

Once upon a Time

.....ADHA

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ADCSS2020
20/10/2020

Presentation Layout



- State of The Art
- Space 4.0
- Industry 4.0
- Strategic Plan : Innovation Requirements
- The One Common Denominator (OCD)
- Strategy
- ADHA Task Force
- Study Outcome



Computer & Data Handling System

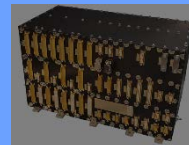
1. Classical solution



OBC



PLMM



RIU

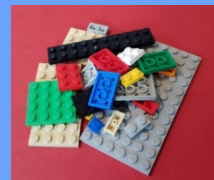


GNSS

- Push Strategy: Unit re-use ➡ **STAR WARS**
- New function: Insertion requires **overall development cycle of the whole unit**

2. R&D Solutions

— Technology Push:



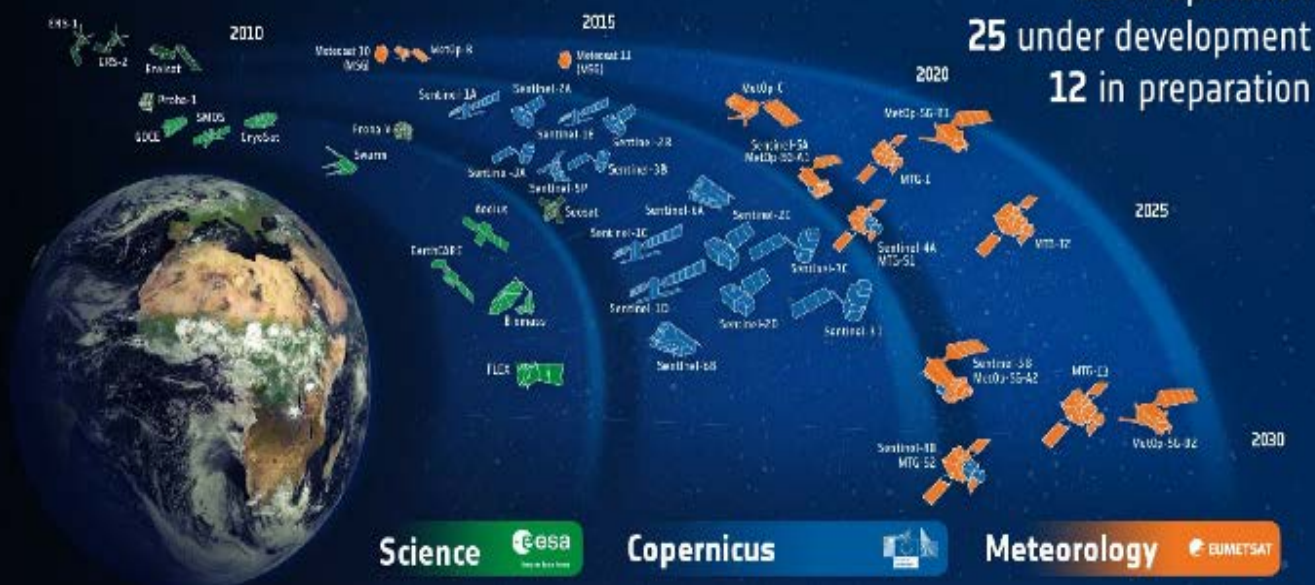
- Phase 1: Start with TRL 4 (TDE program) to assess feasibility & benefit for qualification
- Phase 2: TRL 6 with GSTP program: Insertion requires overall Dev Cycle of the whole unit

Space 4.0



State of The Art

A successful Track-Record ESA-Developed Earth Observation Missions



Space 4.0





Future EO – Structured around 4 Blocks



650 M€
ESA/PB-EO(2019)7, rev.1

1. **Future
Flagships
& Systems**

Copernicus

Sentinel-NG

2.

**Research
Missions**

FORUM or SKIM

3.

**Foundations,
Concepts &
Technology**

2025

**Operation &
Exploitation**

3.

**Mission
Management**



4.

**Earth Science
for Society**



Higher performance / cost ratio

- **New Measurements** (enabler)
- **Instruments** (driver), for the whole spectrum (RF, optical)
- **Higher spatial, temporal** and **radiometric** resolution
- Higher **lifetime** (7 yrs → 10 yrs or more)
- **Faster to design/develop and deploy**
- Long-term data **continuity** → **BIG DATA + AI**
- Platform : specific EO needs (AOCS, **storage, comms speed...**) → **Standardisation**
- Lower recurring **cost** (spin-in techno: e.g. COTS , multi-source)



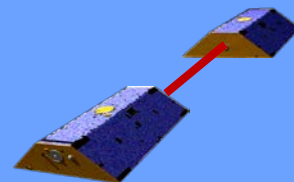
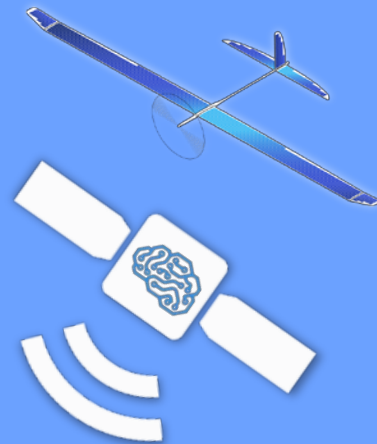
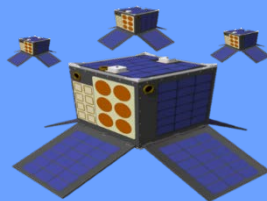
Miniaturisation and constellations (incl. convoys and formations)

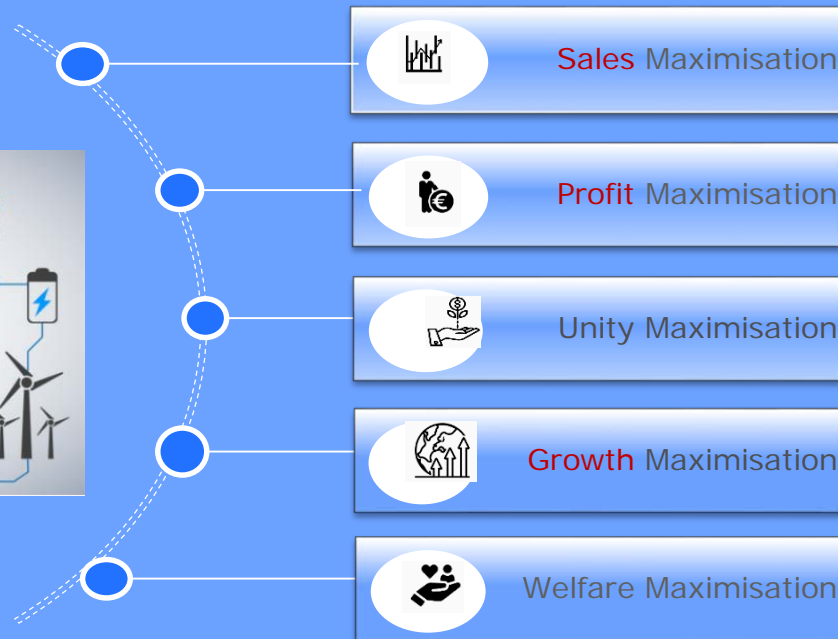
- **More autonomous platform & operations**
- Distributed Ground Segment
- **Synchronisation** (with ISL beacon and/or with GNSS)
- Launcher techno for efficient access to space
- **lower cost, fast-to-market ability, adaptability and flexibility.**



Mainly, but NOT LIMITED to LEO: also High-Elliptic (HEO) and GSO (e.g. G-Class EE-10). Dr-Ing Wahida Gasti | 20/10/2020 | Slide 6

- Call for Innovative Early (Mission) Concepts
- Early phases/campaigns/IPD for:
 - EE-11
 - Sentinel-1/2/3-topo/3-opt NG,
 - future Meteo Missions,
 - Mission of Opportunity (e.g. NGGM)
- Other Instrument Pre-developments
- Cross-cutting technology pre-developments, e.g. for small instrument concepts, platforms







TARGET 1

30% improvement of spacecraft development time by 2023

TARGET 2

One order of magnitude improvement of cost efficiency with every generation

TARGET 3

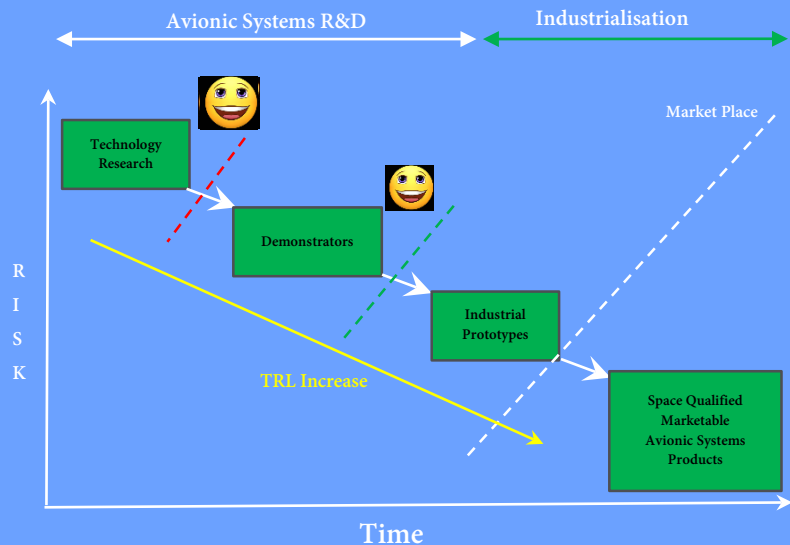
30% faster development and adoption of innovative technology

TARGET 4

Inverting Europe's contribution to space debris by 2030

Strategy: The One Common Denominator 1/3

Shorter Time to Market



Technology Research Pillars:

- Miniaturisation & Integration
- Modularity & Scalability

CDHS Objectives:

- 30% of updated design every 4 to 6 years
- More integrated systems (miniaturization + streamlined interfaces)
- Mass, Power & Volume Budget Reduction
- Reduction of the Integration & the Launch Costs (which is mass dependent).

ADHA Activity Objectives

- ✓ Scope of this study is to improve the DHS design by focusing on the following aspects:
 - ✓ Optimisation of the budget (mass/power/volume)
 - ✓ Higher level of integration of OBC, SSMM, RIU, GNSS: to reduce the mass, size and power of the DHS equipment, limit the number of interfaces, the harness and consequently the AIT effort.
 - ✓ Modularity concept **to support the interchangeability and the interoperability** between different missions **(Double Sourcing)**
 - ✓ Performance improvement: by the use of multicore processors and new generations of high speed networks and links.
 - ✓ COTS usage: to achieve high reliability COTS can lead to a strong reduction of the EEE

The One Common Denominator (OCD)

Classical CDHS solutions



OBC



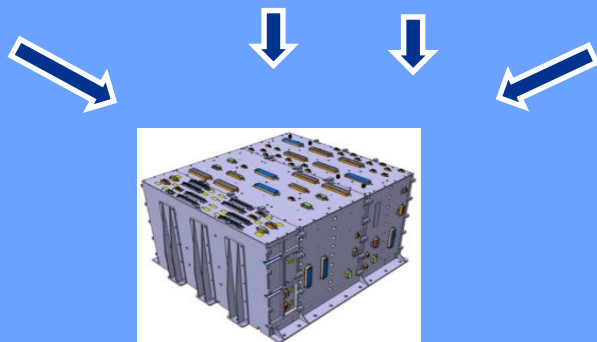
PLMM



RIU

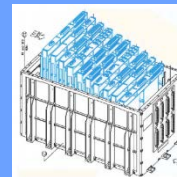


GNSS

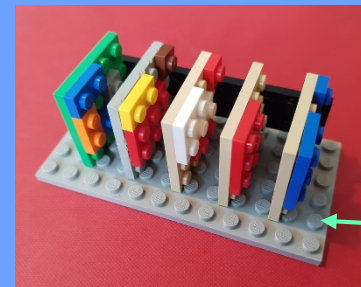


One Common Denominator

~~OCD based on stacked modules~~



OCD = ADHA

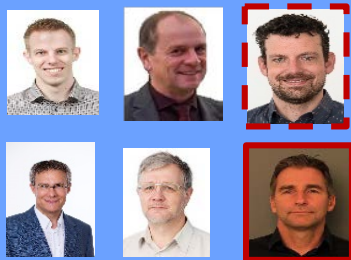


cPCI-S-S

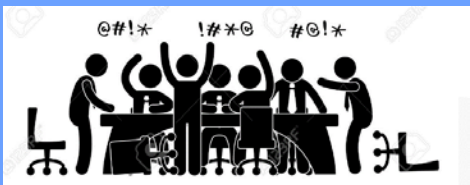
ESA

RUAG/ADS

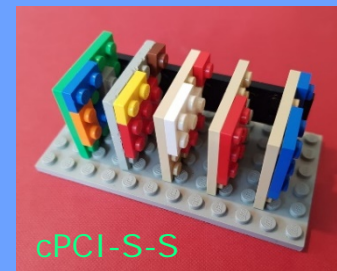
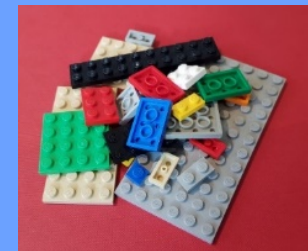
TAS



ADHA Task Force Working



Thanks to ADHA TEAM



A Star is Born

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ADHA IN



European Space Agency



IF YOU HAVE QUESTIONS,
PLEASE MINDFUL ON THE NEXT PRESENTATIONS
OF THE ADHA SESSION