



Progetto Jean Monnet

"EU Space Policy, International Law, and Sustainability" (EUSPIL)

# European Space Cooperation: EU and ESA

## **SPEAKER**

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14 March 2025 | 9:00-14:00

Room C2, Polo Piagge

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# The Laws applicable to Outer Space

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Dr. Marco Ferrazzani  
Director of internal services – European Space Agency

Pisa - 21 Marzo 2025 -

# The Laws applicable to Outer Space

- 
1. Evolution of space activities
  2. International space law
  3. National Space Legislation
  4. Institutional and policy frameworks for space in Europe

# New trends in international governance

## Evolutions of space activities

### Quo vadis ?

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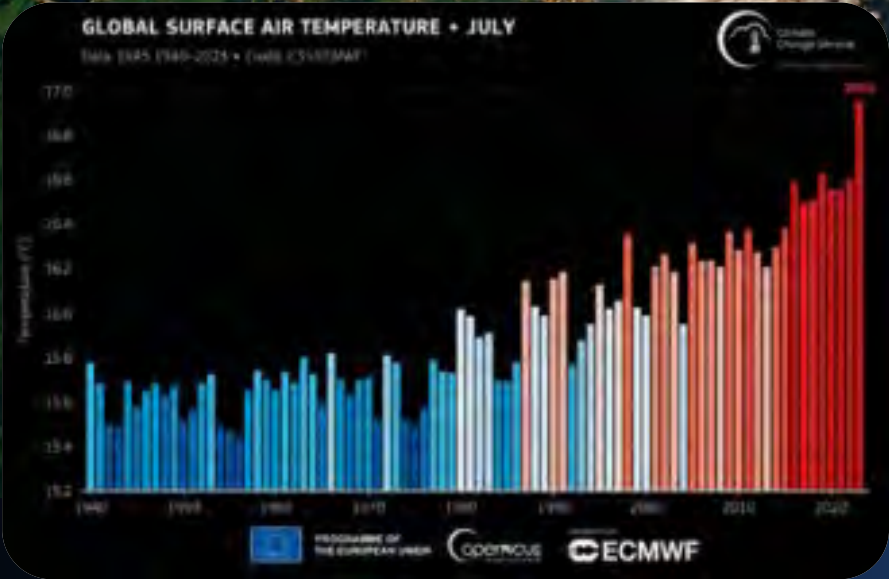
## European and global challenges

Europe and the world are facing unprecedented societal challenges; climate change, a shifting geo-political balance and war endanger our existence and will define the world for decades ahead.

Climate change indicators continue to worsen, spurring a higher frequency of extreme weather events, which have dramatic knock-on effects for the economy and society.

The number of violent conflicts is the highest since the Second World War, with one-quarter of humanity – more than 2 billion people – living in conflict areas or in their direct vicinity.

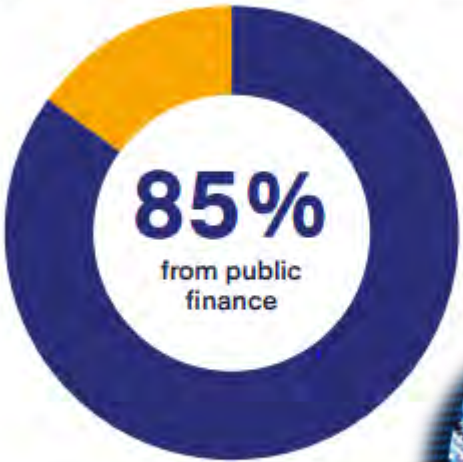
Reaching NetZero targets by 2050 and establishing peaceful cooperation and multilateralism, in a new multi-polar world, are prerequisites for prosperity and a positive future for generations to come.



# (Geo)political challenges: Europe



Space investments are dominated by public budgets, particularly defence



Close to 50% of that originating from defence budgets

Source: EuroConsult, Space Capital



Europe's Decline in the Distribution of Global Wealth

2020

2010

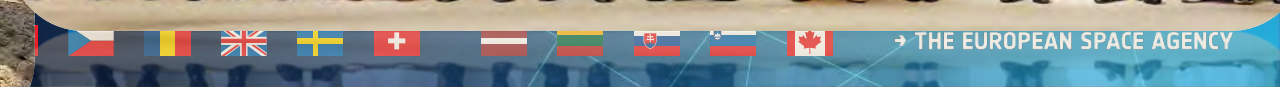


Credit: Allianz Global Wealth Report 2021

EU Parliament study:  
[https://www.europarl.europa.eu/RegData/etudes/IDAN/2024/757592/EPRS\\_IDA%282024%29757592\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2024/757592/EPRS_IDA%282024%29757592_EN.pdf)



# (Geo)political challenges: Worldwide





# Rudolf Kjellén

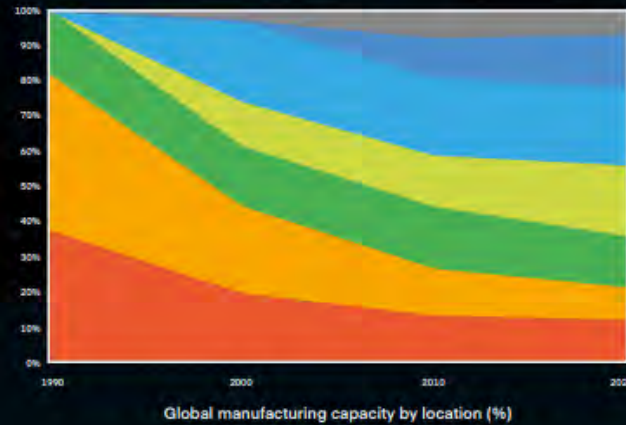
## Nov 18 2024 2:49 pm EST

# Future challenges: space sector and beyond

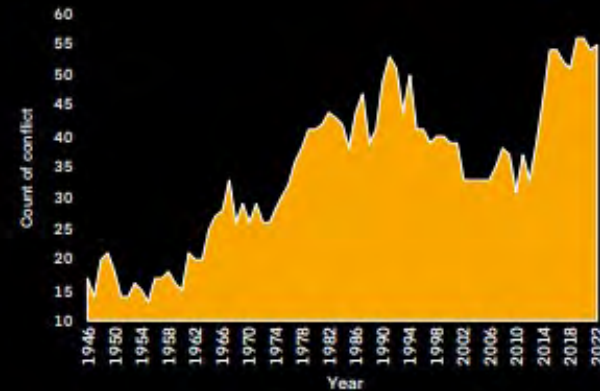


While in 1990, Europe was home to almost half of the global chip manufacturing, its share fell to below 10% by 2020.

Europe missed the opportunity to develop market and industry capability in one of the key enablers of the future economies. This has resulted in a supply chain crisis, affecting other key industries, such as automotive. Decades without a clear European policy vision and inaction can be measured in trillions of Euros. Europe missed out on this essential component for autonomous production and development during the digital revolution.



## Highest number of active conflicts worldwide



Source: Uppsala Conflict Data Program

## Uncertain European economy

Europeans have become deeply pessimistic about their economic prospects, with 84% worried about job loss and only 20% of families expecting to be better off in 5 years.

nature

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BOOK REVIEW | 08 May 2023

## Ethics in outer space: can we make interplanetary exploration just?

The prospect of settling the Moon, Mars and elsewhere requires urgent conversations about issues such as labour and reproductive rights far from Earth.

Alexandra Witze



CASSINI  
Challenges

INSIGHTS

POLICY FORUM

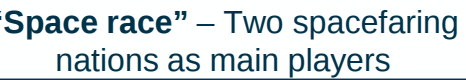


SPACEFLIGHT

## Ethically cleared to launch?

Rules are needed for human research in commercial spaceflight

By Yasuhiro Hiraizumi, Jennifer Fogarty, Timothy C. Caldwell, Serena A. N. Chantrelle, Pascal Bonny, Jessica Candia, I. Glenn Cohen



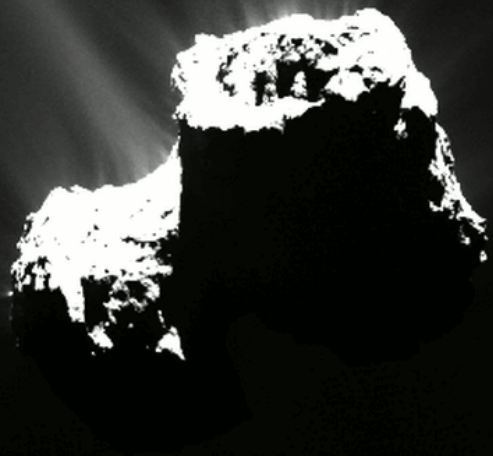
# Europe is back!

However, this is a crucial time.

# Europe must continue to lead in space.

**We cannot allow aggressive authoritarian regimes to dominate.**

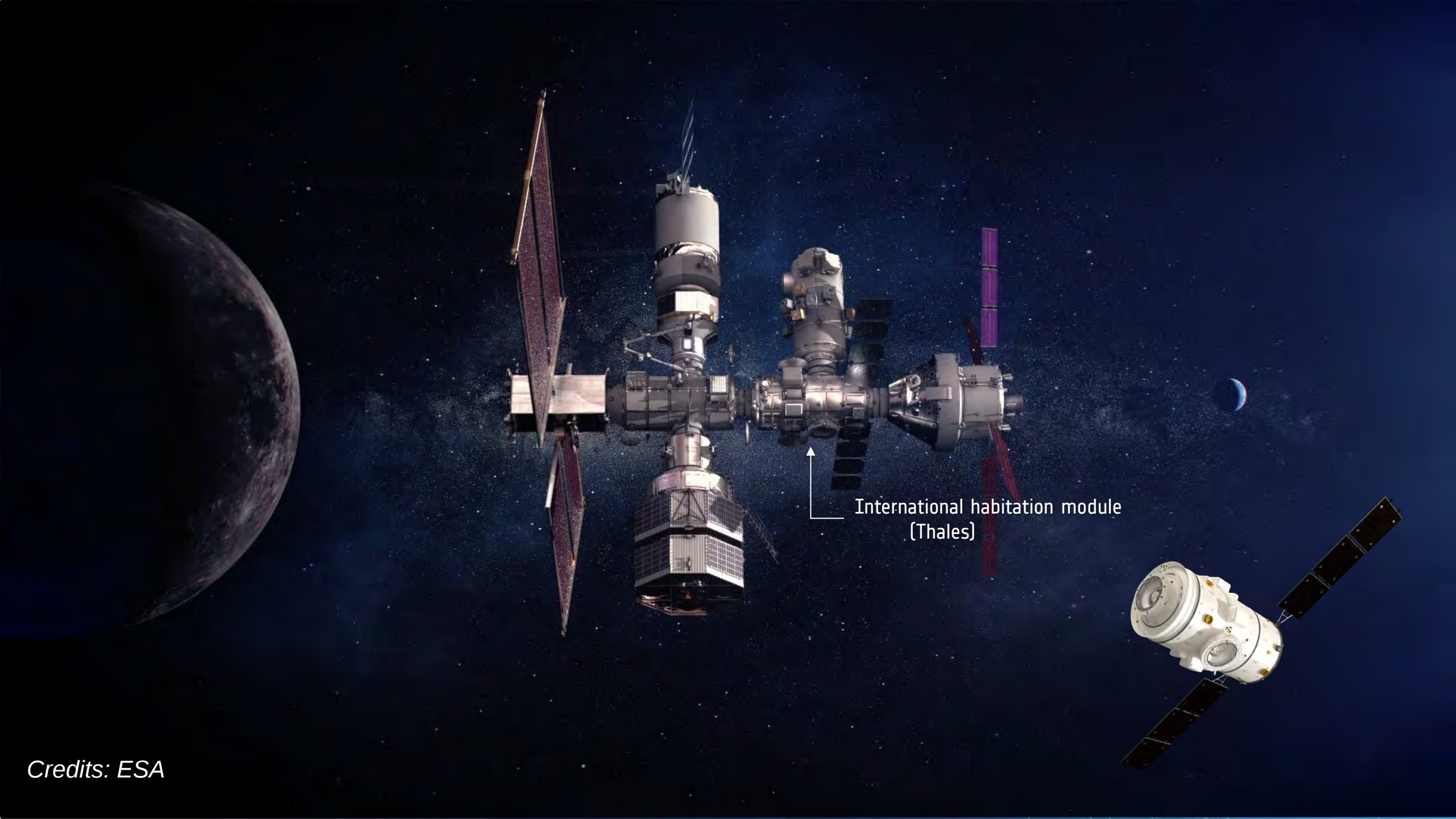
For space to benefit humanity, Europe must remain a prominent space power.



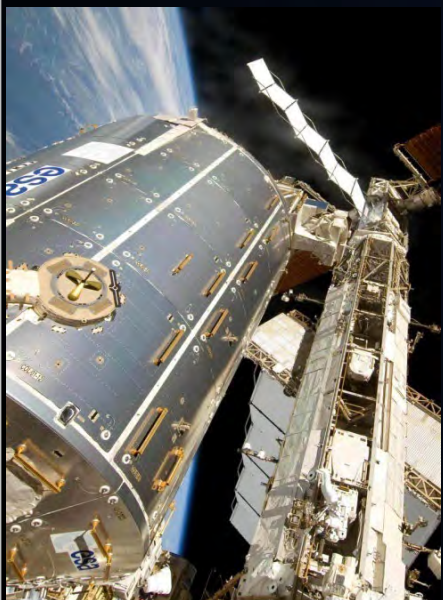


Credits: ESA





International habitation module  
(Thales)

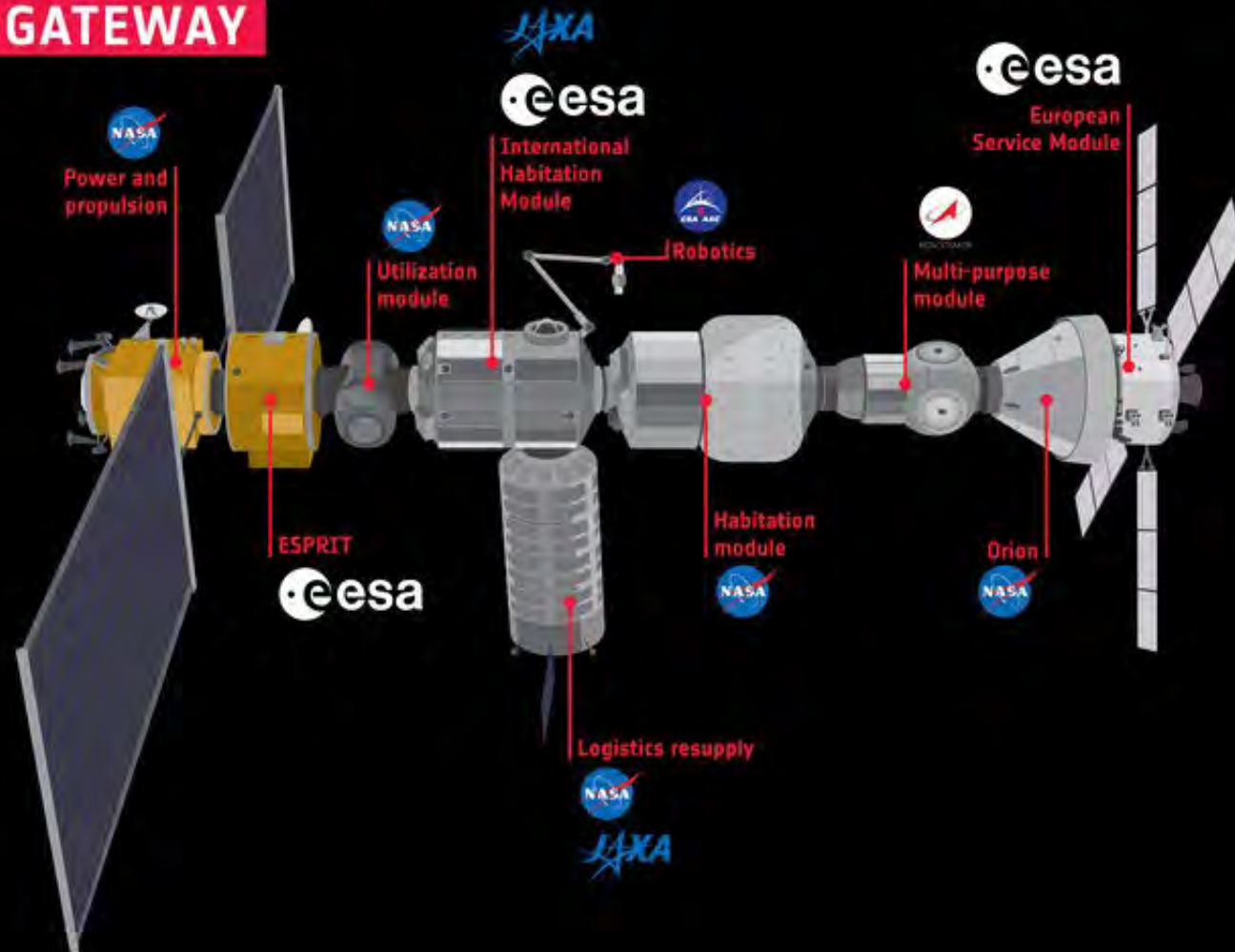


# 4 ISS Partners

44



## → LUNAR GATEWAY



#ExploreFarther

Space19

# GATEWAY LUNAR SPACE STATION CONFIGURATION



**INTERNATIONAL HABITAT (I-HAB):** Additional crew living quarters that will house life support systems and camera equipment that will enhance Gateway's capabilities for scientific research. Provided by the European Space Agency and the Japan Aerospace Exploration Agency.

**CANADARM3:** Next-generation robotic arm provided by the Canadian Space Agency that will move end over end to different locations on the space station. It will be used to install science experiment, assist astronauts on spacewalks and perform external surveys.

**ORION:** Crewed spacecraft that will carry Artemis astronauts from Earth to Gateway and back. Orion will also deliver the I-HAB to lunar orbit to dock with HALO as part of the larger Gateway configuration. Orion will also deliver ERM and airlock.

**HABITATION AND LOGISTICS OUTPOST (HALO):** Initial crew living quarters with pressurized volume that includes life support systems and environmental control; fire detection and suppression; water storage and distribution; and a high-rate lunar communications system provided by the European Space Agency.

**POWER AND PROPULSION ELEMENT (PPE):** Home of Gateway's power; communications; altitude control; and orbital control and transfer capabilities. Roll-Out Solar Arrays will generate 60 kW of electrical power, making it the most powerful electric propulsion spacecraft ever flown.

**ESPRIT REFUELING MODULE (ERM):** ESA-provided habitable space that includes fuel tanks to refuel PPE, cargo space, and large windows that will allow Artemis astronauts to capture stunning images from lunar orbit.

**LOGISTICS MODULE (LM):** Cargo module that will deliver supplies, as well as internal and external science experiments, prior to crew arrival. It will also serve as additional space for science.

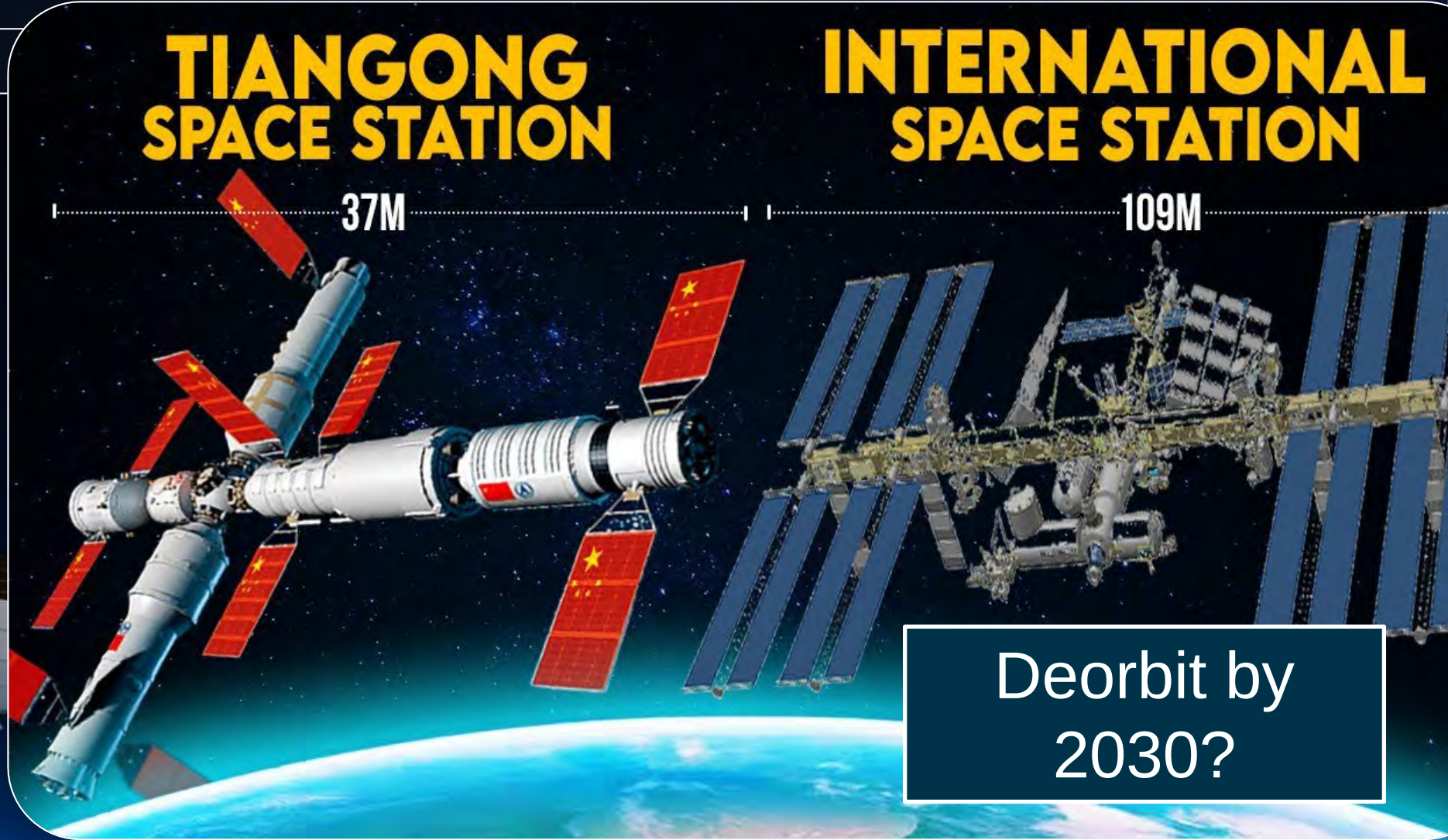
**AIRLOCK (GOVERNMENT REFERENCE):** Access point between Gateway's pressurized cabin and the vacuum outside. The government reference airlock will enable spacewalks and allow hardware and science experiments to be transferred outside. It could also be used as an additional docking port.



# Future: LEO exploration



Ready by  
2030?



Deorbit by  
2030?

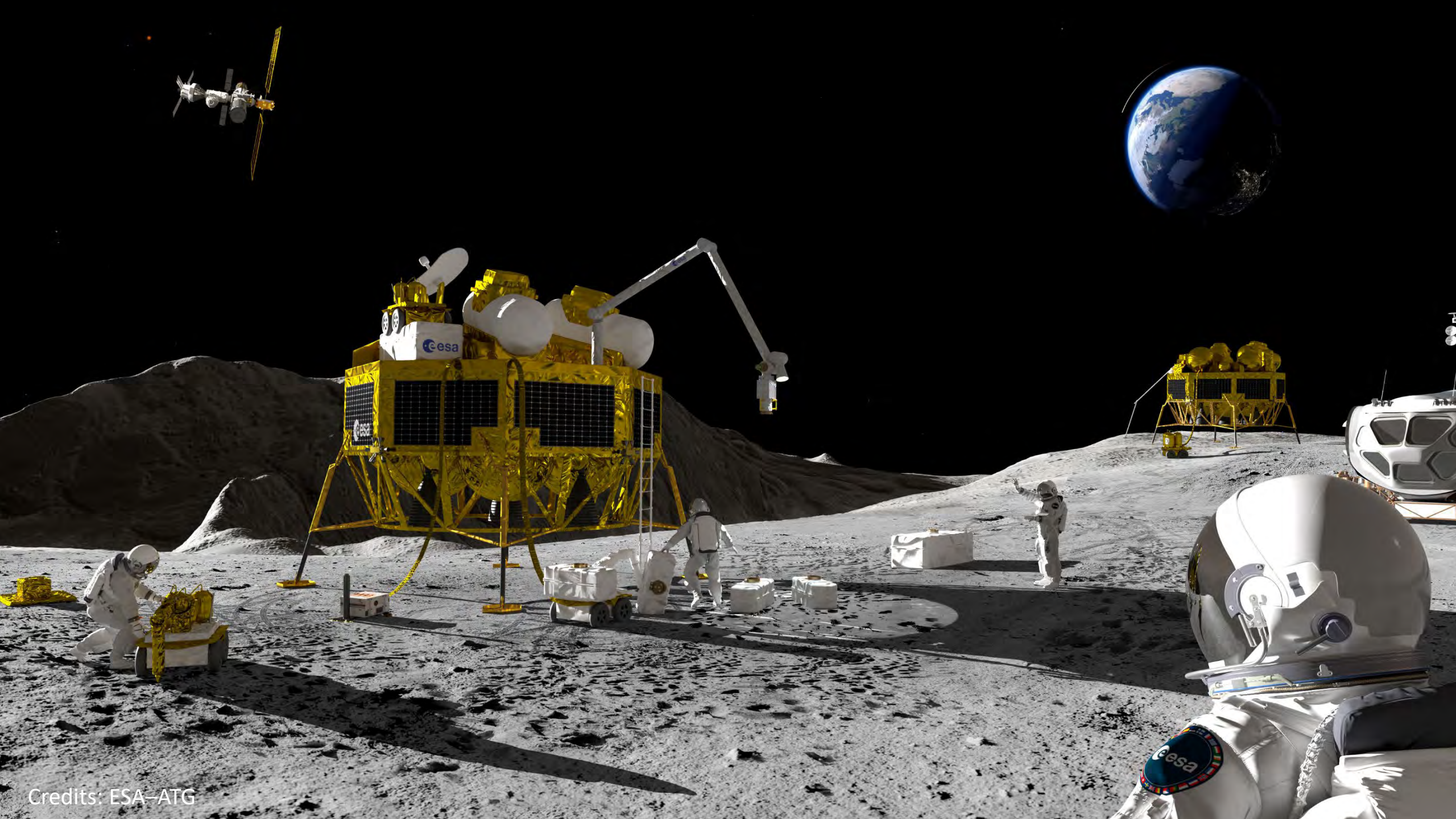


- Deployment of a telescope – 300x wider than Hubble

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## → THE EUROPEAN SPACE AGENCY



Ready to go

The Moon rocket



# Future of international cooperation



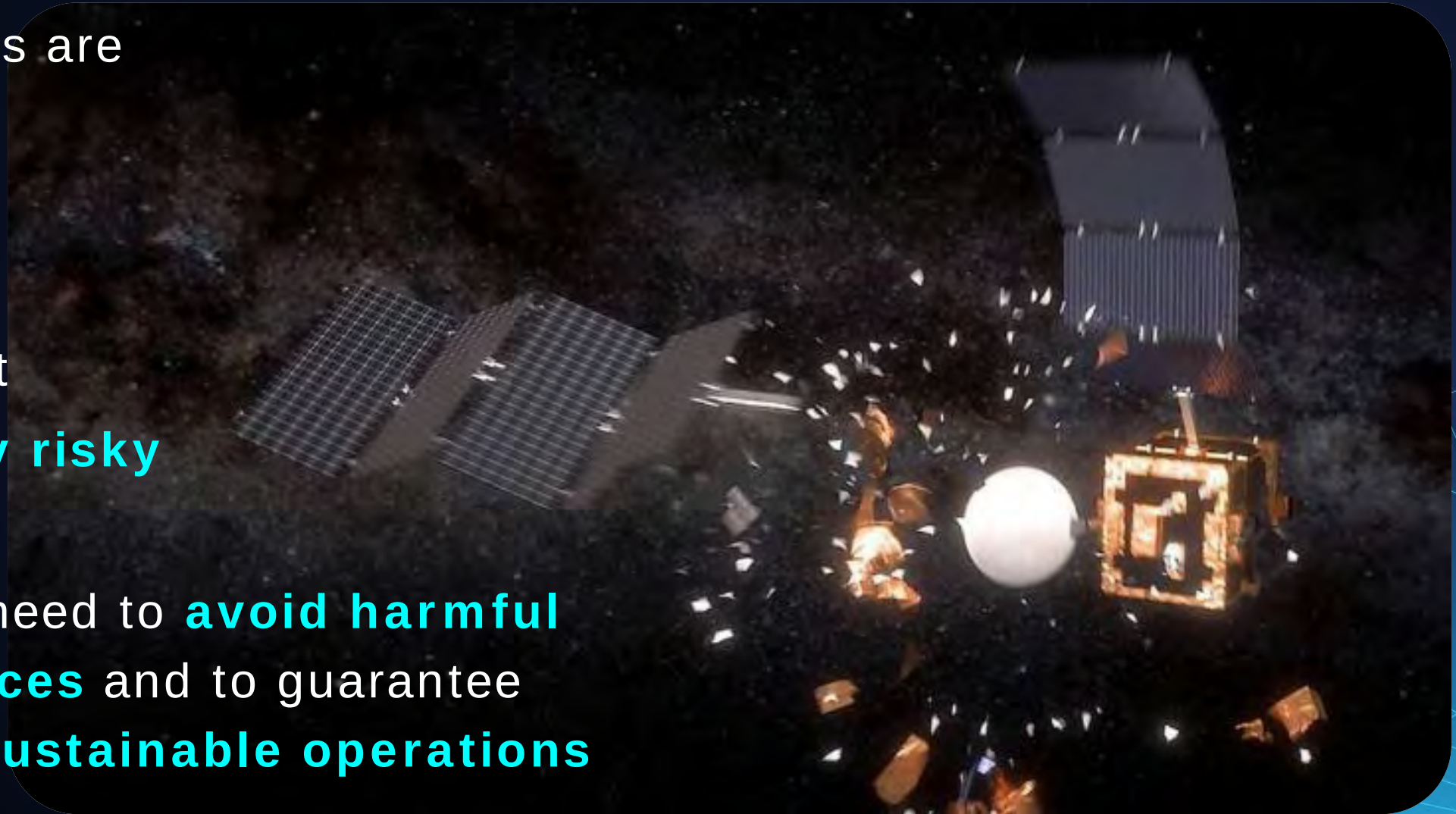
- Geopolitical circumstances and political involvement of many actors in space increase complexity of international cooperation
  - Political statement to cooperate with certain countries/organisations
- International cooperation as the essence of outer space activities
  - Committee on the Peaceful Uses of Outer Space (COPUOS)
  - Involvement of International Telecommunications Union
- Space as a key element for the Summit of the Future 2024
  - Increased regional cooperation





# Spaceflight: not only a technical challenge

- Space activities are
  - Complex
  - Expensive
  - Numerous
  - Out of sight
  - **Inherently risky**
- There is a need to **avoid harmful interferences** and to guarantee **safe and sustainable operations**

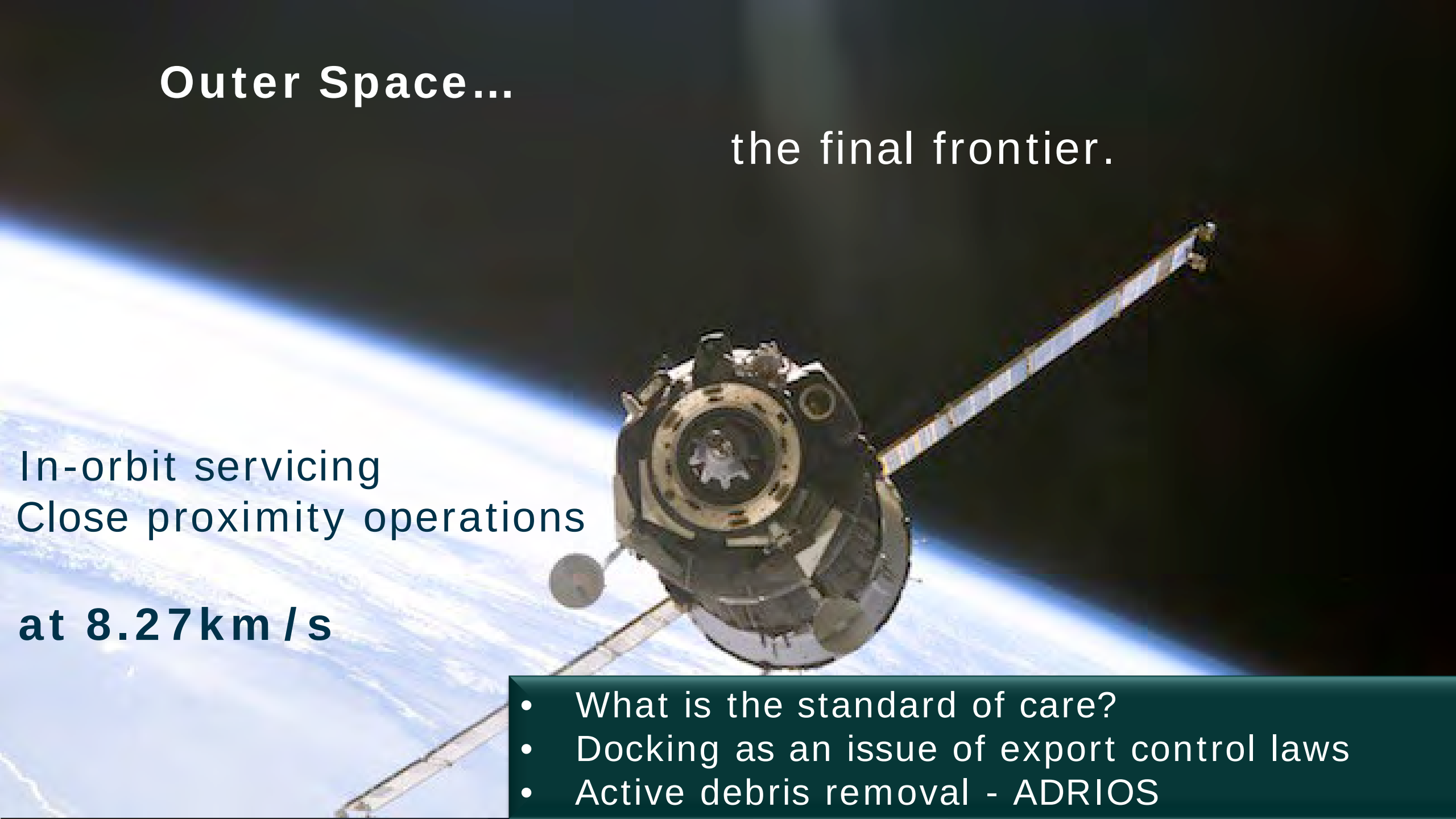


# Outer Space...

the final frontier.

In-orbit servicing  
Close proximity operations

at 8.27km / s

- 
- A satellite with a large central body and two long, thin solar panel arrays is shown in orbit above the Earth's blue and white atmosphere. The satellite is oriented towards the viewer, showing its complex structure and various instruments.
- What is the standard of care?
  - Docking as an issue of export control laws
  - Active debris removal - ADRIOS



382  $\longrightarrow$  1,704

75%  
revenues to  
come from govt.

**13 B€** in 2021 **+95%** since 2020

93 B€  $\longrightarrow$  113 B€

IN ORBIT SERVICING,  
MANUFACTURING, ASSEMBLY



# INVESTOR Partnerships



EUROPEAN COMMISSION  
& EUSPA & EIC

EUROPEAN INVESTMENT  
FUND & EUROPEAN  
INVESTMENT BANK

**ACCELERATORS**

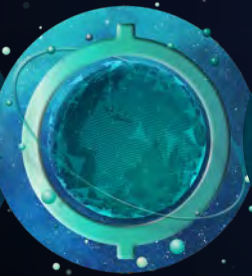
Space founders, Seraphim,  
Starburst, TakeOff!, CDL Space

**INVESTORS**

Venture Capital, Private Equity,  
Institutional investors; ...

**31** MEMBERS OF THE  
ESA INVESTOR NETWORK

**250+** LARGE  
INVESTMENT COMMUNITY



# Recap: The (st)ages of space law making

1930s - 1950s

1960s - 1970s  
Competition

1980s - 2000s  
Cooperation

2000s – 2020s  
Participation



Dawn of  
Space Law

Era of  
UN Treaties

Era of  
Principles

Era of  
Guidelines

Era of  
National  
Space Laws

Legally  
binding

Non-legally  
binding

Legally  
binding

# Space activities: regulatory layers

## International law

UN-Charter

**UN Space Treaties**

ITU Convention and Constitution

Cooperation agreements

Non-proliferation / test ban Treaties

*... and many more*

## National law

Constitutional law

Administrative law

**National Space Law**  
(etc.)

**Technical regulations**

Implementation mechanism



## Soft (non-) law

Technical standards

UN Principles

Space Debris Mitigation Guidelines

Long-Term Sustainability Guidelines

*etc.*

# Questions?

# The Laws applicable to Outer Space

## Why International law

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# Outer space is not a place without law

## International law

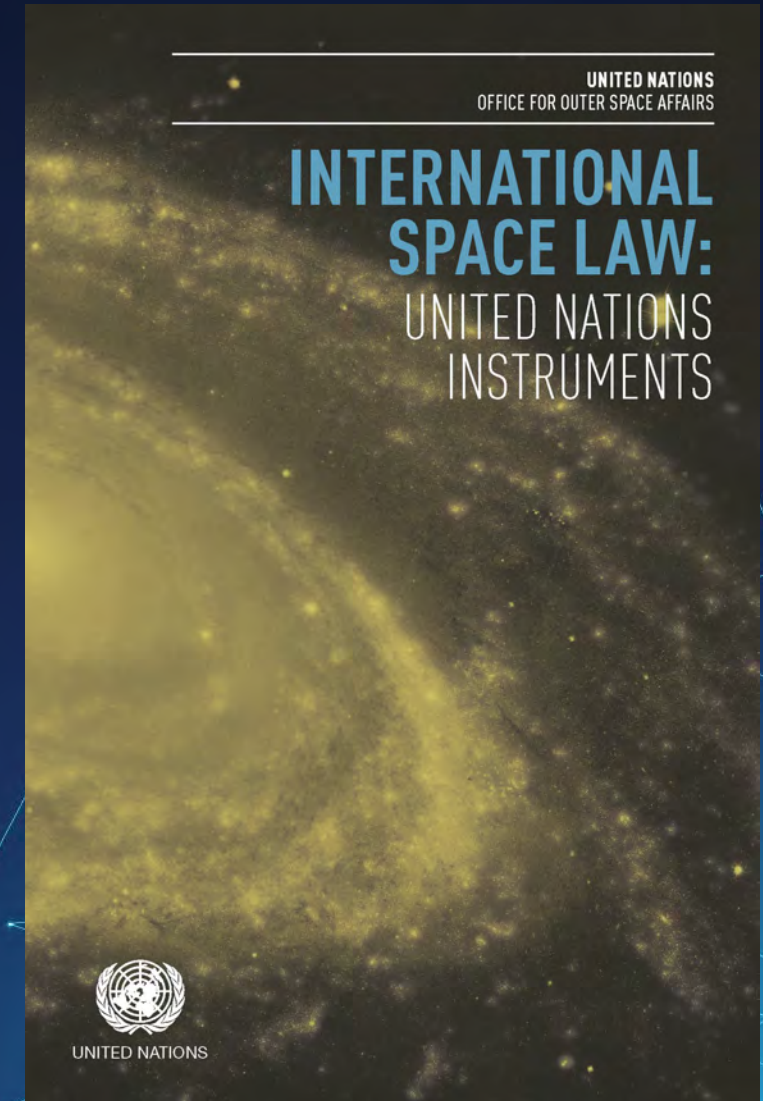
### ICJ Statute

Article 38 1. *The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply:*

- a. international conventions, whether general or particular, establishing rules expressly recognized by the contesting states ;*
- b. international custom, as evidence of a general practice accepted as law;*
- c. the general principles of law recognized by civilized nations ;*
- d. subject to the provisions of Article 59, judicial decisions and the **teachings** of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law.*

## Domestic Law

- 5 UN Treaties on Outer Space Activities
- **Outer Space Treaty 1967**
  - The “Magna Charta” of space law
  - 113 State Parties (as of 2023)
- **Rescue and Return Agreement 1968**
- **Liability Convention 1972**
- **Registration Convention 1976**
- **Moon Agreement 1984**
- = binding international law
  - Article 38 ICJ Statute



# The magna Charta of Space Law

The 1963 UN GA Resolution turned into a Treaty

Elaboration of the treaty.

UN COPUOS (consensus)

UN General Assembly ore Principles

Text adopted and open to signature and ratification



- **Substitute** for treaty law
- **Complimentary** to legally binding instruments
- Addressing **various political views**
- Addressing **current issues** and possible solutions, also in connection with technical standards (LTS Guidelines, Space Debris Mitigation)
- Adoption into national law = binding on national level
- Emergence of customary international law?

# Outer Space Treaty – Core principles – Article I



Freedom of exploration and use

No discrimination of any kind

For the benefit of all countries

# Outer Space Treaty – Core principles

## Freedom of scientific investigation



States should facilitate this through  
cooperation mechanisms

# Outer Space Treaty – Core principles



Outer space = **province of humankind**



**All humankind – all countries?**

Irrespective the degree of **economic**  
or **scientific** development



## Non-appropriation principle



No occupation

No claims of sovereignty

Or any other means

## II Non Appropriation.

A necessary consequence of freedom of use.

The current interpretation by some: distinction between claim of sovereignty and claim on resources.

Resources cannot be distinguished from sovereign rights

Assimilation with living resources in the high sea cannot be used as fishes reproduce

Mineral resources are expressly considered as Common by the Montego Bay Convention.

# Outer Space Treaty – Article III

Activities in outer space shall be carried out in accordance with **international law**

including the UN Charter

in the interest of maintaining international peace and security



# Outer Space Treaty – Article IV

States shall **not** place in **orbit** space objects carrying

- **nuclear** weapons
- other weapons of mass destruction (**WMD**)

States shall **not** install such weapons on celestial bodies

The Moon and other celestial bodies shall be used **exclusively for peaceful purposes.**

- No military bases, testing of weapons, military manoeuvres

...

## IV Military activities in Outer space

General rules of International Law including UN Charter apply

Special rules: article IV OST

Distinction between space around the earth and celestial bodies and space around them

Around the earth the rules are weak and insufficient.

Only interdiction of weapons of mass destruction N B C in orbit.

On celestial bodies the rule is more strict : no military activities.

# Outer Space Treaty – Core principles



Astronauts are the envoys of  
humankind

States should render **all**  
**possible assistance** in  
cases of **distress**,  
**emergency** or **accident**

## Article V

- Astronauts shall be regarded as « envoy of humankind »
- In case of an emergency landing astronauts must be “safely and promptly returned to the State of registry of the space vehicle.
- Assistance
- Information to other States

# Outer Space Treaty – Core principles



Who **pays** in cases of  
**damage** and on-ground  
**casualties**?

**Responsibility and liability**

Regardless if  
the activities are carried out  
governmental agencies  
or  
non-governmental entities



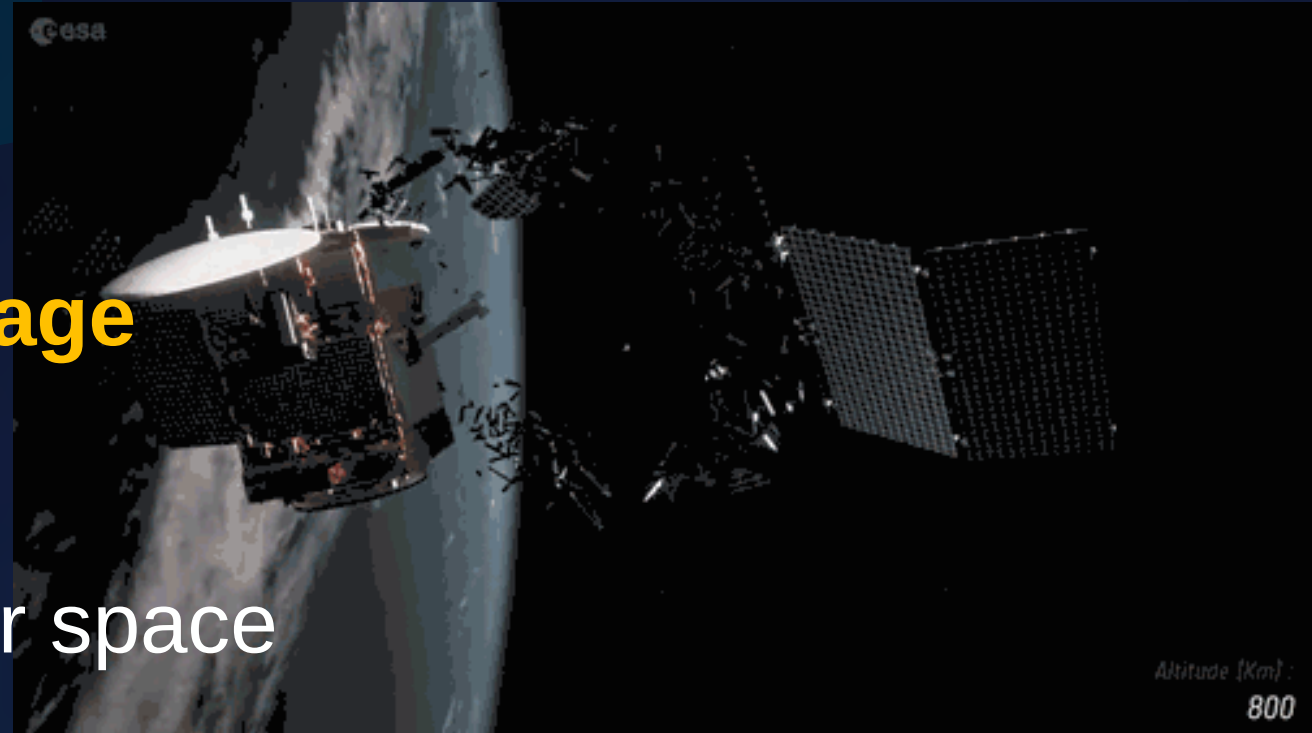
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# Outer Space Treaty – Article VII

Each state that launches or procures a launch, or from whose territory or facility an object is launched

is internationally **liable** for **damage**  
to other State parties

on Earth, in outer space or in air space



→ **Liability Convention**

# “Appropriate” state?

The activities of non-governmental entities require **authorisation** and **continuing supervision** of the **appropriate** State party.

Launching state?

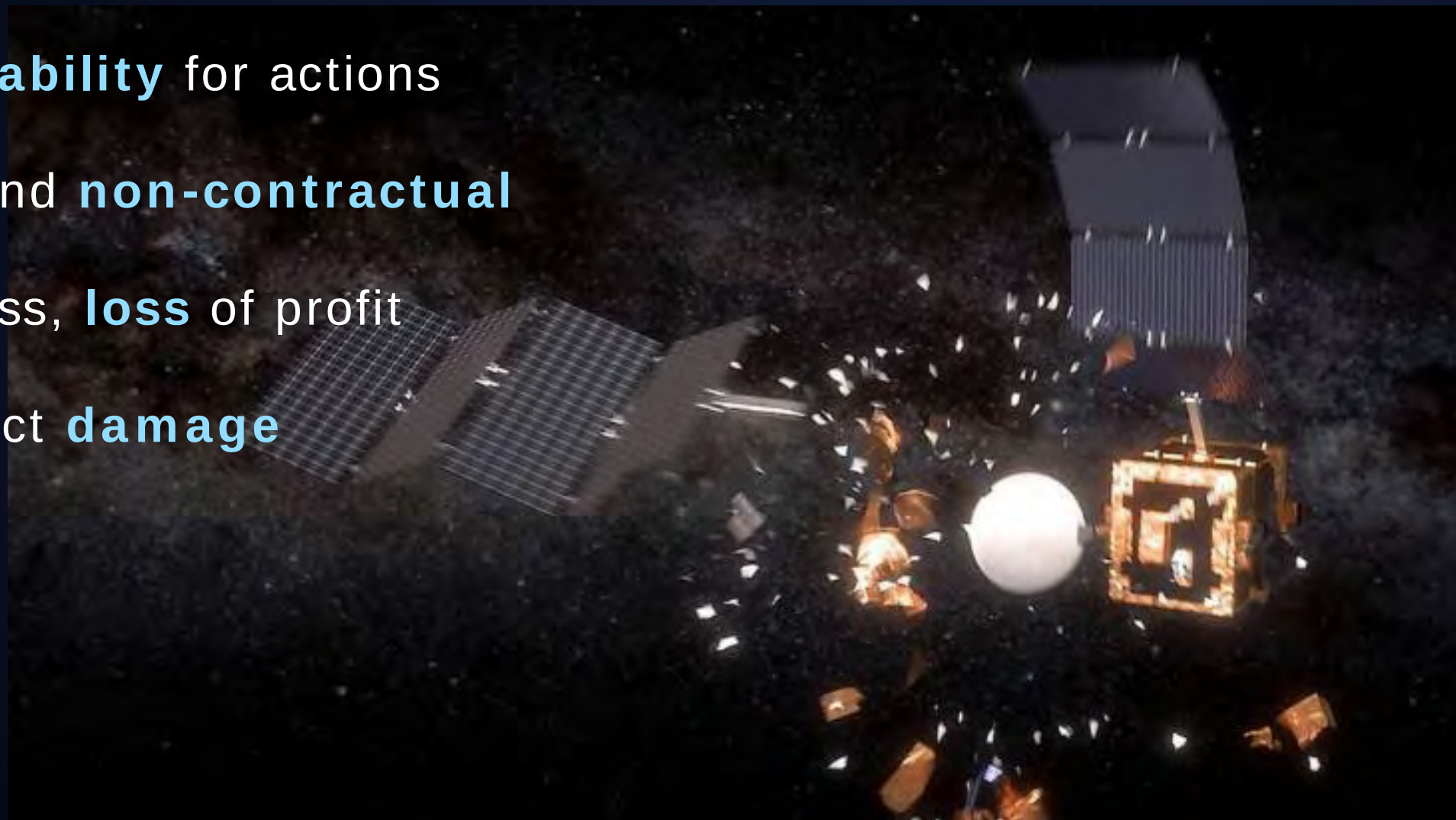
A state that **launches** or **procures** a launch, or from whose **territory** or **facility** an object is launched

State of registry?

→ Article VIII Outer Space Treaty, Registration Convention...

# What is liability?

- Legal **accountability** for actions
- **Contractual** and **non-contractual**
- **Loss** of business, **loss** of profit
- Direct or indirect **damage**



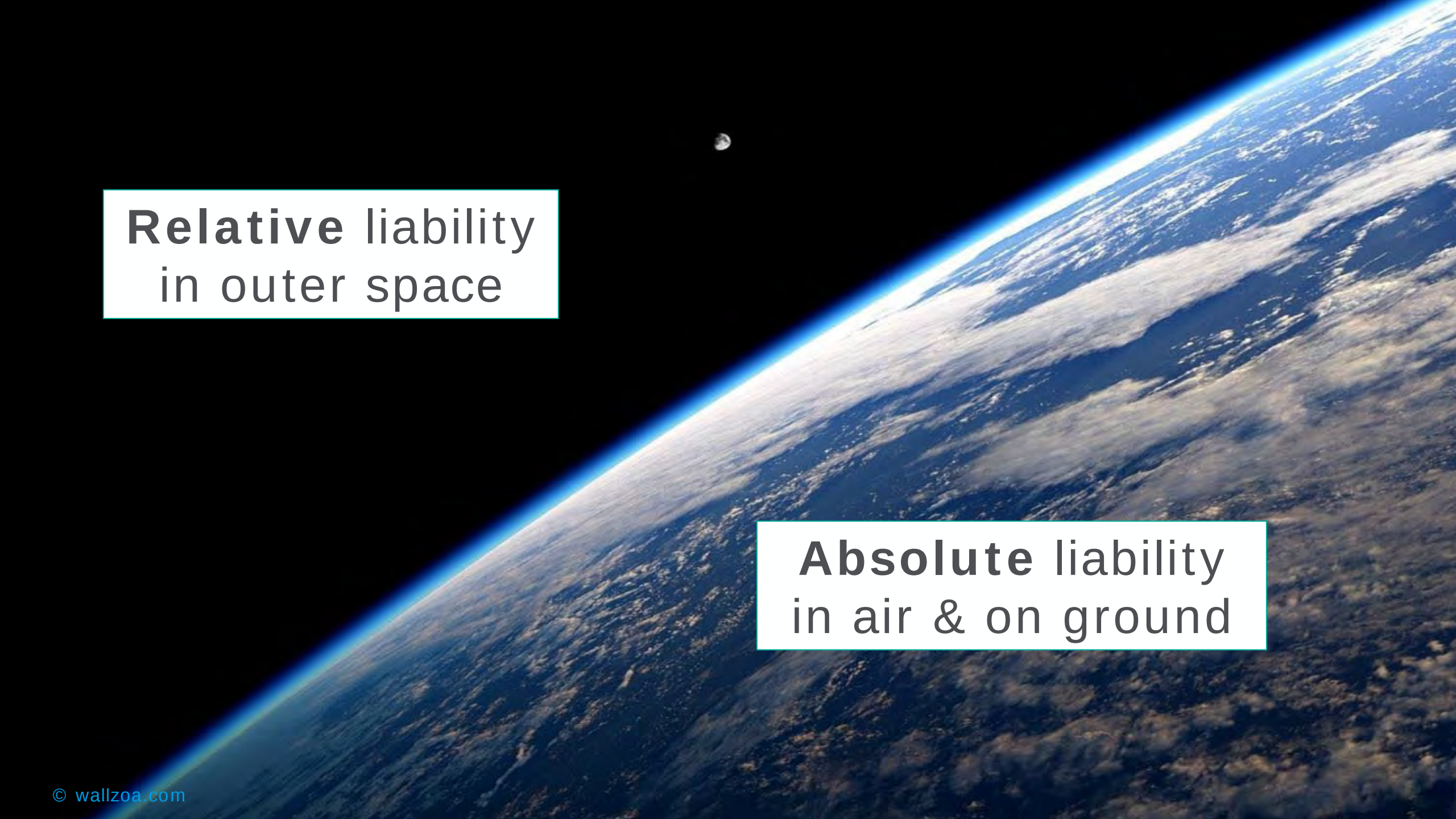
# Liability in international space law



- Outer Space Treaty 1967
- Article VII

## Liability Convention 1976

- Distinction between:
- State **responsibility**
- State **liability**

A photograph of Earth from space, showing the curvature of the planet and the blue atmosphere. The Moon is visible in the black background of space.

**Relative** liability  
in outer space

**Absolute** liability  
in air & on ground

# Liability – core principles

## Absolute liability

- Damage on Earth or to an aircraft in flight
  - Full compensation for damage
- Damage means loss of life, personal injury, loss to property



## Fault-based liability

- Damage caused **elsewhere** than on the surface of the Earth to a space object of another state
- Compensation **ONLY** if **fault** can be established
- Causal link?
- Standard of care?

# Liability – Summary of core principles

A State is liable for space activities under international space law if it:

- launches a space object into outer space
  - procures the launch
  - a space object is launched from its territory
  - or from its facility
- 
- A launching State shall be **absolutely liable** to pay compensation for damage caused by its space object on the surface of the earth or to aircraft in flight
  - In outer space the latter shall be liable **only if the damage is due to its fault** or the fault of persons for whom it is responsible



-



- ESA UNCLASSIFIED – For Official Use

- Foundation laid by the **IADC** (Inter-Agency Space Debris Coordination Committee) in **1993**
- Guidance on **preventing/minimizing** consequences or by-products of space activities
- In principle **no *retroactive* effect**
- **Non-binding** (recommendation) & **technical** (STSC), rather than legal (LSC) implications
- Basis for national legislation → technical guidelines are transposed into binding law

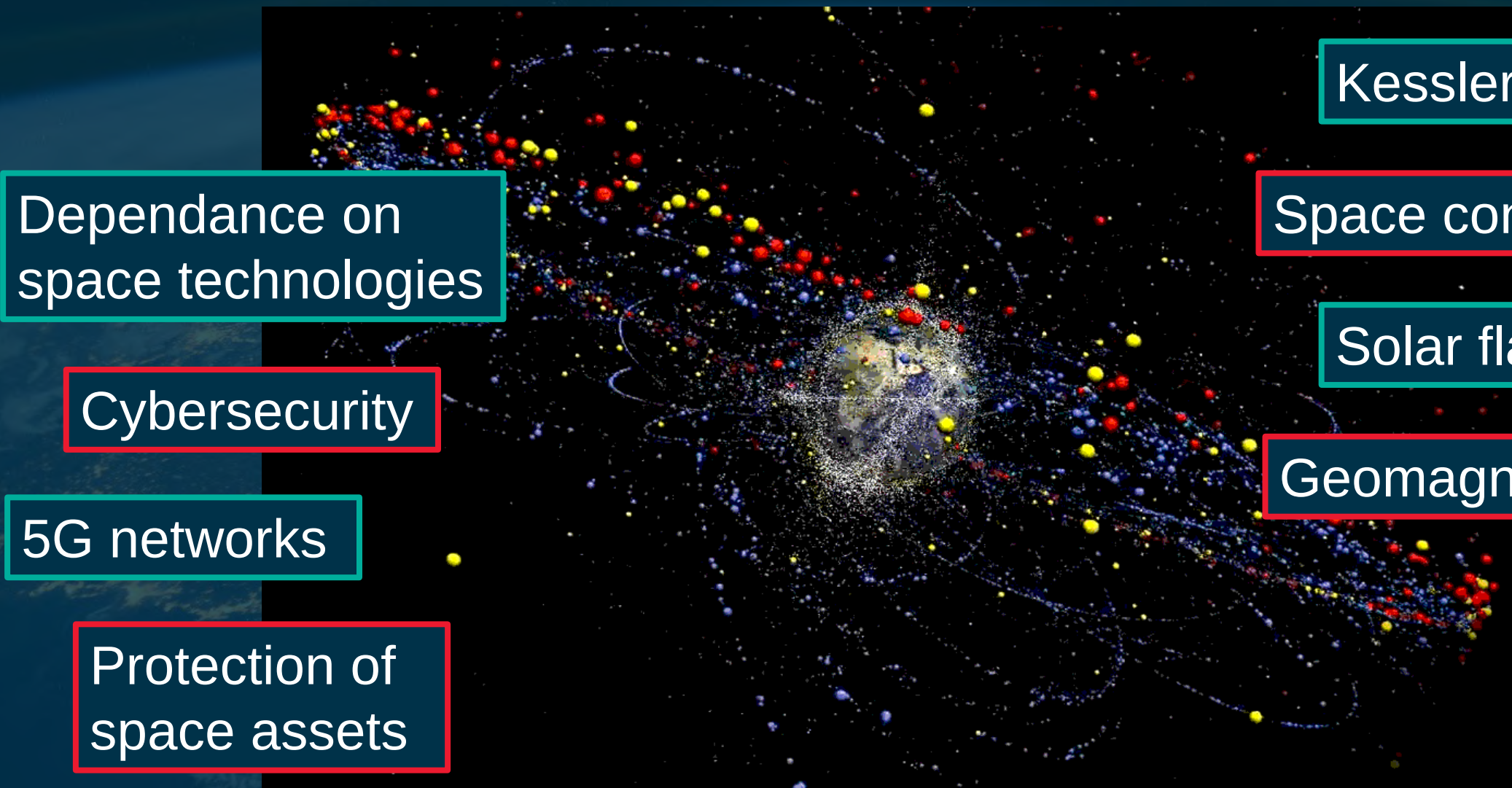


- COPUOS Guidelines = too abstract?
- SDM Guidelines: **Reference** to the latest version of the IADC Guidelines for “For more in-depth descriptions and recommendations”
- Recommendatory standards are still to be observed as they are effective in promoting safe and stable use of outer space
- Technically-focused documents, suggestions on **best-practice** solutions
- Taking **national & regional** standards into account
- International organisations: Inter-Agency Debris Coordination Committee, International Standardisation Organisation...
- **Future topics: In-Orbit Servicing?**  
**Active Debris Removal?**

The image displays a dense field of space debris and satellite orbits against a black background. The debris is represented by numerous small, colored spheres (red, yellow, blue, and white) and thin, glowing lines that trace the paths of objects in orbit. The orbits are concentrated in a central region, with some debris scattered further out. The overall scene conveys the complexity and density of the space environment.

Key concepts and labels visible in the image include:

- Dependance on space technologies** (top left, teal box)
- Cybersecurity** (middle left, red box)
- 5G networks** (bottom left, teal box)
- Protection of space assets** (bottom left, red box)
- Kessler** (top right, teal box)
- Space con** (middle right, red box)
- Solar fl** (bottom right, teal box)
- Geomagn** (bottom right, red box)



The image displays a detailed model of the Earth's space environment, featuring a dense concentration of satellites and space debris in various orbits around the planet. The visualization is overlaid with several text boxes highlighting key concepts in space security and policy.

Dependance on space technologies

Cybersecurity

5G networks

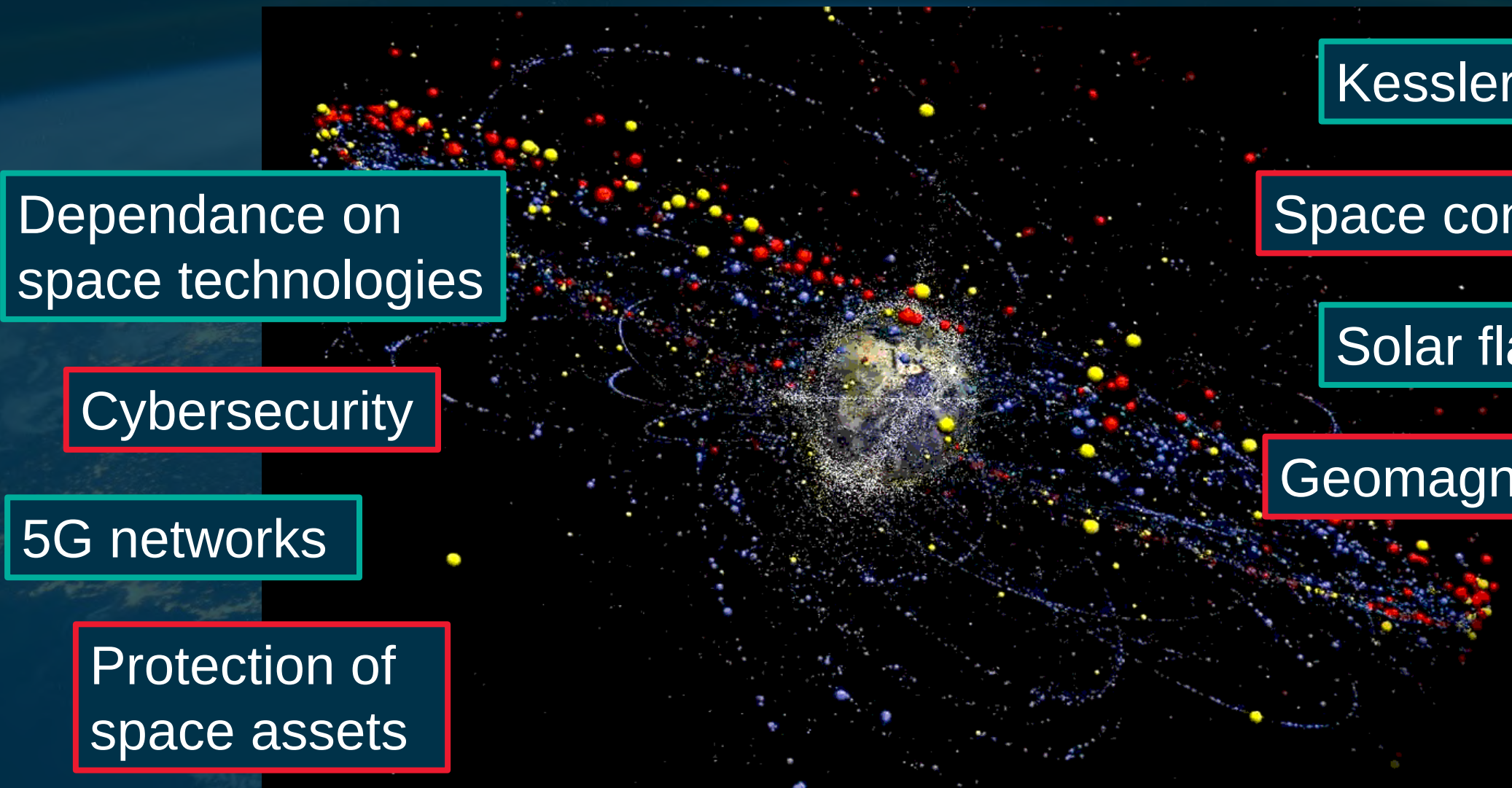
Protection of space assets

Kessler

Space con

Solar fla

Geomagn



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Dependance on space technologies

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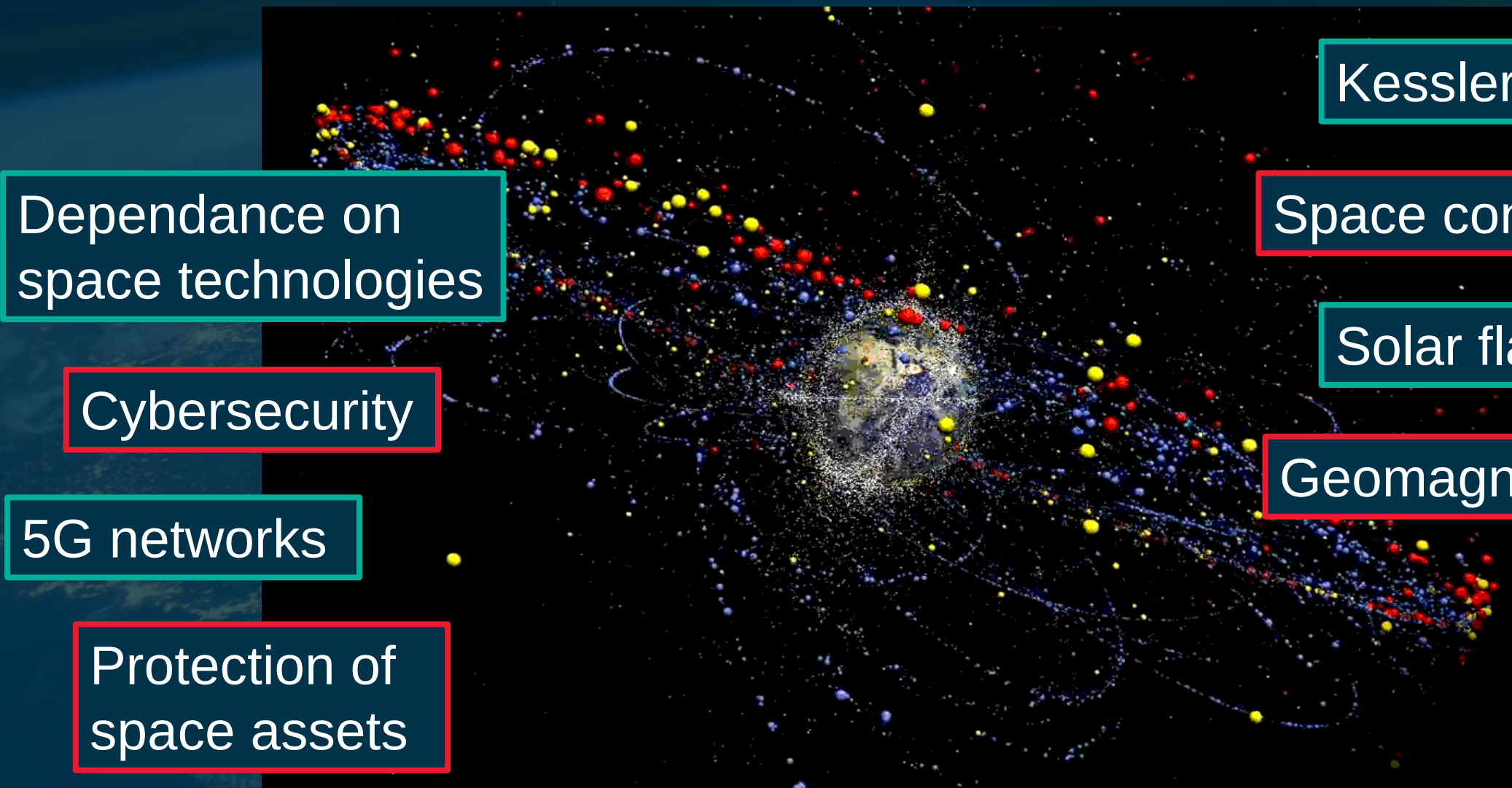
Protection of space assets

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Dependance on space technologies

Cybersecurity

5G networks

Protection of space assets

Kessler

Space con

Solar fla

Geomagn

## Kessler syndrome

## Space congestion

## Solar flares

## Geomagnetic storms

# The future of space law: more, less or different?

- International principles, national details?
- Non-legally binding instruments?
- Completely re-thinking the system?
- How to maintain the regulatory environment adequate?
- *foster innovation, guarantee participation, encourage cooperation, mitigate risks, support the rule of law*



# Questions?

# The Laws applicable to Outer Space

## National Space Legislation

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# Why national space legislation (NSL)?

National space legislation is not just “**nice to have**”...

International space law provides for legally binding  
**obligations**

**in some cases**

The obligation have to be **translated** into, or  
**developed** through, national space law and regulations

**National space law as the continuation, concretisation  
and completion of international space law**

# Space actors want, more than ever, to...

- Use and explore outer space
- Derive **benefits** and secure **investments**
- **Mitigate** risks and ensure the **safety** of space activities
- Implement a wide variety of **political goals**
- Seek **innovative** solutions to shape the future



# The need for national interpretation

## Article VI Outer Space Treaty:

**“The activities of non-governmental entities [...] shall require authorisation and continuous supervision”**

## Concretisation of high-level principles

National legislators factor in:

- National “spaceflight realities”
- National legal system
- National industry
- Policy expectations and goals



# Pyramid of Space Law

## UN Level

UN Charter

5 Treaties  
+ UN principles

International Institutions:  
UN, ITU, ESA, COSPAR

## Spacefaring Nations

Programme Agreements:  
ISS IGA, SARSAT, EUMETSAT,  
Lunar Gateway, Artemis Accords

## National Jurisdiction

National laws on space activities:  
Liability, National agencies, licensing,  
registration, technical regulations

Public procurement, Export control, Technical  
compliance, Public Private Partnerships, Intellectual  
Property Rights, space assets guarantees, Industrial  
contracts



# National space laws (NSL) – purpose and scope



- Sum of domestic legal instruments pertaining to space activities
- Acts which define rights and obligations under a **national jurisdiction**
- **Directly applicable and enforceable**

NSL as the **continuation, concretion and completion of international space law**

# The need for national adaptation and application

- National application is necessary and helpful
  - Both at the **legislative** and **executive** (regulatory) level
- National legislation can stimulate **industry**
- Approaches and choices by the national legislator **can reflect**:
  - National context
  - National legal system
  - Policies
  - Spaceflight “realities”
  - Expectations & future outlooks

# Through a national space law, a state can...

...**clarify** competences and administrative procedures to be followed in the context of national space activities;

... **provide** for a predictable and legally secure environment for national space activities;

... **mitigate** the risk of acting wrongfully under international law and thus evoking State responsibility;

... **choose** what method to take in terms of the form of implementation at the domestic level.

- **Single acts**
- **Unified acts**
- **Clusters of instruments**

# National law gives standing and protection

## Current status in ESA Member States & Associate Members:

- **13 States** have a space law
- **3 States** have regulatory acts (e.g. for liability or registration)
- **10 States** have no space law yet
- **Timing** of laws shows **maturity** of space policy
- Applicability of **several** national space laws due to multinational space missions?



# NSL benefits all actors

State ensures  
**compliance** with  
international  
obligations

Legal **certainty** and  
**security** for space  
activities

**Prevention** of harmful  
consequences of space  
activities

**Predictability** for  
non-governmental  
actors

State carries  
**responsibility** for  
non-governmental  
activities

**Defining**  
administrative  
competences

**International  
reputation**

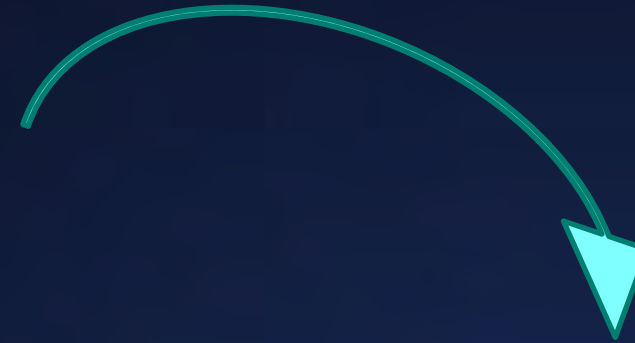


# Multiple jurisdictions vs 'flags of convenience'

- Internationalised space mission architectures may lead to **applicability of several NSL**
- Mitigation of undesired consequences can be achieved through cooperation, coordination and **appropriate advancement of international law**
- NSL is necessary in order to **prevent** and **avoid** harmful consequences
- States bear international responsibility for private activities in outer space:
  - Authorisation
  - Continuous supervision

# International “building blocks” of NSL

- Project 2001 Plus (coordinated by DLR & Cologne Institute of Air and Space Law) - 2004
- ILA Sofia Guidelines for a Model Law on National Space Legislation – 2012  
(contained in UN doc.A/AC.105/C.2/2013/CRP.6)
- UN GA Resolution on Recommendations on a National Legislation Relevant to the Peaceful Exploration and Use of Outer Space – 2013  
(UNGA resolution 68/74 of 11 December 13)



1. Authorisation
- 2. Supervision
3. Registration
4. Compensation
5. Additional regulation

# UN GA Recommendations on a National Legislation Relevant to the Peaceful Exploration and Use of Outer Space

- A/RES/68/74
- Highlights the importance of NSP
  - Due to an increasing number of non-governmental actors
  - For the purpose of space sustainability
  - For consistency and predictability in regard to authorisation and supervision
- Recognises the validity of different approaches taken by States in relation to national instruments
- No concrete text proposals → “building blocks” for consideration

- 
- 1. Authorisation**
  - 2. Supervision**
  - 3. Registration**
  - 4. Compensation**
  - 5. Additional regulation**



- nal”?
- where does the work/activity  
structures)*
- regulated in domestic law?
- 78

**Australia (1982)** *launch* a space object.....**Space object** means a thing consisting of: (a) a launch vehicle; (b) a payload (c) returned Payload separation from a launcher (Part.2)

# Scope of application – What is a space activity?

**Ukraine (1996):** Space activity" shall mean scientific space research, the designed application of space technology and the use of outer space" (Art.1)

**Austria (2011):** the launch, operation or control of a space object, as well as the operation of a launch facility (Art. 2.1)

**UK (2018):** launching or procuring the launch or the return to earth of a space object or of an aircraft carrying a space object, operating a space object, or any activity in outer space;

Distinguishes Sub-orbital activities: a rocket or a rocket or other craft that is capable of operating above the stratosphere

# Scope of application – What is a space activity?

- **Territorial jurisdiction:** Based on where the activity takes place
- **Personal jurisdiction:** Based on the legal or natural person conducting the space activity
- **What makes a space company “Greek”?**  
*(Multi-national companies, subsidiaries, where does the work/activity take place, ownership structures, board structures)*
  - Top-down constitutional requirements; regulated in domestic law?
  - Inspiration from the maritime, aviation or other sectors

# Scope of application – What is a space activity?

- **Territorial jurisdiction:** Based on where the activity takes place
- **Personal jurisdiction:** Based on the legal or natural person conducting the space activity



**SWE/DEN/AU/FI:** both territorial and personal

**All activities on national territory, vessels / facilities under national jurisdiction or activities conducted by nationals**

- **International frequency management:** system of the International Telecommunication Union (ITU)
- **Export control** and non-proliferation regimes
- **Non-legally binding** guidelines, recommendations and standards e.g. space debris mitigation (IADC, COPUOS, ISO)
- Penal code, tort law, tax law, safety and environmental regulations, ...

- **Article VI Outer Space Treaty:** space activities [...] “require authorisation”
- Authorisation  $\neq$  licensing
- Licensing is the most common form of authorisation
- No prescribed method – national **discretion** regarding the form of implementation at domestic level
  - Unified acts / clusters of instruments

Type and range of space activities are influencing factors

- UK: “Outcome based regulator”
  - Discussions with every applicant
- NZ: “Manufacturers have to meet a standard”
  - NZ then checks if standard makes sense for this application
- IT: Italian operators asking for a “clear way forward”
- CA: Registration not addressed in NSL

# Registration of space objects

## National level: national registry



## International level: notification

- Establishment of a national space object registry
- No specifications in international law

- Notification of space objects “upon launch” to the UN Secretary General
- OOSA Online Index of Space Objects

### Legal effect:

With the act of registration, a State retains **jurisdiction and control** over the space object

### Common misconception:

Non-governmental actors cannot register nor notify

# Questions?

- Transfer of risks to a dedicated market
- Covers damage to property, liability, loss of revenue...

- Is insurance **limited**?



Usually 60M EUR

- Three phases of risk:

**Phase 1:** Pre-launch

**Phase 2:** Launch, in orbit and tests

**Phase 3:** After the end of life of a space object

## PHASES OF RISKS

### PHASE 1

**Period before launch**

Assembly  
integration  
tests of  
satellite

Transit to  
launch site

Launch  
campaign

« Ground » insurers  
Space object (satellite + launch vehicle)  
Access to space object

Signature of the  
satellite procurement  
contract

### PHASE 2

**Launch, in-orbit commissioning  
and tests Period**

Launch vehicle  
flight

In orbit tests

Dedicated space insurers (first  
party)  
Aviation insurers (TPL)  
Launch irreversible  
Risky phase

Release of the launcher

### PHASE 3

**Period after operational use of  
the satellite**

Use in orbit  
Re-entry

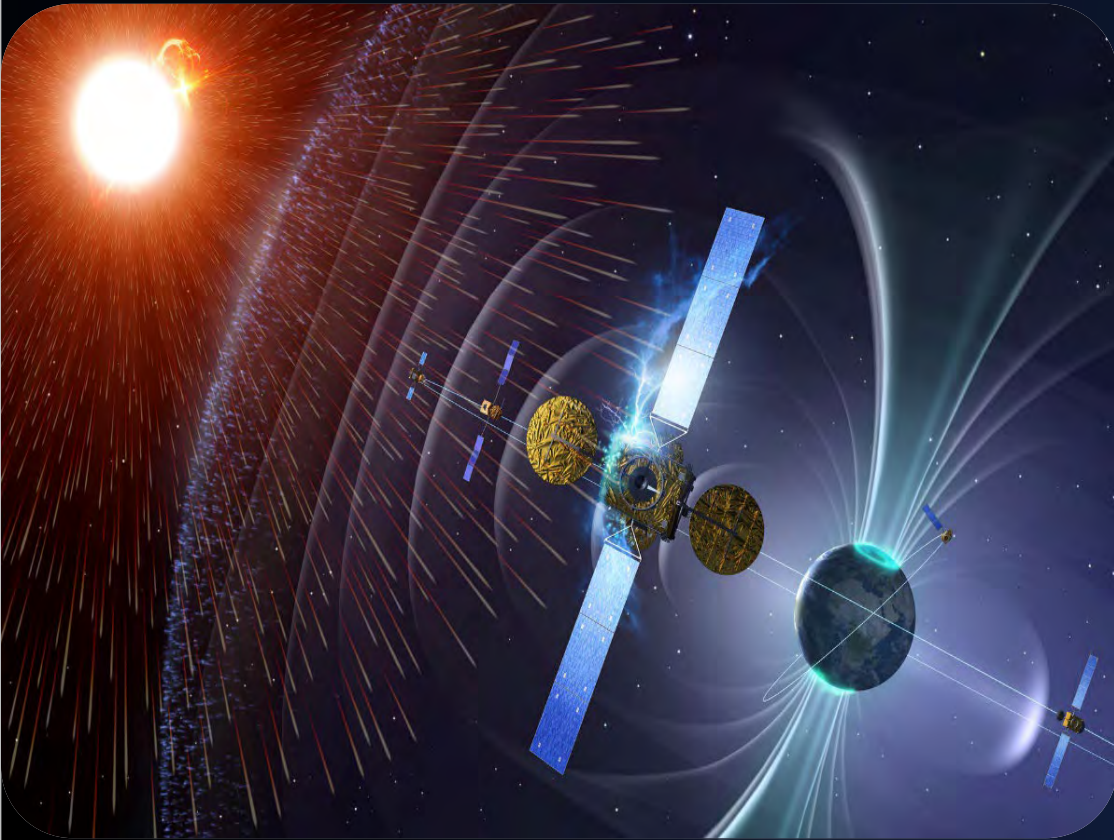
Operation of the satellite  
Dedicated space  
insurers (first party)  
Aviation insurers (TPL)

Operational use of  
the satellite

IPR **ensures** protection over research and development

IPR **encourages** the publication, distribution and disclosure to the public

## → INNOVATION



- International principles, national details?
- Non-legally binding instruments?
- Completely re-thinking the system?
- How to maintain the regulatory environment adequate?
- *foster innovation, guarantee participation, encourage cooperation, mitigate risks, support the rule of law*

# Conclusions

- Houston, we have a **problem**
- Houston, we have the **legal rules**
- Houston, we have (some) **solutions**



# The Laws applicable to Outer Space

## The Institutional and policy frameworks for Space in Europe

---

# EU Space Policy and EU Space Programme



EU Space  
Programme  
Regulation 2021  
for the years  
2021-2027

Bringing  
together  
existing EU  
space  
programmes:  
Galileo,  
Copernicus,  
EGNOS

## EU space in numbers

2021-2027  
EU space budget



2022  
EU space business



# Future for a EU space law?

- EU has space infrastructures and operations, but **no acceptance yet** to the rights and obligations of UN treaties



- **Article 189 Para. 2 TFEU:**  
European Parliament and the Council, acting in accordance with the ordinary legislative procedure, shall establish the necessary measures, which **may** take the form of a European space programme, **excluding** any harmonisation of the laws and regulations of the Member States.

- Proposal for a EU space law to cover “**safety, security and sustainability**” and present common rules on:
  - Collision avoidance
  - Space threats assessment
  - Resilience requirements
  - Zero-debris approach

**“Single-market moment” of space**

# EU Space Legislation – Pillars of the draft proposal

## Safety

Limiting space object collision risk

Mandatory use of satellite **tracking** service

**Mitigation** measures incl. post mission disposal, “space safe” label

**Remediation** measures incl. zero debris approach

## Security - Resilience

“Resilience baseline” for space operators, filling gaps for protection of space-based infrastructure

Complementary to NIS2/CER L **ectives**

Resilience **measures** and **requirements** (cyber-security, asset security)  
Possible **sec. standards**  
**Info-sharing**

## Sustainability

Creation of a sector-specific method for environmental footprint calculation

Sector-specific **LCA** methodology (PEF)

**Research** activities

**Ecodesign** promotion

## Competitiveness

“level playing field”

Not specifically mentioned in the EU stakeholder consultation survey; rather an overarching consideration

“measures for the approximation of law, regulation in Member States ... [for] the establishment and functioning of the internal market”  
**Art.114.1 TFEU**

# The ESA-EU Framework Agreement

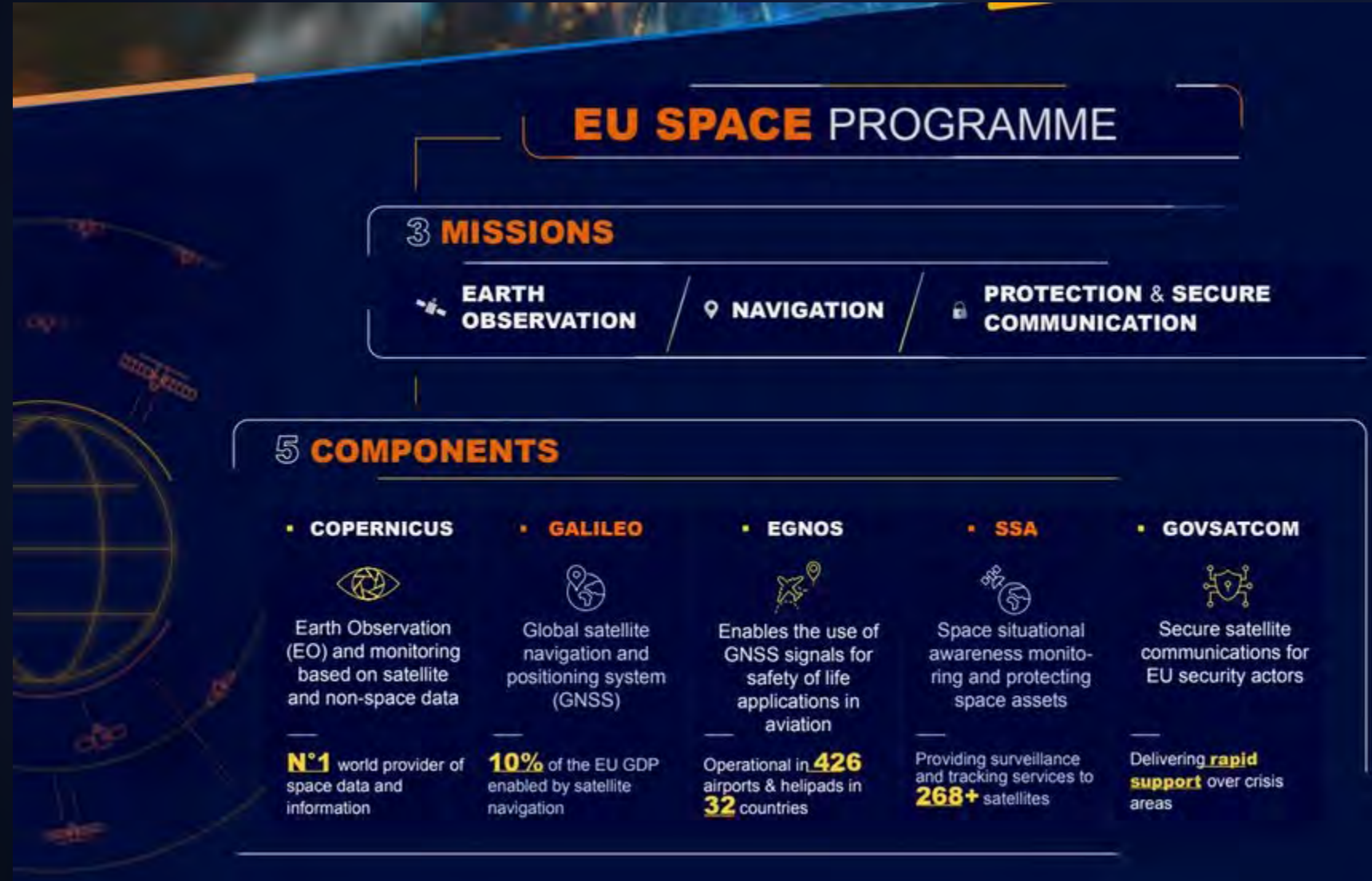


|             |                                                            |                                                                                                                                                                                                                |
|-------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2004        | <b>Article 1</b><br>(Purpose)                              | Coherent and progressive development of <b>overall European Space Policy</b>                                                                                                                                   |
| 2008        | <b>Article 2</b><br>(Principles)                           | Cooperation “ <i>in the light of the common objectives [...], with due regard to their respective tasks and responsibilities and their respective institutional settings and operational frameworks</i> ”      |
| 2009        |                                                            |                                                                                                                                                                                                                |
| 2012 – 2015 | <b>Article 3</b><br>(Fields of Cooperation)                | <b>Comprehensive fields of cooperation</b> (science, technology, earth observation, navigation, communication by satellite, human space flight and micro-gravity, launchers, spectrum policy related to space) |
| 2014        |                                                            |                                                                                                                                                                                                                |
| 2016        | <b>Article 5</b><br>(Joint Initiatives)                    | Possibility for <b>specific arrangements to implement joint initiatives</b> , e.g. management by ESA of EU space-related activities, participation by the EU in ESA optional programmes                        |
| 2018        |                                                            |                                                                                                                                                                                                                |
| 2021        | <b>Article 6</b><br>(Consultation and information)         | Parties to <b>consult</b> regularly and <b>inform</b> each other of new initiatives in the fields of cooperation                                                                                               |
| 2022        |                                                            |                                                                                                                                                                                                                |
| 2023        | <b>Article 8</b><br>(Coordination, cooperative activities) | Joint and concomitant meetings of EU Council and ESA Council at ministerial level (“ <b>Space Council</b> ”) to coordinate and facilitate cooperative activities, assisted by <b>Secretariat</b>               |



Gradually entrusted with  
tasks related to EU  
space programmes:  
Galileo, Copernicus,  
EGNOS

## Close cooperation and collaboration with ESA



## EUROPE'S GATEWAY TO SPACE



### WHAT

22 Member States, 5000 employees

### WHY

Exploration and use of space for exclusively peaceful purposes

### WHERE

HQ in Paris, 7 sites across Europe and a spaceport in French Guiana

### HOW MUCH

€6.49 billion = €12 per European per year

# What Does ESA Do?



**ALL OF THIS IS POSSIBLE THANKS TO THE COLLABORATION OF MEMBER STATES**

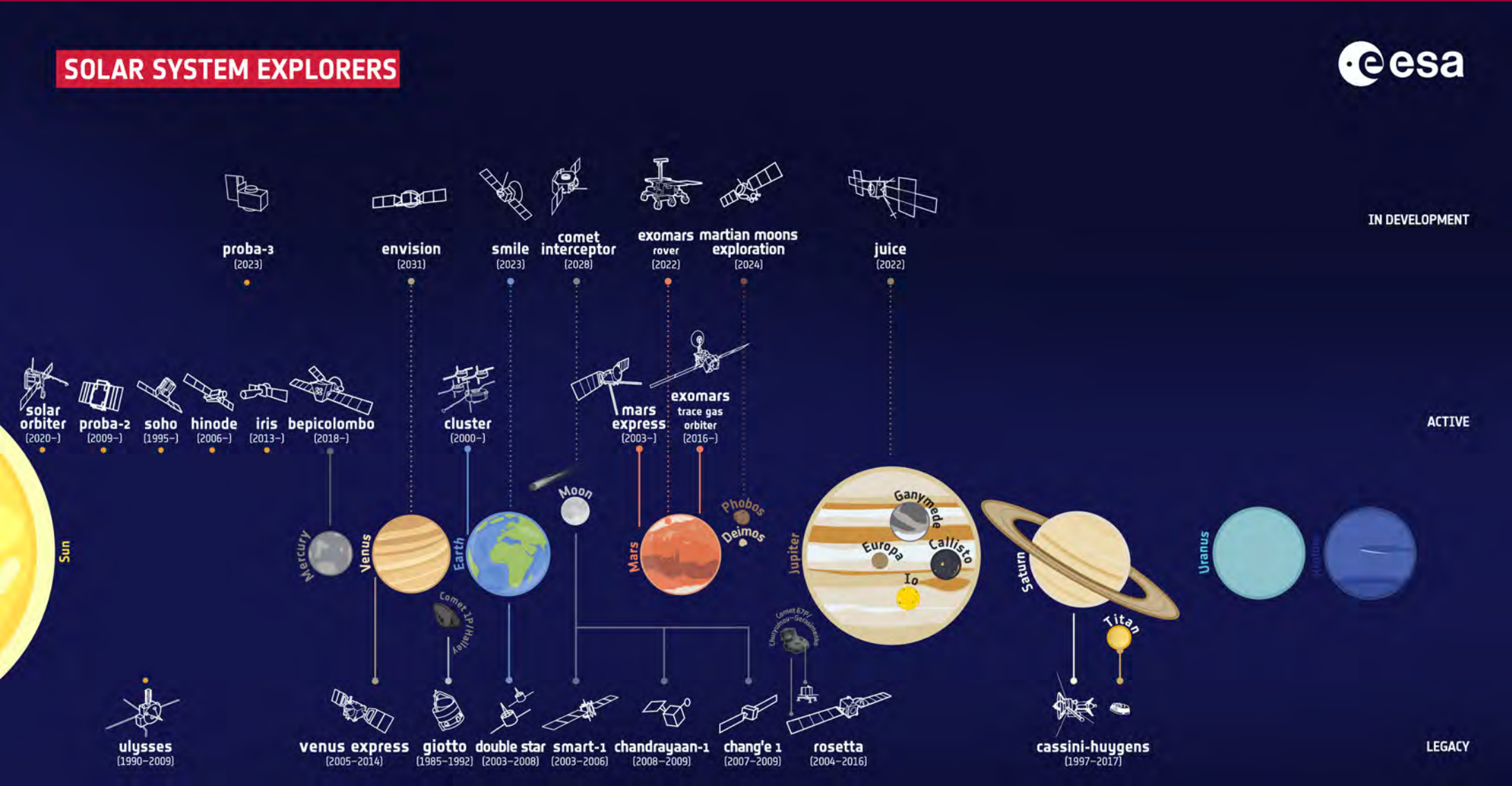
**ESA** is active across **every** area of the **space sector**

**World leader in science and technology**

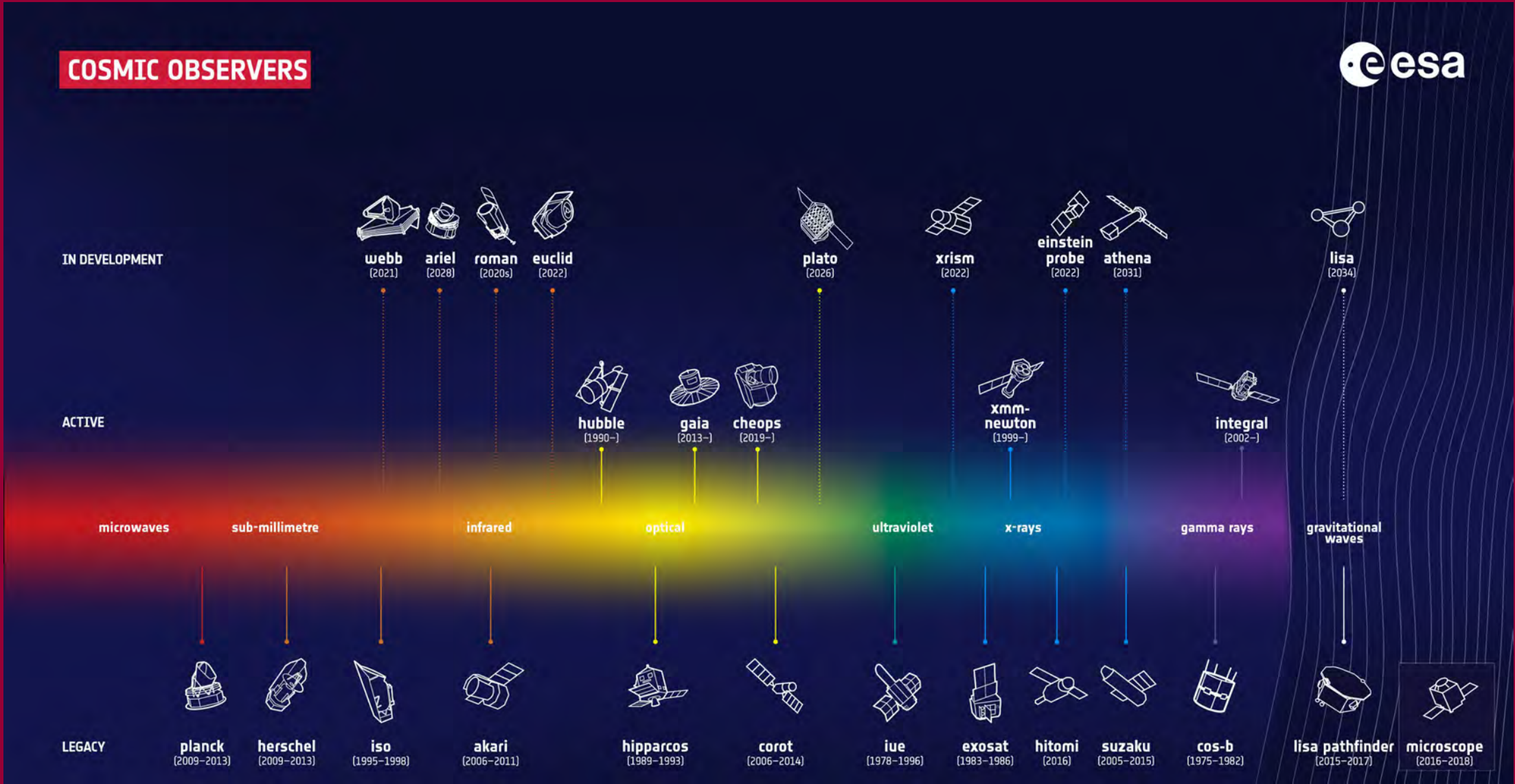
**Over 80 satellites** developed, tested, and operated **since 1975**

**More than 220 launches** from Europe's Spaceport in Kourou

# Some of Today and Tomorrow's ESA Missions (1)



# Some of Today and Tomorrow's ESA Missions (2)



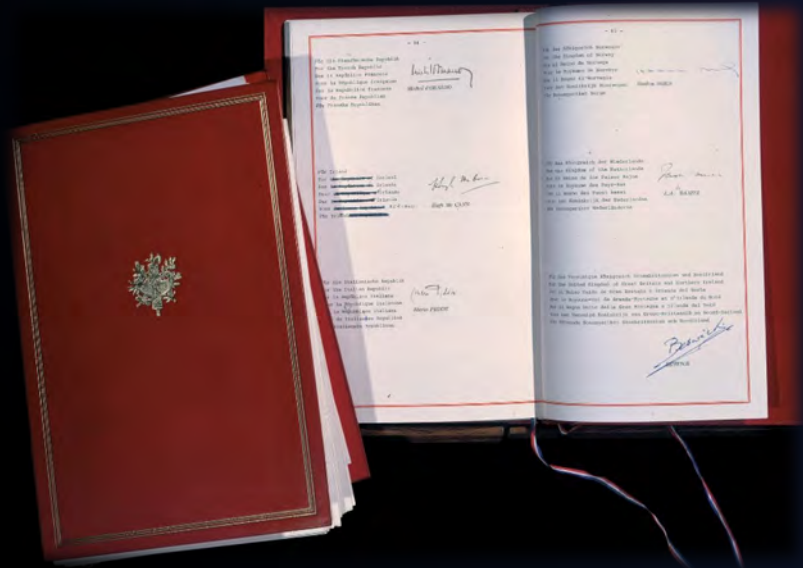


esa is a space actor and a mechanism of international cooperation.

# The business card



- an **intergovernmental** organisation
- with international **legal personality**
- established by an international **treaty**
- composed of 23 **Member States**
- administering **public** (=tax payers) money
- providing for **cooperation in space** research, technology and applications



# 1975 Signing of ESA Convention

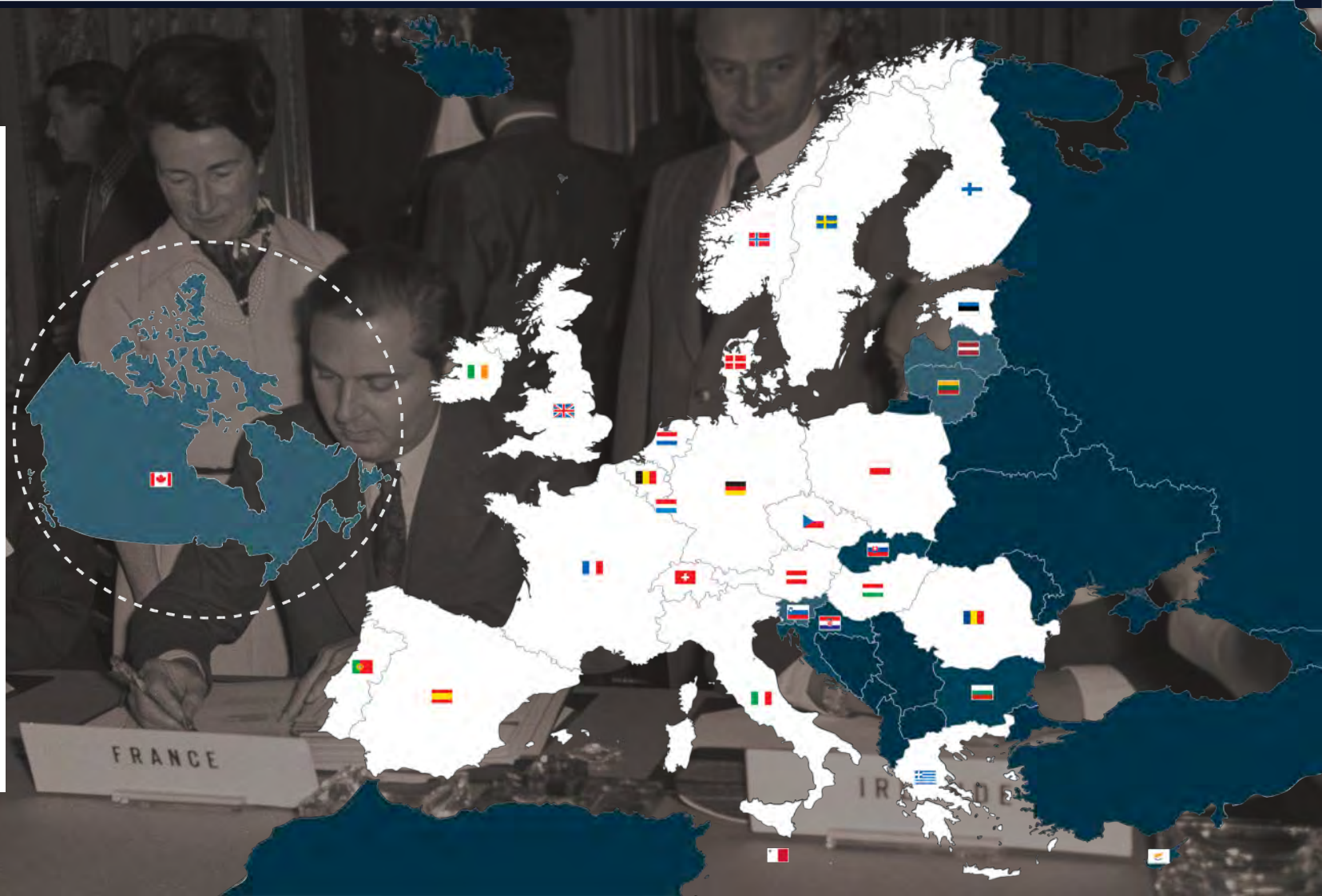
# 10

## MEMBER STATES

FRANCE

# 23

## MEMBER STATES



# ESA Establishments (1)



## Headquarters

Located in Paris, home to the main programme directorates that steer and formulate ESA policy.



## ESRIN

ESA's centre for Earth observation activities, near Rome, Italy, also develops information systems and hosts the Vega launcher project.



## ESTEC

The European Space Research and Technology Centre, Noordwijk, the Netherlands, is the largest site and the technical heart of ESA.



## ESOC

The European Space Operations Centre, Darmstadt, Germany, tracks and controls European spacecraft.



## EAC

The European Astronaut Centre, Cologne, Germany, trains astronauts for missions to the International Space Station and beyond.



ESA UNCLASSIFIED - For Official Use

# ESA Establishments (2)



## ESAC

The European Space Astronomy Centre, near Madrid, Spain, hosts the science operation centres and archives for ESA's astronomy and planetary missions.



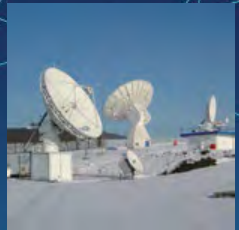
## Harwell (ECSAT)

Harwell Centre, in Oxfordshire, UK, is focusing on commercialisation and partnerships in space activities.



## Redu (ESEC)

The European Space Security and Education Centre in Belgium is part of ESA's ground station network and has specialised on operating small satellites and security relevant, sensitive operations.



## Guiana Space Centre

ESA's launchers lift off from Europe's Spaceport in Kourou, French Guiana. It is jointly operated by the French space agency (CNES) and Arianespace with the support of European industry.



ESA UNCLASSIFIED - For Official Use

- 1964: the European Space Research Organisation (ESRO) and the European Organisation for the Development and Construction of Space Vehicle Launchers (ELDO)
- **1975**: ESRO and ELDO merged to become ESA
- **22 Member States**
- 4 Associate Members
- 2 European Cooperating States
- + Canada





“[...] provide for and to promote, **for exclusively peaceful purposes**, **cooperation** among **European States** in **space research and technology** and their space applications [...]”

- An international intergovernmental organisation;
- With legal personality in international law;
- Through the ratification of the ESA Convention, Member States have incorporated the provisions of the ESA Convention into their respective domestic law systems
- ESA is therefore **bound by its own set of rules and regulations**, and not directly by that of the individual Member States, or of other international organisation such as the European Union



# Essentials of the mechanism (1)

ESA acts through two “organs”:



+



\* delegate level  
\* ministerial level

CEO and legal representative <=

the Director General

the Council

“assisted by a staff”

“shall establish a Science  
Programme Committee”

SPC

&

“may establish other subordinate  
bodies as necessary”

Employment contract with ESA  
Staff Rules & Regulations applicable  
Functional immunity (also for delegates)

Committees

AFC IPC IRC SEC

Programme Boards

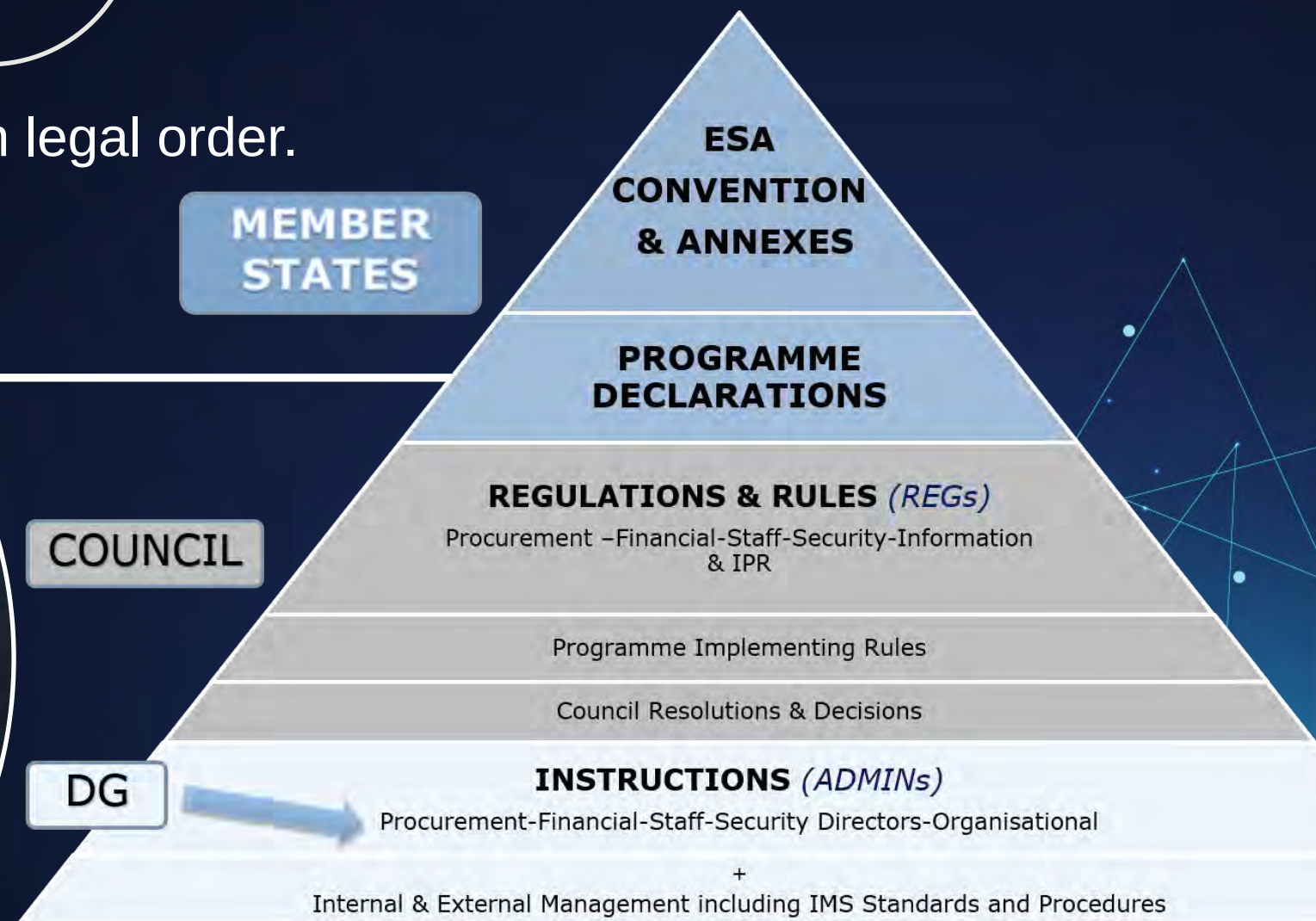
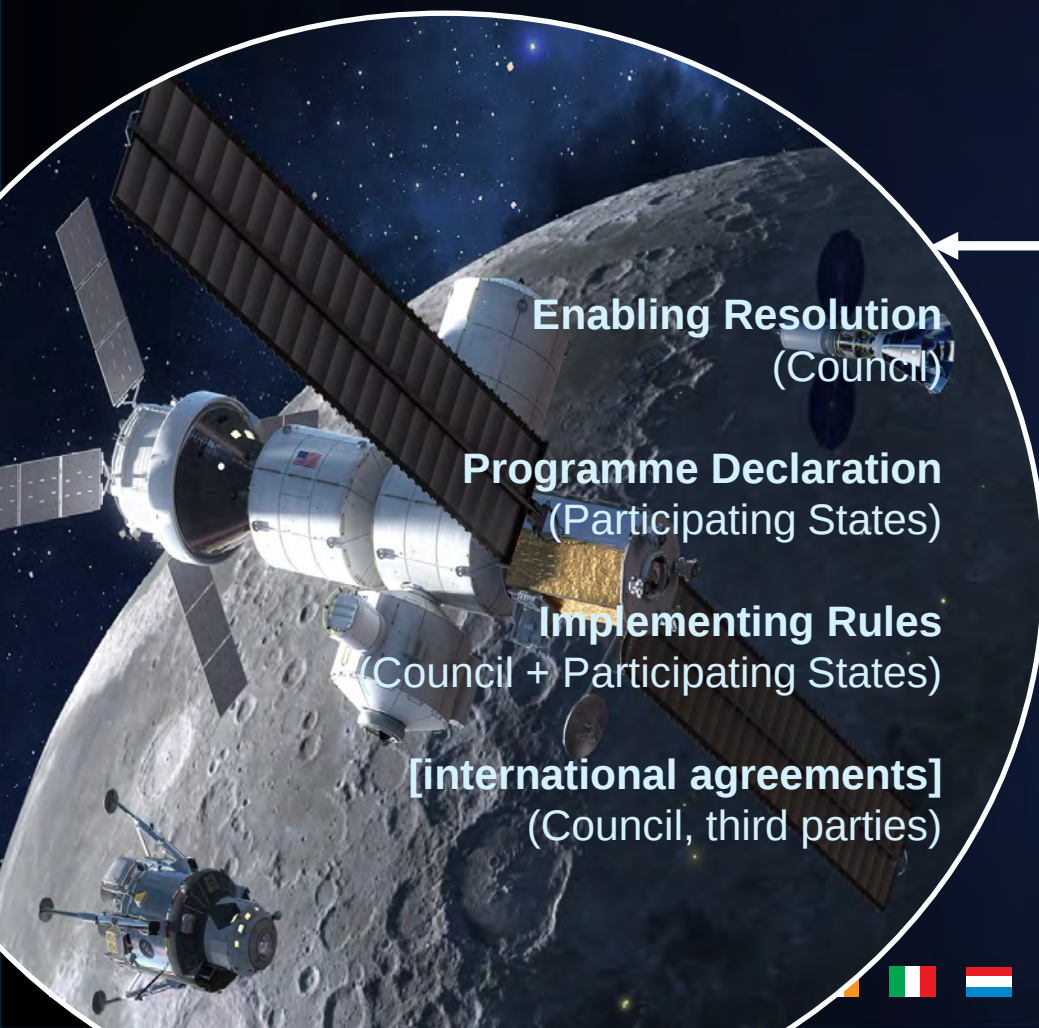
PB-EO PB-STS PB-NAV PB-HME PB-SSA JCB

Other bodies

IGA-CC ...

# Essentials of the mechanism (2)

ESA works on the basis of its own legal order.



# Essentials of the



# mechanism (3)



ESA's interaction with public bodies (States, IGOs, etc.)

## Member States

- Accession agreements
- Host agreements (e.g. with NL for ESTEC)
- Requesting Party Agreements (e.g., technical assistance, national space prog.)

## European Non-Member States

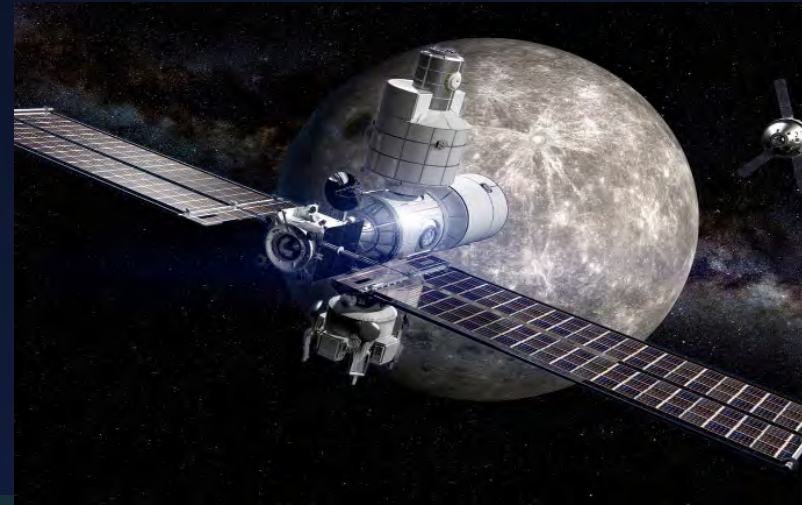
- European Cooperating State Agreements
- Association Agreements ("Associate Member")

## European Union

- Cooperation & delegation

## International partners

- + 530 international cooperation agreements
- Special case Canada



ESA-NASA Lunar Gateway Negotiation Team,  
*Bilateral meeting @ HQB, Feb/2020*



ESA-Canada Cooperation Agreement 2020-2030,  
*Signature ceremony, CA Embassy, Feb/2019*

## The content of the Convention:

- a) purpose, activities and programmes
- b) industrial policy
- c) organs, financial and administrative set-up
- a) treaty-technical articles



[https://www.esa.int/About\\_Us/Law\\_at\\_ESA/ESA\\_Convention](https://www.esa.int/About_Us/Law_at_ESA/ESA_Convention)

## Chief Executive Officer of the Agency and its legal representative

### Role

- Takes all measures necessary for the management of the Agency, the execution of its programmes, and the fulfilment of its purpose;
- Is assisted by scientific, technical, administrative and clerical staff;
- Has authority over ESA establishments, delegated to a head establishment.

**Governing body of ESA**, where each Member State is represented

## Role I

- Provides policy guidelines for ESA's activities;
- Every two to three years, Council meets at **ministerial level** ("Ministerial Council") to take key decisions on new and continuing programmes as well as financial commitments;
  - November 2022
- The ESA Council at ministerial level also meets with the EU Council to form the European "**Space Council**."

## Role II

- Appoints the Director General and the Directors (based on DG proposal);
- Determines the five-year level of resources for mandatory activities;
- Adopts ESA Regulations and Rules;
- Establishes subordinate bodies, such as the **International Relations Committee (IRC)**, as may be required;
- Exercises its decision-making capacity by adopting proposals, procurements, budgets etc.

**Last Council at  
ministerial level**

**22-23 November 2023 –  
Paris, France**



- The work of the Council, leading to the necessary decisions, builds up through a process of information, consultation and finally decision:
  - ❖ **INFORMATION items:** are noted and comments can be introduced (limited discussions); **INFORMATION documents** are not discussed, unless agreed at the adoption of the Agenda
  - ❖ **CONSULTATION items:** are discussed for comments and guidance
  - ❖ taking **DECISIONS** = adoption, approval or recommendation

## WHO DECIDES ?

- Member States or Participating States
- General Rule: **ONE State = ONE vote**

## MAJORITY REQUIRED

- simple, or double simple;
- two-thirds, or double two-thirds;
- unanimity;
- in some cases, **CONSENSUS** (not voting)

## VOTING PRINCIPLES

1. **One State one vote principle**
2. **Weighted voting for certain decisions:**
  - *Majority is calculated on the basis of the number of votes and on the basis of the contributions to optional programmes*

# International Relations Committee (IRC) I

- The IRC's tasks are as follows:
  - **assist the Council** in concerting the **policies** of the Member States in the space field, with the aim of **arriving at a common position** in international bodies (eg. UN COPUOS)
  - **prepare Council decisions** relating to the Agency's international relations
  - to submit to Council **opinions on the development of relations** established with non-member States, including the implementing of international agreements
  - submit **views and recommendations** with regard to cooperation



# International Relations Committee (IRC) II



- About 85% of ESA's budget is spent on contracts with European industry.
- An important feature of ESA is the “geographical return”.

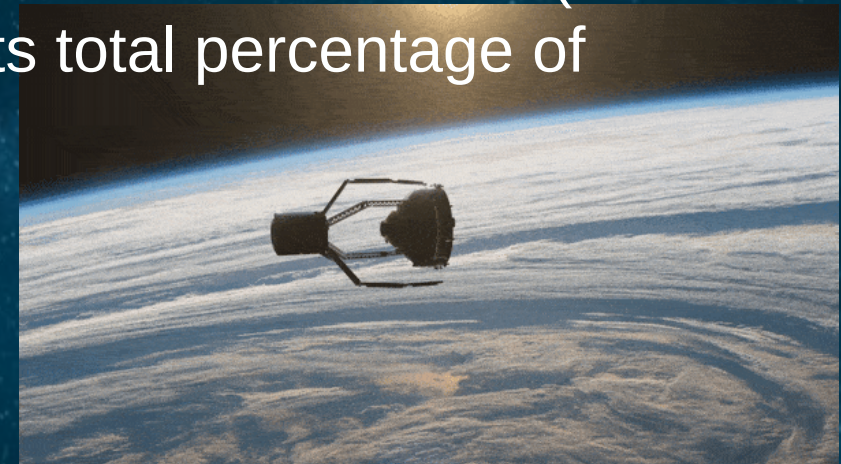
## *Industrial Policy*

### *Article IV*

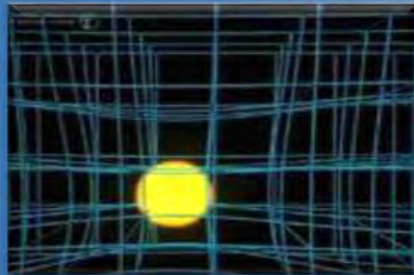
*The geographical distribution of all the Agency's contracts shall be governed by the following general rules:*

- 1. A Member State's overall return coefficient shall be the ratio between its percentage share of the total value of all contracts awarded among all Member States and its total percentage contributions.*
- 3. Ideally the distribution of contracts placed by the Agency should result in all countries having an overall return coefficient of 1.*

- Art. VII ESA Convention
  - Improve the competitiveness of European industry
  - Participate in an equitable manner by Member States
  - Competitive bidding
  - ESA shall make the maximum use of external contractors
- Annex V
  - Give preference to industry and organisations of Member States
  - Geographical distribution governed by an overall **return coefficient** (ratio between the percentage share of contracts and its total percentage of contributions)
- ClearSpace as one of the newest examples



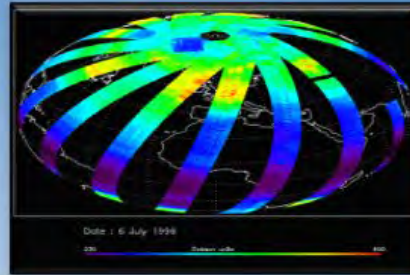
## Science and Exploration



## Safety and Security



## Applications



## Enabling and Support (transport, tech & ops)



## *Mandatory activities*

- Member States have the obligation to participate and to fund
- State contribution is determined according to a GNP contribution scale approved by Council

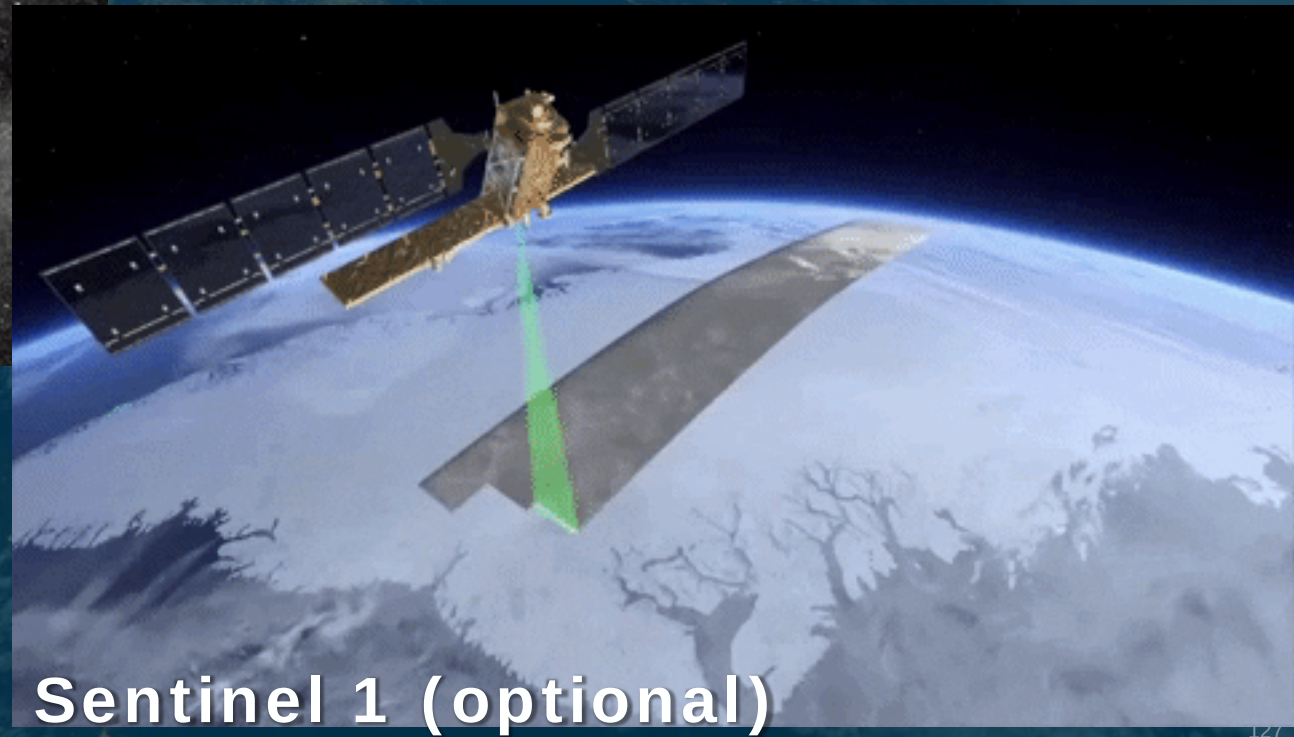
## *Optional programmes*

- Member States may decide whether or not to participate
- Member States determine the level of their participation

## *"Requesting party activities"*

- Operational activities (Art. V.2 ESA Convention)
- Assistance to Projects of Member States (Article IX.2 of ESA Convention)

# ESA's activity types II

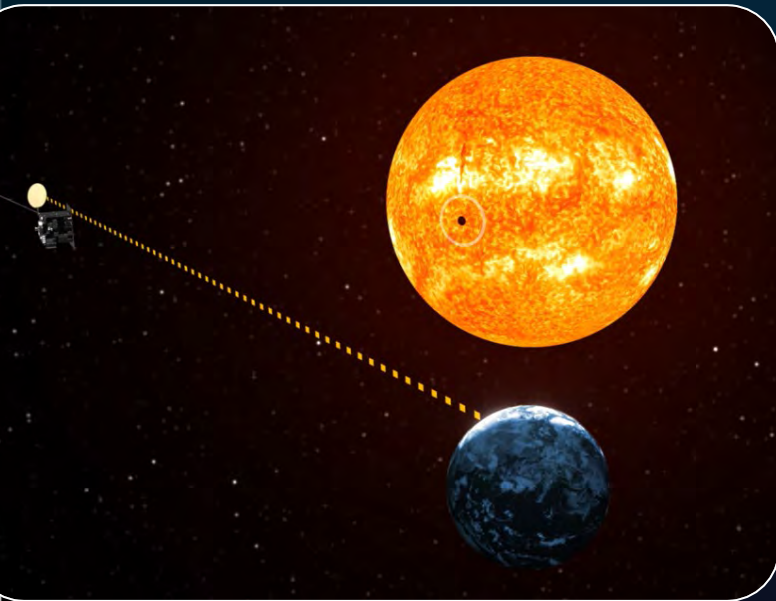


# ESA's Space Safety Programme

Cornerstone missions



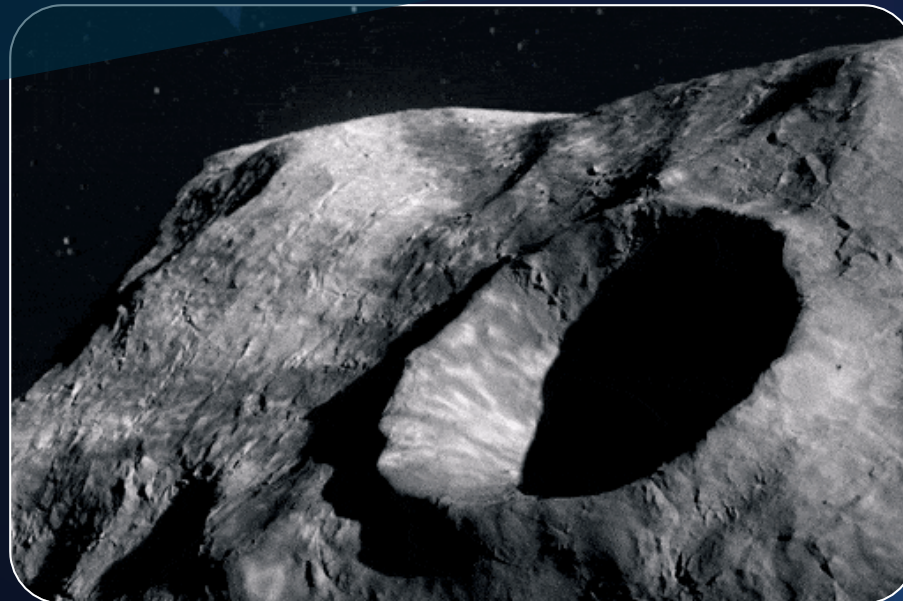
## Vigil



Observe the sun and send near real-time data on potentially **hazardous** solar activity



## Hera



**ESA's contribution** to the first test of asteroid deflection (post-impact investigation of NASA's DART mission)

Launch in 2024



## Clearspace-1



**Remove** a piece of debris – 112kg – from orbit and perform a **controlled** re-entry

Launch in 2026

# Legal framework for ESA programmes

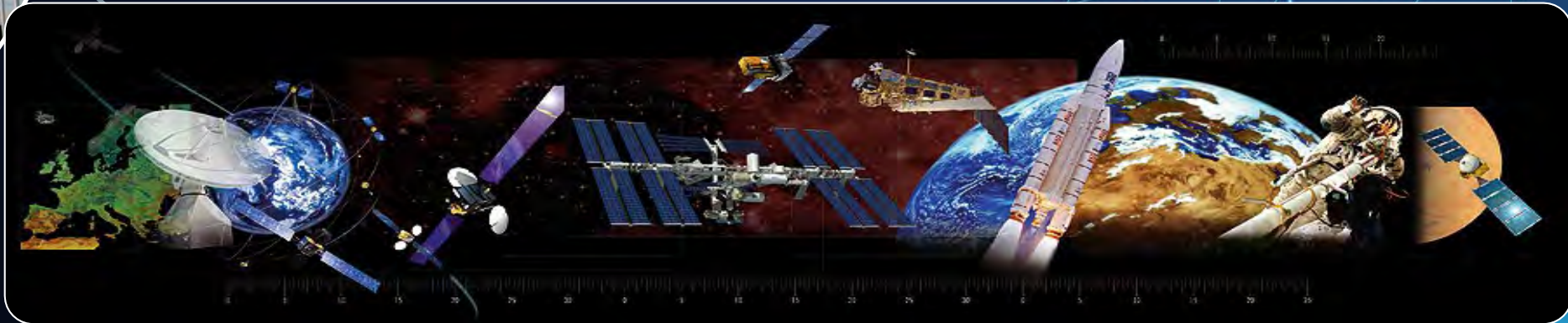
Article V ESA Convention

Mandatory  
activities

All member states obliged to contribute  
Science  
Basic Activities

Optional  
activities

Member states choose to participate  
Decided at ESA Council at ministerial level  
No obligation to contribute



# ESA optional programmes

## ESA Council at Ministerial Level

Each optional programme is an international agreement between states  
 The text and objectives are prepared in advance

### Programme declaration

### Implementing Rules

### General ESA legal framework

Once agreed upon, the programme is entrusted to the ESA Director General for execution



Human and Robotic Exploration

General Support Technology Programme (GSTP)

Navigation

Earth Observation

...

Tailored to member states' interests and national objectives

# Example: ESA's Space Safety Programme (S2P)

## **2009: Establishment**

### Space Situational Awareness Programme

- Space Weather Coordination
- NEO Coordination
- Space surveillance and tracking

## **2013: Expansion**

- Rapid maturation of applications, sensor systems and user interfaces
- SSA Space Weather Service Network

## **2016: Enhancement**

- Development and deployment of sensors and hosted payloads
- Internal studies for further development of SST systems



## **2019: “Space Safety Programme”**

- Focus to include concrete missions and activities to prevent dangers from space

# Questions?

# ESA as an actor for international space governance



Active permanent  
observer at UN  
COPUOS since  
1975



Active participation  
at UN Climate  
Change conference  
(COP28)

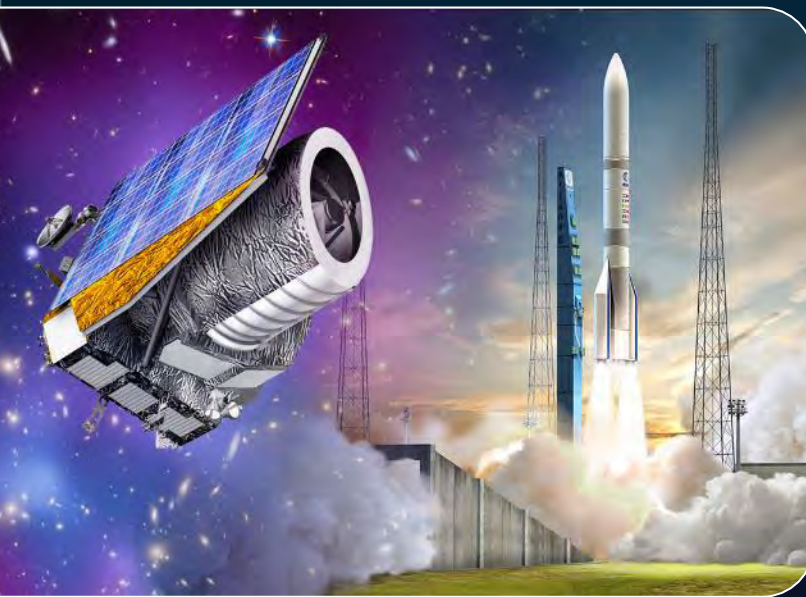
Direct involvement  
at international  
bodies such as  
COSPAR, IADC,  
ILC

# ESA's contributions to international space law



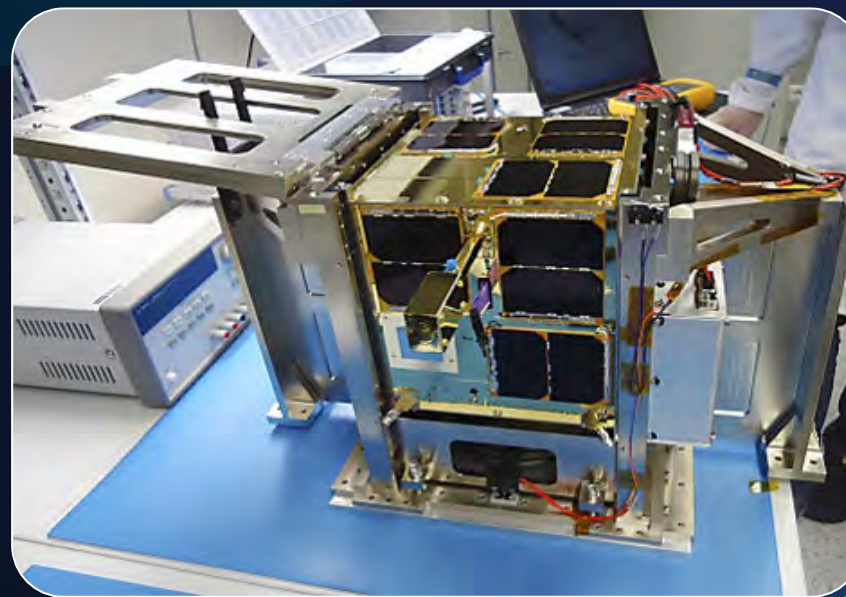
„responsible, sustainable, effective“

for its  
**missions**



Acceptance of UN space treaties; full range of **rules, standards & processes**

for its  
**Member States**



**Technical assistance & legal advice** for space laws incl. authorisation/supervision

Ministerial Council Mandate

for the  
**int'l community**



ARTICLE

European Cooperation for Space Standardization (ECSS)  
Standards and Engineering Guidance

**Standardisation, toolboxes, COPUOS**  
permanent observer, int. coordination

# A mandate to support space law-making

*The ESA Council, meeting at ministerial level,*

APPRECIATES the Agency's continued support of Member States in the establishment and implementation of national space legislation and programmes through **technical and legal advice**; (...)



accuracy and completeness of technical information provided by operator to MS for application for **authorisation** under NSL

advice on **technical issues** for the implementation of **legal norms** in the MS and/or **non-legally binding** international standards applicable to activities referred to in NSL

technological **reliability** and **quality** of satellite/space object and its associated systems, as well as procedures and protocols applied by operator

## ESA's technical assistance and expertise

**relevance** and/or **suitability** of T&Cs, if any, imposed on an **operator** by the MS in the course of an authorisation/supervision process

**evaluation** of risk assessment provided by operator in its authorisation application on **risks** for damages caused to a **third party**

ESA's **technical opinion** on **compliance** of operator's space activity as provided by operator in **technical information to MS** (SDM rules, standards, recommendations and guidelines applicable under the NSL, related to development, launching and operation)

- ESA is an active promoter of space law!
- ESA accepted rights & obligations of 3 UN treaties: ARRA, LIAB and REG
- ESA policies for the internal regulation of:
  - Launching State Liability
  - Space Debris Mitigation
  - Space Object Registration
  - Frequency Management
  - Nuclear Power Sources



## Space Debris Mitigation Policy for Agency Projects (2014, revised 2022)

- Applies to the procurement of ESA space systems and operations under the responsibility of ESA
- Compliance with **technical standards** from e.g. the International Standardisation Organisation and the European Cooperation for Space Standardisation
- Future aspects outside the scope of the Policy: a “zero-debris” approach to be implemented by 2030?



## ESA Space Object Registration Policy (2014)

- Additional information on a space object previously registered by the European Space Agency**
- European Student Earth Orbiter (ESEO)**
- Information provided in conformity with the Convention on Registration of Objects Launched into Outer Space**
- |                                                      |                                       |
|------------------------------------------------------|---------------------------------------|
| Committee on Space Research international designator | 2018-099AL                            |
| Name of space object                                 | European Student Earth Orbiter (ESEO) |
| Registration document                                | <a href="#">ST/SG/SER.E/871</a>       |
- Additional voluntary information for use in the Register of Objects Launched into Outer Space**
- |                                                                    |                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Change of status in operations                                     |                                                                                                                                                                                                                                                                                  |
| Date when space object was no longer functional                    | 4 December 2020 UTC                                                                                                                                                                                                                                                              |
| Date when space object was no longer operational                   | Not available (passive de-orbit)                                                                                                                                                                                                                                                 |
| Physical conditions when space object is moved to a disposal orbit | Not available                                                                                                                                                                                                                                                                    |
| Website                                                            | <a href="http://www.esa.int/Education/ESEO/The_ESEO_Mission">www.esa.int/Education/ESEO/The_ESEO_Mission</a>                                                                                                                                                                     |
| Other information                                                  | The projected date of re-entry, in accordance with the European Cooperation for Space Standardization recommended method and the International Organization for Standardization (ISO) Monte Carlo method, is between 13 and 15 years. Both methods are ISO 27852:2016 compatible |

# ESA's participation in space law making I

- ESA is a **permanent observer** in the UN Committee on the Peaceful Uses of Outer Space (COPUOS)
- ESA coordinates & assists its Member States during the preparation for COPUOS, its Scientific and Technical Subcommittee and its Legal Subcommittee
- ESA **applies space law** on a daily basis through its programmes



- ESA assists its Member States in the establishment and implementation of **national space law** through technical and legal advice
- Legal advice:
  - Institutional and programmatic level;
  - Clarification on obligations rooted in international law
  - Understanding of the Agency's programmatic framework
  - Updates on current State practice & legal developments

- Set up by the ECSL Charter in 1989 under the auspices of the European Space Agency (ESA) and part of ESA' Legal Department
- Composed of **10 Board Members**, who meet at least bi-annually and are elected every 3 years by the ECSL General Meetings of Members
- The day-to-day running, promotion and relations with Members is carried out by the **Executive Secretariat**
- Located in **ESA HQ** in Paris, France
- **Promotes** the overall **knowledge and development of space law** in Europe through both academic and industry-focused activities
- Members include:
  - Students, Individuals (Professionals and Academics) and Institutional Members (Ministries, Universities and Companies)



- Summer Course on Space Law and Policy (annual event)
- 2 weeks of lectures, panel discussions and group project work
- Next year: Budapest, Hungary
- Application process:
- Italian NPOC – Pre-selection
- CV + Motivation statement

