

Future **Perspectives** 2040+

European Space Policy Institute

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The European Earth Observation
Ecosystem 2040+

ESA ESTEC, 11.2.2025

Dealing with Reality

From a political perspective, Europe remains very **vulnerable to the inducements and impositions of foreign actors** when it comes to both its external and internal decisions.

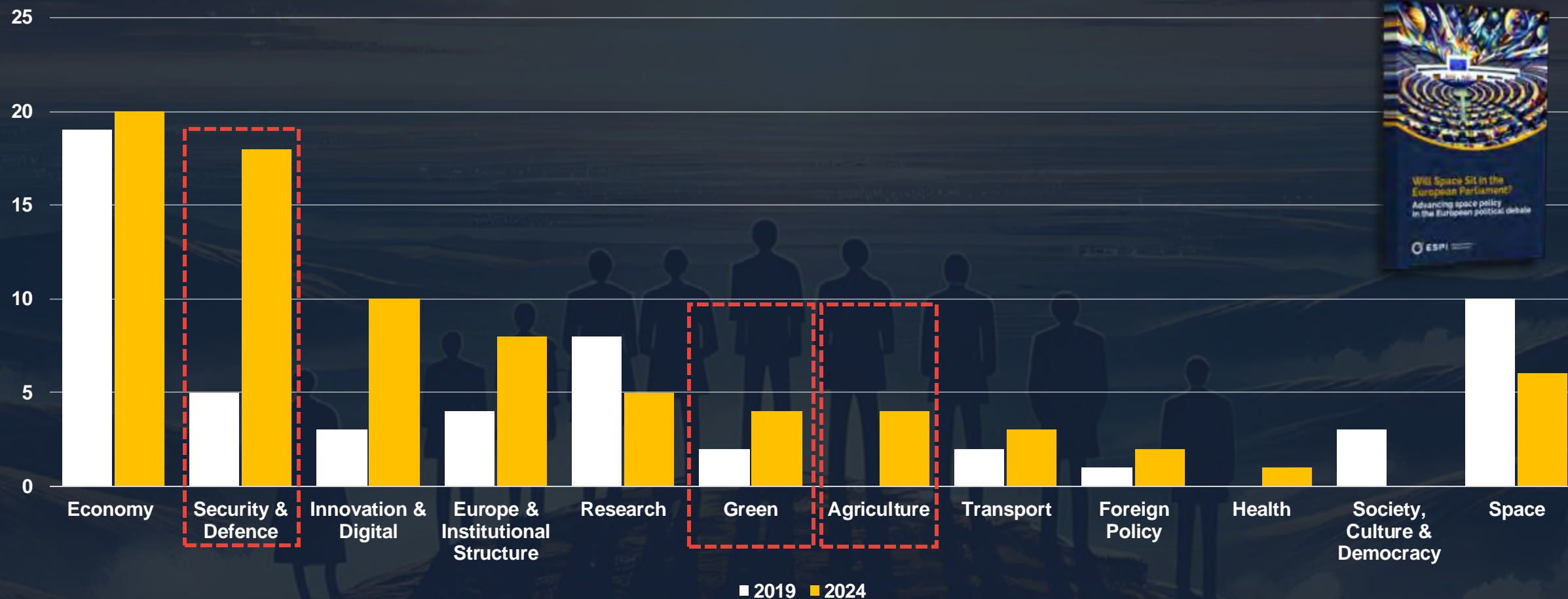
Europe as a whole **lacks the fundamental features defining autonomy** over space matters.

Europe **falls short on other key indicators**, such as the use of space for military and security applications or the use of space for diplomatic purposes,

"Europe as a Space Power" (ESPI, 2023)

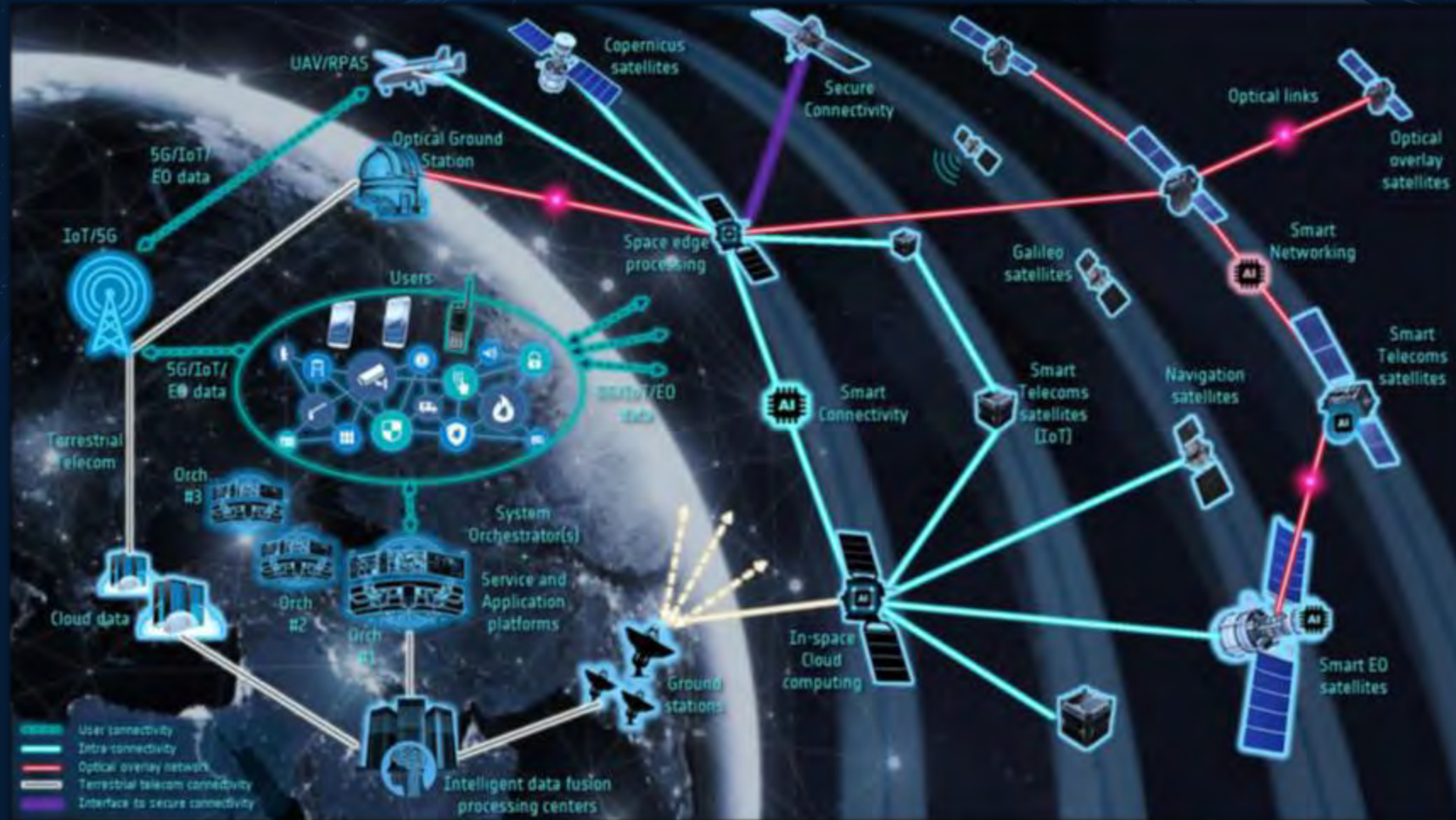
European Parliament Election 2024: "from Kyoto to Kiev"?

+ 41% surge in space-related references in 2024 EU elections compared to 2019 across party manifestos.





SYSTEM INTEGRATION



R3 Vision – Leveraging multiple systems (Source: ESA)



SPACE & STRATEGY – Supply-side push --> Policy PULL

- **Beyond EO** - Europe should position itself as a champion of integration of space applications
- **Space4Economy** - (and beyond the downstream): Verticalization, from the space economy towards the development of space for the economy
- **Competitiveness** - European space ecosystem: high cost of R&D & low level of capital support
- **Security** - More than the military use: critical infrastructure, food security & economic resilience
- **Space4Diplomacy** - Space as a critical tool for diplomacy, Europe as a trusted partner
- **Regional** - Arctic and Mediterranean, Eastern Europe, e.g. space solutions for security & defence



Source: An Initial Perspective on a European Space Strategy 2040: From Vision Towards Implementation

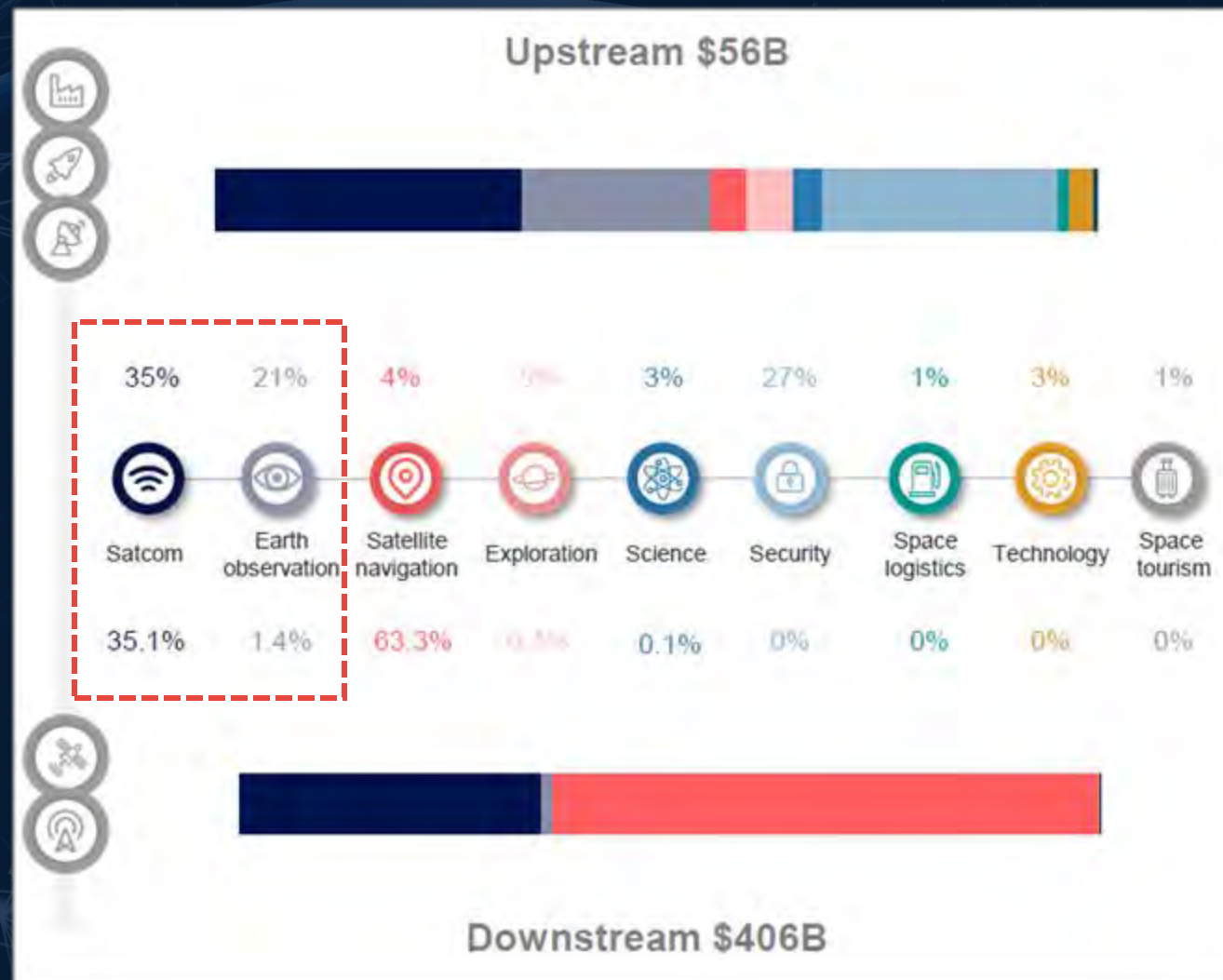
In EO, the strategic focus for the next decade should expand to

- **Addressing climate adaptation** and
- **Placing greater emphasis on economic & security and defence policy**

Europe must move from space introspect focus to developing an eco-system beyond the space bubble



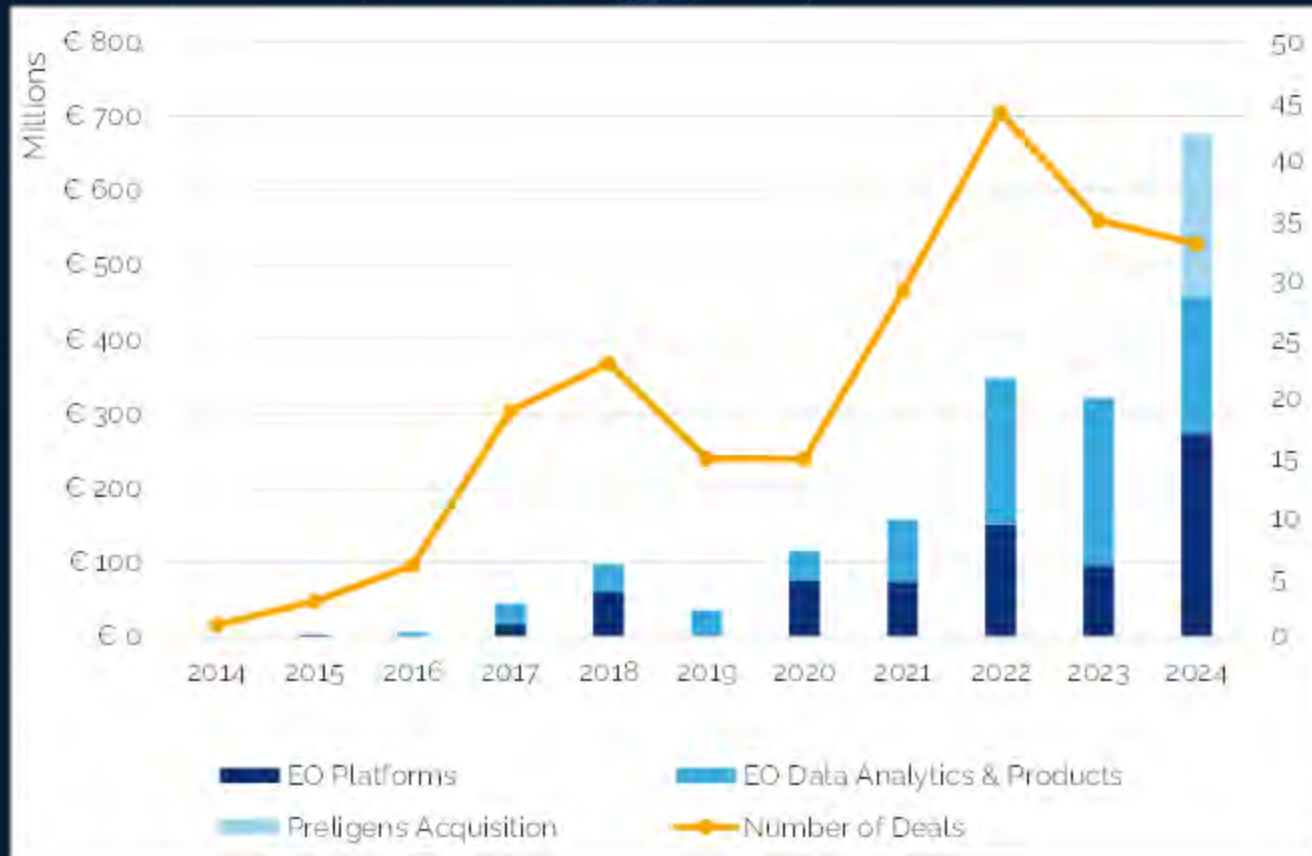
EO WITHIN THE SPACE ECONOMY "on the menu?"



Space market trends by application (Source: Euroconsult 2023)



EUROPEAN INVESTMENTS IN EO ECOSYSTEM

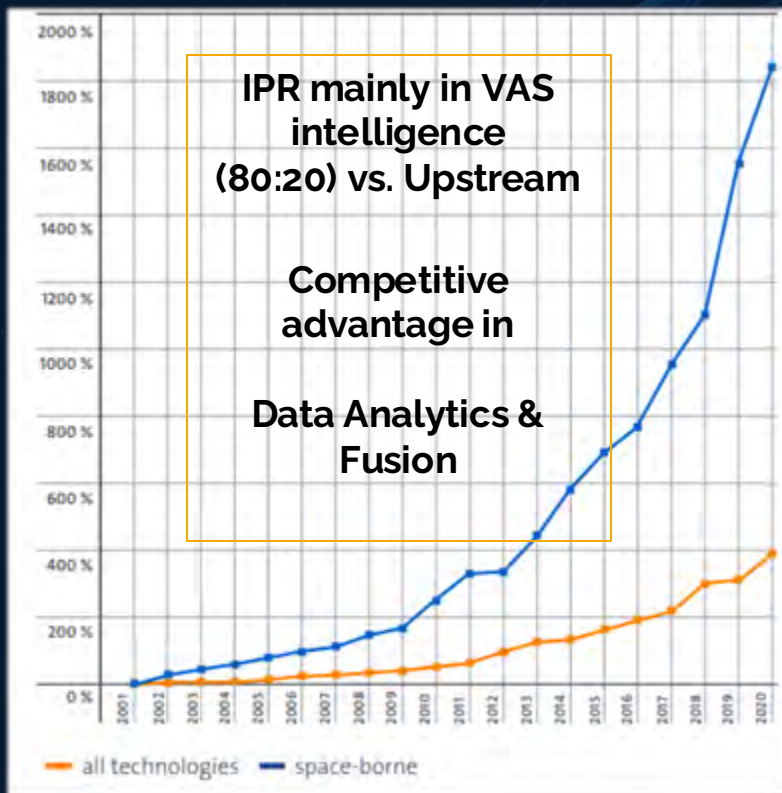


Investments in EO Space Ventures in Europe
(Source: ESPI Space Venture Database)

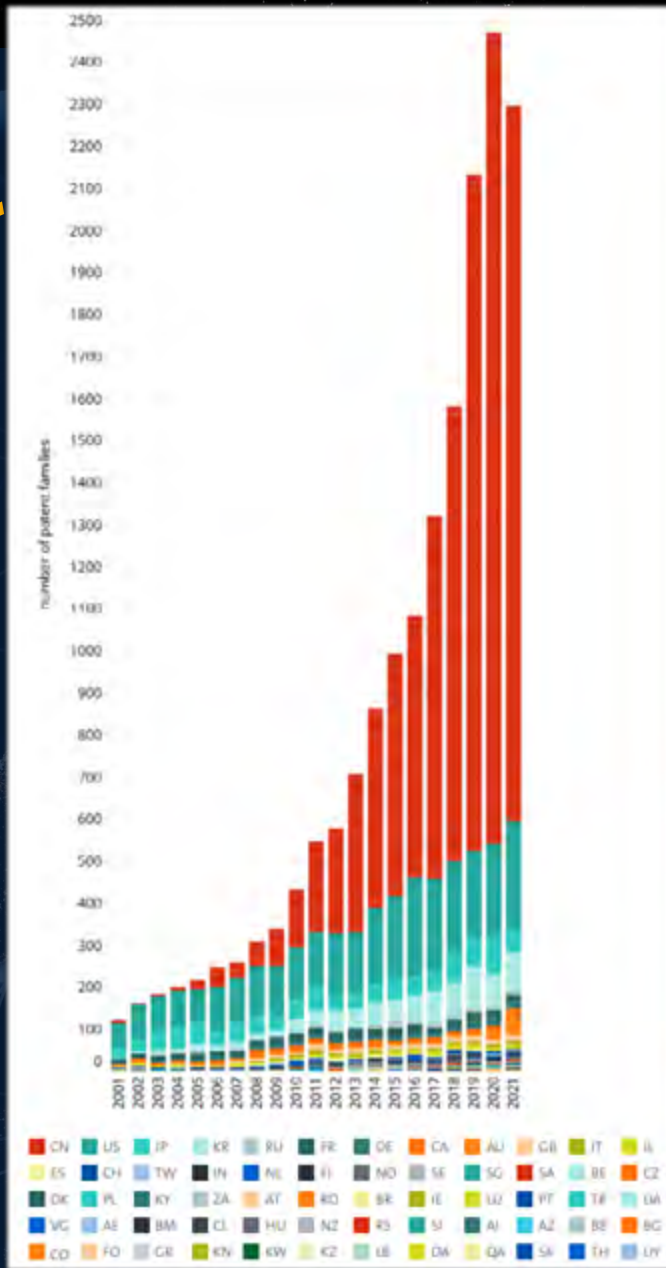


INNOVATION GAP

From innovation to commercial



Growth rate of patent filing activity (by publication year) in green applications of space-borne compared with filing in all technologies



Timeline of patent filing activity in space-borne sensing by country of applicant



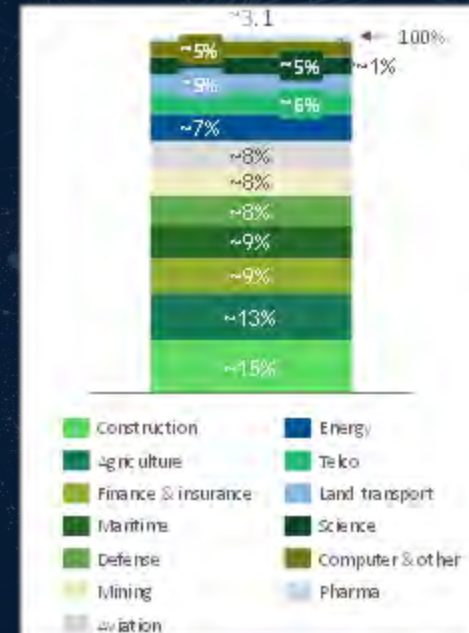


SPACE4ECONOMY

Industry	SatCom	PNT ¹	Earth Obs. ²	Space Expl.	Exemplary business case
Agriculture	High	High	High	Medium	Precision fertilization and planting through autonomous tractors
Aviation	High	High	Medium	Medium	Over-ocean flight route optimization
Computer & other	Medium	High	Medium	Medium	Navigation for smart devices and wearables
Construction	Medium	High	Medium	Medium	Construction equipment mgmt and predictive maintenance
Defense	High	High	High	High	Secure satellite communications and coverage of remote areas
Energy	Medium	Medium	High	Medium	Space weather monitoring to avoid power grid disruptions
Finance & insurance	Medium	High	Medium	Medium	Evaluation of assets status
Land transport	Medium	High	Medium	Medium	Management and deployment of connected fleet
Mining	Medium	High	Medium	Medium	Autonomous haul truck fleet driving
Pharma	Medium	Medium	Medium	High	In-space R&D and research for new product development
Science	Medium	Medium	Medium	High	Space technology spin-offs unlocking new markets potential
Maritime	Medium	High	Medium	Medium	PNT for navigation and positioning in remote areas
Telco	High	Medium	Medium	Medium	Geostationary and NGSO satellites for communication purposes

● High value potential
 ● Moderate value potential
 ● Low value potential

1. PNT: Positioning, Navigation, Timing 2. Incl. (Space) weather forecasting



Space value of Space for economy '22 (\$T)
 (Source: ESPI-BCG More than a Space Programme)

Space application value potential across selected industries
 (Source: ESPI-BCG More than a Space Programme)



To date, European space policy and programme action is mostly concerned with **space capabilities**, and less so with:

- the **policy impact of space** - integrating space into other policy sectors, especially adaptation and including security & defence,
- building the **required foundations** in industrial competitiveness, bridging the innovation gap, talent and finance.



POLICY IMPACT

SPACE POLICY INTEGRATED WITH OTHER POLICY DOMAINS

- Integrate space with other policy domains of governments, political programmes, parliamentary action and policy directions for the development of space for the wider economy.
- Align space policies and programme actions with strategies in other sectoral domains, including digital, green, security and defence, energy, mobility and health.
- Design space policy in support of business strategies beyond the space industry for industries in other sectors, including Fortune500 companies and entrepreneurs in energy, food and agriculture, insurance, automotive, telecommunications, chemistry, finance, health and pharmaceuticals.
- Leverage space for diplomacy as an integral component of European action in international cooperation.



GREEN, SUSTAINABLE AND RESILIENT SOCIETIES

Europe should increasingly be at the forefront of using space, and especially EO, for addressing today's main policy challenges in the environmental and security domains

To this end, there is a need to shift from using space for monitoring crisis to action

ESPI is committed to facilitate:

- Federated and user-driven advancement of **space services for energy, digital, emergency management, urban, mobility and agriculture** priorities
- The **focus on adaptation** to climate change impacts, from prevention to recovery
- Leveraging **mitigation & adaptation financing sources to develop space** solutions & infrastructure
- An increased role of **space for diplomacy** in Europe
- An increased **integration of space into Green Transition policies and strategies**, including the European Green Deal and EU climate legislation
- The use of **space at the core of future integrated sustainable solutions**
- The **growth of the EO commercial** sector in line with main policy priorities



POLICY VALUE OF EO



Digital Transformation

Ensuring that digital infrastructure and technologies, including their supply chains, become more sustainable, resilient, and energy- and resource-efficient, including AI data centres.



Agriculture & Food

Monitoring and operations management of farming, land, livestock (including aquaculture). Food supply chain.



Climate Resilience and (Natural) Emergency Management

Includes climate-induced natural disasters such as floods, wildfires and drought, and other natural disasters such as earthquakes, tsunamis, hurricanes, etc., and their management and disaster planning.



Energy (Infrastructure & Renewables)

Including energy infrastructure (grids, poles, etc.), transition to renewable energy, nuclear energy, energy efficiency. Also includes marine energy infrastructure



Peace & Security

Combines defence, law enforcement & justice, and civil security, including human rights, migration and protection of citizens, international diplomacy.

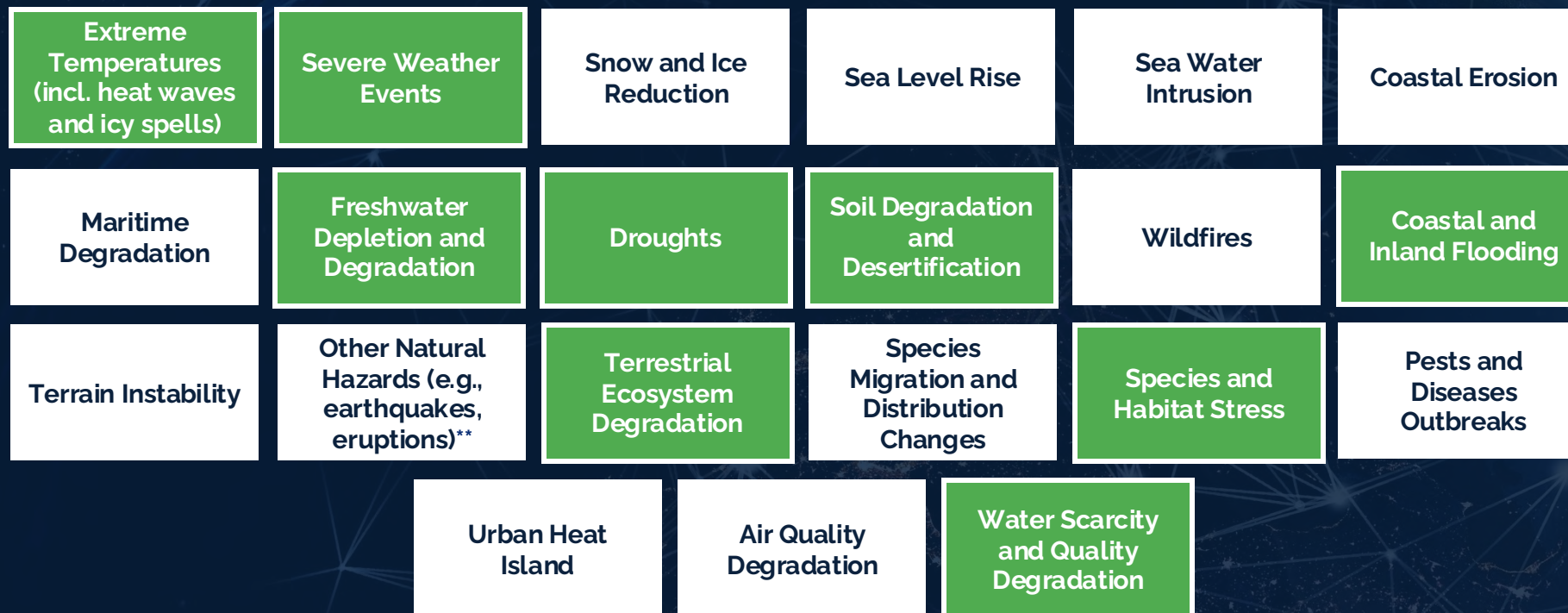


Finance & Insurance

For finance, this includes risk evaluations for loans or lending, asset monitoring and valuations, investment decision making (e.g. urban planning), space as a watchdog for ESG. For insurance, this includes fraud prevention, risk assessment, claims verification.

Climate Resilience & (Natural) Emergency Management

Priority challenges to address (>90% of countries)



Agriculture & Food

Priority challenges to address (>90% of countries)

Animal Monitoring and Management	Development of Rural Areas	Crop Health	Soil Quality	Land Usage	GhG Emissions	Lands Contributing to Carbon Sequestration
Monitoring Weather	Monitoring and Assessing Farm Infrastructure	Monitoring and Assessing Farm Vehicles	Promoting Organic, Local, and Seasonal Produce	Sustainable Packaging	Biodiversity Protection	Biodiversity Extension
Water Body Quality	Digital Tools (e.g., precision farming, AI/ML, IoT)	Irrigation Management	Yield Optimisation, Estimation and Forecasting	Harvest Scheduling and Storage Planning	Farm Waste	Food Waste
Food Transport	Short Supply Chains	Cooperation with Other Sectors	Food and Produce Quality	Ensure Traceability and Transparency in the Food Chain	Promote Healthy and Diversified Diets	Consumer Education & Training
Farming Training	Ensuring Food Access for Vulnerable Populations	Promote Young Farmers and Fishers	Aquaculture Monitoring	Finance for Farming	Insurance for Farming	Support Farming Laws

Sectors

Protein Crops

Meat Livestock

Apiculture

Dairy

Wheat Crops

Fruit & Vegetables

Wine & Hops

Olive & Oil

Seafood

Sheep & Goats

Peace & Security

Priority challenges to address (>90% of countries)

Border Security and Illegal Immigration Control	Illegal Trafficking	Illegal Financial Activities	Illegal Maritime Activities	Illegal Natural Resources Exploitation	Corruption Prevention	Attraction of foreign direct investment
Terrorist Threat	Disinformation Threat	Upholding Human Right Internationally	Protection of Ground-Based Critical Infrastructures	Search and Rescue	Pandemic Response and Health Crisis	Peace Promotion
Climate Change Impact	Natural Hazard Disaster Response	Risks on Essential Systems	Post-crisis Reconstruction and Recovery	Ensure Swift Military Mobility	Strengthening of Military and Strategic Telecom. Capab.	Ensure Access to a Greater Security Situat. Awareness
Cyber-attack Threat	Protection of Space Assets	International Defence Cooperation	Military Exercises and Training	Conflict Deterrence Capability	Development Cooperation and Humanitarian Crisis Diplomacy	Treaty Negotiation and Compliance Monitoring
		Demographic challenges	Reduce Dependence on Ext. Countries in Strategic Areas	Foreign Espionage Threat		



TAKE AWAYS

Earth Observation is not a guarded domain

- SPACE4ECONOMY & ELONOMICS
- SPACE4POLICY & KYOTO – KIEV

Need to build-in Policy drive & competitiveness of industry as core elements

No business as usual but paradigm shift

Thank you



European Space
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ESPI – Space for the brave