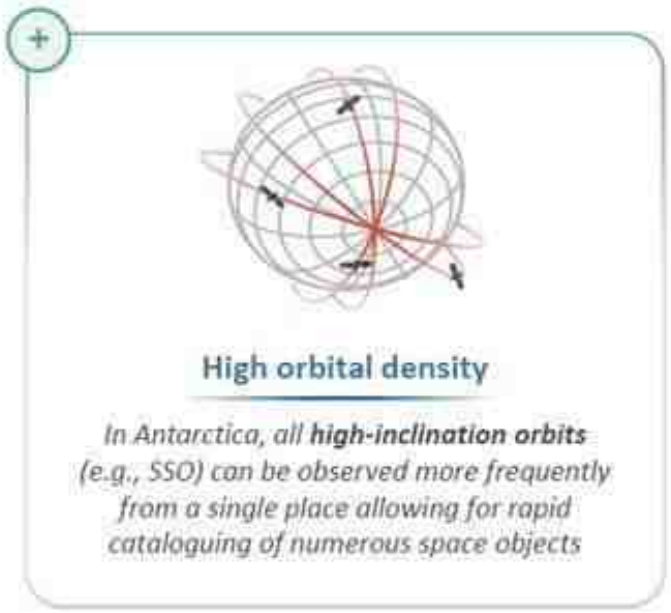


Solar Radiation Storm



ESA mission in L5

SSA telescope in Princess Elizabeth



- Unique advantages for the SSA community
  - Geographic relevance for EU-SST
- Sovereign sensor = unique opportunity to learn about Space environment
- Site survey has been done and results are analysed
  - Technically feasible
  - Legal aspect = approved @ DG JUR
- Installation pending procurement initiation

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Space Based Space Surveillance : SBSS project

- Feasibility study running via ESA GSTP framework
  - Determine the feasibility of SBSS
  - Draft the technical specifications
- Flagship ESA GSTP framework
  - Develop the Belgian space industrial base
  - Innovate in the field of space surveillance
  - Build an IOD by the end of 2027
- Potential follow-up :
  - Procurement of a small constellation by early 2030

NorthStar Earth and Space SBSS

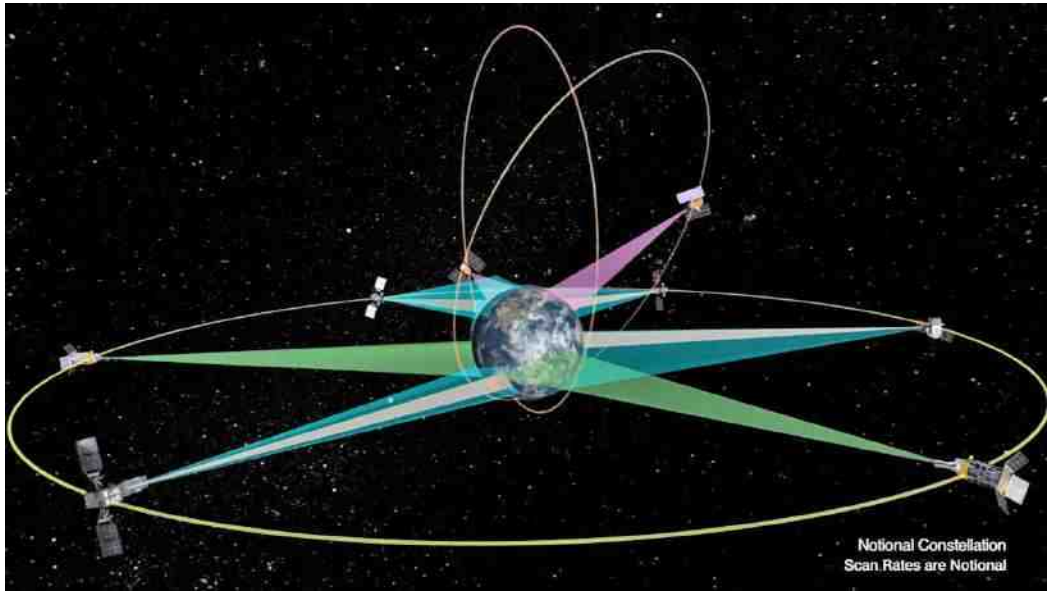
SEW

ODIN'S EYE 2

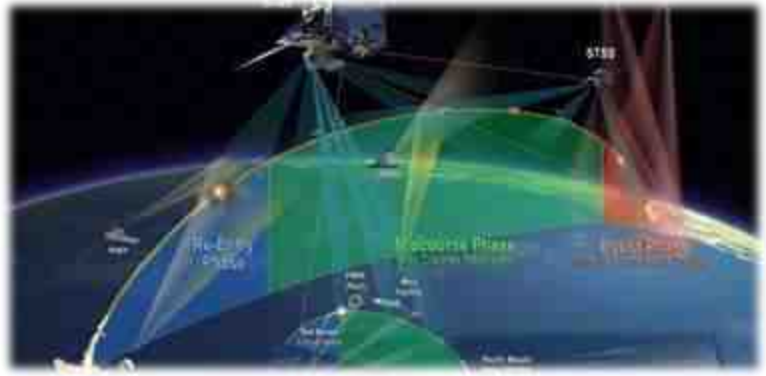
EDF Project

OIP Space Instruments

BEL Industry

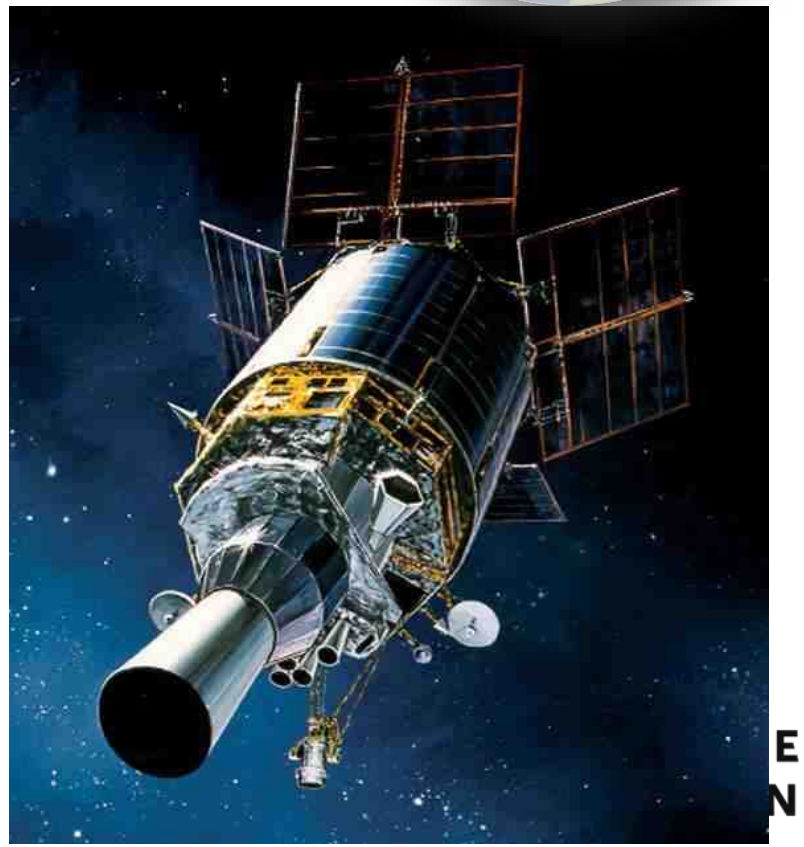


USSF OPIR constellations (SBIRS + DSP)



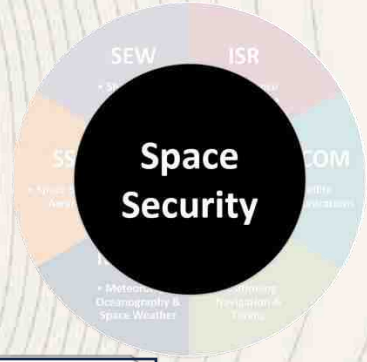
Missile Warning chain

USSF Delta 4 logo



USSF OPIR DSP satellite

Belgian Space Security Centre - Roadmap



2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030

- *Strategy definition phase*
- **SSA SME (Project Office)**
- **SSC CO on post**
- *BUILD-UP phase*
- **IOC**
- *CONSOLIDATION phase*
- **FOC**
- *Antarctica SSA Telescope build-up*
- **IOC**
- *Antarctica SSA Telescope Operational*
- *Space Based Space Surveillance (SBSS)*
- **IOD**
- *SBSS Follow-up TBC*

***IOC criteria**:*

Minimum 5 FTE

Main tasks :
- *SSA (2)*
- *NAVWAR (1)*

***FOC criteria**:*

Minimum 15 FTE

Main tasks :
- *SSA (5)*
- *NAVWAR (3)*
- *Threat watch (2)*
- *Sensor Operation (2)*

SSC : Space Security Centre
IOD : In orbit Demonstration
SBSS : Space-based Space Surveillance
SSA : Space Situational Awareness
NAVWAR : Navigation Warfare

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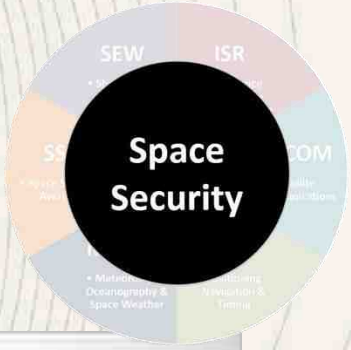
Belgian Space Security Centre Structure



- Air & Space component
  - Currently under A5
  - SSC CO
    - 1 OF-4
    - Project Office
      - 2 FTE
    - Space Surveillance Section
      - 5 FTE
    - Space Intel Section
      - 3 FTE
    - Sensor production Section
      - 2 FTE
    - NAVWAR Section
      - 2 FTE

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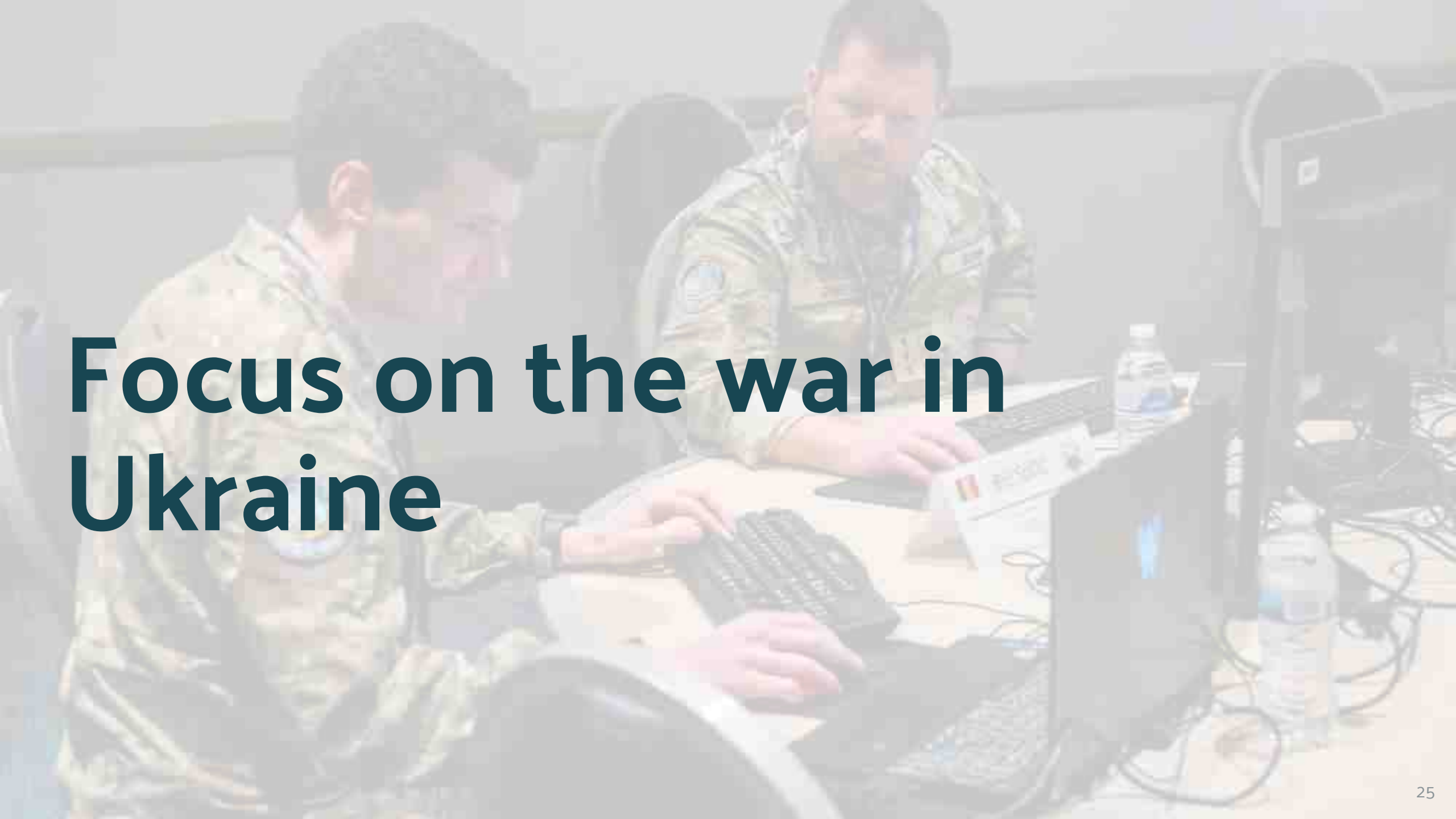


Focus on the war in Ukraine

Space in the Ukraine War : Before the War

15 Nov 2021

ASAT test

Early 2022

Strong increase of GNSS jamming East of UKR

24 Feb 2022

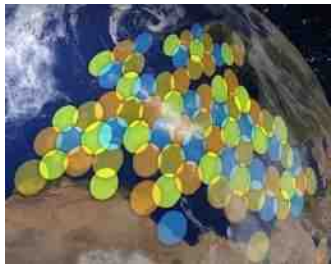
Cyber attack on Ground infra of KA-SAT

7 Jan 2022

Cable cut Svalbard

05 Feb 2022

Launch of Cosmos 2553



Luch multiple RPO

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Space in the Ukraine War : During the War

- Space as a sensor
  - Space-based ISR make the UKR war one of the most transparent battlefield
    - No need to own the assets
      - UKR supported by Western Countries and commercial actors
      - RUS supported by CHN (with exception of targeting Western Countries)
- Space as an enabler
  - SATCOM is a game changer
    - Starlink constellation allows massive data streams
    - Starlink terminal optimized SWaP allows decision advantage
  - GIS Arta as an example
    - Decision advantage = shorter OODA loop
  - Disruption of this strategic advantage
    - Offensive Counter Space RUS capabilities
- Space as a target
  - Space X, VIASAT, INMARSAT, EUTELSAT,… are commercial actors with a large contribution
    - Are they becoming legal targets ?
    - How reliable are they ?

    ➔ Strategies for the integration of Commercial Space (US DoD, GBR, NATO (draft))

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Space in the Ukraine War : Lessons learned so far

- Power of crowdsourced Situational Awareness
    - Not only based on military ISR
    - Not only SB-ISR
- Satellite-based technologies as a day to day tool for all troops
    - Down to tactical units
    - Evolution of the TTPs
- Access to space capabilities is more important than owning them
    - Multinational support
- Commercial assets are a game changer but what about their status (legitimate targets ?)
    - Commercial support
    - Need to set up a legal framework
- Developments in space technologies can foster new combinations of capabilities for mil purposes
    - Space technologies to enable MDO

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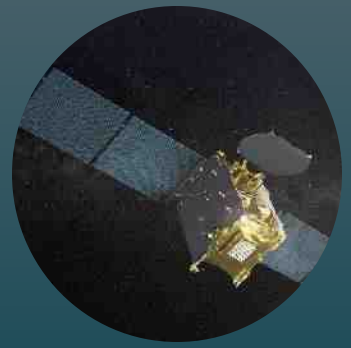
Conclusion

Robust & secure access to space capabilities to support Ops & Intel



Contribution to protection of national and allied assets and stakeholders

Contribute to a Safe, Secure & Sustainable Outer Space for all space users

Cooperation with international stakeholders to apprehend and mitigate risks and threats

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Any questions ?