HELLENIC REPUBLIC
Ministry of Digital Policy, Telecommunications and Media

ΤΟ ΑΥΡΙΟ ΣΗΜΕΡΑ ΓΙΑ ΟΛΟΥΣ

"Η αξιοποίηση της διαστημικής τεχνολογίας στην οικονομική ανάπτυξη εξειδικευμένων εφαρμογών IoT και η επίδραση στην οικονομική ανάπτυξη της χώρας μας".

Dr. Athanasios Potsis
HAS BoD Member
President Hellenic Association of Space Industry

www.hellenicspaceagency.gov.gr

KEY SPACE MARKET INPUTS

- **Growing International Market**
  - International Space Industry Market in 2017 had a turn over that **exceeded 329 Billion USD**
  - European Space Industry Market had a turn over of **8 Billion Euros for 2018**
  - The **development rate for 2015 was 7%**
- **Future Potentials**
  - Space related private initiatives like SPACE X and AMAZON will allow private industry to utilize space for immediate business activities
  - Space technology is becoming more and more "Business Driven" rather than "National Driven"
- **Development and Innovation Heritage**
  - Space sector is a **driving force** for broader and stronger international partnerships that lead to **Growth**, **Employment** and **Competitiveness** in several sectors of the economy

Greece & Space Milestones

1985
Greece becomes member of **INTELSAT & INMARSAT**

1994
1st Protocol for cooperation with **ESA**

2003
Launch of **"Hellas Sat"** the **1st Greek Satellite**

2005
Greece becomes the **16th member of ESA**

2005
Greek MOD joins **Helios II** Strategic Reconnaissance program

2009
Formation of the **Hellenic Association of Space Industries**

2013
Inauguration of the **National Space Cluster**

si-cluster
a corallia initiative

2018
Inauguration of the **Hellenic Space Agency**

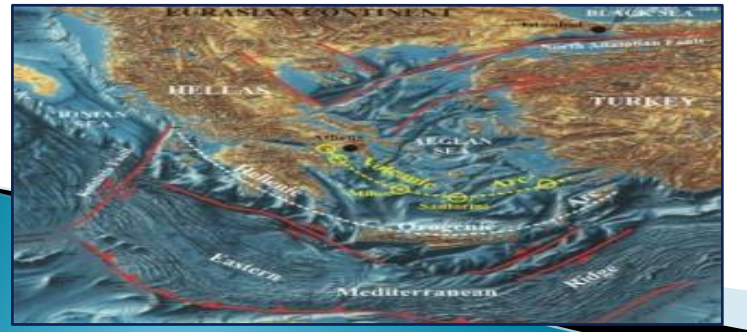
WHY GREECE… One of the BEST Natural Test Sites

- Southeastern region of the EU
- Geopolitically sensitive region
- Strong commercial and industrial interests

- Biggest and most dispersed maritime area
- The highest number of islands of the European Union

- The greater part is mountainous
- Strong topography
- Difficulties in transportation and communication, particularly close to the border areas

- One of the most seismically active regions in the world
- High frequency of natural catastrophic events (e.g. earthquakes, landslides, floods, forest fires)



GREECE …… Why to Invest on Space?

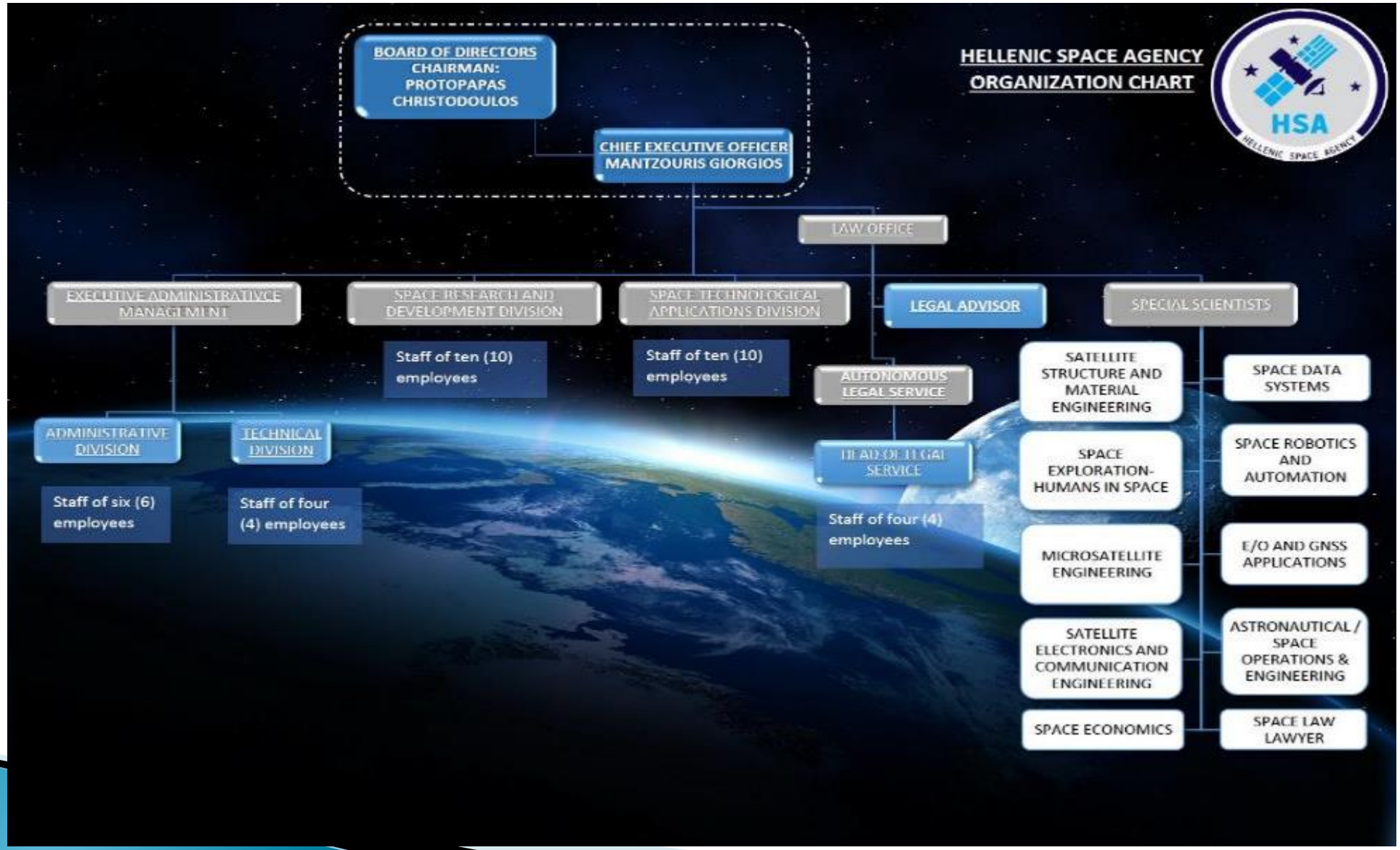
Return On Investment (ROI)
Συντελεστής απόδοσης

x 6

Employment Increase
Απασχόληση

+ 17%

Organization Chart



National Space Policy & Strategy

- Official National Registration of Space Operators – Scientists

https://www.hellenicspaceagency.gov.gr/συνεργασίες/

- Official Registration of National Investments in Space (Including more than 15 years of ESA participation as the 16th Member)

- Discussions and negotiations globally on joint programs

- *Greek Citizens will gain optimum access in space applications and any space investment program*

International Affairs

- **MoU** :CNES (France), Inmarsat (Israel), Cyprus University of Technology

- **Under signing procedure:** NASA (USA), ROSKOSMOS (Russia) ASI (Italy), ROSA (Romania), UKSA (UK), ISA (Israel)

MoU under discussion:

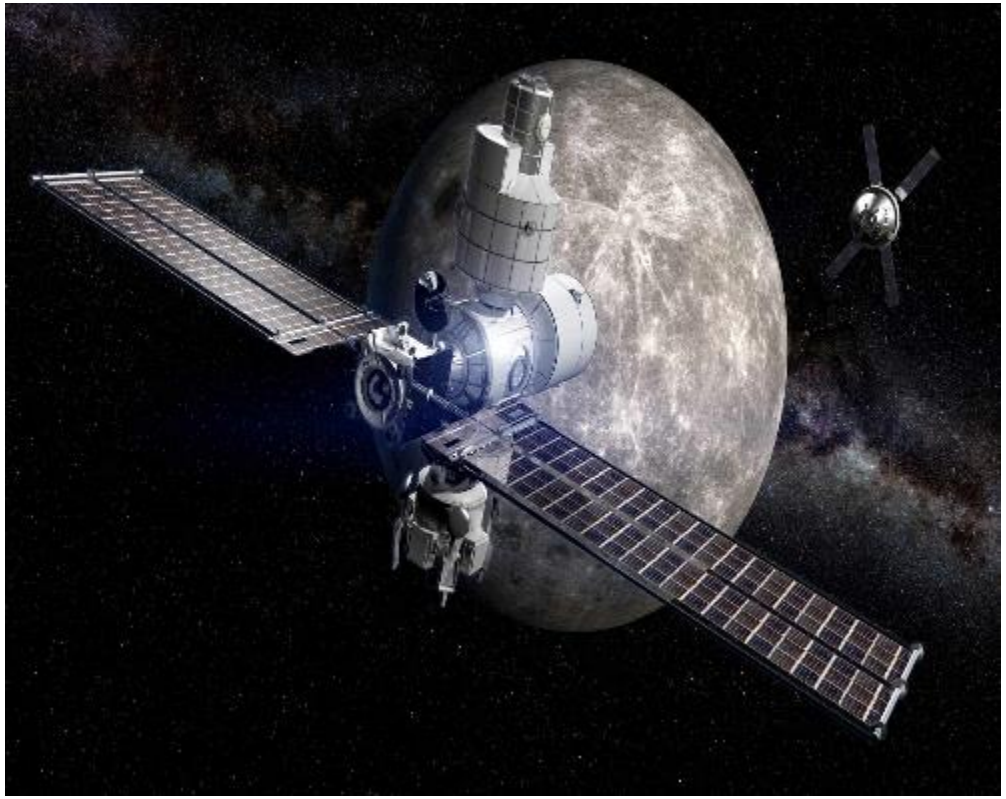
- **Space Agencies**

  DLR (Germany),UAE Space Agency (UAE), EXA (Ecuador), KARI (Korea), AEM (Mexico), AEB (Brazil), BELSPO (Belgium)

- **Primes**: Thales, Airbus, Rhea, OHB, Lockheed Martin
- **Universities**: US NPS Space Systems Academic Group,

Main Space Programs

- **NASA Orion Mission**:
  - –Radiation Monitoring WRMISS (Workshop on Radiation Monitoring for the International Space Station), DR Marianthi Fragopoulou CEO HERADO / Ad Researcher NCSR
  - – Greece one of the six countries participating in Space Weather simulation
- **NASA Moon Gateway**: Greece ,as an official member, takes part in all activities
- **National Microsatellites**: cooperation between local Universities, Industry and International Strategic Partners

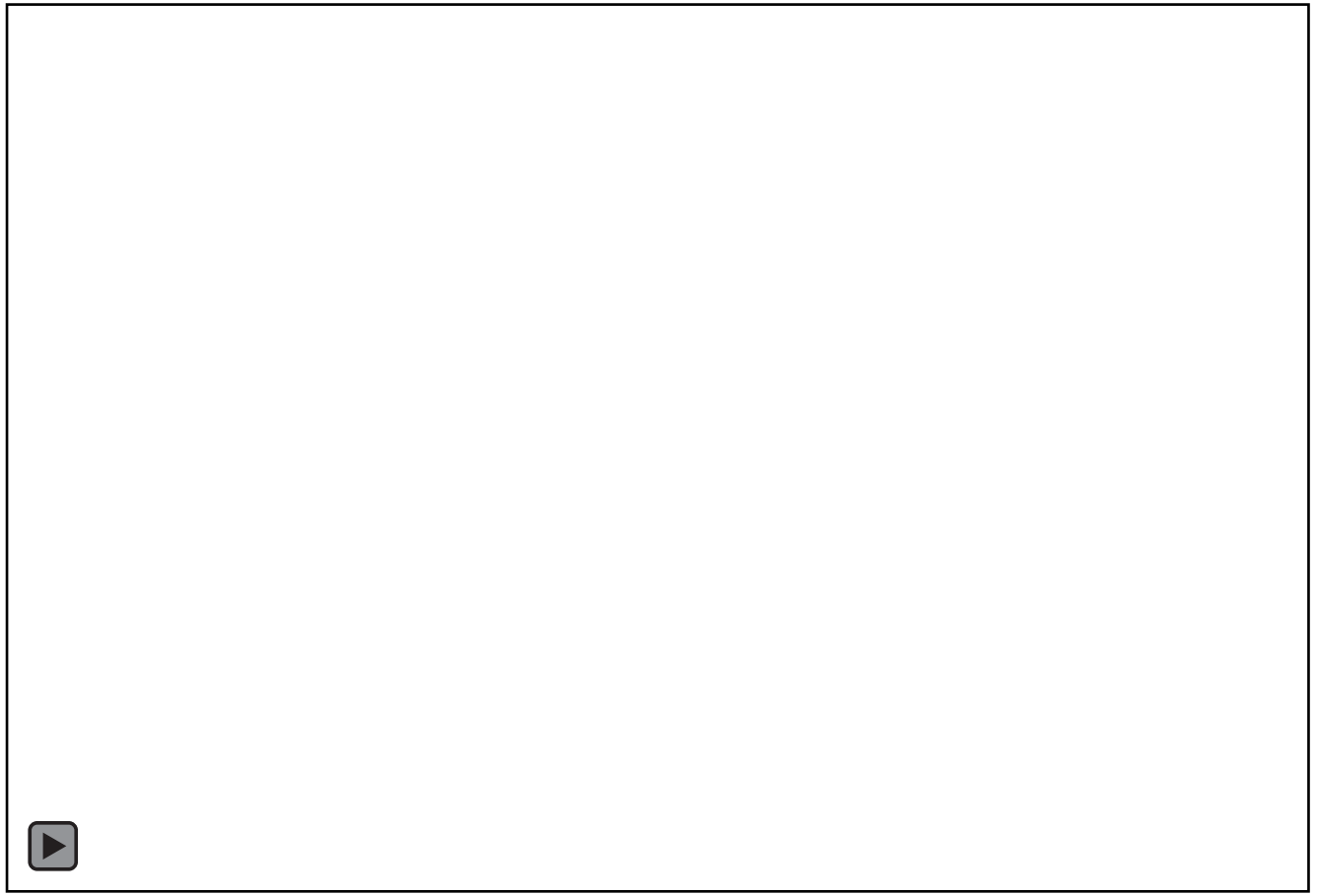


Main Space Programs

- **Earth Observation Geostationary** (GEO) **satellites – Environmental operations :Fire Urgency Estimator:** Cooperation with CNES and other countries of the area facing similar problems

- **Maritime & Space**

- **Astrobotic** (Grrece participate to US/NASA “Back to the Moon” Mission



EUROPEAN UNION INVESTMENTS ON SPACE GNSS & SECURITY

EUROPEAN DEFENCE AGENCY

2000 to 2024 program cost will exceed 22 billion euros

1998 to 2020 program cost estimated at 6.7 billion euros

MEMBER OF ALL MAJOR ORGANIZATIONS RELATED TO SPACE

BUT:

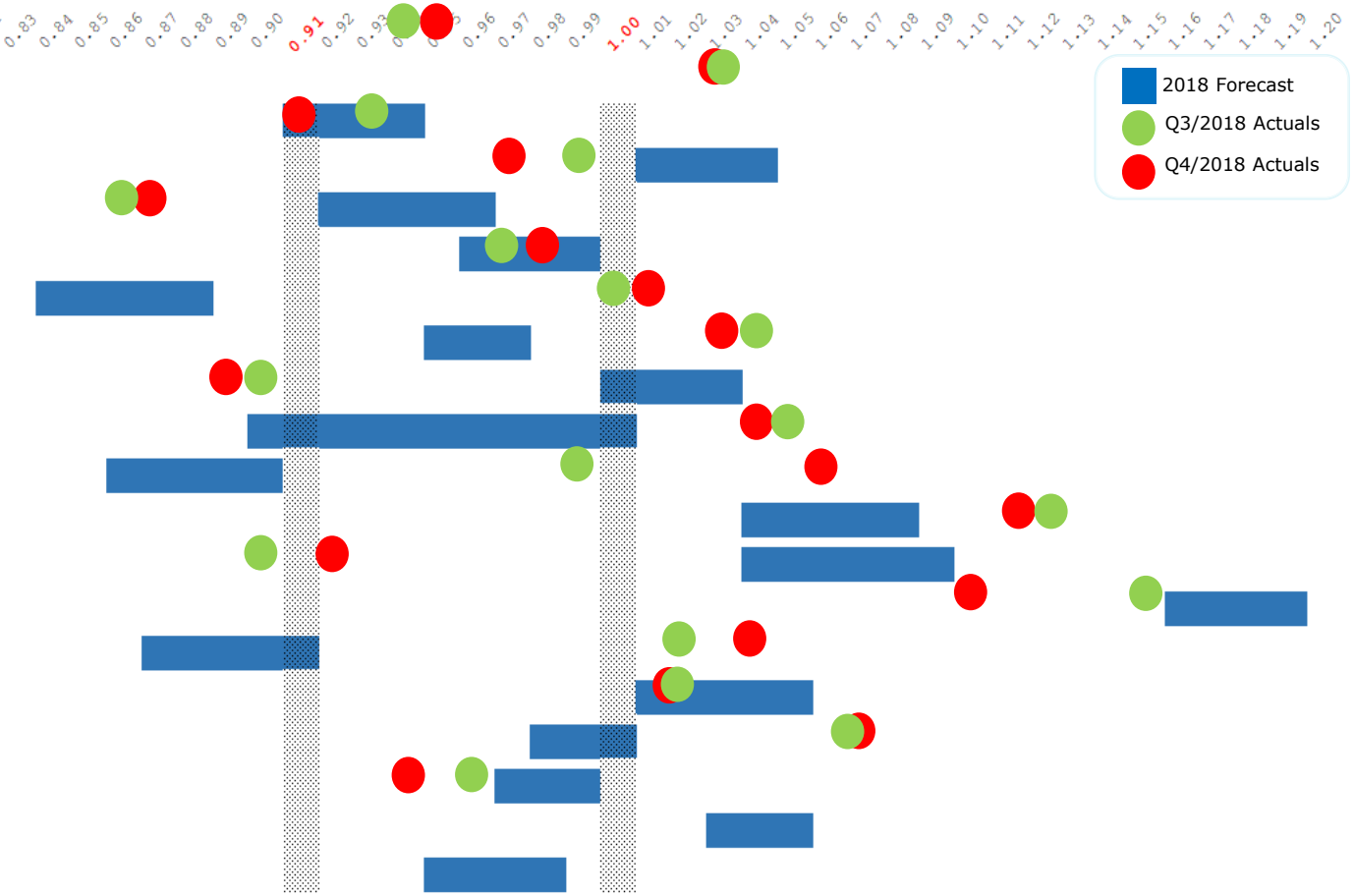
- Still no major EU Space related infrastructure
- Limited participation to EU major Industrial Space related programs like GALILEO and Copernicus where there are no mandatory geo-returns

Greece as the 16th state member of the European space agency – ESA

- ✓ ESA has become the Driving Force for the development of the local industry and the space related infrastructure
- ✓ Since 2005 more than 80 Million of Euros have been contracted for space technology related programs in Greece
- ✓ Greece is participating with 12MEUROS at ESA Mandatory programs
- ✓ During ESA Ministerial Council at Lucerne, Greece decided to rejoin ESA optional programs investing approximately 8,2 MEUROS for the next three years

Geographical Return Coefficient (GRC) in ESA Programs over the last 5 years

Country	2018 Forecast Lower limit	2018 Forecast Higher limit
Austria	0.91	0.94
Belgium	1.01	1.04
Czech Republic	0.92	0.96
Denmark	0.96	0.99
Finland	0.84	0.88
France	0.95	0.97
Germany	1.00	1.03
Greece	0.90	1.00
Ireland	0.86	0.90
Italy	1.04	1.08
Luxembourg	1.04	1.09
Netherlands	1.16	1.19
Norway	0.87	0.91
Portugal	1.01	1.05
Spain	0.98	1.00
Sweden	0.97	0.99
Switzerland	1.03	1.05
United Kingdom	0.95	0.98



- This achievement during the period of financial crisis in Greece: Is due to a number of ESA call/tenders "Restricted to Greece"
- But it shows the existing capabilities of the Greece Space Sector

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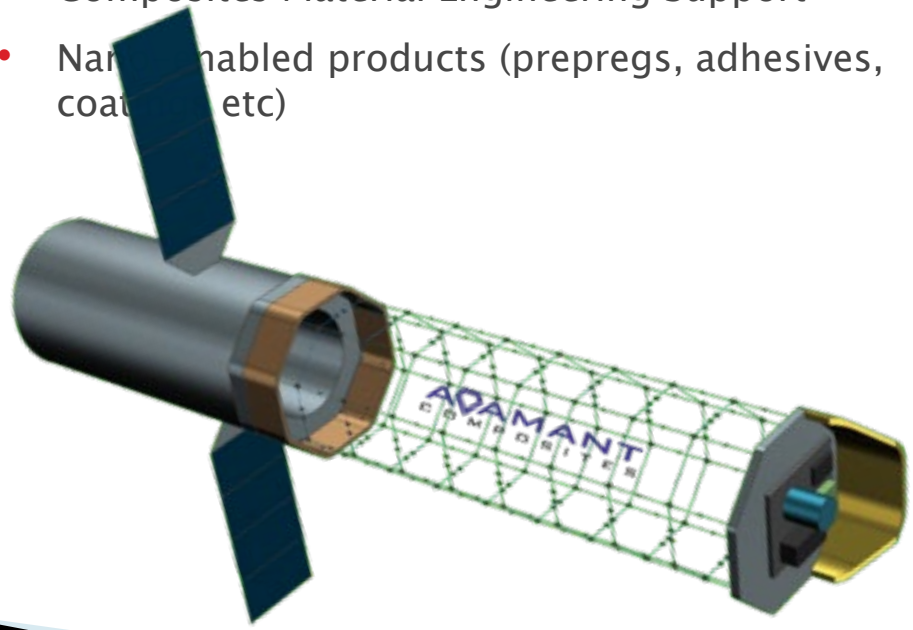
Hellenic Association of Space Industry

Hellenic association of space industry

- Non-for profit organization approved by the Greek-laws
- 41 local SME companies with long standing experience and know how on space technology
- More than 1000 high level educated personnel
- More than 90% of ESA-Greek cooperation programs run by HASI members
- Permanente open call for new members

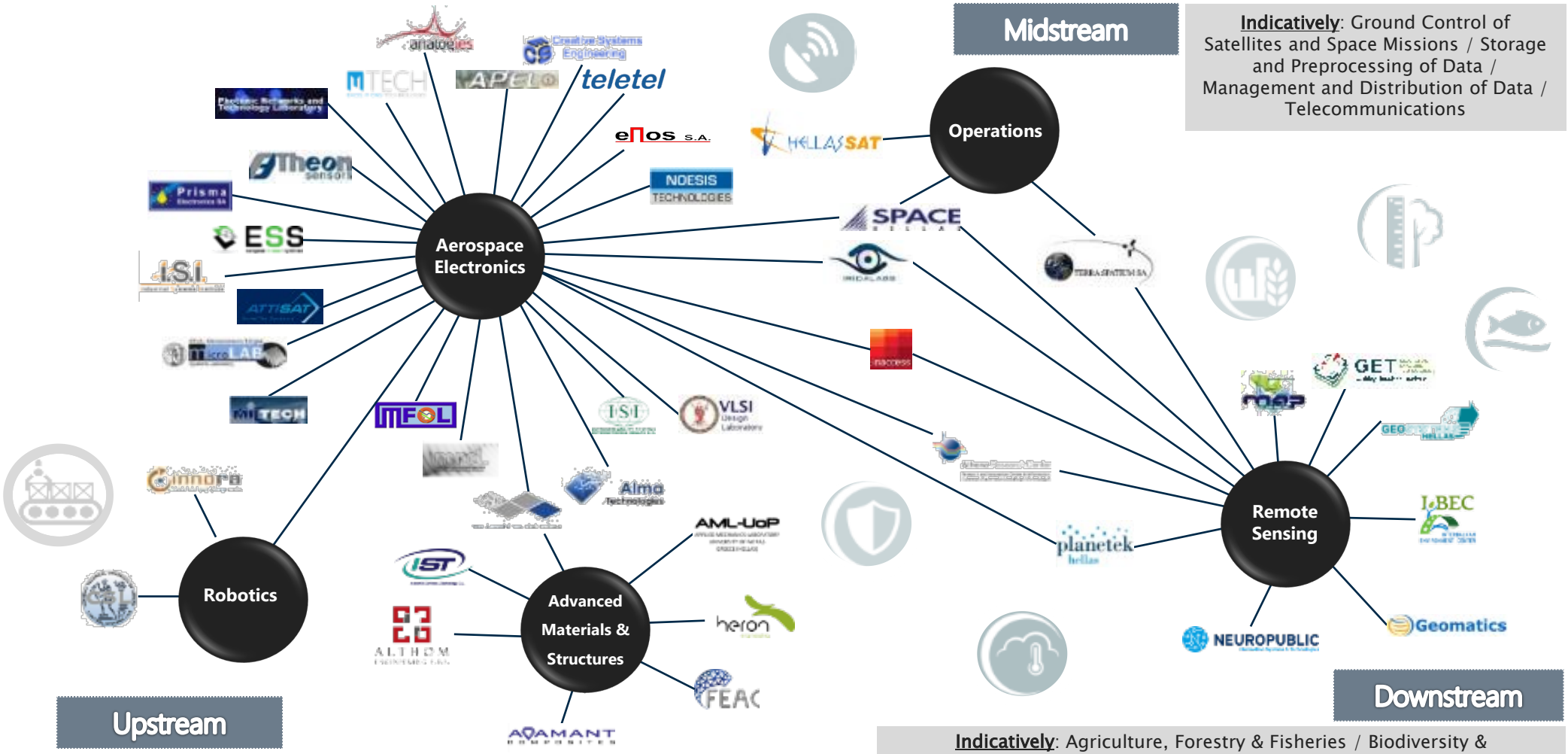
AREAS OF EXPERTISE

- ✓ **ASICS Designs**
  - Analogue and Digital ASICS for aerospace applications
- ✓ **Advanced Structures / Materials & Mechanisms**
  - Sandwich panels, enclosures, struts, fittings, brackets and joints
  - Monitoring systems for Composites Manufacturing
  - Composites Material Engineering Support
  - Nan[illegible]nabled products (prepregs, adhesives, coat[illegible] etc)



- ✓ **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
  - ISVV, Software Validation, Engineering Services
- ✓ **Electric Propulsion Systems**
  - PPU Design, Manufacture, Certification & Testing of EP
- ✓ **Remote Sensing Systems**
  - Synthetic Aperture Radar core Signal Processing
  - Optical, Thermal and Hyperspectral
  - Data FUSION technologies
- ✓ **Sensors**
  - MEMs based sensors for aerospace applications

THEMATIC FOCUS



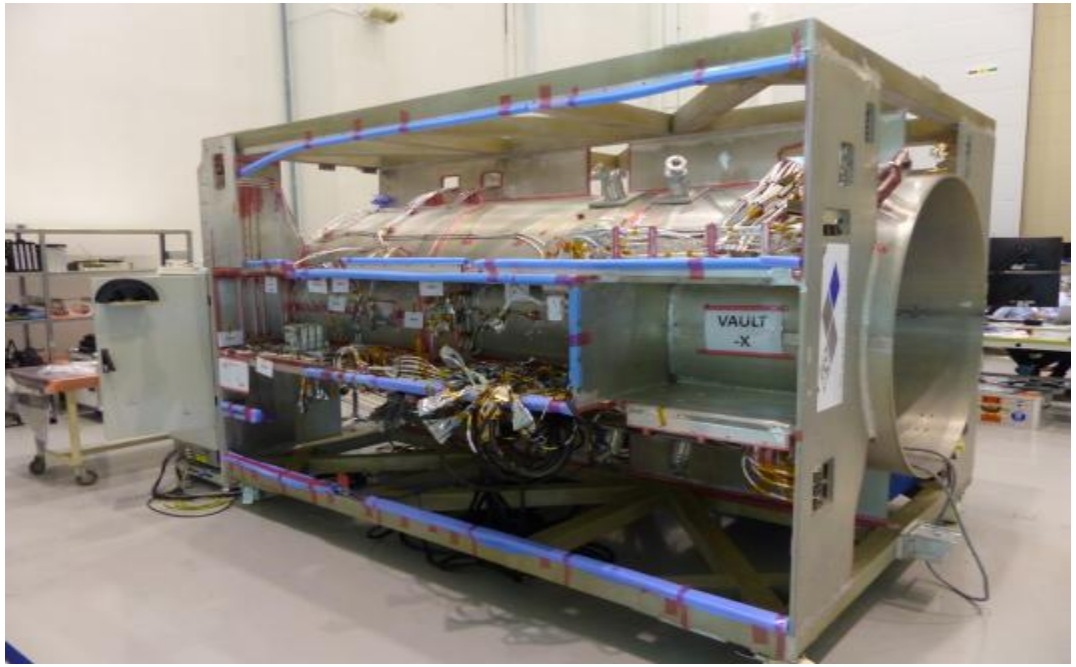
Indicatively: Ground Control of Satellites and Space Missions / Storage and Preprocessing of Data / Management and Distribution of Data / Telecommunications

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

PARTICIPATION TO SPACE MISSIONS

- SOLAR ORBITER – ESA MISSION
- EUCLID – ESA MISSION
- JUICE – ESA MISSION
- PLATO – ESA MISSION
- SENTINEL 1 – ESA MISSION
- SENTINEL 6 – ESA MISSION
- MEPS – ESA R&D PROJECT
- COPERNICUS SENTINEL 10 (Hyperspectral mission)
- EXOMARS ROVER – ESA
- IASI-NG – CNES MISSION
- MICROCARB –CNES MISSION



Alma Technologies

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The Greek Space Technologies and Applications Cluster

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Our Vision

To sustain
a **world class**
cluster on space
technologies
& applications

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59 Committed members + 15 Participants

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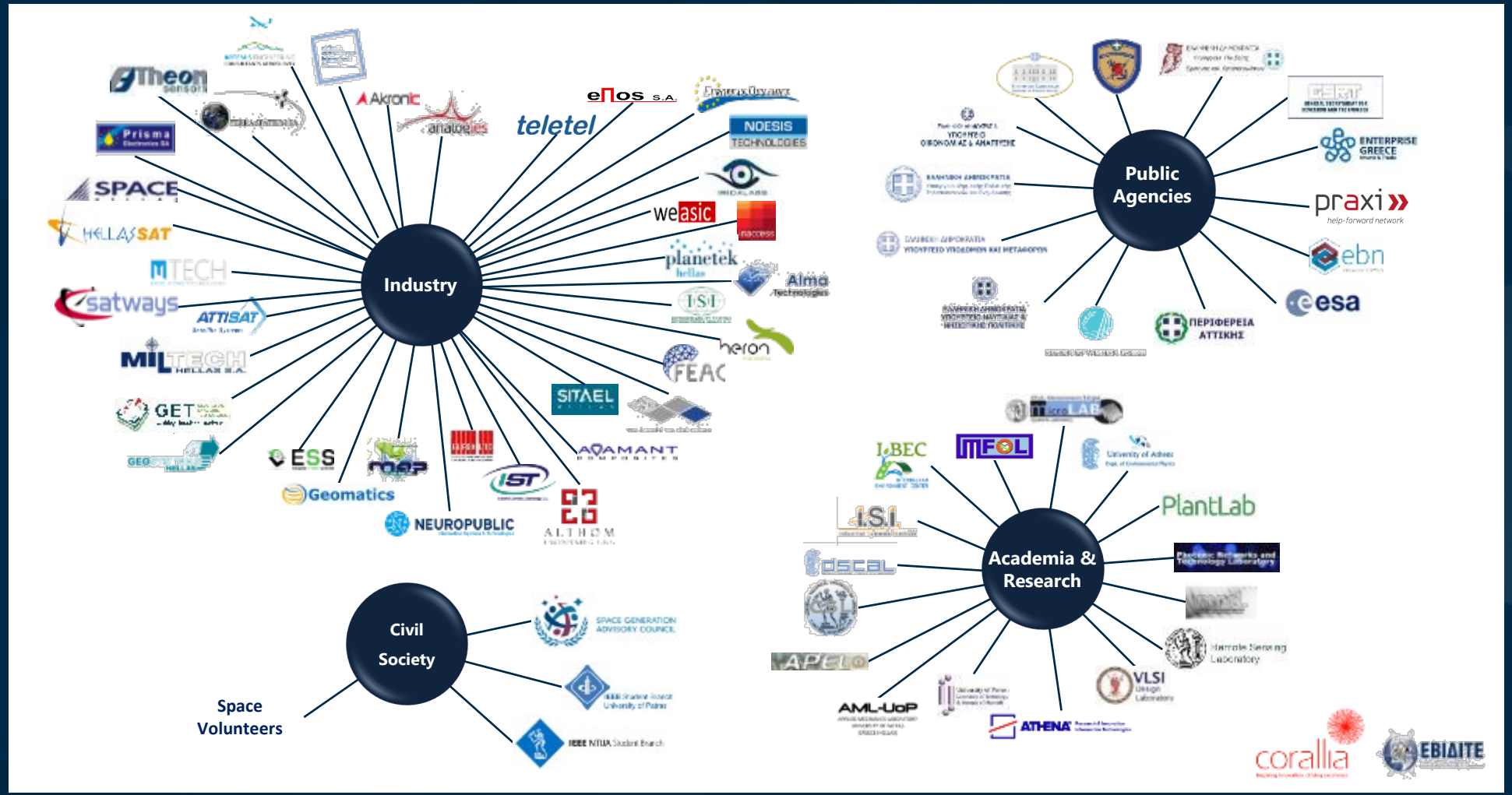
Quadraple Helix



si·cluster
a corallia initiative

Gold Label

GOLD Cluster Management Excellence
PROVEN FOR CLUSTER EXCELLENCE

One of the 3 gold labeled clusters worldwide in the space sector

31 indicators monitored

97% score

Visibility and Passport of the si-Cluster to the world


Report on the results of the

Cluster Organisation Management Excellence Assessment

si-Cluster
The Space Technologies and Applications Cluster
(facilitated by Corallia)

Date of assessment: Dec 15-17, 2015

GOLD Cluster Management Excellence
PROVEN FOR CLUSTER EXCELLENCE

el of the European Cluster Excellence Initiative (ECEI)

SPACE TECHNOLOGIES ON MARITIME

European Space Agency initiated cooperation with Rolls Royce on Maritime

30th of November 2017

"Rolls-Royce and the European Space Agency (ESA) have signed a ground-breaking cooperation agreement aimed at pursuing space activities in support of autonomous, remote controlled shipping and promoting innovation in European digital logistics."

Develop and validate new solutions for:

- **communication between vessel systems and shore based systems** in addition to ship-to-ship communication.
- **The next generation of 5G communications** will rely on seamless integration of telecom networks and services, and ESA's Satellite for 5G Initiative exists to support the technical and supply chain progress required

30 November 2017

Rolls-Royce and the European Space Agency to collaborate on shipping's digital future

More about: Press release › Marine › Ship Intelligence › Digital › Global ›

Rolls-Royce and the European Space Agency (ESA) have signed a ground-breaking cooperation agreement aimed at pursuing space activities in support of autonomous, remote controlled shipping and promoting innovation in European digital logistics.

The Memorandum of Intent (MOI) forms part of ESA's wider strategy. Jan Wörner, ESA's Director General stated that, "ESA has a long history of working internationally with our partners across Europe. This agreement is another demonstration of the positive application of Space 4.0 and the desire for a United Space in Europe; maximising the integration of space into our economy and society."

Karno Tenovuo, Rolls-Royce, SVP Ship Intelligence, said: "The space industry has been operating assets remotely for many decades. The information, software and satellite based

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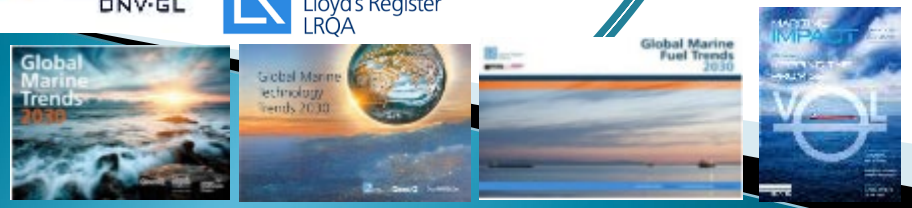
SPACE TECHNOLOGIES ON MARITIME

Internal Technological Developments

- Shipbuilding
- Propulsion & Powering
- Smart Ship

External Technological Developments

- Advanced Materials
- Big data Analytics
- Robotics
- Sensors
- Communications



SPACE TECHNOLOGIES ON MARITIME

External Technological Developments

- Advanced Materials
- Big data Analytics
- Robotics
- Sensors
- Communications

HSA

ΕΛΔΟ

HEMEXPO
HELLENIC MARINE EQUIPMENT MANUFACTURERS & EXPORTERS

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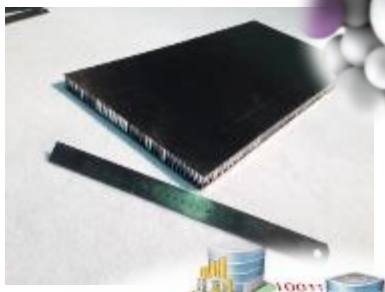
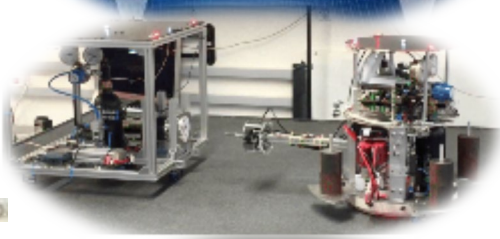
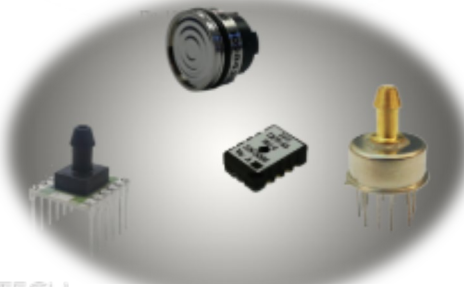






SPACE TECHNOLOGIES ON MARITIME

AIRBUS

Commercial Aircraft | Helicopters | Defence | Space | Company | Newsroom

Airbus Home › Newsroom › Airbus' Skyways Drone Trials World's First Shore-To-Ship Deliveries

Innovation

Airbus' Skyways drone trials world's first shore-to-ship deliveries

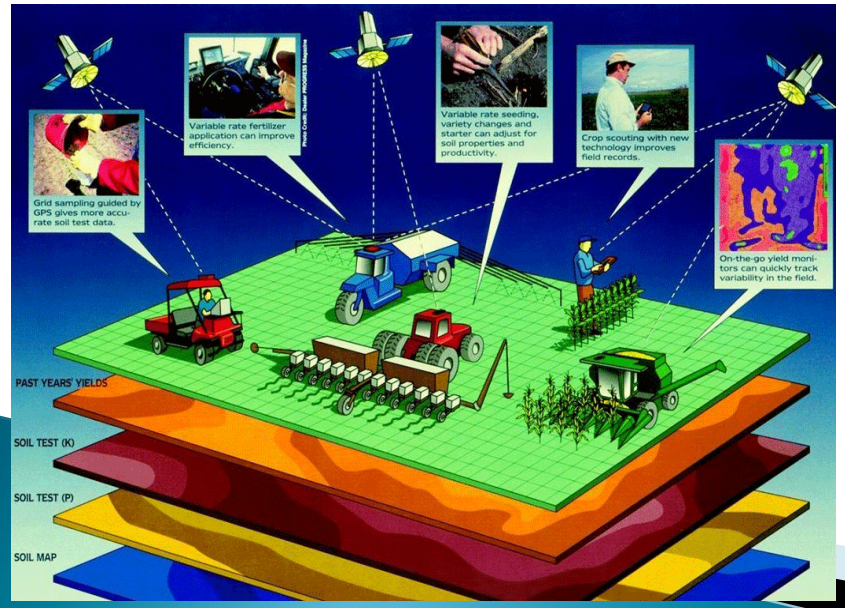
15 March 2019

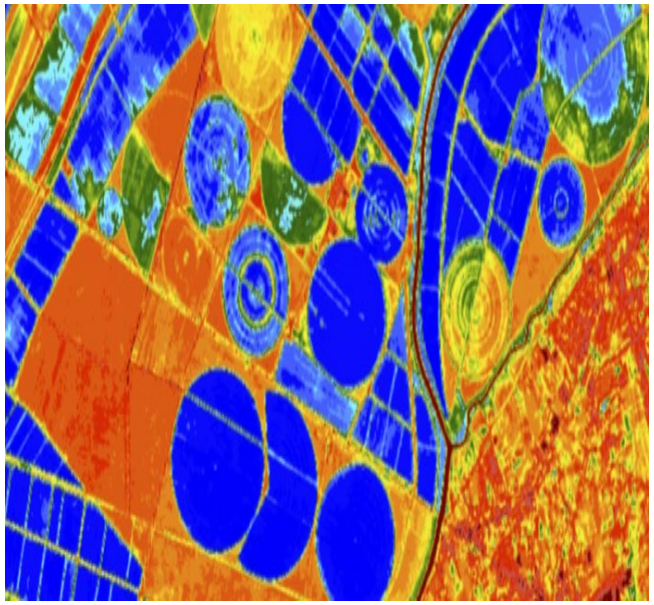
EN

SPACE TECHNOLOGIES ON PRECISION AGRICULTURE

Agriculture forms the basis of the world's food supply. Soil conditions, water availability, weather extremes and climate change can represent costly challenges both to farmers and the overall food security of populations

Through the integration of satellite data and data collected on the ground at local level we can improve crop production by optimizing the use of water and fertilizers, predict the extent of crops, and orient development policies towards sustainable forestry practices.





Satellite Navigation Technology

- **Personal location devices (smartphones, watches, tablets, and others)**
  reduce liability and payment related to positioning and timing (like parking, last-mile delivery, vehicle sharing, emergency response, etc).

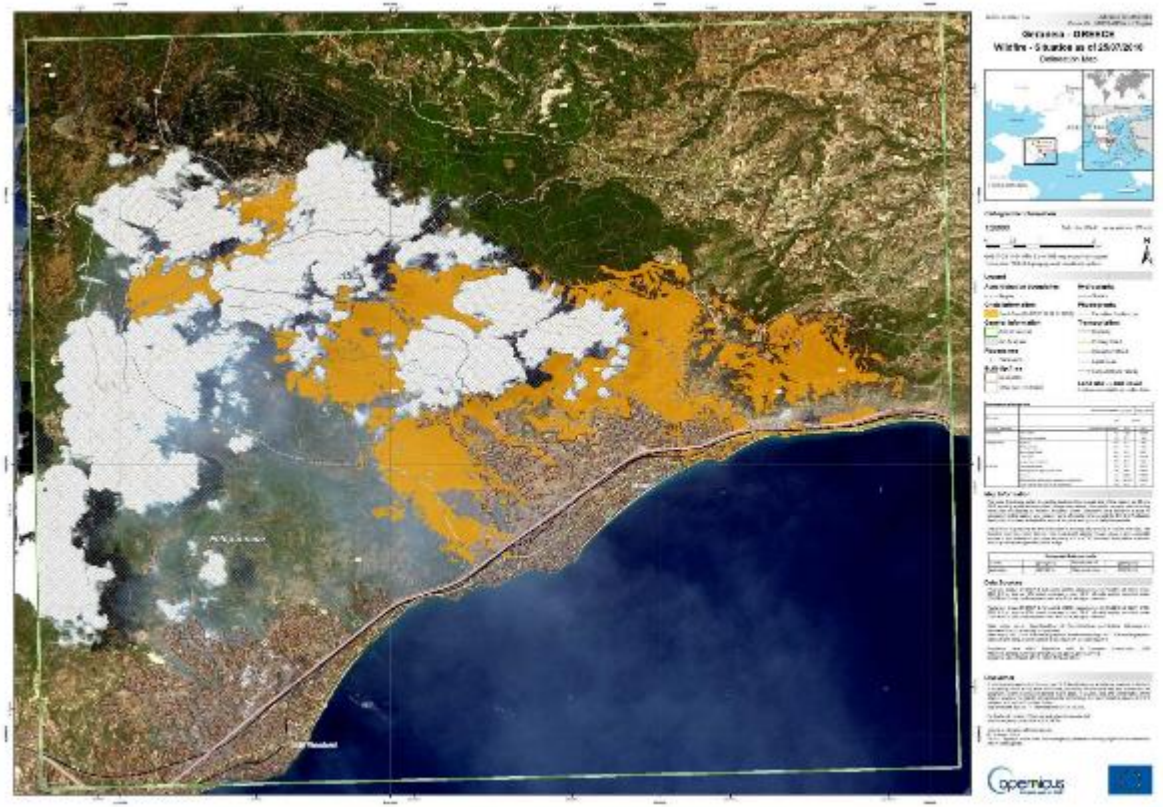
- **Autonomous Driving**
  Satellite positioning is the fundamental technology for providing absolute positioning globally and accurate timing information for all levels of conditional, high and full automation

- **Mobility as a service**
  Mobility as a Service (MaaS) accessed by citizens through mobile apps aggregate different transport modes and are increasingly commonplace in urban life.

SPACE TECHNOLOGIES ON EMERGENCY SERVICES

- Space technologies can measure and forecast the effects of unforeseen disasters that can put in danger both the environment and the population

- In all phases of crisis management, satellite-derived information plays an essential role as a synoptic, independent and objective source.



Greece Space Investment 5.0 Plan

➢ Five Main Investment Programs – Initiatives

1. Increase Participation to ESA programs (2019)
2. Initiate National Microsatellites Program (2019)
3. Inaugurate first ESA BIC in Greece (2019)
4. Inaugurate Space for Maritime future Technologies Innovation Cluster
5. Initiate National High Resolution Persistent EO Satellite Based System