

# What role for the public sector in the future space economy?

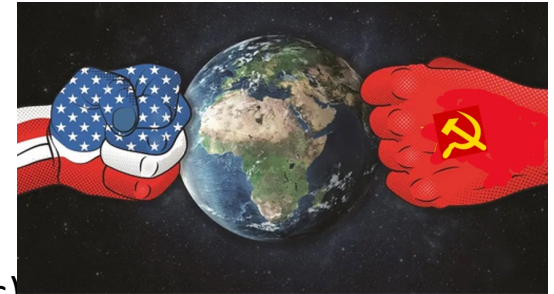
Elena Grifoni Winters  
Gran Sasso Science Institute  
PhD Days  
L'Aquila, 6th June 2024

- **The public sector has had a fundamental role in the development of space activities**
- **However in the last 10/15 years the space sector has undergone a true “mutation”**
- **The entry, and consolidation, of new private actors is a defining characteristic of the new space**
- **What is today, and what should be in the future, the role of institutions to ensure the sustainable growth of space activities?**

## - The fundamental role of the public sector in the development of space activities -



- 75 years of space activities (1957 Sputnik)
- Broadly divided in 2 phases:
  - Phase 1 (1960-1990: Competition + Science)
  - Phase 2 (1991 – to-date: Cooperation + Applications)
- Always sustained by 2 key drivers:
  - The political driver
  - The military driver
  - (The economic driver)



**→ lead by public sector initiatives and investments**



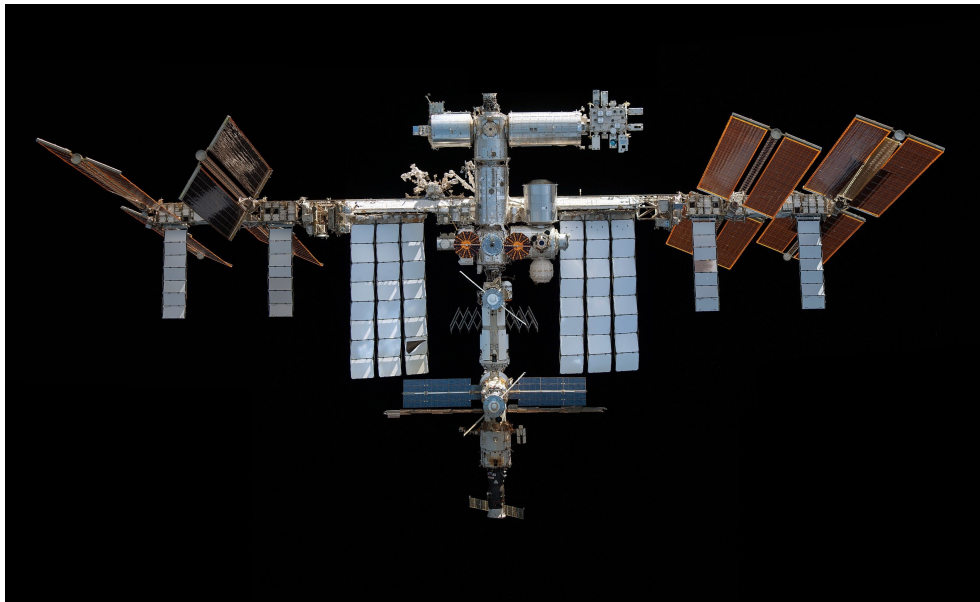
## EXAMPLES



### The space race:

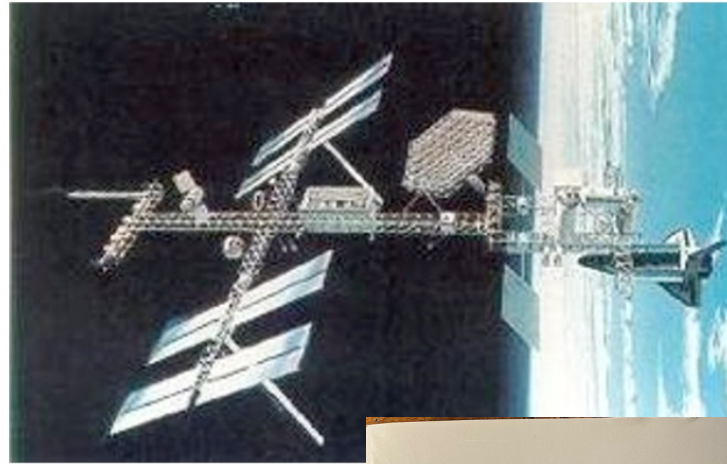
- Purely public/institutional (US/USSR)
- 2 main objectives:
  - Visibility/Prestige as political/diplomatic instrument
  - build and maintain competence and capacity (not products competitive on the commercial market...), also in support of the development of military technology
- Immense public investment
  - 1966: NASA's budget = 5.5% US Federal Budget;
  - 2024: < 1%

## The International Space Station Programme:

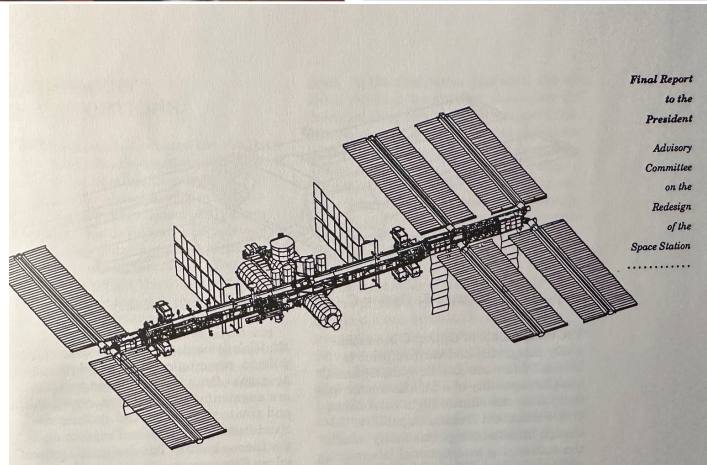


- A scientific and **POLITICAL** programme
- No monetizable ROI and high risk/costs
- Rigid G2G Governance

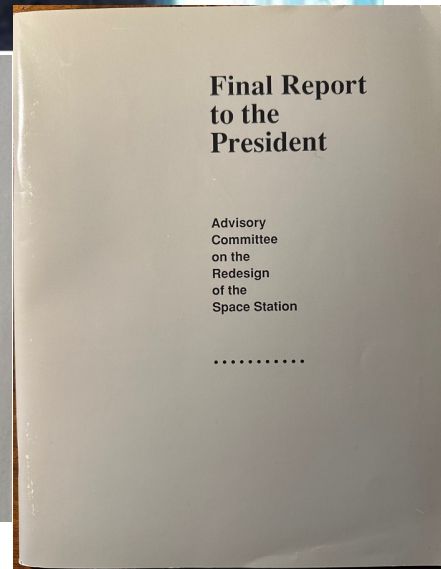
# The International Space Station



1988...



*Final Report  
to the  
President  
Advisory  
Committee  
on the  
Redesign  
of the  
Space Station  
.....*



...1993



The public sector has had a unique role in the establishment, development and support of space activities, characterized by:

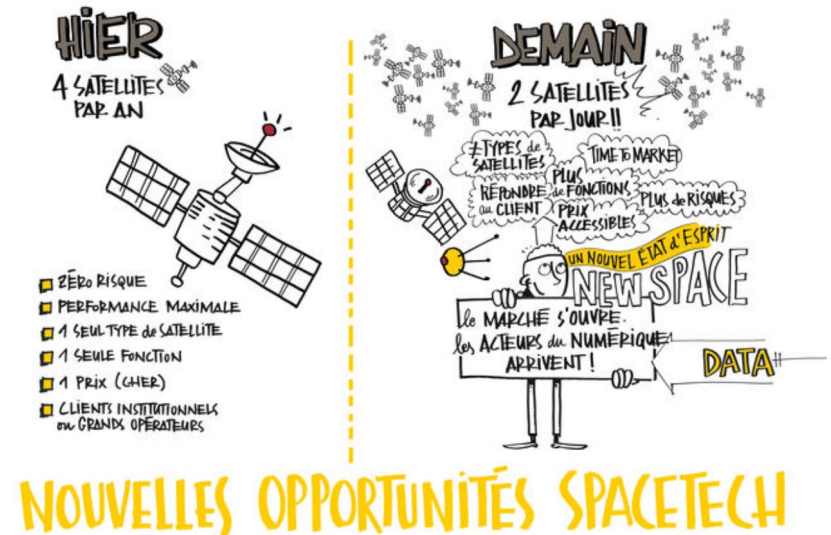
- High risks and costs, lack of ROI, relevance to military technology and capacity and
- Their use as instruments for geo-politics and (soft) diplomacy

This set-up/governance has produced:

- A stable environment allowing for the realization of Long Term programs, fixing obligations and benefits and therefore protecting the respective investments (IGA/MOUs)
- The maximization of the use of (the best) technology, cost and risk sharing
- **the UNQUANTIFIABLE political value of cooperation and peace**

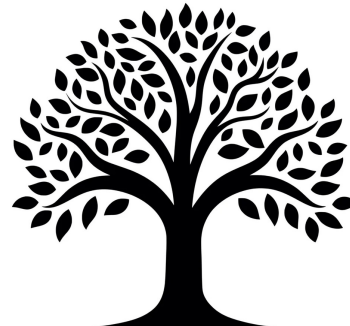
# Space Economy/Private actors

- Since 10/15 years the private sector has taken an increasing role in space activities
- The main drivers of this mutation being:
  - The widening of the spectrum of space activities
  - Technology
 Giving birth to the “Space Economy”



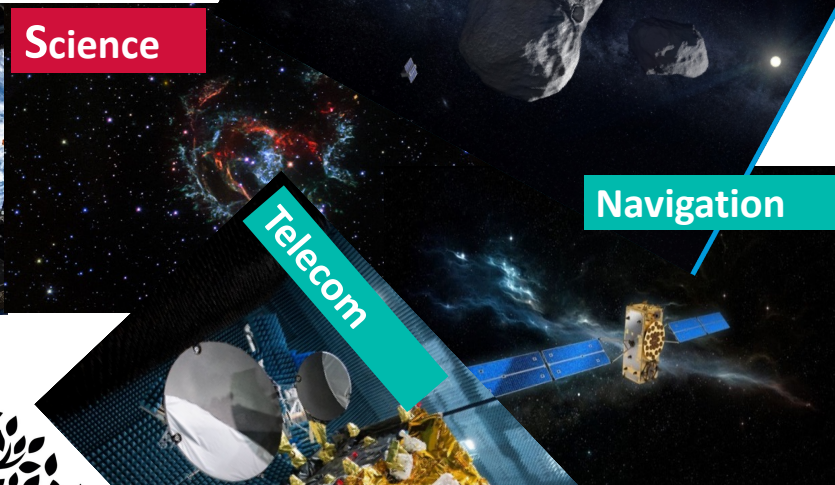


# From Science and Exploration...





**... to APPLICATIONS**

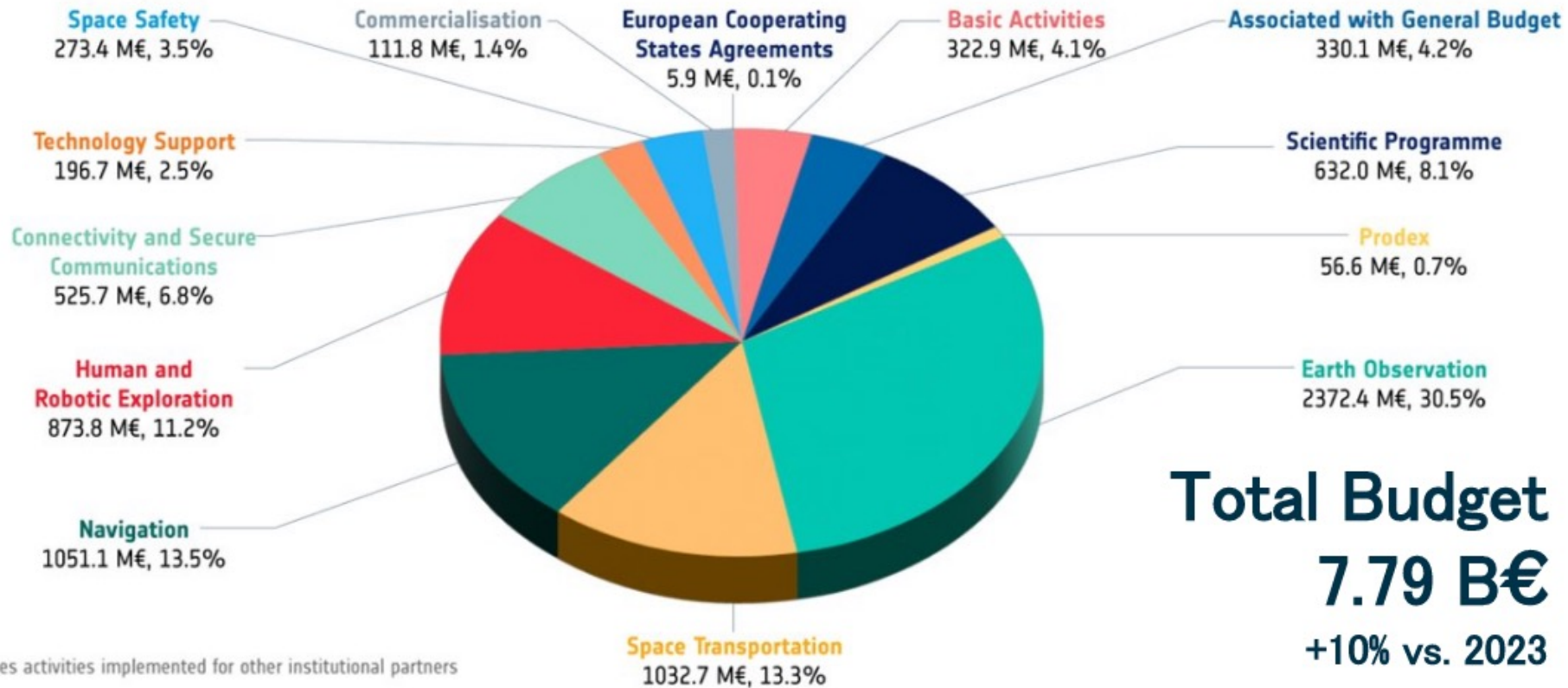


**Safety**

**Navigation**

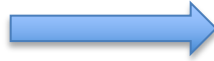


# ESA Budget 2024



**Applications (EO/NAV/TC/Safety represent > 50% of ESA activities)**

# TECHNOLOGY



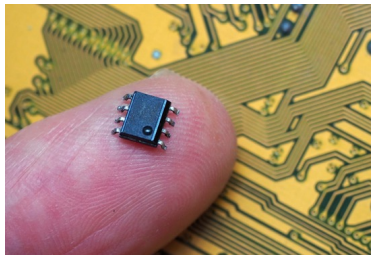
A true Technology leap opens the way to new missions, new applications and new players

Quantum tech



Secure comm

Miniaturization



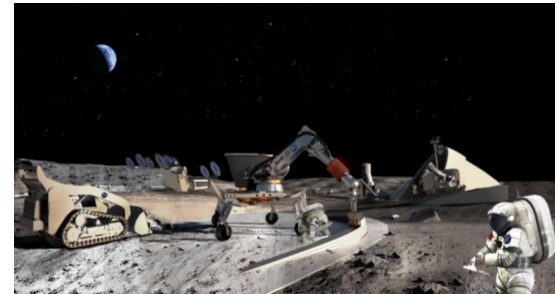
Cube and Nano Sats

A.I.



Obstacles avoidance

Additive Manufacturing



Habitable Infrastructure

# The numbers of the Space Economy

## OECD SPACE ECONOMY HANDBOOK – 2022

The space economy consists of **space-related goods and services**, both **public and private**. This includes goods and services that:

- are used in space, or directly support those used in space
- require direct input from space to function, or directly support those that do
- are associated with studying space



447B\$ - 2020  
 506B\$ - 2021  
 546B\$ - 2022



385B\$ - 2020  
 370B\$ - 2021  
 464B\$ - 2022



371B\$ - 2020  
 386B\$ - 2021  
 384B\$ - 2022



368B\$ - 2019  
 447B\$ - 2020



309B€ - 2017



1T\$ - 2040



630b\$ - 2023  
 .....  
 1,8T\$ - 2035

If the numbers may be “confused” and “confusing” one thing is sure: there is a space economy and it’s there to stay (and grow)

## - The role of the private sector -



Private companies investing their money...



... and private investors





**PRIVATE ACTORS**

- 2002 (100M\$)
- 2023 profitable (8+B\$)

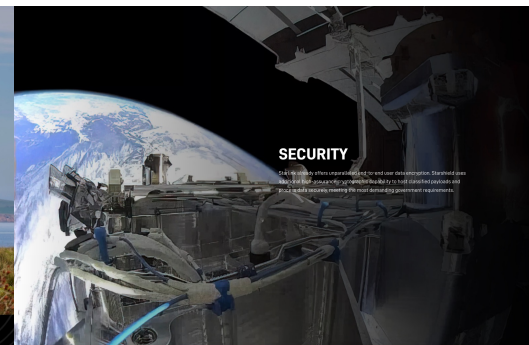
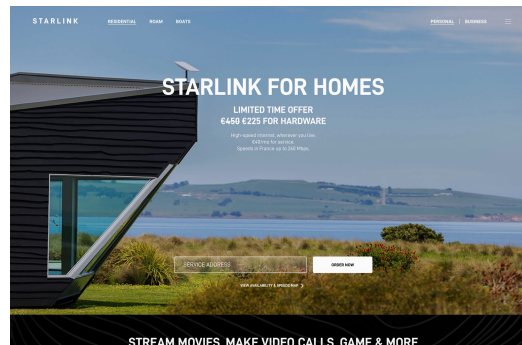
**Aerospace company**  
**Manufacturer and provider of:**

**Space Launch Services**  
**(Enabling Infrastructure)**

2023 → 98/109 US Launches



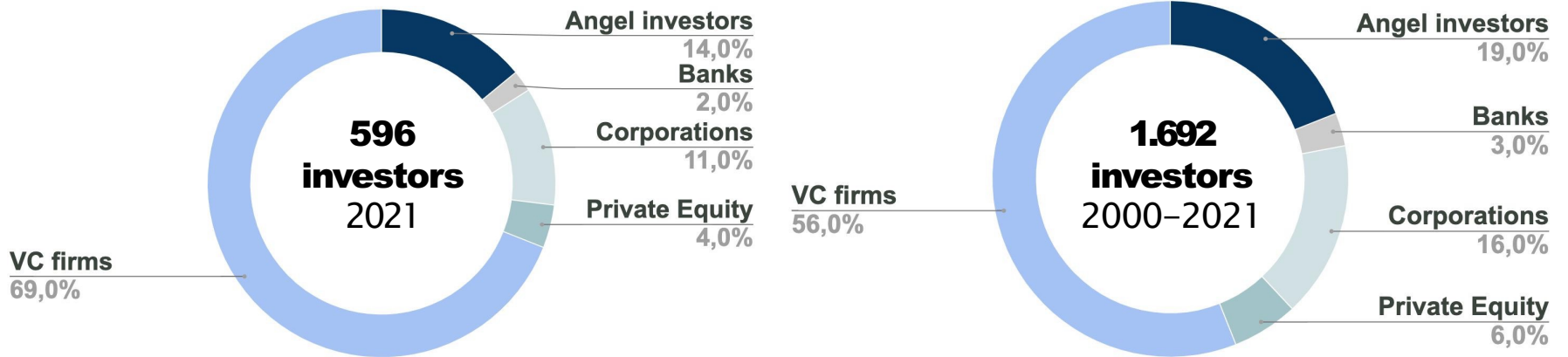
**Telecom Services**  
**(Services)**

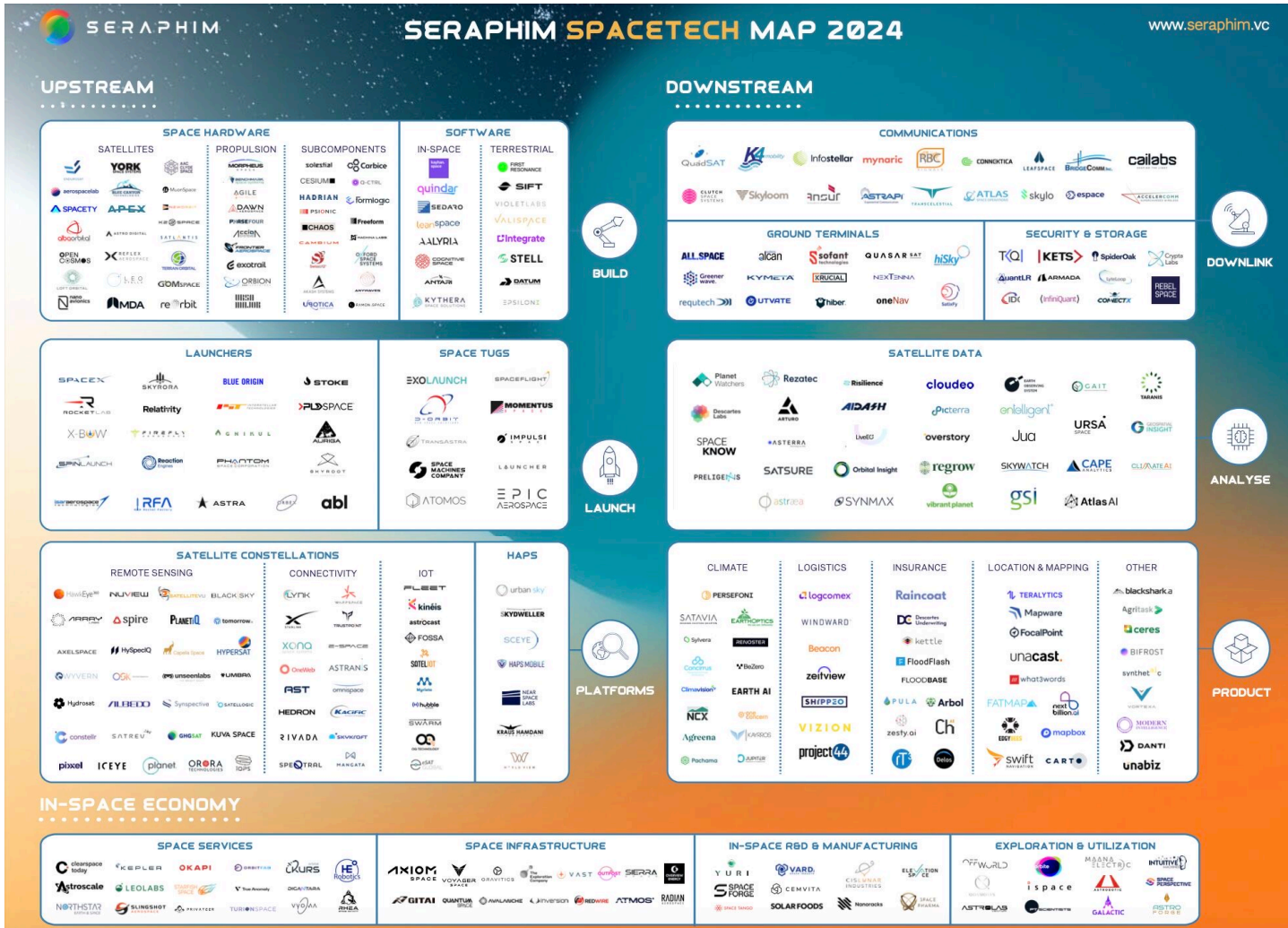


**PRIVATE INVESTORS**

**2000/2021** → **1.626 investors** have invested in space companies

Almost 30% of these investors invested in startup space ventures for the first time in 2021.







**Since 2010,**

thanks to the evolution of technology, the reduction of prices, and the increasing relevance of the space sector for the economy world-wide,...

**private actors and investors have taken up an increasing role,**

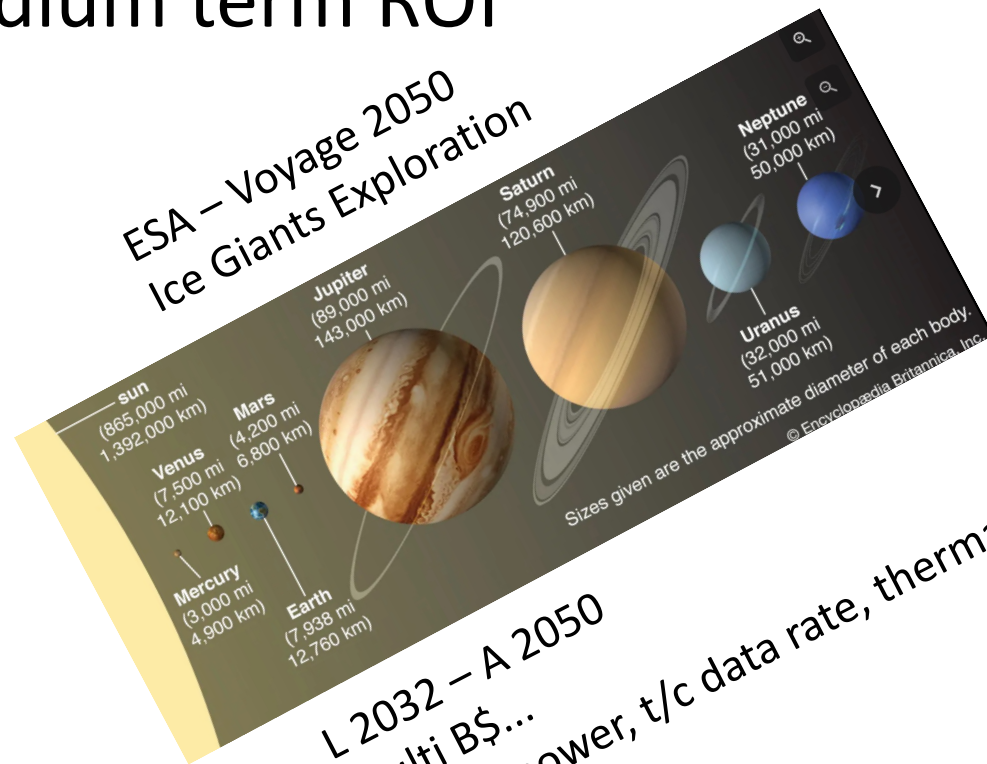
**accelerating the growth of the space economy and**

**revolutionising its governance, and methodology.**

**What is today the role of institutions in the space sector?**

# Today - Programs

- Large R&D Science/Exploration Programs
- no short/medium term ROI
- Low TRL
- Political
- Cooperative
- ...



L 2032 - A 2050  
 Multi B\$...

Electric power, t/c data rate, thermal environment  
 RTG...

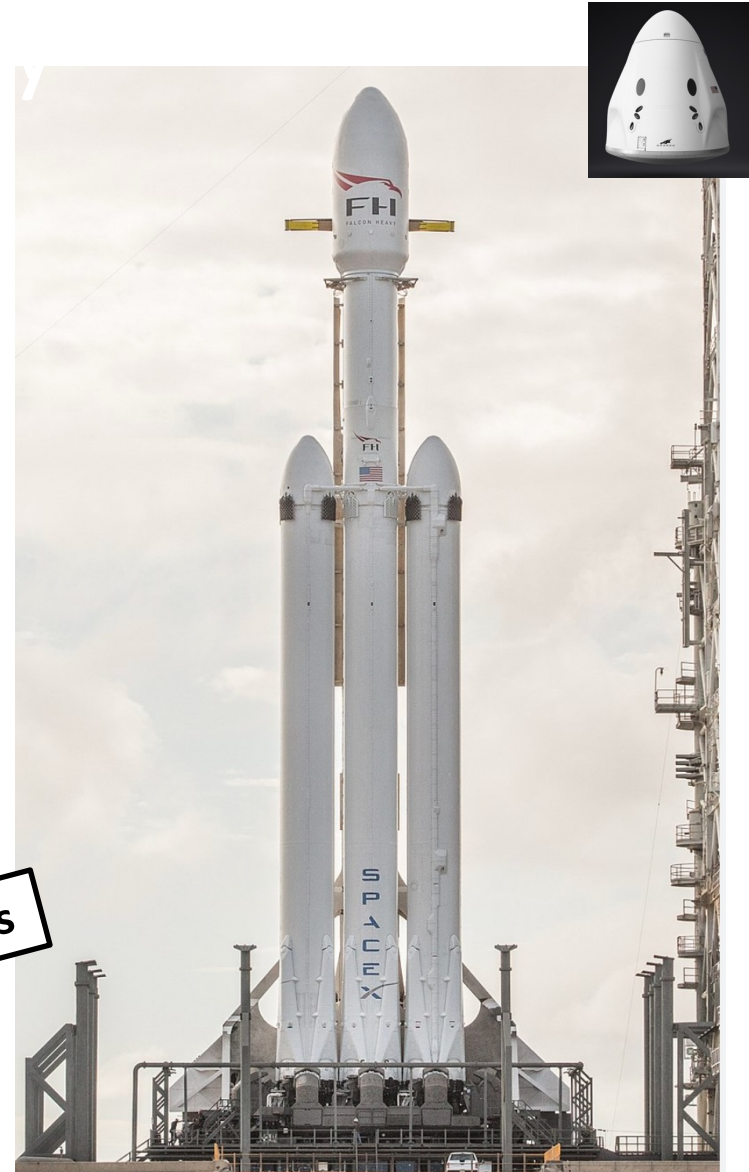
LAUNCHERS

## SpaceX – Falcon 9&H

2023:

- 98F9H/109 US Launches
  - 63/98 Starlink
  - 15/35 Institutional
  - 20/35 Commercial
- 3.5 B\$ revenues
- 2/3 revenues institutional

Guaranteed yearly sales at subsidized prices



# Today – Anchor Tenancy

**The LEO Economy**



Commercial Crew Program  
> 8B\$ (2010)



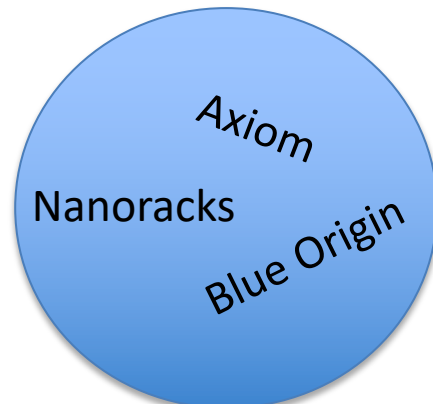
Boeing: >4B\$



SpaceX: >3B\$



Commercial LEO Destination Program



> 0.5B\$  
Already  
awarded

# Today - Funding

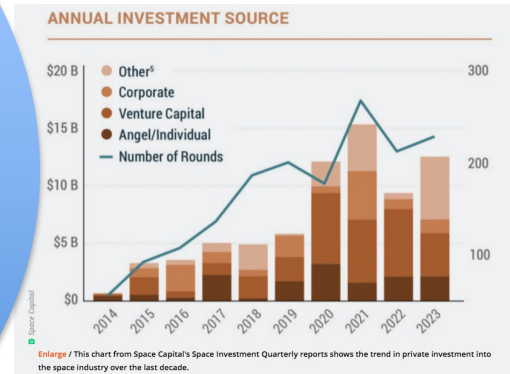
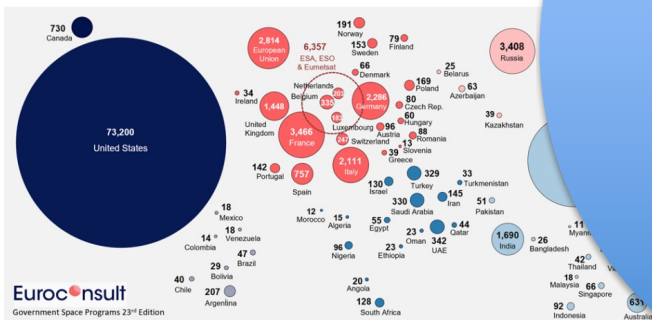
**The space sector still is fundamentally institutionally**

**Factor 10:1**

**Public Investments 2023 = 117 B\$**

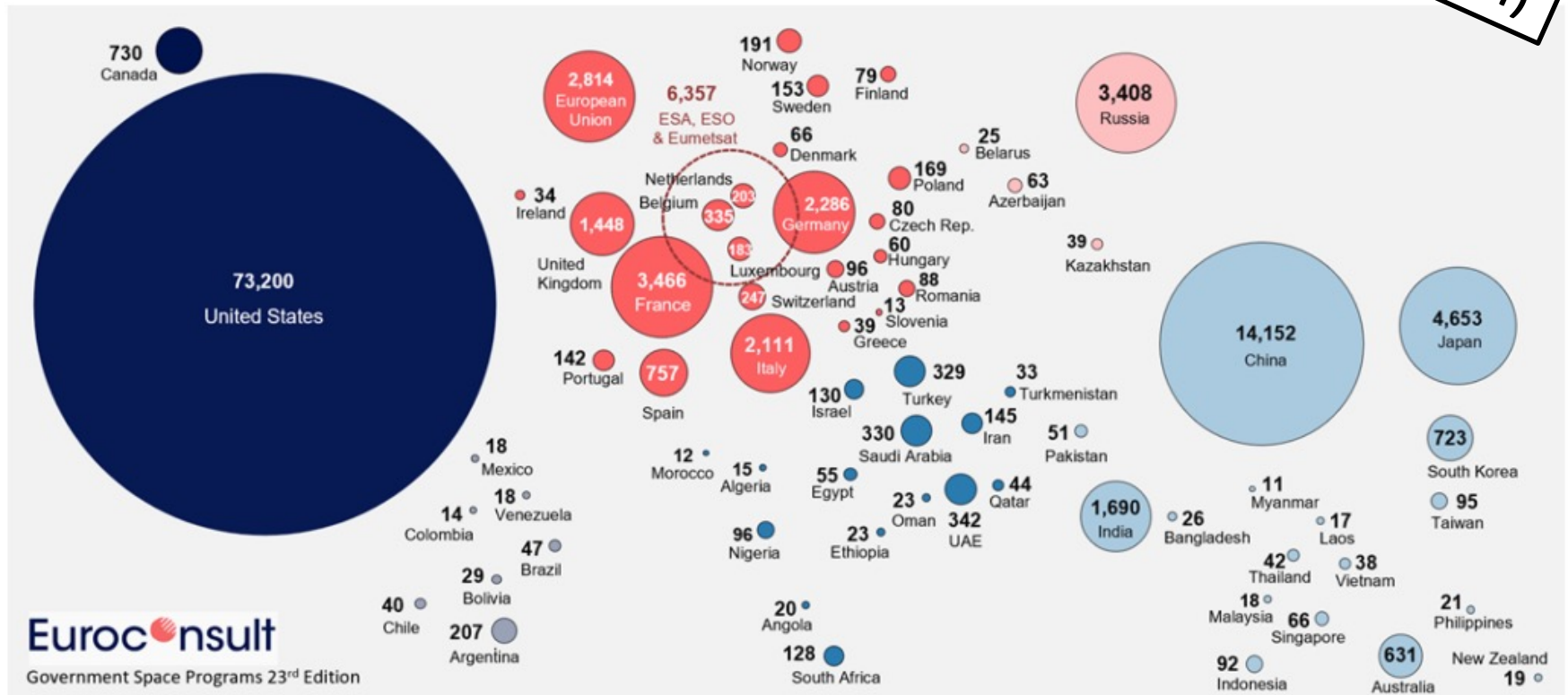
**Private Investments  
2023 = 12.5 B\$**

World government expenditures for space programs in 2023\* for a total investment of \$117 billion



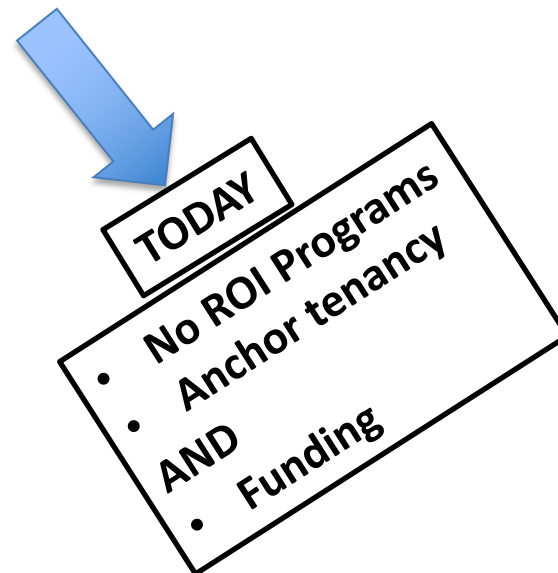
**Substantial share from the (US) military sector)**

World government expenditures for space programs in 2023\* for a total investment of \$117 billion





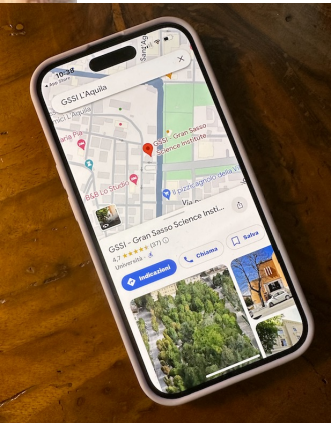
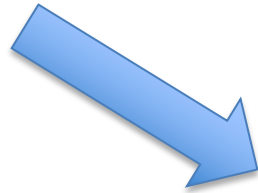
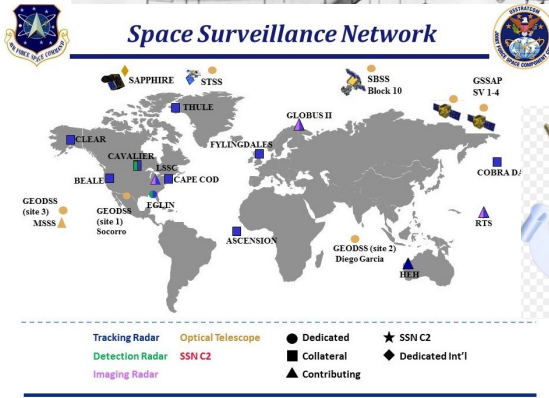
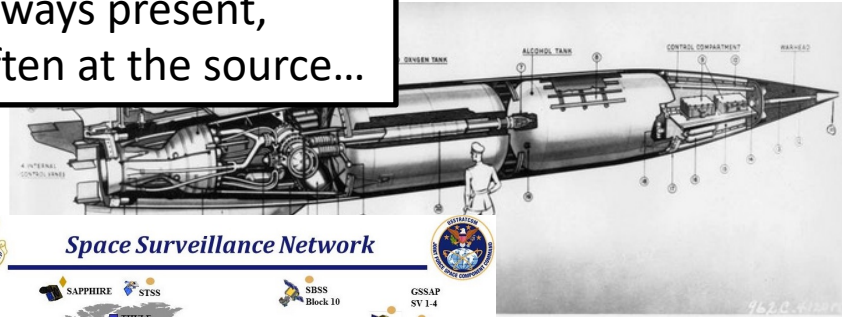
- What is today the role of institutions in the space sector? -



**And what will be its role in the future?**

# The Security dimension

Always present,  
often at the source...



...and growing

# The Security dimension <sup>2/4</sup>

Operational range

from

Sub-orbital

to

Sub-orbital AND Orbital

BECAUSE

## Starlink in Ukraine

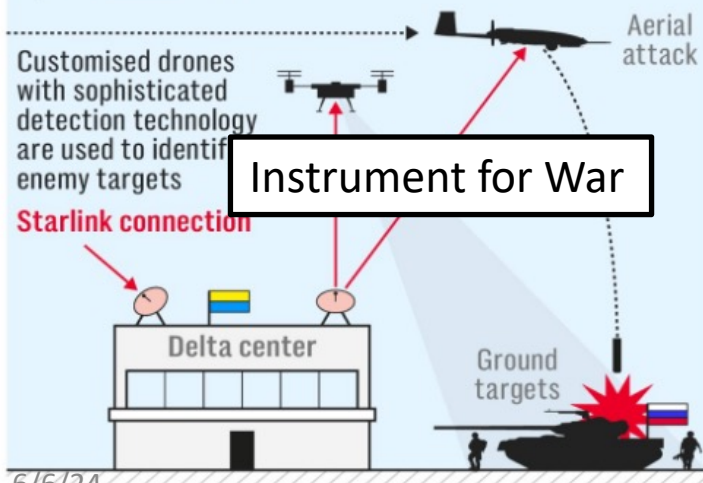
Ukraine aerial reconnaissance

The Aerorozvidka unit uses the Starlink to operate their drones

Customised drones with sophisticated detection technology are used to identify enemy targets

Starlink connection

Instrument for War



6/6/24

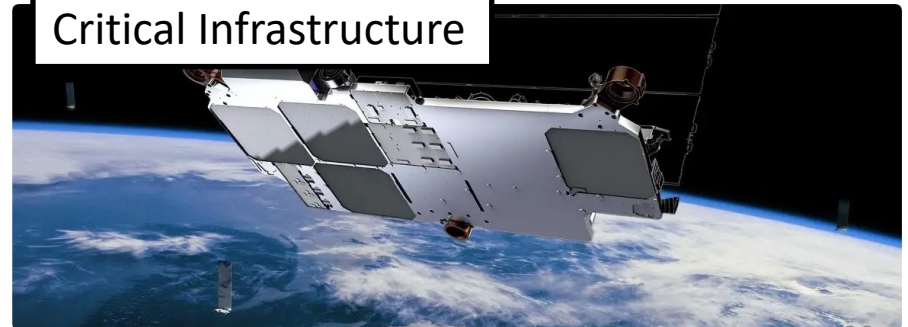
## Space Infrastructure

### Jamming and Cyber Attacks: How Space is Being Targeted in Ukraine

Juliana Suess  
5 April 2022 5 Minute Read

SHARE

Critical Infrastructure



# The Security dimension 3/4

The military dimension of space grows...

**France's Macron announces creation of French space force**



By Euronews with Reuters  
Published on 13/07/2019 - 22:59



... creation of « Space Forces »

... the budgets grow



# The Security dimension

4/4

The military dimension of space grows...

ORG/ FY	NASA	US SF
2021	23B\$	15 B\$
2022	24B\$	17B\$
2023	25B\$	26B\$
2024	27B\$?	30B\$?

... the budgets grow



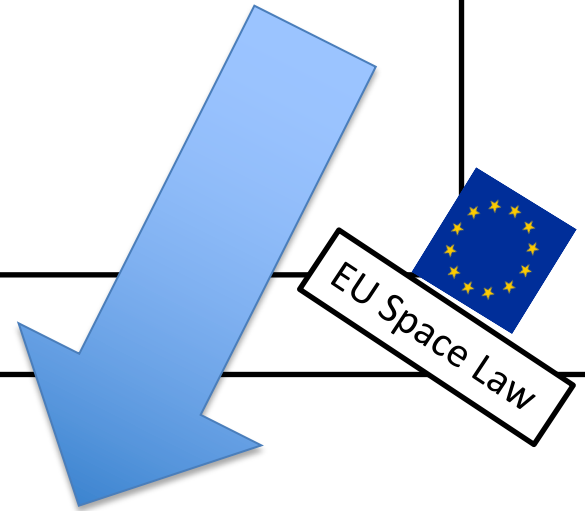


# Regulation

- Today, space is central to our lives and welfare
- Its evolution can play a key role in our sustainable and peaceful evolution
- This evolution is challenged by
  - Arrival of new players
  - Global competition
  - Security and sustainability threats

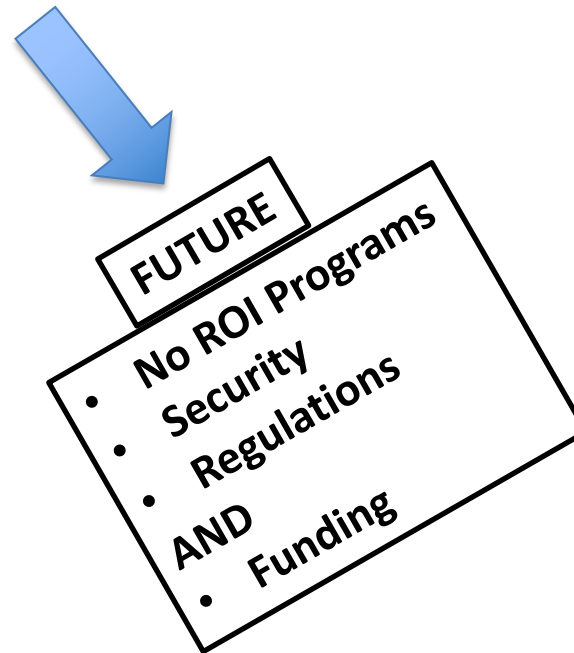
## COMMON RULES

- (in Europe) to boost competitiveness
- To regulate the private sector (risks, pollution, resources/strategic inst. ownership)
- To ensure the enforcement of our fundamental principles (peaceful use)





**And what will be, in the future, the role of institutions in the space sector? -**



The public sector has the **OBLIGATION**  
 to ensure  
 the evolution of space activities in  
 support **the sustainable and peaceful**  
**future on the planet**



**A turbulent and fragmented world**



# THANK YOU

