Activities & Perspectives of the Hellenic Space Industry

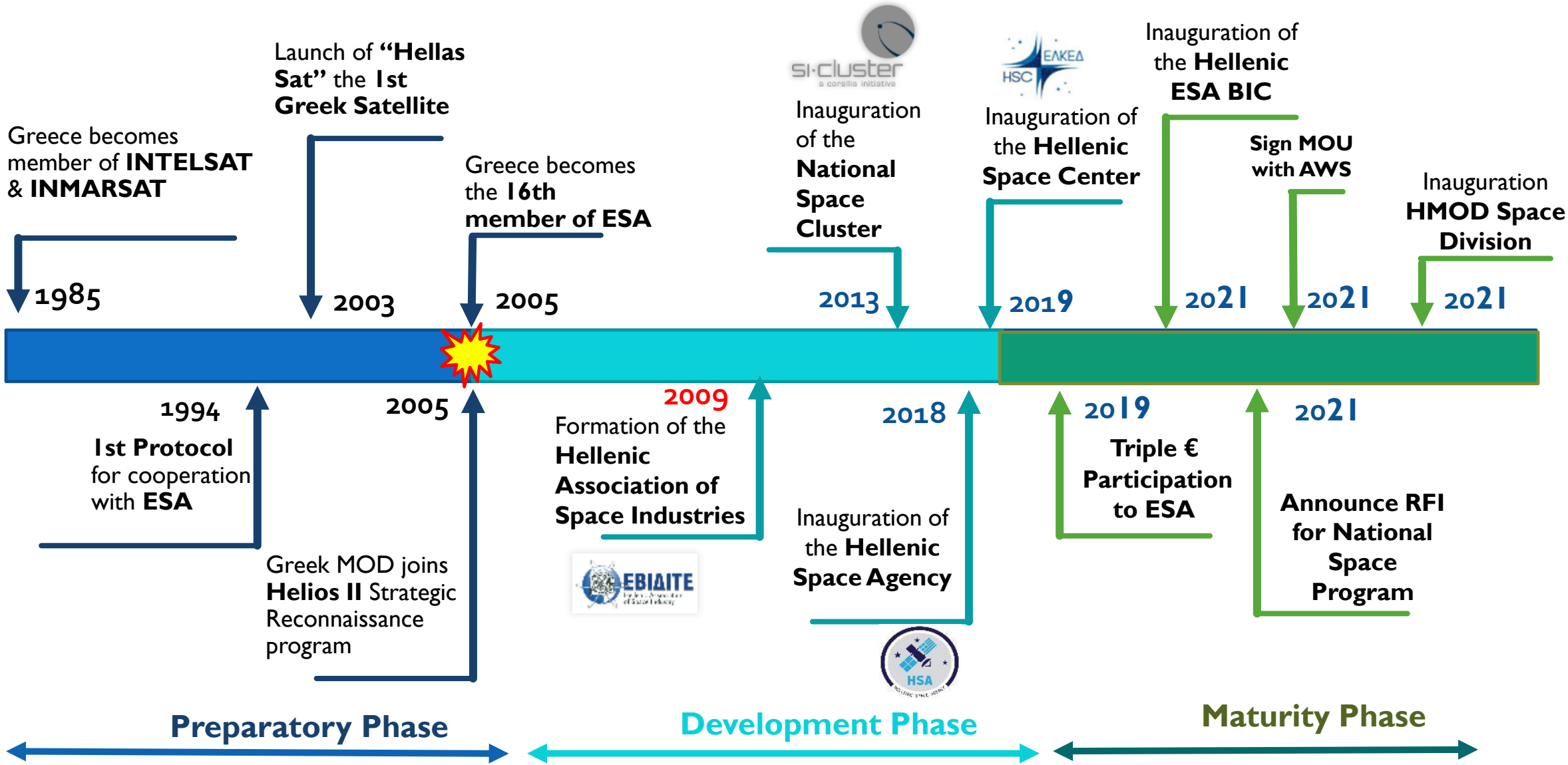
Supporting the autonomous involvement of Greece in ESA science missions

ΕΒΙΔΙΤΕ
Hellenic Association of Space Industry

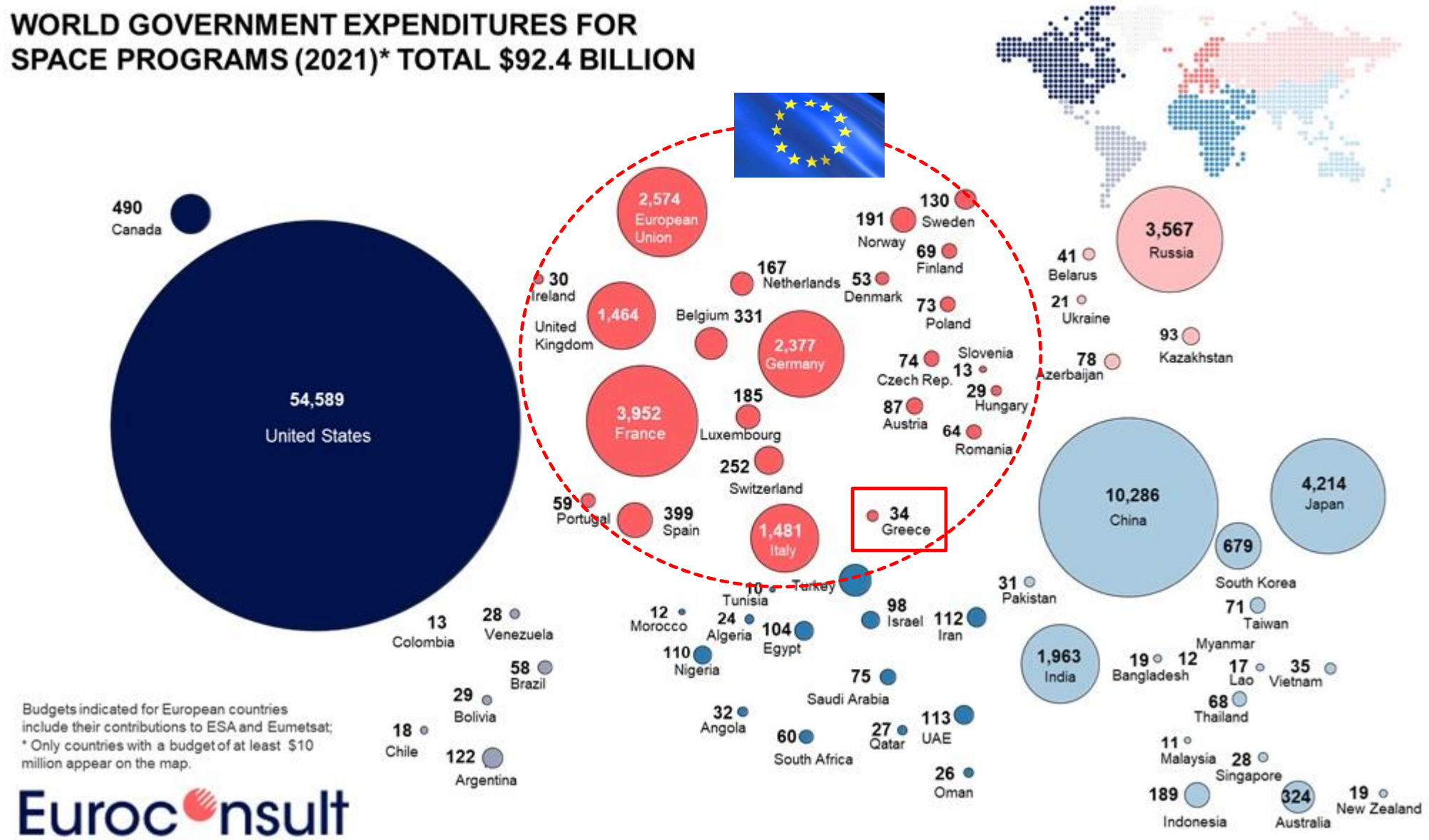
Stelios Bollanos
HASI, Vice President

Planetek Hellas, Cofounder & Director

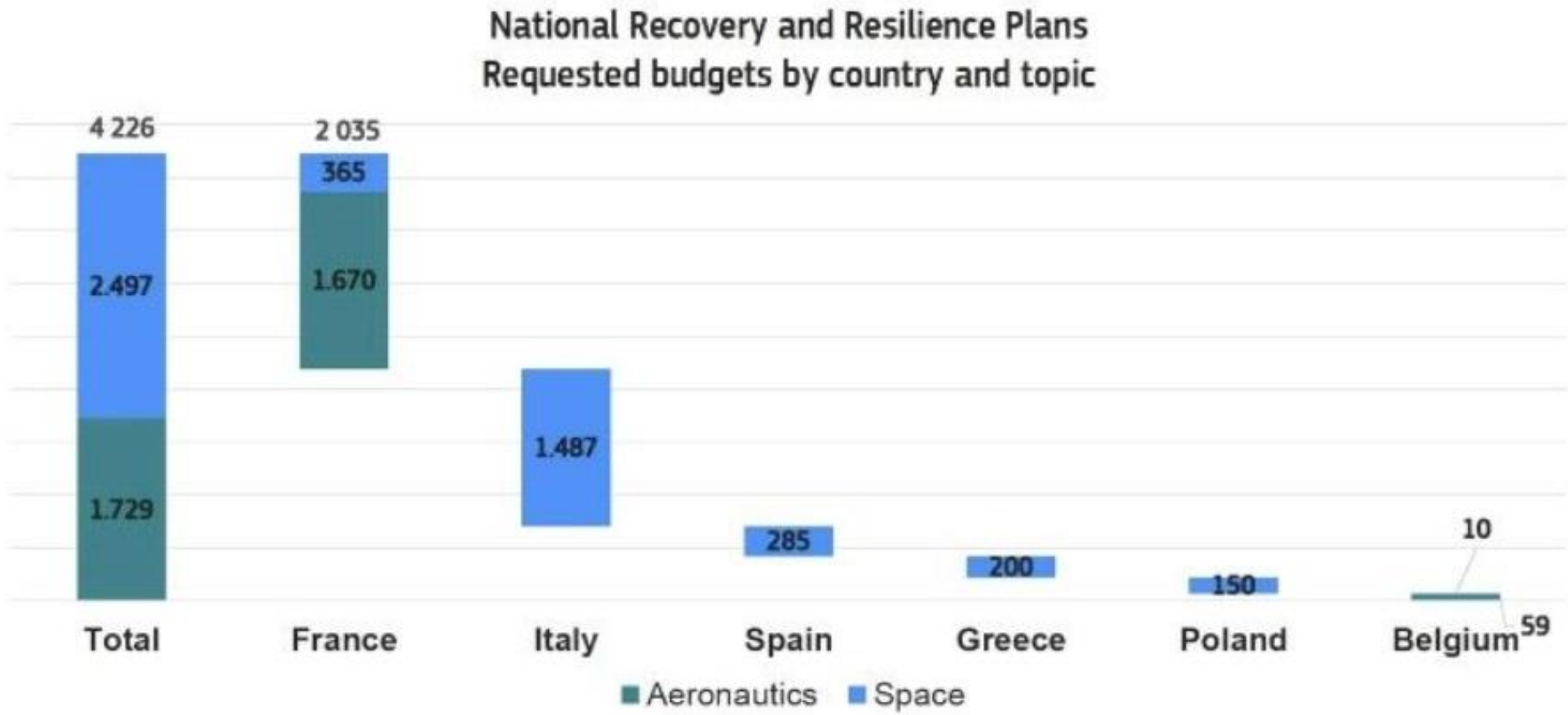
GREECE AND SPACE



INTERNATIONAL INVESTMENTS

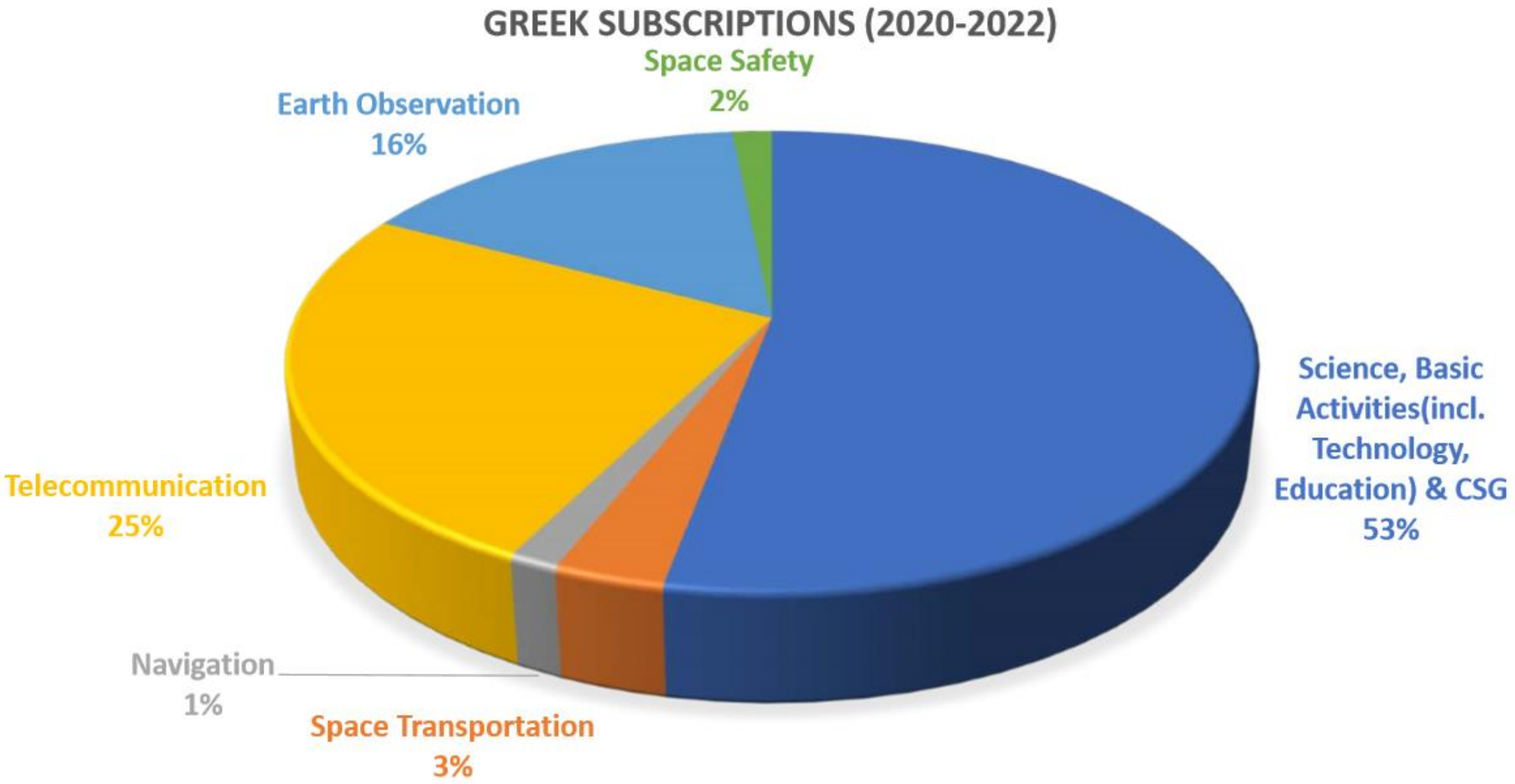


Space and aeronautics measures total €4.2 bn



European Commission

- 63.6 M Euros for three years

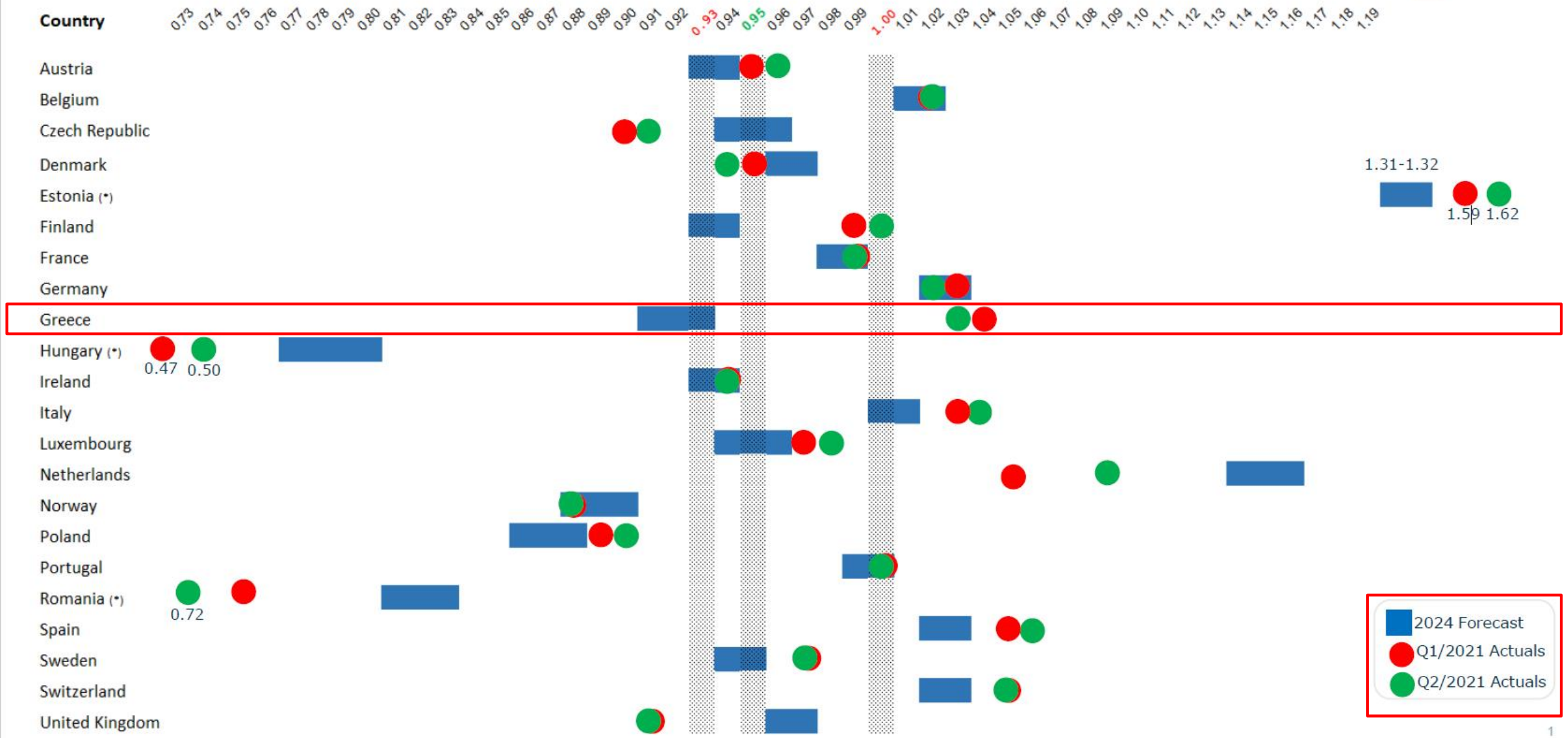


- 33 M Euros for three years (2020 -22)

PROGRAMME	M Euro
Earth Observation	10
Telecommunication and Integrated Applications	16
Technology	2.4
Space Transportation	2
Navigation	0.9
Safety and Security	1
Science and Exploration (Prodex)	0.4
Human Spaceflight and Robotic Exploration	0.3

Increased by 4 times in comparison with the previous Ministerial (8,2M€)

Geo-Return Status



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Υπουργείο Ψηφιακής Διακυβέρνησης

Space Objectives, Strategies and Actions

Objectives

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Υπουργείο Ψηφιακής Διακυβέρνησης

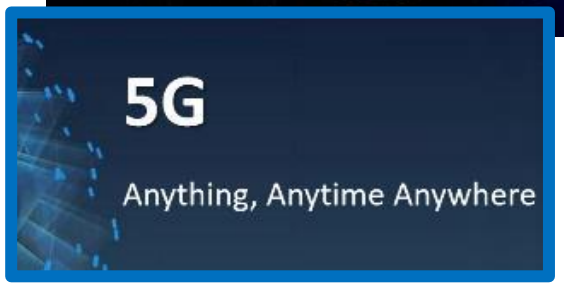
1. **Strengthen national security and defense, especially with the utilization and development of space infrastructure.** Ensure national autonomy in safety and security (e.g border control, disaster management) by enhancing existing infrastructures (e.g. GreekCom) and developing new ones (e.g small satellites). The goal is to autonomously respond to national safety and security needs.
2. **Development of the Greek space industry.** Maximise the integration of Greek companies into the European industrial space landscape. The goal is to create a sustainably competitive Greek space industry.
3. **Utilise of space data and the development of relevant applications.** Foster the integration of space into the society and economy, by facilitating the use of space technologies and applications to support public policies and business development (e.g. telecom, transport, maritime, agriculture, energy, environment). The goal is to create public and commercial services.
4. **Support space research and innovation.**

*National law 4727/2020

HOW TO IMPROVE THE POSITION OF GREECE IN RELATION TO THE EUROPEAN UNION INVESTMENTS IN SPACE

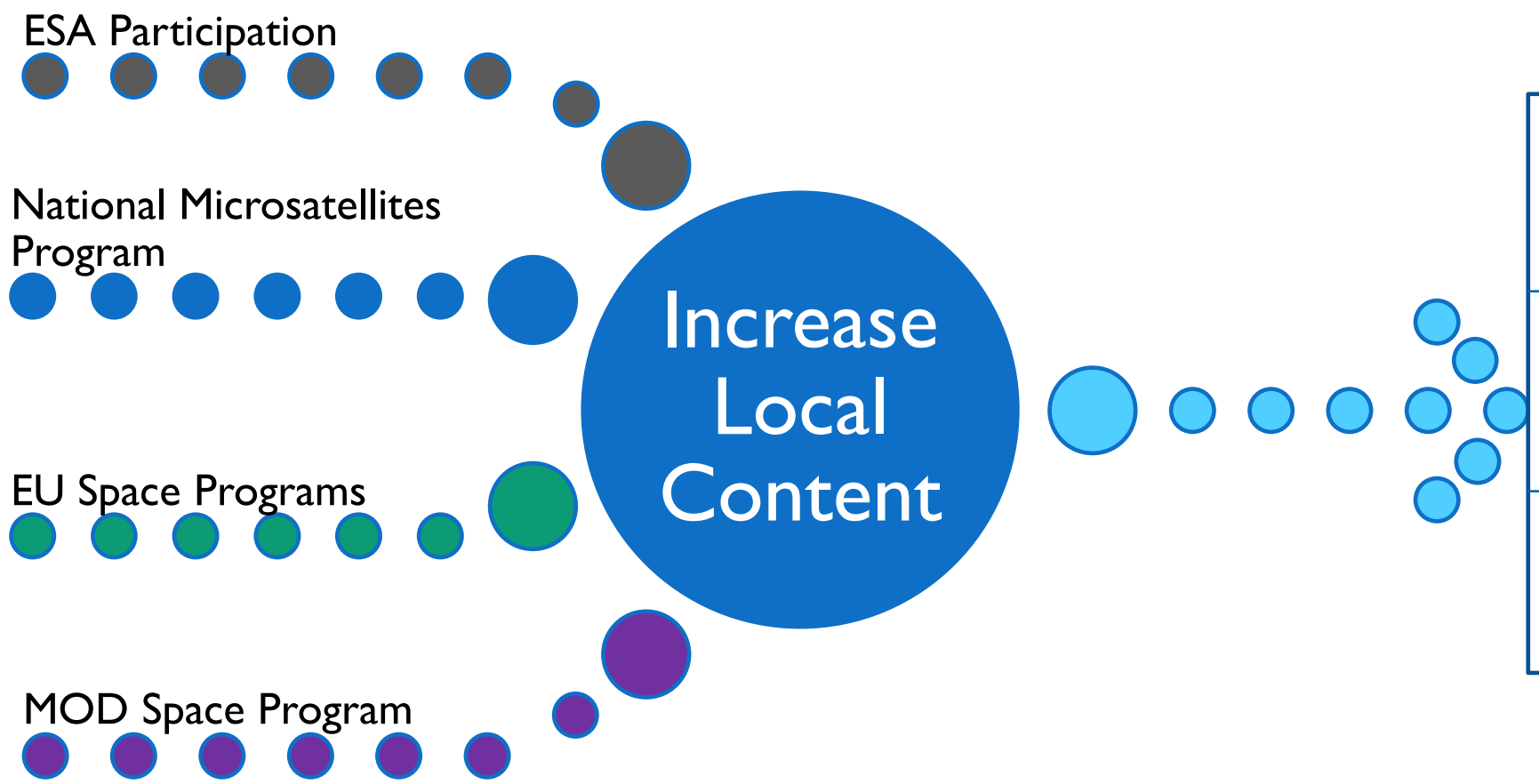
2000 to 2024 program value will exceed 22 billion euros

1998 to 2020 program value estimated at 6.7 billion euros



2026 program value estimated at 6 billion euros

OBJECTIVE OF HASI



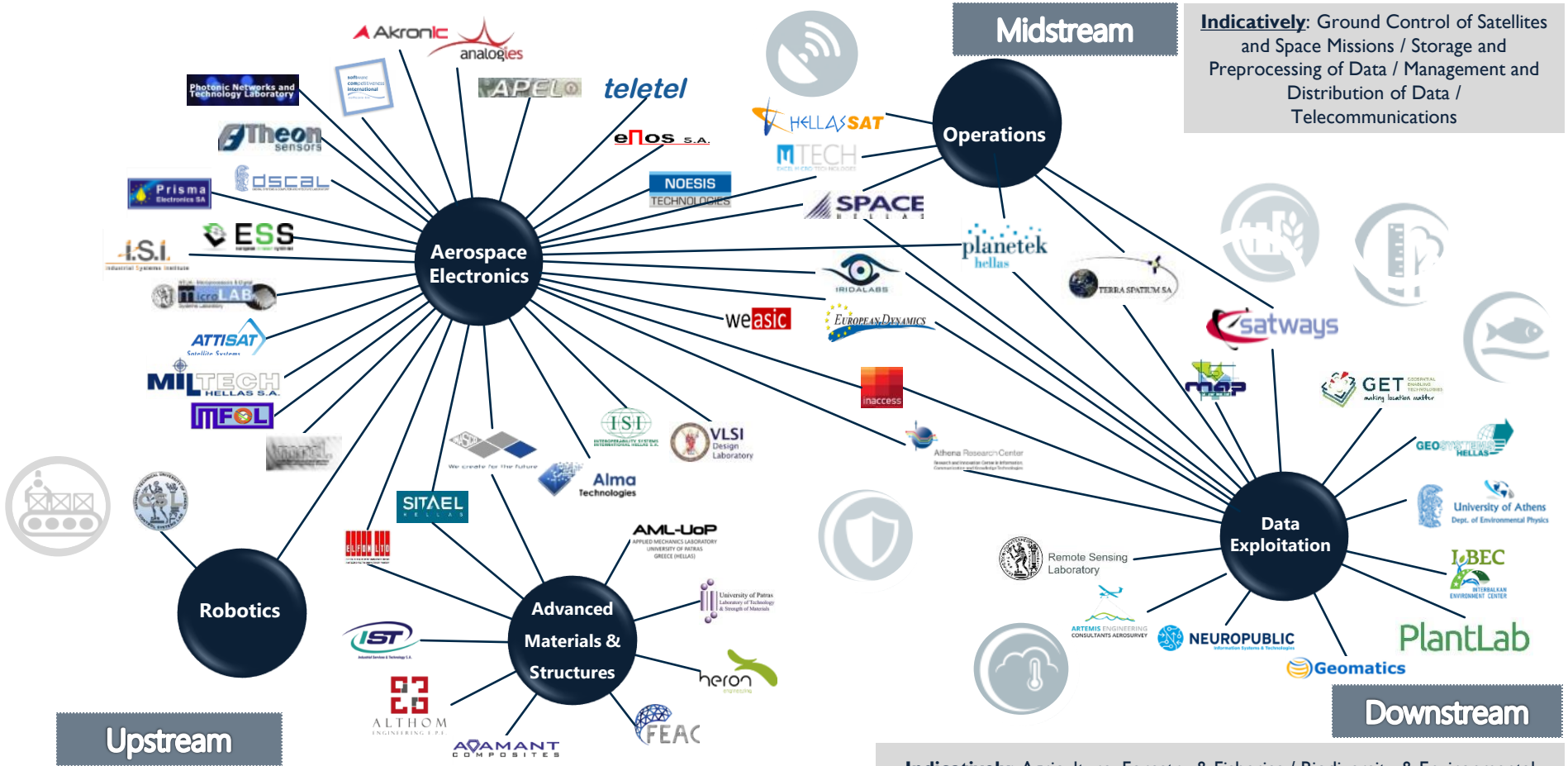
si·cluster
a corallia initiative

Strategy and Business Plan

HELLENIC ASSOCIATION OF SPACE INDUSTRY

- Non-for profit organization approved by the Greek-laws
- 45 local (mainly SME) companies with long standing experience and know how on space technology
- More than 2500 high level educated personnel
- More than 90% of ESA-Greek cooperation programs run by HASI members
- Permanente open call for new members

THEMATIC FOCUS OF THE VALUE CHAIN



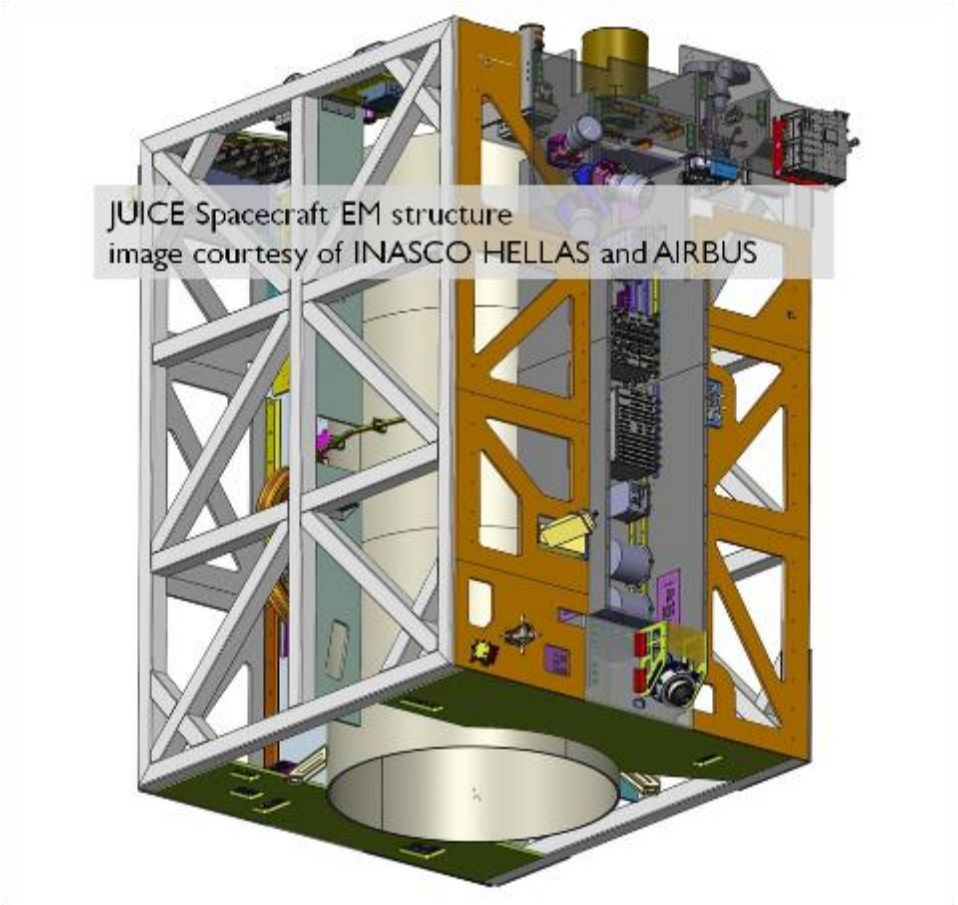
Indicatively: Ground Control of Satellites and Space Missions / Storage and Preprocessing of Data / Management and Distribution of Data / Telecommunications

Indicatively: Design & Development of Satellite Subsystems & Components (Structures, Mechanisms, Power Control, Telemetry Tracking & Control, Attitude & Orbital Control Systems, Communications, Thermal Control, On-Board Computers, etc.) / Payload Development (for Downstream Applications and Space Science) / Ground Control Equipment / Launchers /Life Support Equipment

Indicatively: Agriculture, Forestry & Fisheries / Biodiversity & Environmental Protection / Climate & Energy / Civil Protection & Humanitarian Aid, Security & Border Control / Public Health, Disease Control / Tourism / Transport & Safety / Urban & Regional Planning / Navigation / Air Traffic Control / Telecommunications / Space Science / Technology Transfer to Earth Applications

AREAS OF EXPERTISE

- ✓ **Sensors**
  - MEMs based sensors for aerospace applications
- ✓ **ASICS Designs**
  - Analogue and Digital ASICS for aerospace applications
- ✓ **Advanced Structures and Mechanisms**
  - Sandwich panels, Walls, enclosures, struts, fittings, brackets and joints
  - Spacecraft EM structures
  - Composites Material Engineering Support
- ✓ **Mechanical Ground Support Equipment and Transportation Containers**
- ✓ **Novel Materials and Processes**
  - Nano-enabled products (prepregs, adhesives, coatings etc)
  - Advanced Ceramics and Metals (Aluminium, Titanium)
- ✓ **Electrical Ground Support Equipment**
  - - AOCS, TM/TC, CDMU SCOEs
  - - SpW, MIL-STD-1553, CAN recorders
- ✓ **On board Software**
  - Development of AOCS, Central Software, Power Control etc.
  - ISVV, Software Validation, Engineering services
- ✓ **Electric Propulsion Systems**
  - PPU Design, manufacture, testing and certification for Low Power EP
- ✓ **Remote Sensing Applications and Data Exploitation**
  - Synthetic Aperture Radar (SAR) core signal processing
  - Optical images processing
  - Data Fusion for automatic classification



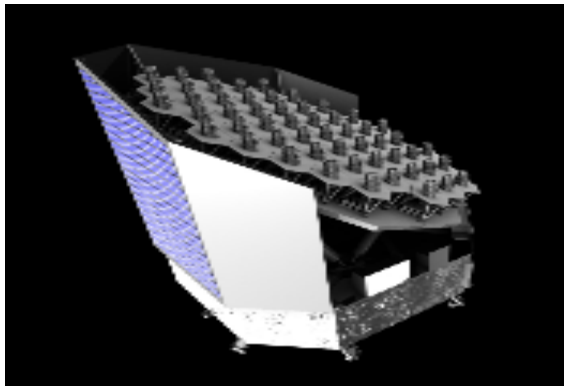
JUICE Spacecraft EM structure
image courtesy of INASCO HELLAS and AIRBUS

GREEK PARTICIPATION IN ESA SPACE MISSIONS

EBIAITE
Hellenic Association of Space Industry

JUICE MISSION

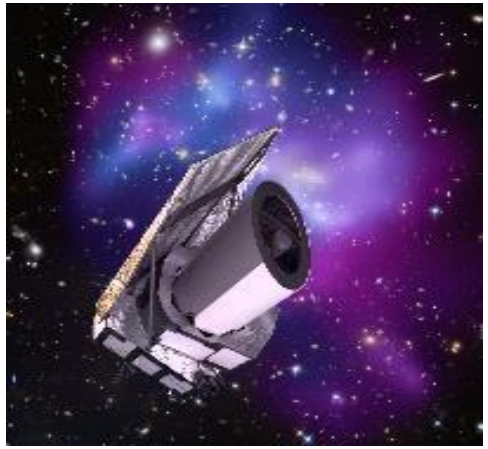
PLATO MISSION



EXO MARS MISSION

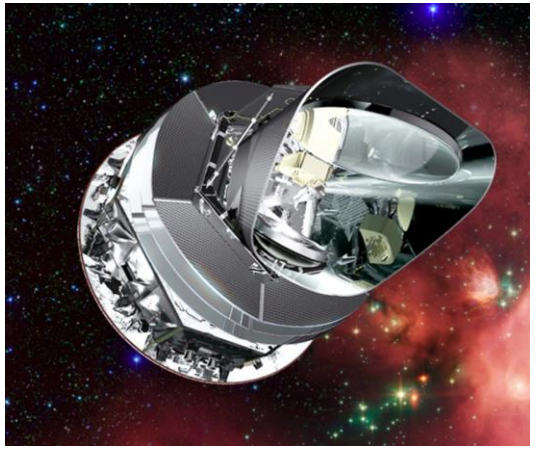
SOLAR ORBITER MISSION

EUCLID MISSION



IASI- NG SPACE MISSION

PLANCK MISSION



TRUTHS MISSION

NATIONAL MICROSATELLITES PROGRAM

Έργο ανάπτυξης μικροδορυφόρων

Το έργο αποτελεί σημαντικό βήμα στην υλοποίηση της στρατηγικής της χώρας για την αξιοποίηση των διαστημικών τεχνολογιών και εφαρμογών και την ενσωμάτωσή τους στην εθνική οικονομία.

Περιλαμβάνει την ανάπτυξη συστοιχίας μικροδορυφόρων που θα εξυπηρετούν εφαρμογές τηλεπικοινωνιών και γεωεπισκόπησης για χρήση σε τομείς, όπως οι κυβερνητικές δορυφορικές υπηρεσίες, η χαρτογραφία, η ναυτιλία, η γεωργία ακριβείας, η τοπογραφία και η πολεοδομία καθώς και άλλους τομείς της οικονομίας. Το έργο των μικροδορυφόρων σχεδιάζεται να χρησιμοποιήσει τις υποδομές Fiber in the sky – EuroQCI, με σκοπό την ολοκληρωμένη παροχή ασφαλών τηλεπικοινωνιακών υπηρεσιών.

Επιπροσθέτως, το έργο των μικροδορυφόρων θα υποστηρίζει εφαρμογές και υπηρεσίες για την έρευνα και διάσωση, την επιτήρηση των συνόρων, την εθνική ασφάλεια, την πολιτική προστασία και την προστασία του περιβάλλοντος. Η κατασκευή του συστήματος των μικροδορυφόρων (διαστημικό και επίγειο τμήμα) αναμένεται να αυξήσει τις ικανότητες της ελληνικής βιομηχανίας υψηλής τεχνολογίας.

Το έργο αναμένεται να αυξήσει τη διαθεσιμότητα, την ασφάλεια και την ανθεκτικότητα των κυβερνητικών δικτύων επικοινωνίας. Παράλληλα θα προσφέρει συνδέσεις υψηλής ταχύτητας σε απομακρυσμένες περιοχές λαμβάνοντας υπόψη το CSR 3 το 2020.

Επιπλέον, ο σχηματισμός ανάπτυξης των μικρο-δορυφόρων είναι μέρος της πρωτοβουλίας EU GovSatCom, EuroQCI και Connectivity που ανακοινώθηκε από την Ευρωπαϊκή Επιτροπή στις 15 Ιουλίου 2020.

Greek Space Industry Ready for this Great Challenge For the Big Change

Overview on GR RFI process

- **Request for Information (RFI) issued on 9th September 2021 for**

"Outline concept for end to end small satellites multipurpose solutions in response to national and European needs"

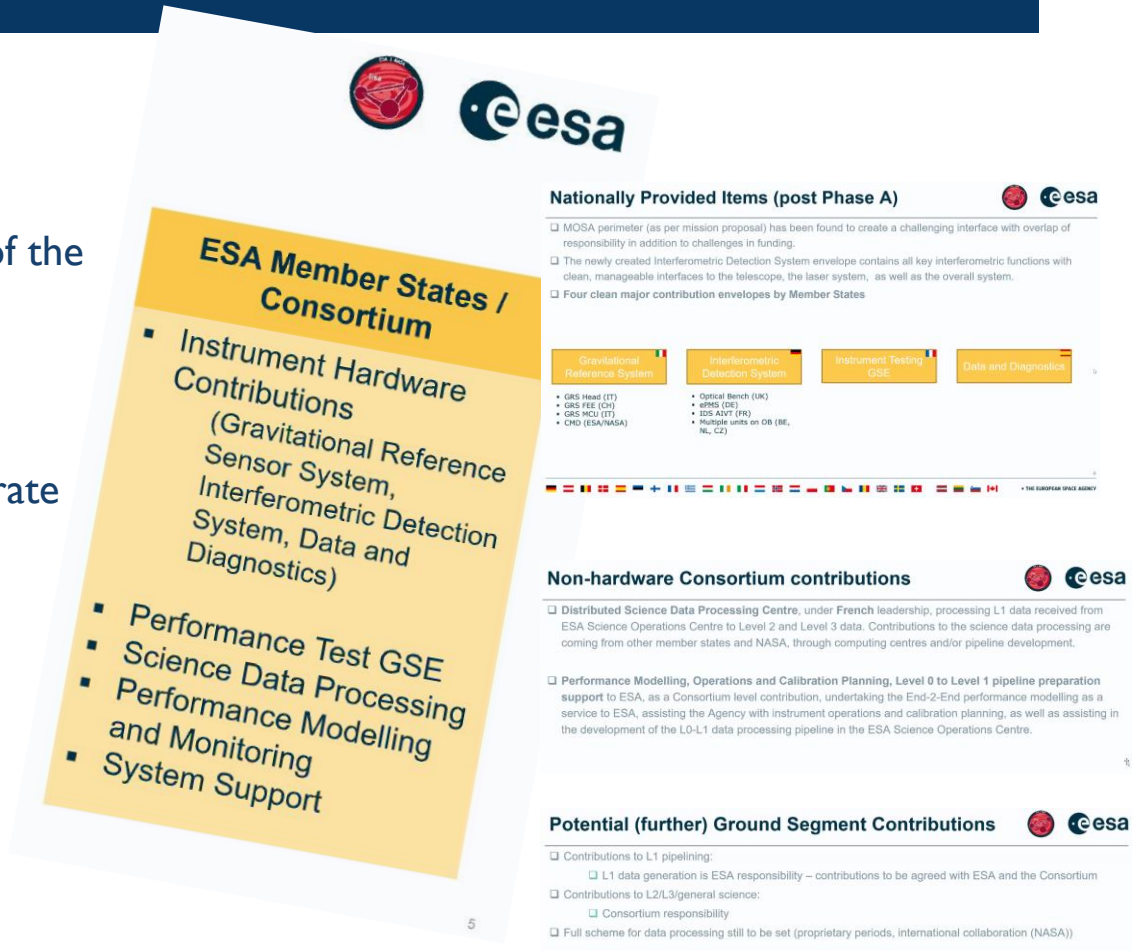
- **11 Proposals Received**
- **Participation – prominent Greek participation**
  - ✓ **37** Greek Business' (5 leading the RFI proposals)
  - ✓ **11** Greek Universities
  - ✓ **9** Greek Institutions
  - ✓ **14** International Business' (6 leading the RFI proposals)

- **Next Steps -> Down-selection of RFI responses and prepare open Tender for industry**

- **Strong industry participation** : Prominent primes, technology providers, Universities and Institutions
- **Diverse propositions** : Missions cover broad options
  - ✓ serving both telecoms and EO use-cases
  - ✓ small cubesats to large 400kg satellite options offered
  - ✓ deployed in multiple orbits
  - ✓ identifying Optical and QKD space and ground solutions, leveraging on Greek ground assets
- **Responding to use-cases**: addressing application relating to
  - ✓ seamless interconnectivity with 5G/6G
  - ✓ fast, flexible and secure communication networks supporting UAVs', IoT devices, 5G/6G networks, QKD etc
  - ✓ EO use-cases for fire detection, maritime monitoring, agriculture, cartography and urban development applications
- **Building competencies in Greece:** Interest expressed to
  - ✓ migrate competencies, offer knowledge exchange from other countries to Greece
  - ✓ build new capabilities and advance current capabilities of Greek companies

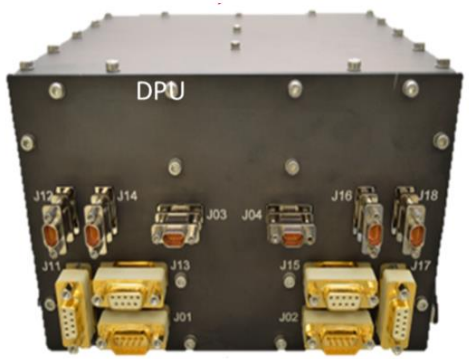
AUTONOMOUS PARTICIPATION IN ESA SCIENCE MISSIONS HOW TO?

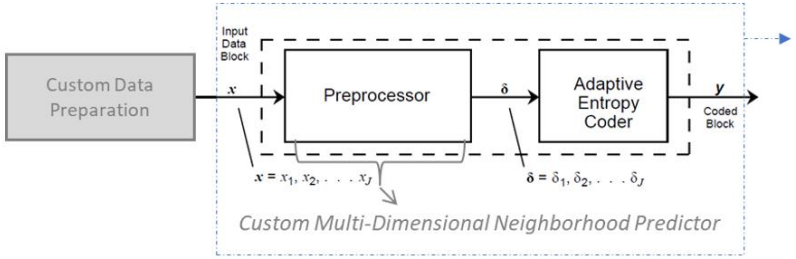
- What science?
  - New/additional payload/experiment?
  - Data exploitation on the ground? Which infrastructure (HD&SW of the DDPC)?
- What can the national ecosystem offer? (Industry & academia)
  - If E2E solution not possible, which countries Greece could collaborate with under the same science objectives?
- How to handle the procurement procedure?
  - HSC? ESA/Prodex? Different?



EXAMPLE OF COLLABORATIVE GREEK INDUSTRIAL CONTRIBUTION ON-BOARD DATA HANDLING AND PROCESSING UNIT

The on-board data handling and processing is designed to support innovative data processing and compression techniques for different type of payload/sensors





Greek DPU-specific Potential

- High bandwidth links for science data (space Wire/ Fiber)
- Custom FPGA based data management
- «traditional» data compression
  (CCSDS based with, e.g. custom pre-processor steps) and...
- ...flexible, innovative, approach to compression
  (data classification and quality adaptive to information trade-off)
- Explore novel approach to data proccessing on-board
- OSRA SW component model and SAVOIR SW architecture
- CFDP ready data (and SAVOIR File management System)

Experienced supply chain

- Multi/Hyper-spectral mission design
- E2E performance simulation, evaluating different operative scenarios
- DPU system design
- System and components level simulation
- Custom HW components design
- High-speed data links
- On-board SW (ECSS E-ST-40C / Q-ST-80C) and ISVV
- On-board data processing (SW and FPGA)
- DPU strctures and mechanical models
- Assembly
- Qualification testing
- EGSE

EXAMPLE OF COLLABORATIVE GREEK INDUSTRIAL CONTRIBUTION DEVELOPMENT OF L1-3 PRODUCTS (DDPC)

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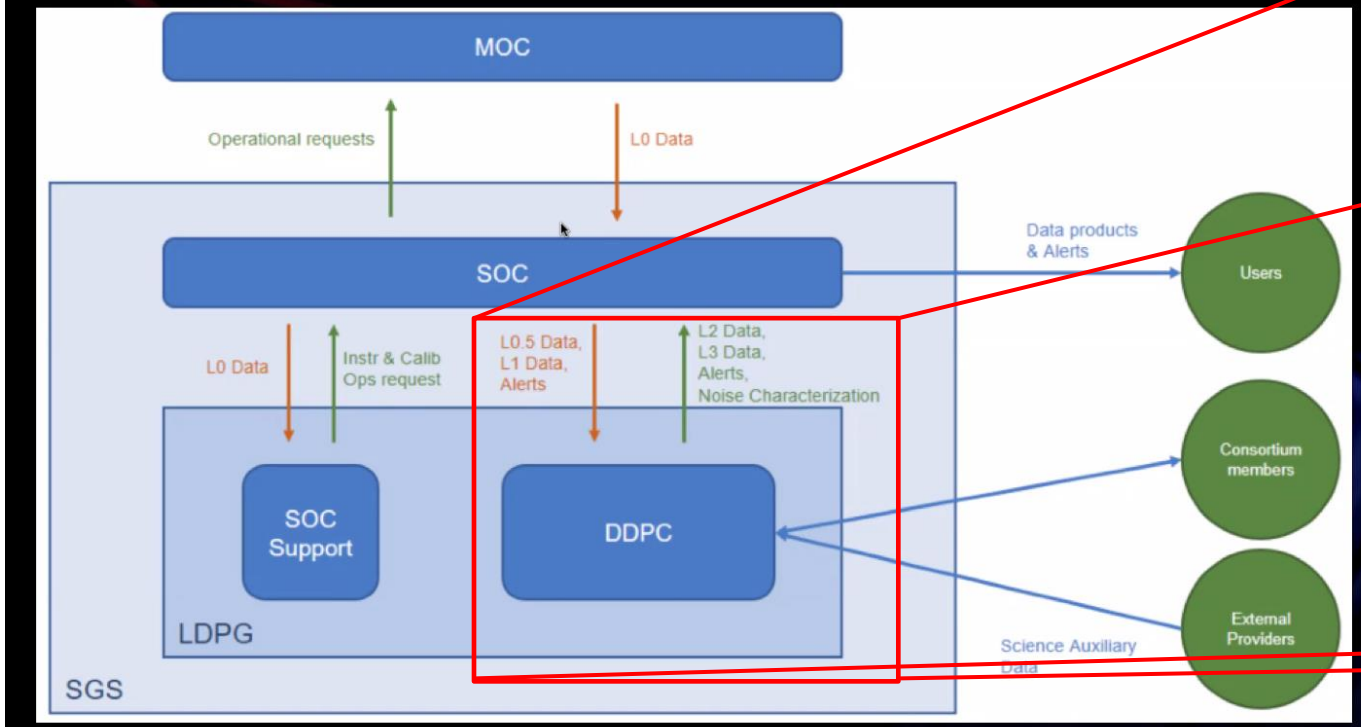
Hellenic Association of Space Industry

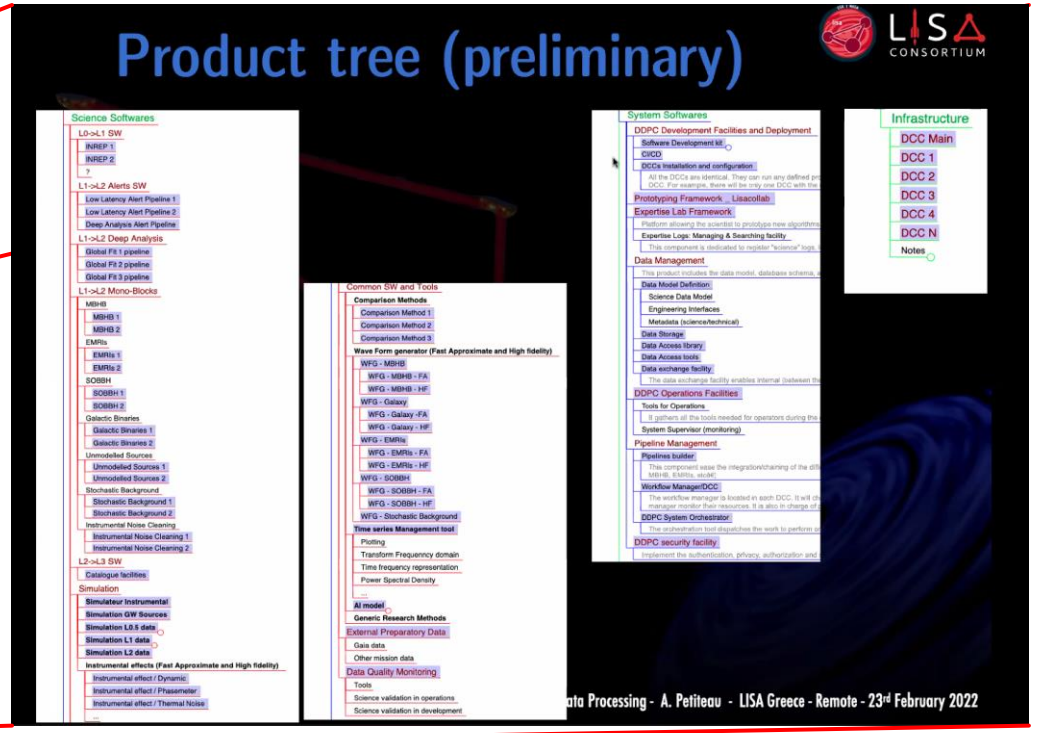
Organisation of the SGS

LISA CONSORTIUM



Product tree (preliminary)

LISA CONSORTIUM



AUTONOMOUS PARTICIPATION IN ESA SCIENCE MISSIONS HOW TO?

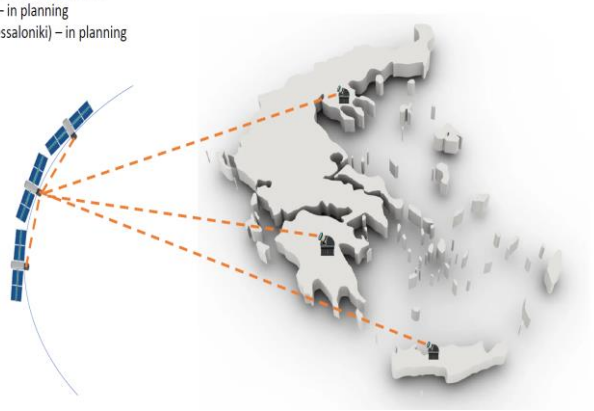
- What is the needed additional budget?
  - Existing strategic decisions of Greece must not be impacted. Errors of the past should not be repeated (IAP-Business Applications)

SUPPORT TO EXISTING ESA INITIATIVES THAT OF GREECE

GreeQCI – Three OGS

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

- Chelmos (Peloponese) – in progress
- Skinakas (Crete) – in planning
- Holomontas (Thessaloniki) – in planning



Opportunities

3 optical stations in Greece

- Helmos (Peloponese)
- Skinakas (Crete)
- Cholomon (Chalkidiki)

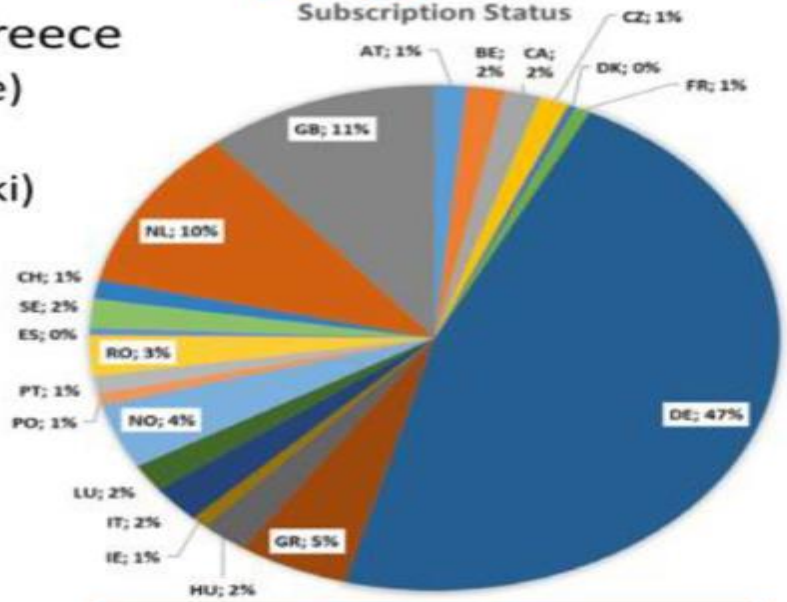
Scylight participation

- 5% of budget
- 4th contributor

scylight

esa European Space Agency

Subscription Status



Total SPL ScyLight:
20 Participating Member States
136 (175) M€

SUPPORT TO EXISTING ESA INITIATIVES THAT OF GREECE

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Hellenic Association of Space Industry

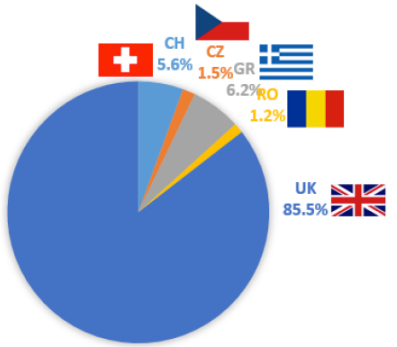
TRUTHS MISSION

Funding and Subscription

esa

- TRUTHS will be step-wise funded from the Earth Watch Programme:
  - ✓ @Space19+ Phase A/B1
  - @CM22 Phase B2/C/D/E1 (including Launcher)
  - @CM25 Phase E2/F

- TRUTHS Phase A/B1 has been fully subscribed at Space19+:
  - Total amount: 32.4 M€
  - 5 Participating Countries: UK, GR, CH, CZ, RO



TRUTHS A/B1 SUBSCRIPTION - @SPACE19+

IN A NUTSHELL…

- Science missions such as LISA are the best examples to underline the need for "continuation" in Governmental Space Policy (20-30-40 years until launch).
- LISA mission, an excellent opportunity for the autonomous involvement of the very active scientific community of Greece. Now is the time to make the decisions!
- The role of the Hellenic Space Center is fundamental in orchestrating the participation of Greece
- Greek space industry ready and willing to support the autonomous participation of Greece in ESA science missions
- Already taken strategic decisions should not be put at risk in the upcoming ESA Council at Ministerial Level (additional funding should be sought for LISA)

HELLENIC ASSOCIATION OF SPACE INDUSTRIES

Your point of contact for industrial space activities in Greece

ΕΒΙΑΙΤΕ
Hellenic Association of Space Industry

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