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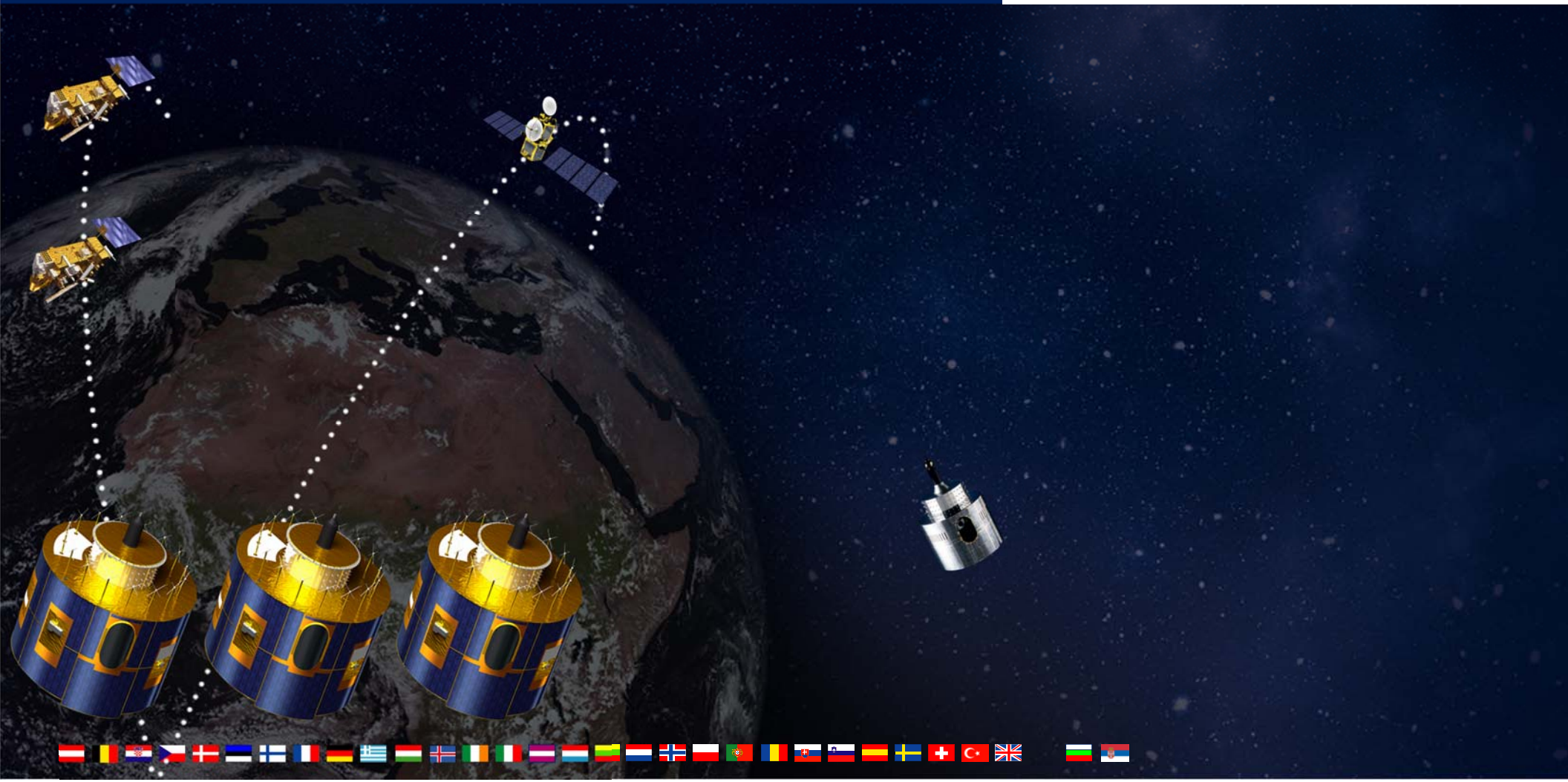
MULTI-MISSION ELEMENTS: KEY GROUND SEGMENT SYSTEMS SERVICES FOR EUMETSAT FUTURE PROGRAMMES

EUMETSAT

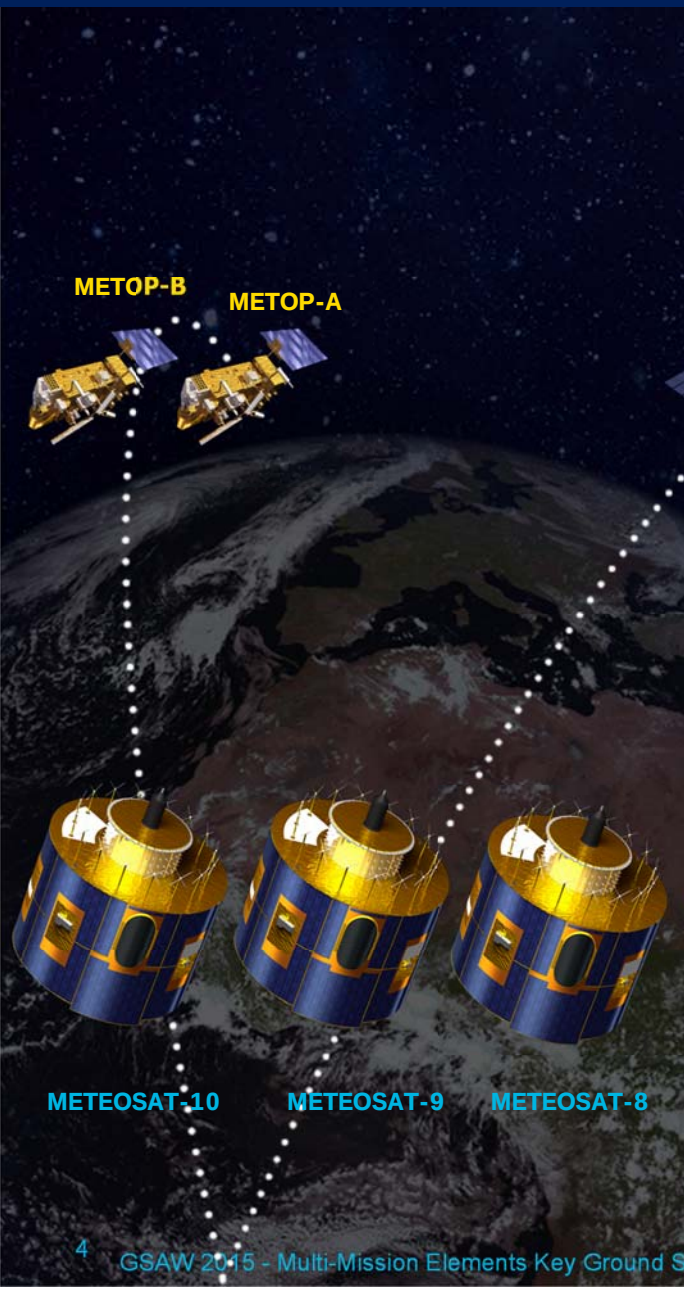


Multi-Mission Elements: Key Ground Segment Systems Services for EUMETSAT Future Programmes

1. Overview of EUMETSAT Satellites, Ground Segments & Multi-Mission Elements (MMEs)
2. MME Challenges & Solutions
3. MME Service approach
4. Conclusion

SATELLITES, GROUND SYSTEMS AND MULTI-MISSION ELEMENTS

Current EUMETSAT satellites



METOP-A (98.7° incl.)

EUMETSAT POLAR SYSTEM

In nominal mid-morning sun synchronous orbit at 817km altitude, as part of the EUMETSAT Polar System (EPS).

JASON-2 (66° incl.)

OCEAN SURFACE TOPOGRAPHY

In nominal non-synchronous low Earth orbit at 1,336km altitude, in support of the Ocean Surface Topography Mission.

METOP-B (98.7° incl.)

EUMETSAT POLAR SYSTEM

In orbit at 817 km altitude, the primary operational satellite of the EUMETSAT Polar System (EPS).

METEOSAT-7 (57.5° EAST)

INDIAN OCEAN DATA COVERAGE

Operated in support of the Indian Ocean Data Coverage (IODC) mission, bridging an observational gap in this region.

METEOSAT-10 (0°)

METEOSAT FULL DISC IMAGERY

Positioned at 0° in support of the prime Meteosat full disc imagery service over the European continent, Africa, and parts of the Indian oceans.

METEOSAT-9 (9.5°EAST)

RAPID SCANNING SERVICE (RSS)

Provides the Rapid Scanning Service, delivering more frequent images every five minutes over parts of Europe, Africa and the adjacent seas.

METEOSAT-8 (3.5° EAST)

BACKUP SERVICE

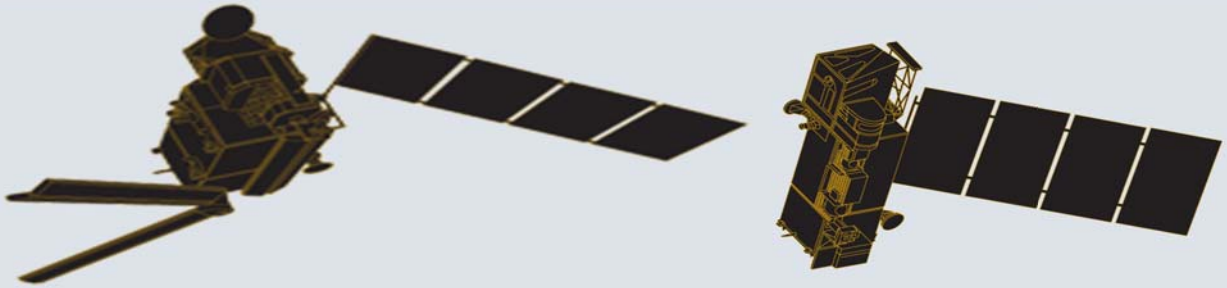
Serves as a back-up to the Meteosat-9 and -10 spacecraft for both full disc imagery and rapid scanning
.

EUMETSAT

Future EUMETSAT programmes: 2018-2040

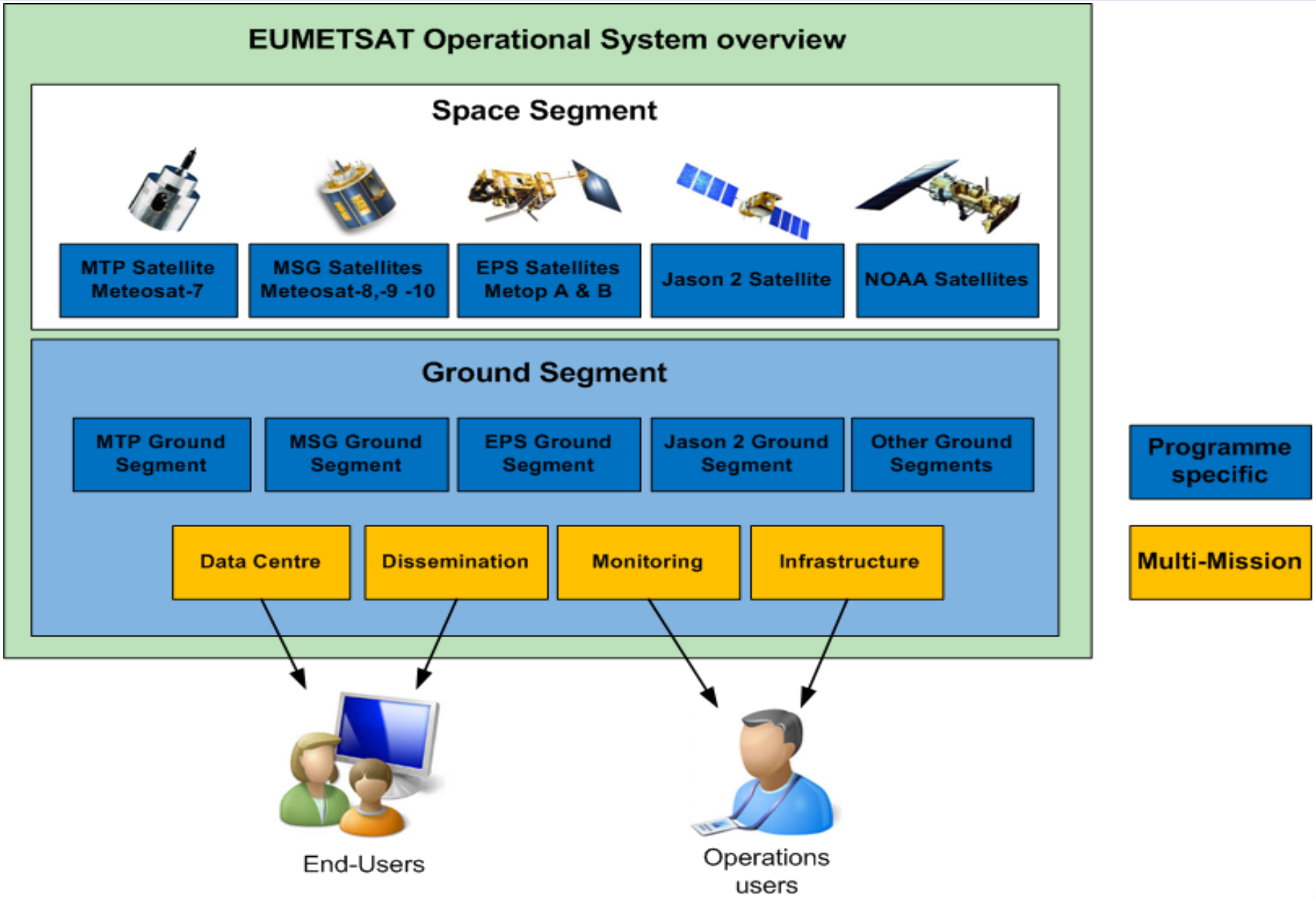
METEOSAT Third Generation (MTG)
Approved, under development
Sentinel-4 on board MTG-I satellites

Jason-CS/*Sentinel-6*:
Proposed
to be approved in 2015



EUMETSAT POLAR SYSTEM Second Generation
approval is expected in 2015 (ATP soon)
Sentinel-5 on board Metop-SG-A satellites

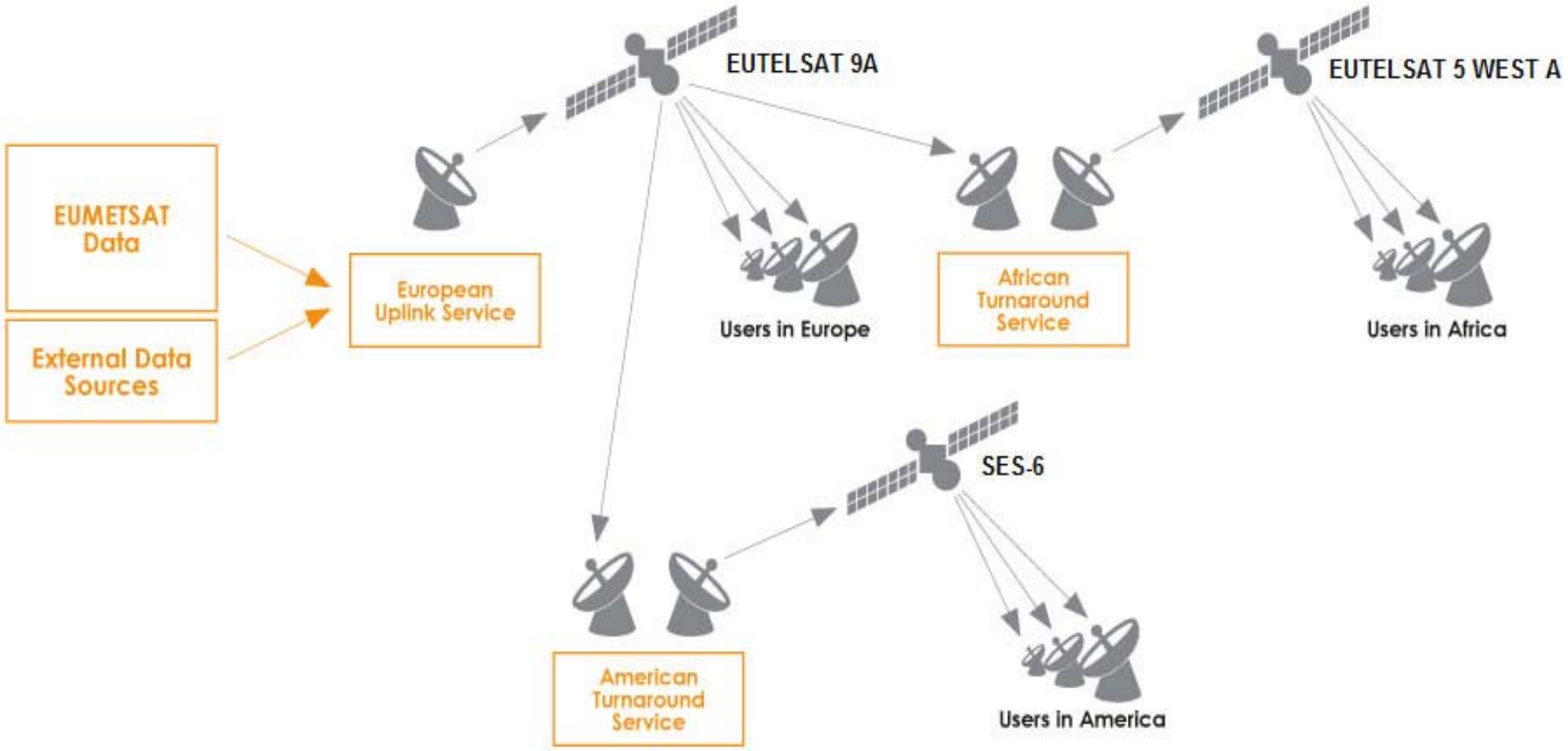
EUMETSAT's Multi-Mission Terminology



EUMETSAT Data Centre

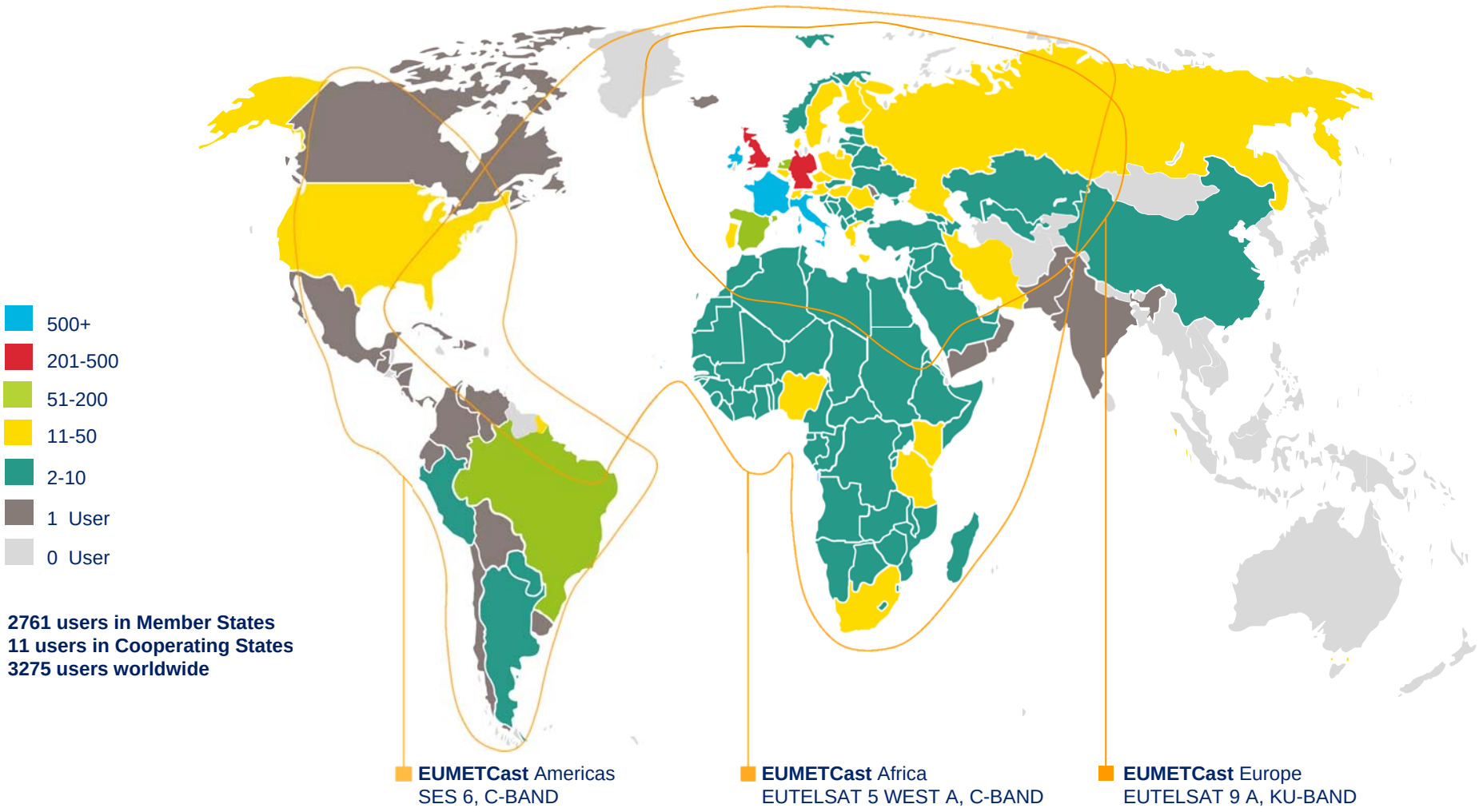
- Archive dating back to 1981
- All EUMETSAT satellites date including reprocessed data
- > 1 Petabytes in the archive
- Retrieval/Ingestion: 10 to 1
- 1.4 Petabytes retrieved annually
- Long-Term Data Preservation in practice since 1995
- Disaster resilient – 3rd Copy
- Access online via EUMETSAT EO Portal

EUMETSAT Dissemination system: EUMETCast



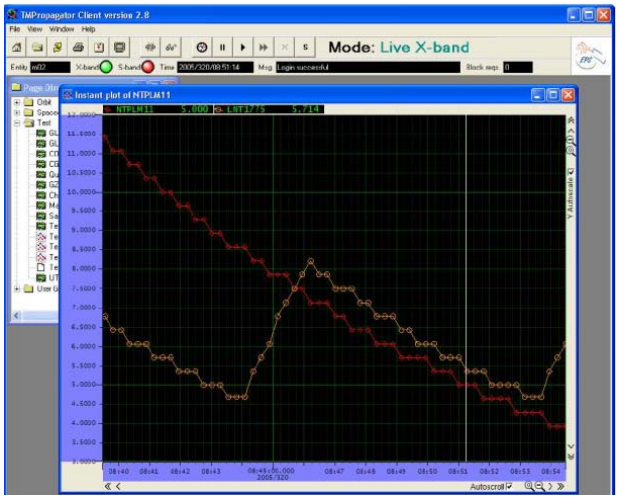
Delivering to users worldwide

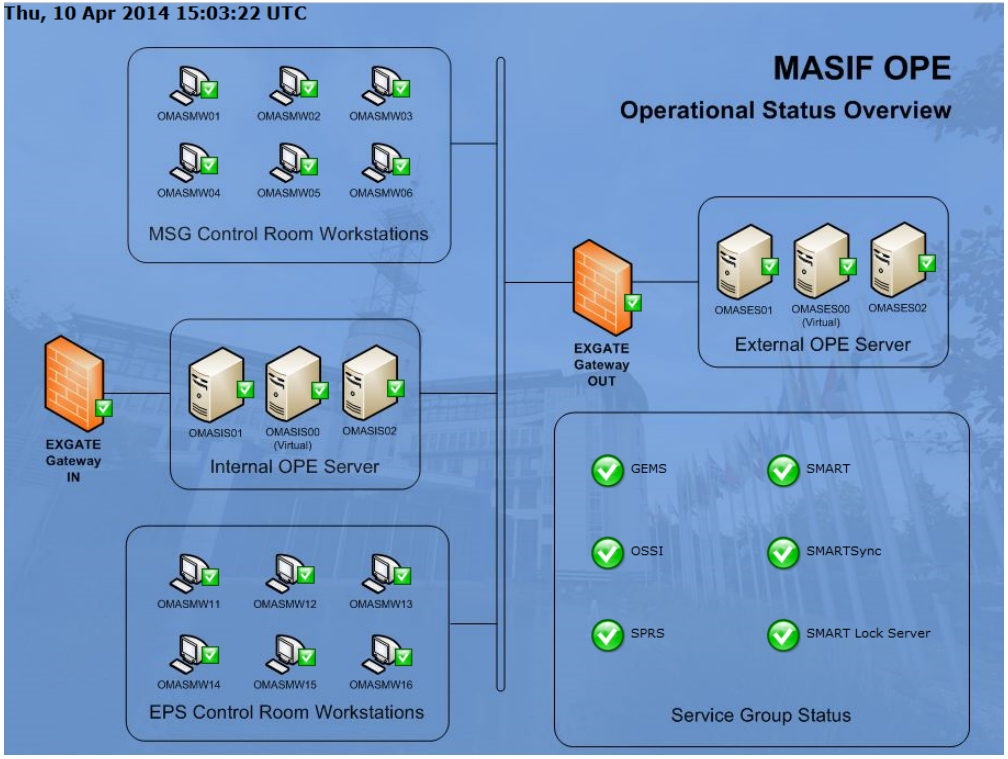
EUMETCast Users Worldwide as of 31 December 2013



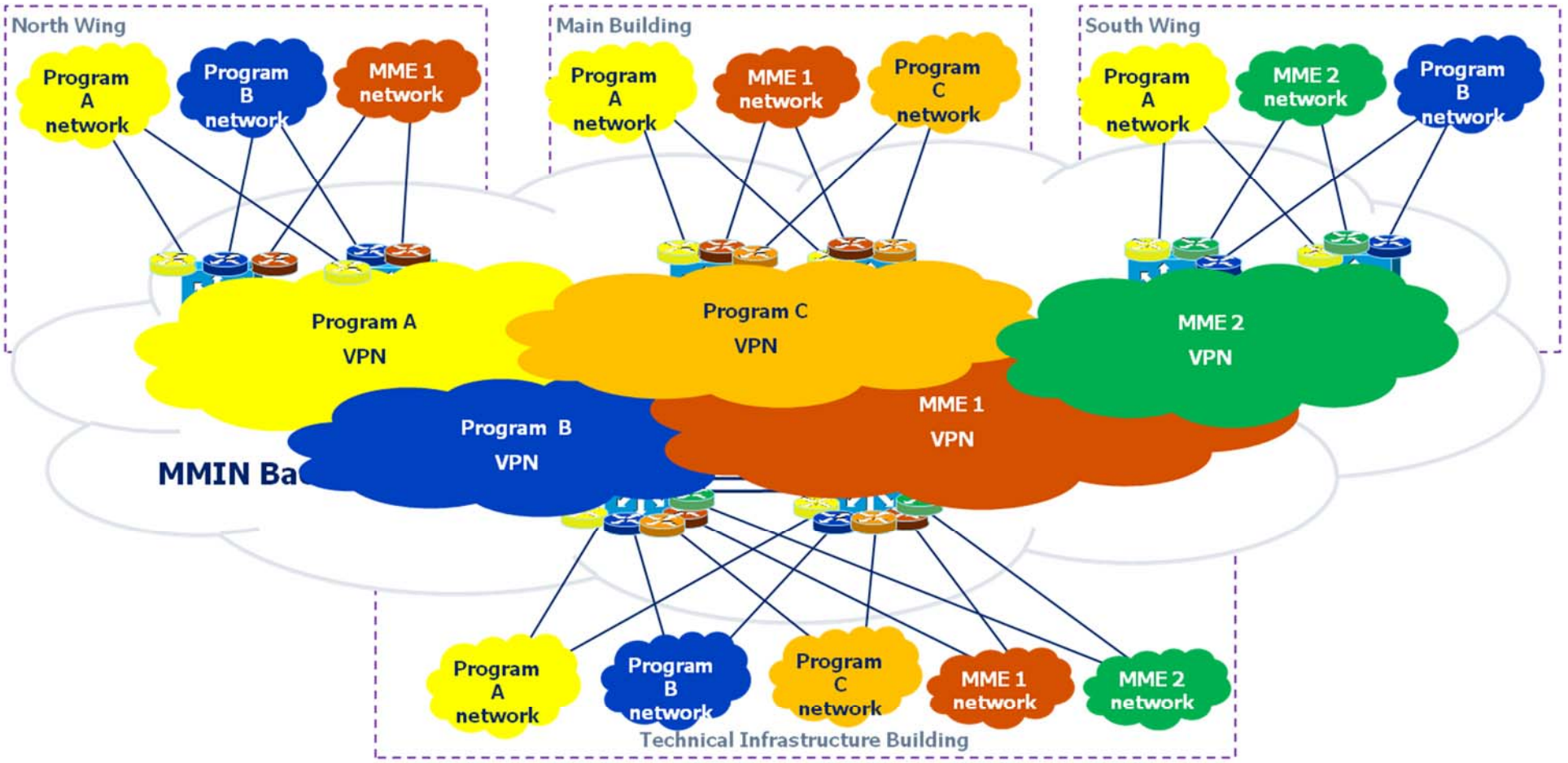
Multi-Mission Element: Monitoring

- Legacy from the existing operational programmes
- Consolidated expertise and fit-for-purpose solutions for “Monitoring, Analysis & Reporting” needs





Multi-Mission Element: Infrastructure



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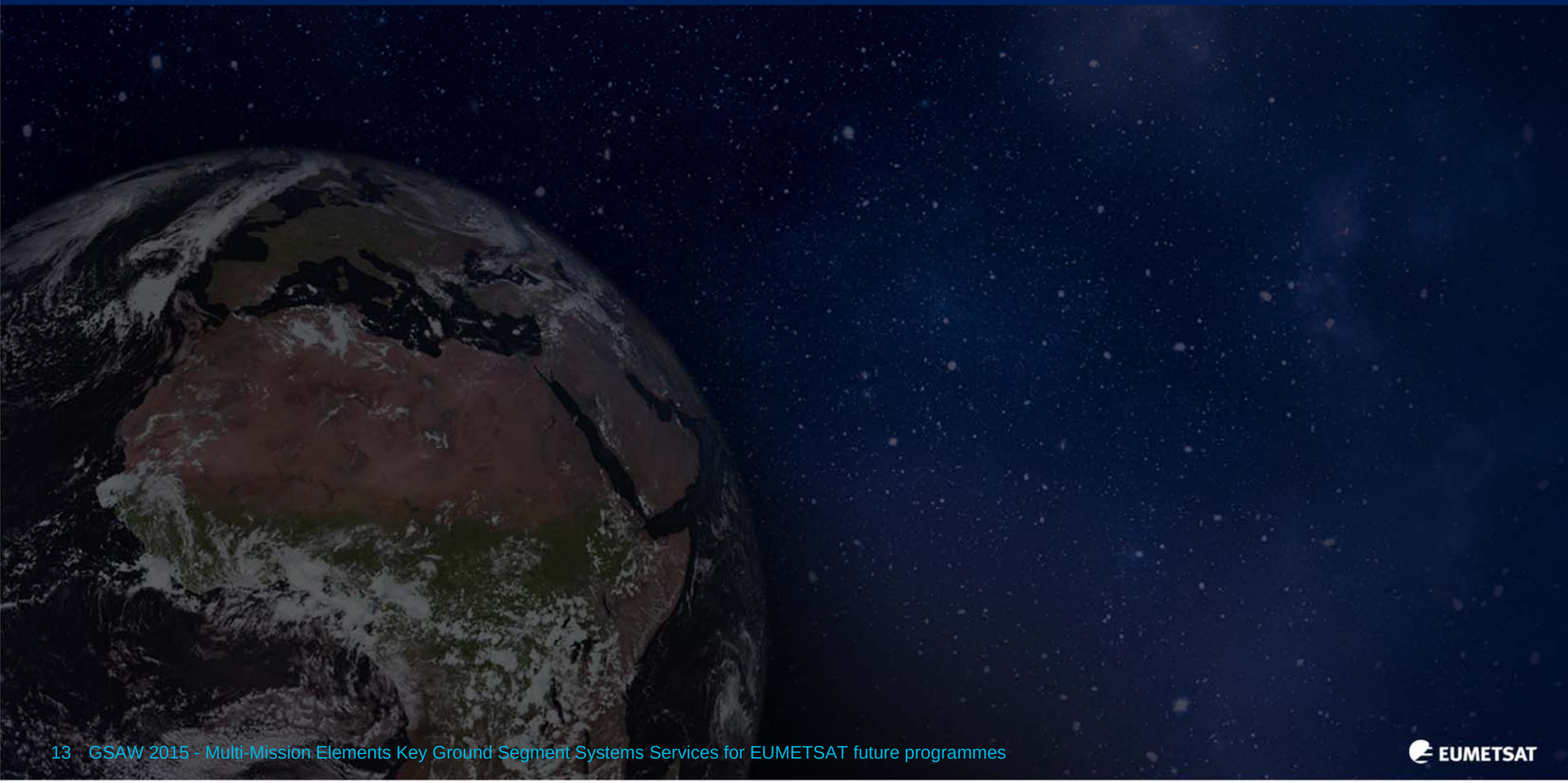
EUMETSAT Multi-Mission Infrastructure Network

EUMETSAT headquarters in Darmstadt, Germany

MME CHALLENGES & SOLUTIONS



EUMETSAT Multi-Mission Approach – Main factors

- Long lifetime missions:
  - Over 20-25 years,
  - satellite data preservation for long-term climatology activities
  - Reducing the long-term cost
- Evolving end-user needs during mission lifetime:
  - Centralised access to data
  - Scalability to cope with evolving needs
  - Consistency of a common interface towards the end-users
- Initial programme development and procurement challenges
  - Delivering missions into a 24/7 operational system fulfilling the end-users expectations while minimising risks and costs during development phase.

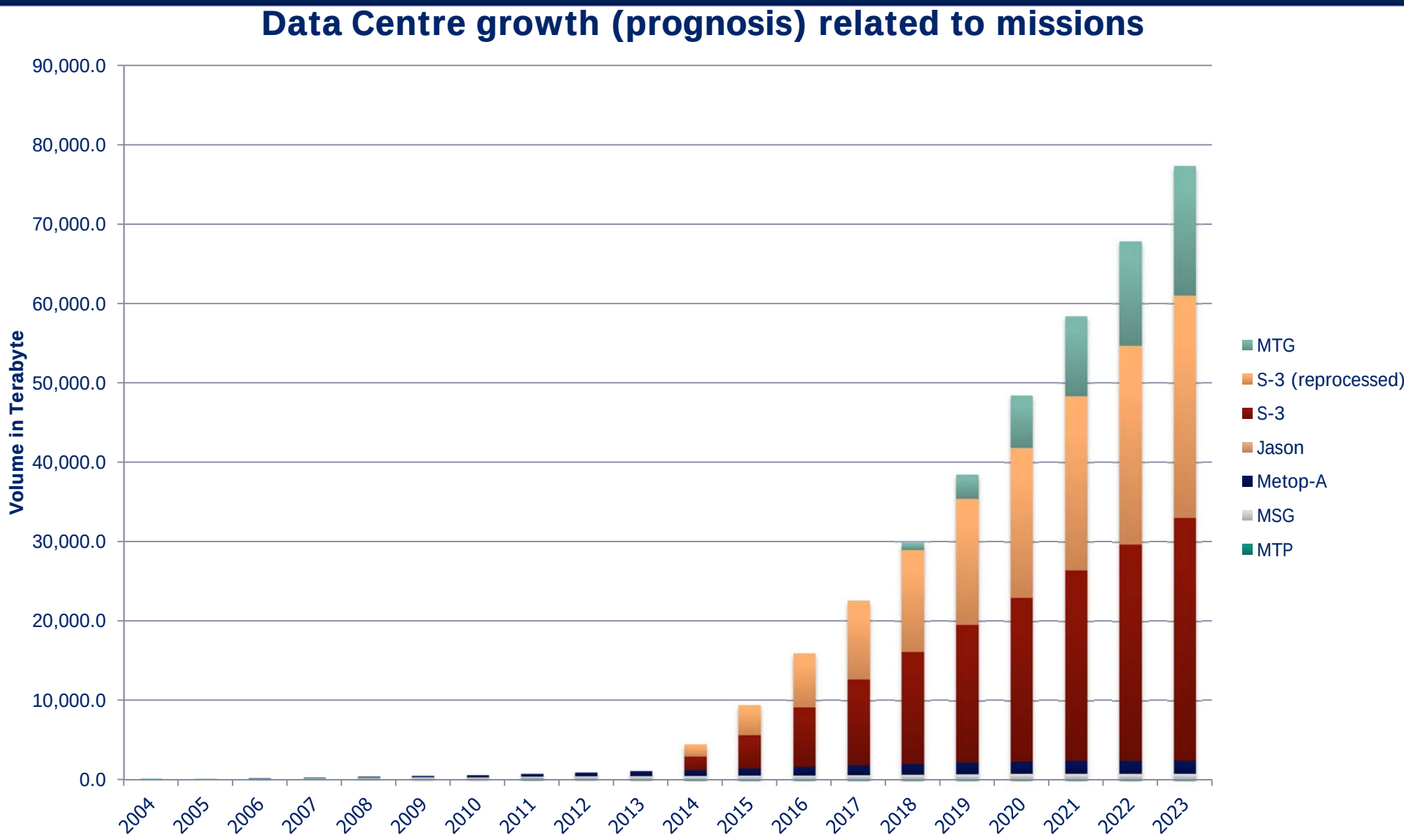
EUMETSAT “Multi-Mission” approach

- “Doing more with the same”

  …much more in reality!

- 2 cases for MMEs offered in future programmes…
  - Re-used as-is
  - Evolution to support new needs

EUMETSAT Data Centre



First real Challenge behind…

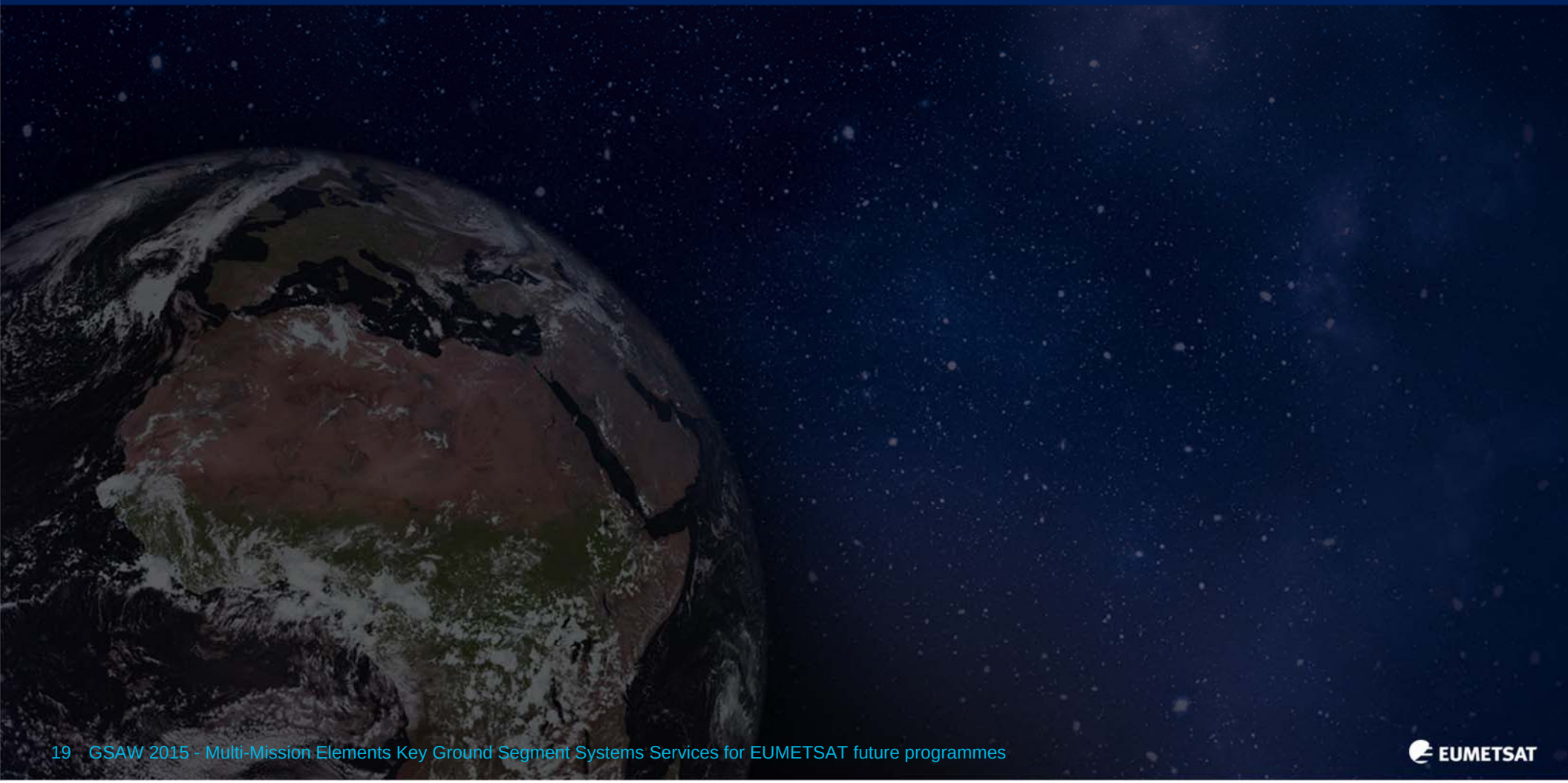
- To identify the appropriate timing for the breakthrough while:
  - Supporting existing operational missions and complex ground systems
  - Being ready for each new programme

- Highest synergy and cost saving points:
  - Obsolescence update combined with major routine evolutions
  - Synchronised with evolution required by the future programmes

EUMETSAT Mid-term evolution plan

- Yearly exercise covering a 5 years' timeframe identifying:
  - high-level constraints such as launches
  - main activities per programme and function
  - long-term activities and obsolescence issues
  - planned increase of resources demand
  - road-map for future systems and technologies
- Taking into account Future Programmes MME Upgrade Projects

MME SERVICES APPROACH



The Service approach versus V-cycle : Why ?

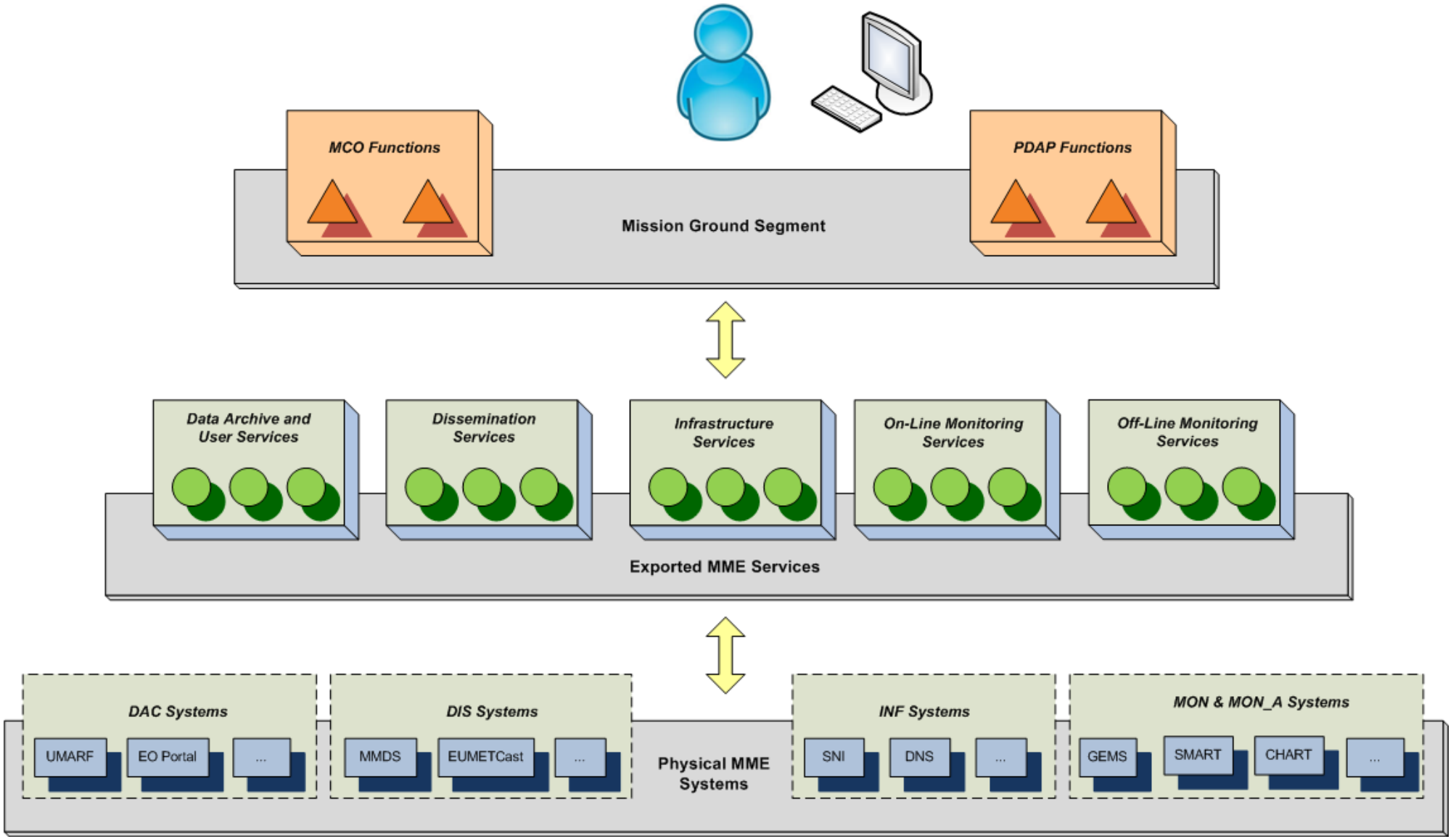
Service-oriented approach for future programme

- Traditional approach was future programme specifying full set of requirements on the MMEs including requirements on the “as built” MMEs.
- This approach implied going through all the phases of a Programme’s development V-cycle
- The Service approach focuses on adapting the MME to programmes’ needs in term of performances and service extensions and therefore streamlining the development life cycle.
- Service approach is more efficient and cost effective way to develop and upgrade MMEs: each of the MME functional group is provided as a set of services to the Programmes.

MME Services upgrade cycle

- Portfolio of Services: the baseline of the MMEs provided as services are the **MME Services Declarations**
- **The MME Service Declarations** are **inputs** for creating the Ground Segment requirements.
- The service specifications for a new programme are **the MME Service Definitions** endorsed at Ground Segment Preliminary Design Review
- **The MME Service Definitions are the baselines** for the development of the MME Service Upgrades for that new programme.
- The MME Acceptance by the programme is based on the Service Verification

MME Service upgrade: layered approach



MME Services Declarations

The document describes the generic services capabilities, functionalities, performances and interfaces independently from the underlining technology & design implementation:

- **Data Center Service Declaration**
- **Dissemination Service Declaration**
- **Monitoring Service Declaration**
- **Infrastructure Service Declaration**

MME Services Definitions

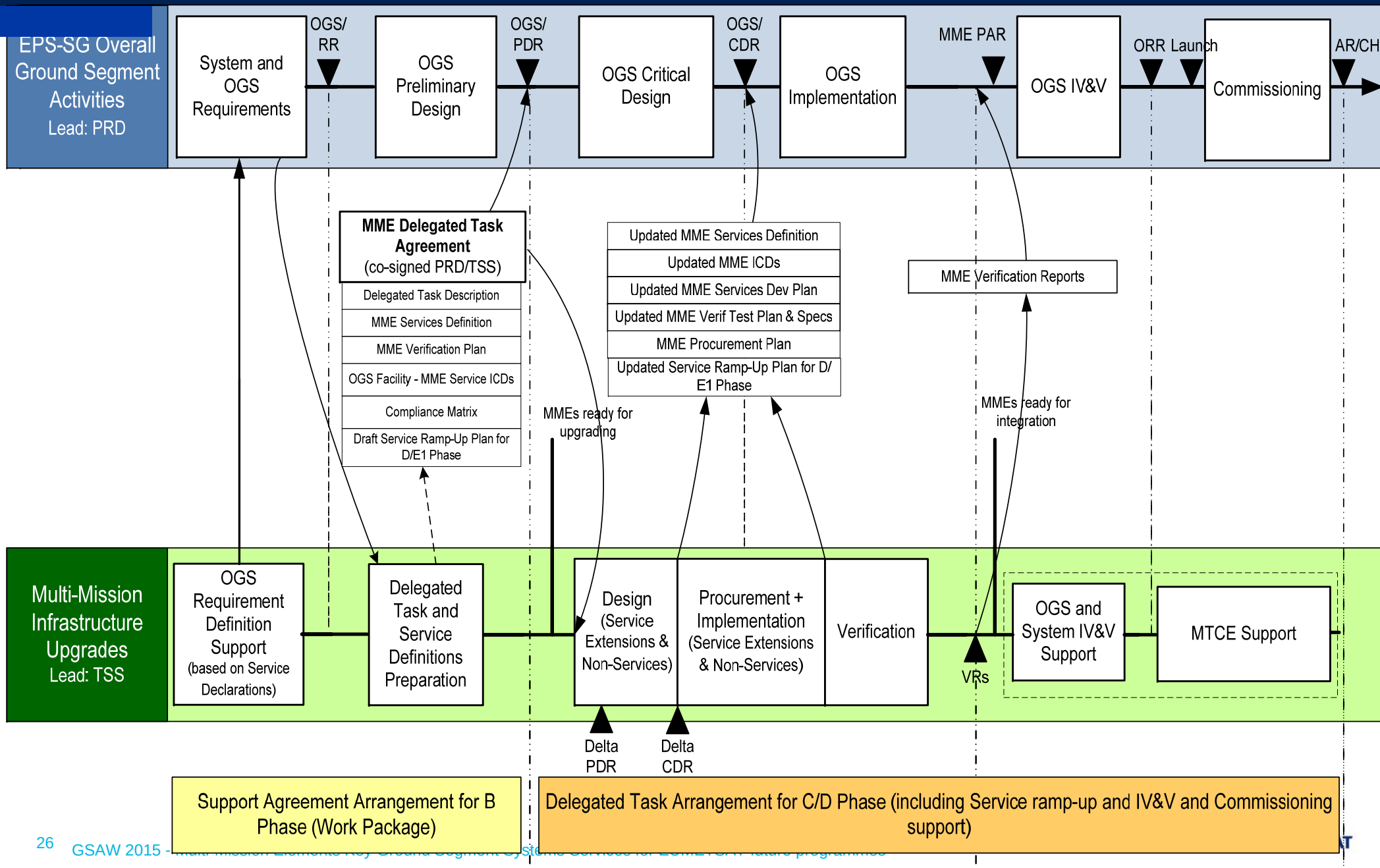
Instantiation of the Service Declaration for a specific programme. It contains:

- **Selection among existing services and tailoring of the relevant functionalities**
- **Sizing of services performance**
- **Possible extensions of existing services**

MME Services upgrade lifecycle phased with the programme

- The Services upgrade encompasses the complete lifecycle, including dedicated phases for development, IV&V support and maintenance.
- The progressive provision of MME Services is guaranteed to the programme for supporting the Ground Segment and System IV&V, LEOP and Commissioning activities on a basis of an agreed service profile.
- The MME phases are closed by specific reviews and are linked to Ground Segment level milestones.

MME Services upgrade lifecycle phased with the programme



Conclusion

- The MME Service approach provides advantages in terms of development efforts.
- Portfolio of MME Services and Service Declaration are key for promoting the use of MME by new programmes
- New programmes can focus on their mission specific needs.
- Service implementation is limited to the new programme extension