



Italian EO Infrastructure and Services: the overall picture

Prof. Andrea Taramelli

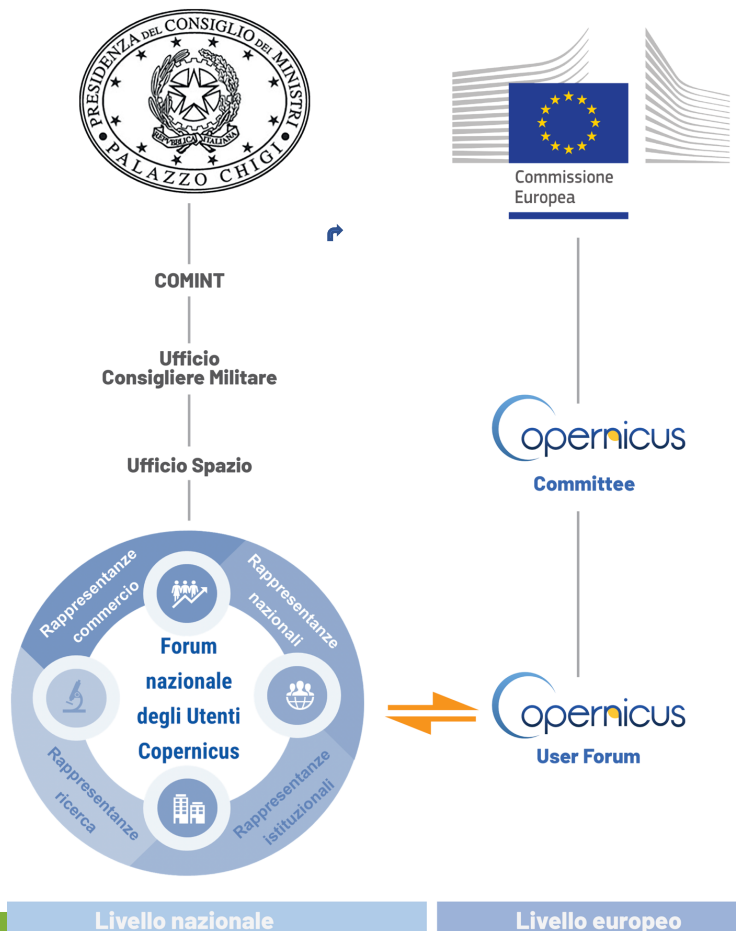


IUSS
Scuola Universitaria Superiore Pavia

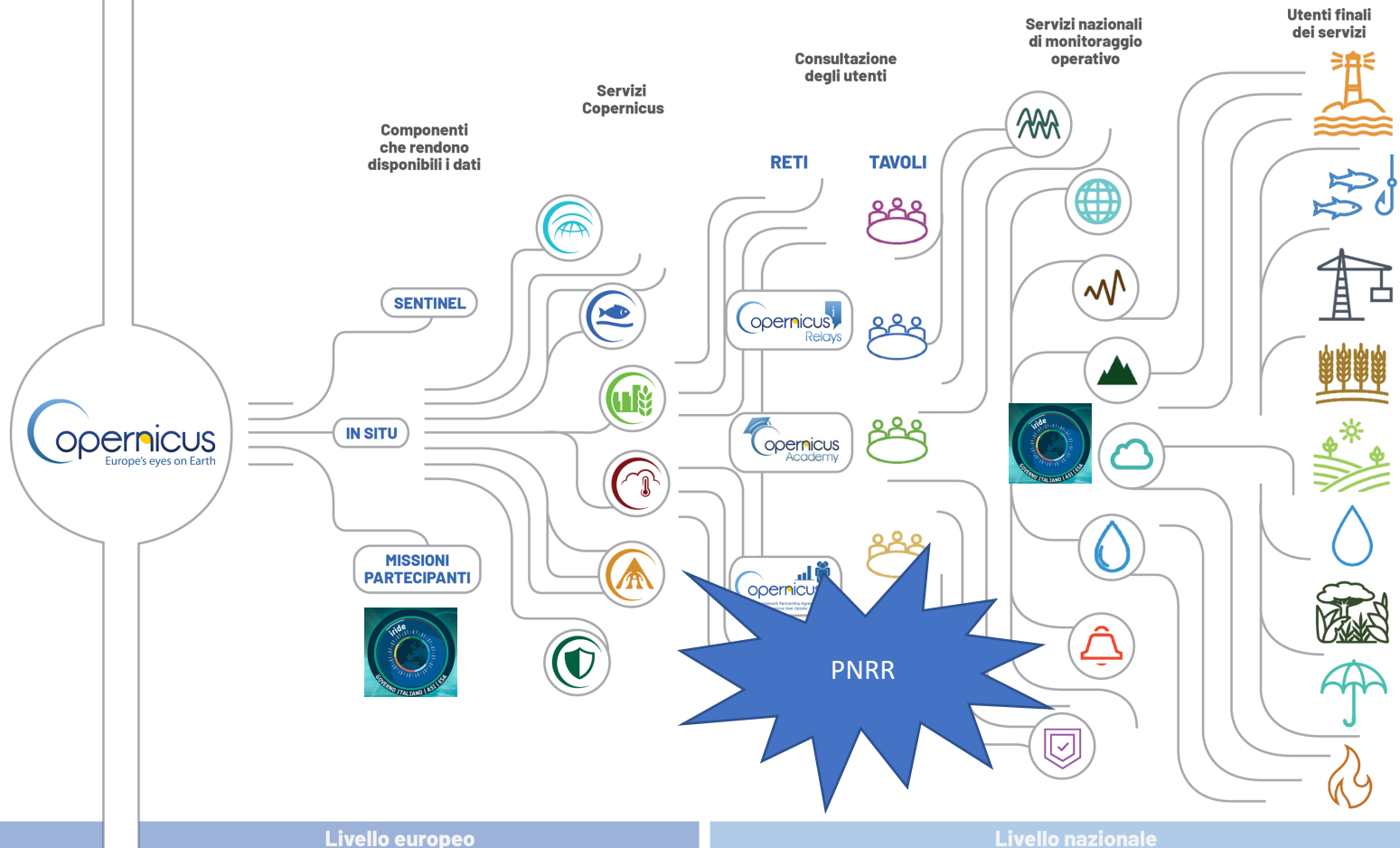


Eu and National Contest

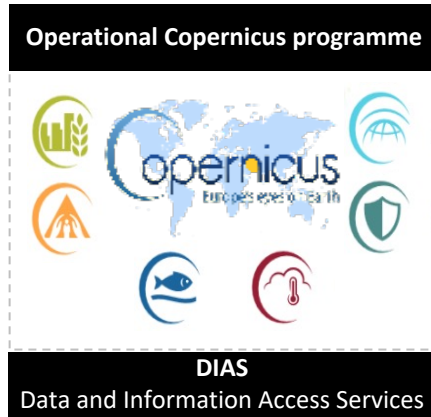
GOVERNANCE



CATENA DEL VALORE



The Italian Strategy aims at accelerating the market uptake process, mainly expanding end-user buyer base



Intermediate & technical end-users' adoption rate has significantly grow

Downstream: Intermediate users

- Pre-processing Analysis
- Access to high and very high resolution imagery
- Value Added Services
- Fusion of EO imagery with other sources of data
- Display

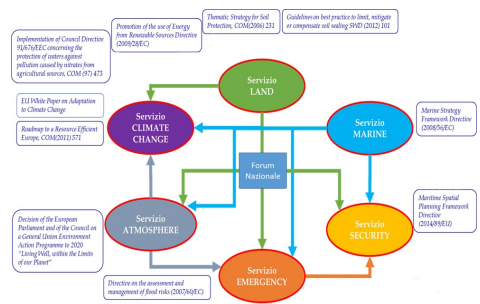
"EO experts"

Adoption at non-technical local & regional governmental authorities remains low

Non-space community: End users

- Input EO-based products in their activities
- Very specific operational needs

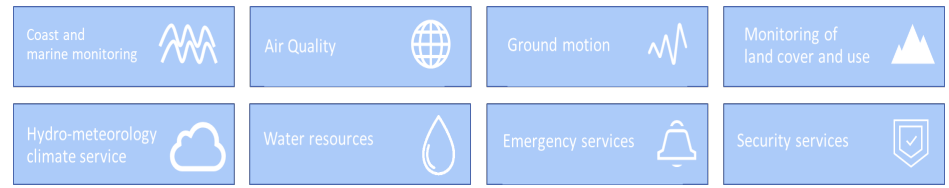
"Non-EO experts"



European obligations



Scientific & Technologic Innovation






National Monitoring Operational Services

National Copernicus User Forum bodies

European
Commission

European and National Governance

Coordinated by   
Framework Partnership Agreement
for Copernicus User Uptake

Media Contact

About User Uptake Resources News Events

Home / User Uptake / Action details

Creating a permanent National Working Group to coordinate EO based activities in the frame of the Italian Presidency of the Council of Ministers

The National experiences matured so far suggest the need for a more structured interaction and exchange of information between the different Entities called to operate in the field of Earth Observation, which involves not only the main Institution involved vertically on the EO topic, but also all those actors with potential interest such as the Ministry of Agricultural and Forestry Policies, the Ministry of Infrastructure and Transport and the Ministry of Cultural Heritage and Tourism and the Ministry of the Environment and Protection of the Territory and the Sea, especially in light of the recently approved national regulations where Earth Observation is explicitly mentioned as a valuable approach for added value information complementing traditional monitoring practices.



Implementing Partner: [ISPRa](#)
Implementing Country: [Italy](#)
Primary Topic: [Marine](#)
Primary Target Users: [General Public](#), [Private Sector](#), [Public Sector](#), [Research Sector](#), [Schools](#)
Primary Target Region: [Europe](#)
Europe: [Italy](#)
Type of Action: [Building an active user dialogue](#)
Action No.: 2019-1-48
Duration: Sep 2020 - Sep 2023 Last Update: 16 Nov 2021

Copernicus Networks

- Copernicus Academy
- Copernicus Relays
- Copernicus FPCUP



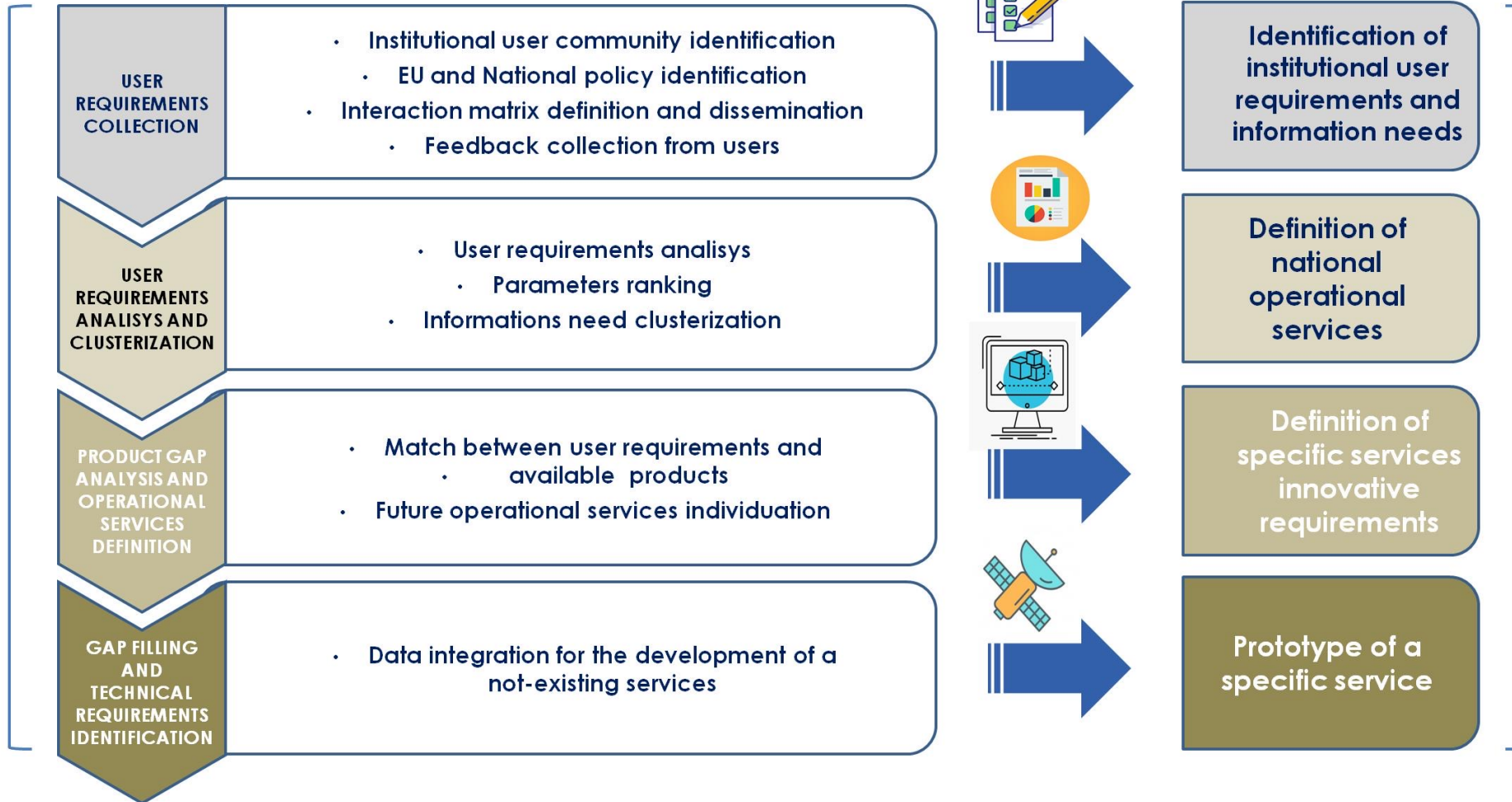
More than 900 participants

- **40** Institutional and non representatives
- **645** in consultation boards
- **75** in National Academy Network
- **10** in National Relays Network
- **172** in Operational Geology and Climatology National Boards

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User consultation: from information needs to technical requirements

Methodology



Results

remote sensing (MDPI)
 Article
An Interaction Methodology to Collect and Assess User-Driven Requirements to Define Potential Opportunities of Future Hyperspectral Imaging Sentinel Mission
 Andrea Taramelli ^{1,2}, Antonella Tornato ^{1,*}, Maria Lucia Magliozzi ³, Stefano Mariani ³, Emiliana Valentini ¹, Massimo Zavagli ³, Mario Costantini ³, Jens Nieke ⁴, Jennifer Adams ⁵ and Michael Rast ⁵

water (MDPI)
 Article
User Needs Analysis for the Definition of Operational Coastal Services
 Serena Geraldini ^{1,*}, Antonello Bruschi ¹, Giorgio Bellotti ² and Andrea Taramelli ^{1,2}

sustainability (MDPI)
 Article
Copernicus in Support of Monitoring, Protection, and Management of Cultural and Natural Heritage
 Alessandra Bonazza ¹, Nico Bonora ², Benjamin Duke ³, Daniele Spizzichino ², Antonella Pasqua Recchia ⁴ and Andrea Taramelli ^{2,3,4,5}

Journal of Environmental Management (ELSEVIER)
 Volume 296, 15 October 2021, 113121
Monitoring environmental and climate goals for European agriculture: User perspectives on the optimization of the Copernicus evolution offer
 Emma Schiavon ^{2,A,B}, Andrea Taramelli ^{1,B,C}, Antonella Tornato ^{2,B,C}, Fabio Pierangeli ^{2,C}

Reference Documentation:


National Plan for the Development of Earth Observation Capabilities (Upstream, Midstream, Downstream)

Annex 1. Roles of National Institutions

Annex 2. Buyers Group Needs Analysis: identification of thematic reference services (produced by UFN)

Annex 3. National Operational Services: constituent elements and products (produced by UFN)

S1-S8 Thematic services

S1
Coast and marine monitoring 


- Tracking and prediction of waves, coasts geomorphology, natural habitat and events affecting the marine environment

S2
Air Quality 


- Mapping of pollutants and dispersion of ash and other materials due to natural and anthropic events

S3
Ground motion 


- Monitoring of ground motion due to earthquakes, volcanic eruptions, landslides

S4
Monitoring of land cover and use 


- Mapping of crops, agriculture, forests, volcanic areas, soil consumption

S5
Hydro-meteorology climate service 

- Monitoring and forecast of greenhouse gases and other Essential Climate Variables (ECV)

S6
Water resources 

- Hydromorphological monitoring
- Modelling of hydrogeological and hydraulic modelling and floods forecast

S7
Emergency services 

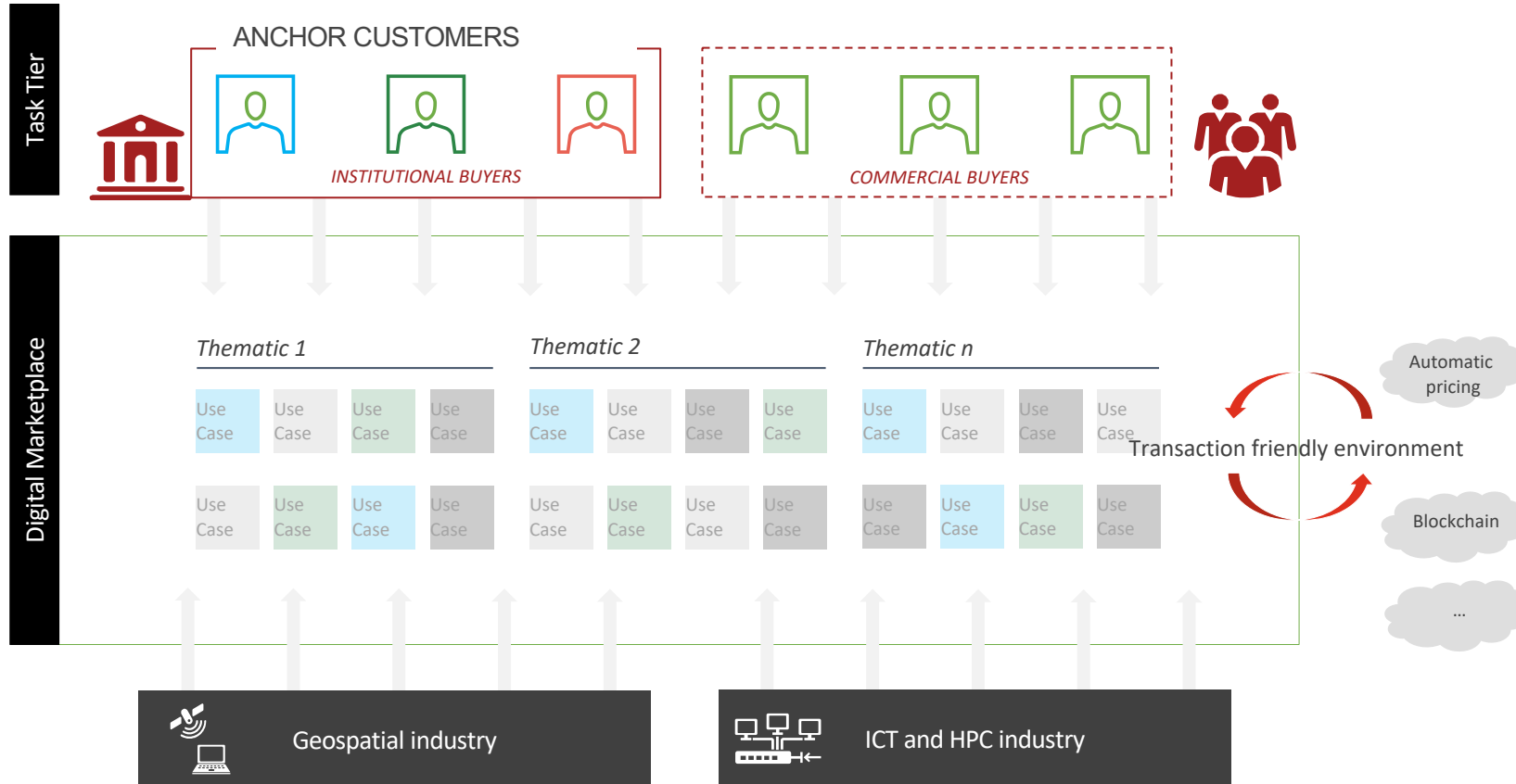
- Identification of critical events such as floods, wildfires, earthquakes and eruptions and mapping of damages

S8
Security services 

Maritime surveillance and surveillance of UE external borders

The Italian strategy aims at constituting a transaction friendly digital market place, using institutional demand as anchor customers

Marketplace



SUMMARY

The Market Uptake Platform will connect demand and supply of geospatial solutions on an **open and flexible digital marketplace** using **institutional users demand as an anchor customer**. It will support the industry, **especially SMEs**, by developing a market responding to institutional operational needs around specific thematic. Being an anchor customer will allow institutional users to benefit from **cost-effective solutions** designed specifically to respond to their **operational needs**.

The MaP should also offer a **highly flexible** digital environment for **real time management of exchanges and easy transaction**, relying on cutting edge blockchain technologies or automatic pricing algorithms, etc.

The anchor customer would allow the development of the platform and facilitate **entrance/penetration for SMEs** that will be able to **access a market formerly too fragmented**.

The CoMaP shall also attract commercial users that could enter the platform to access specific services provided the digital marketplace.

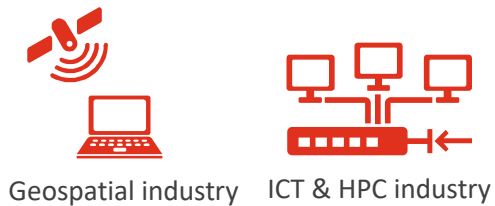
The national initiative aims at bringing together non-technical end-users and the industry (geospatial & ICT) by build a win-win situation through the development of a PPP

Buyers Group / Customers



Demand aggregation

Targeted supply



Industries / Providers

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SUMMARY

The Market Place initiative aims at:

1. Providing **end-users**, first and foremost for institutional organisations, support to decision-making and situational awareness **tailored to their operational needs**;
2. **Hosting and making all data relevant for end-users**, including both satellite data and other sources of data, accessible in a **user-friendly** manner;
3. Offering an **open, scalable and interoperable environment** facilitating the development of applications;
4. Favouring the **access "as a service"** of sophisticated **information extraction technologies** (e.g. Big Data analytics, HPC, ICT, etc.);
5. Setting up a **market place** bridging demand and supply of value-added geospatial applications and services.

The infrastructure will be **developed by a private operator through a Public Private Partnership (PPP)**.

To trigger and match new demand and offer....and build a win-win situation

As institutional and non institutional users → demand for new products and services

Buyers Group / Customers



Local & governmental authorities

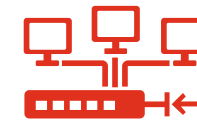


Other non-technical end-users - commercial

Industries / Providers



Geospatial industry



ICT & HPC industry

Demand aggregation

Targeted supply



**MATCHING
HELPED BY PUBLIC
INTERVENTION**

DEMAND

fragmented demand

need for intelligence more than data

user needs not clearly defined

needs in evolution according to

OFFER

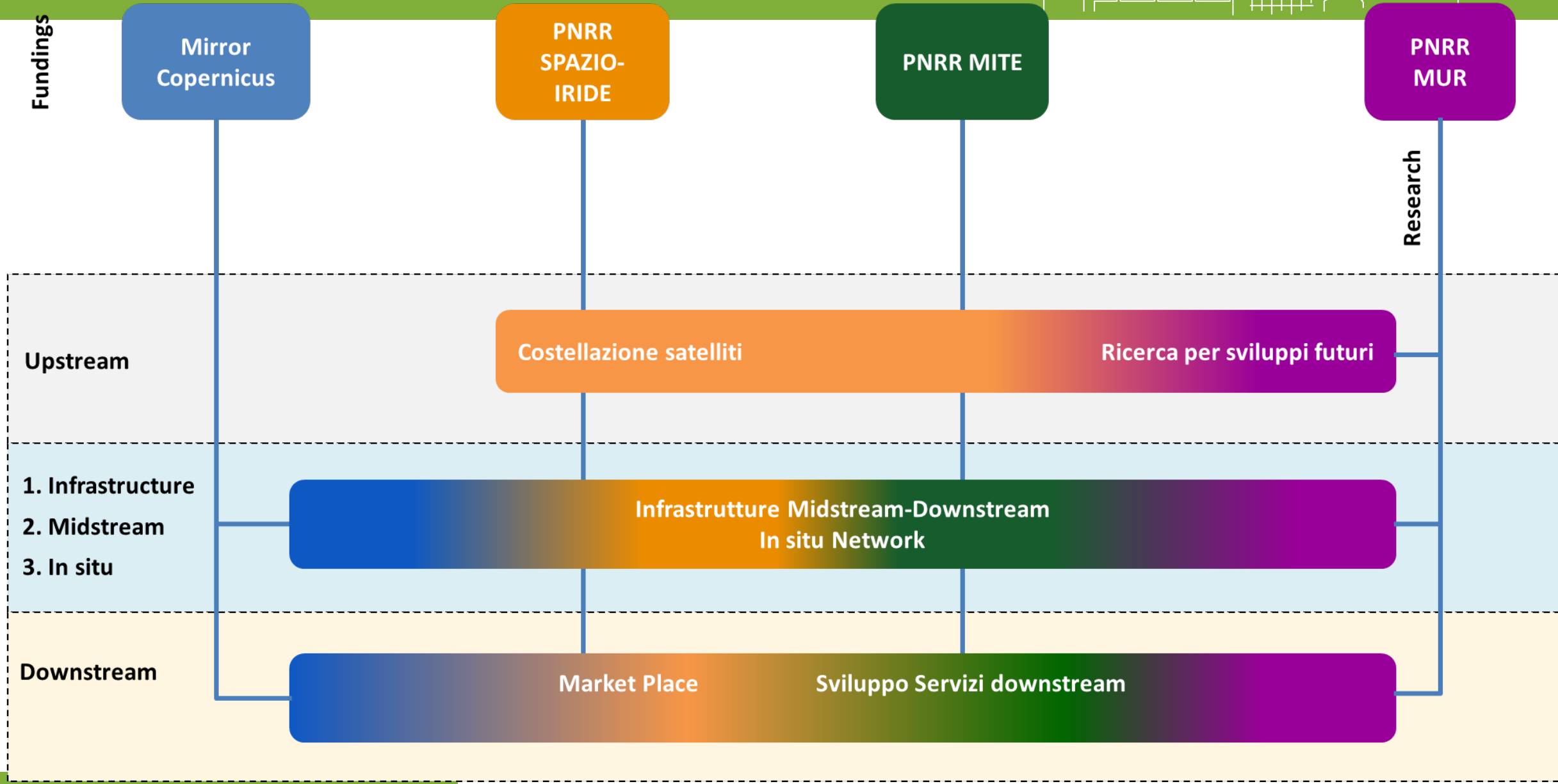
fragmentation of the demand harms market penetration

lack of visibility on local & regional governmental authorities needs

lack of funding to support prototyping tailored to demand needs

strong competition from non-European companies

Integration of Space fundings and actions: PNRRs



EO MIMIT – MASE – MUR: Milestones and fundings



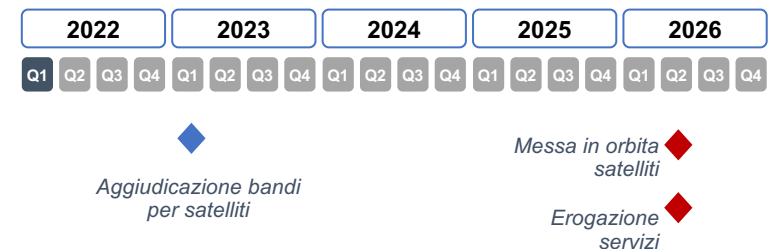
PNRR EO

• **Earth Observation:** development of new applications and services for better land and environmental management using increasingly sophisticated satellite data

Resources

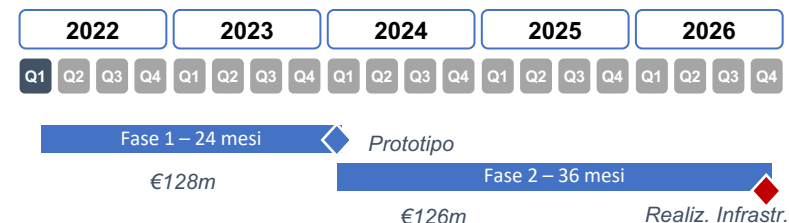


Timeline



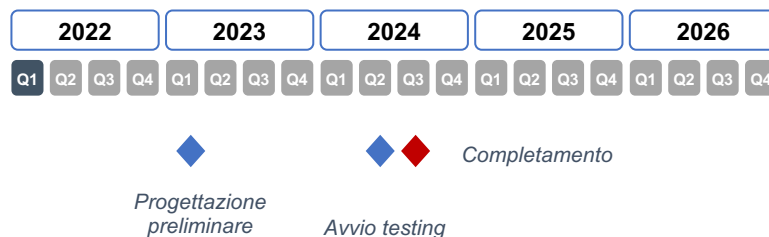
CoMaP

• **Mirror Copernicus:** development of an enabling infrastructure for the Geospatial Services Market - open, scalable, interoperable with other similar systems



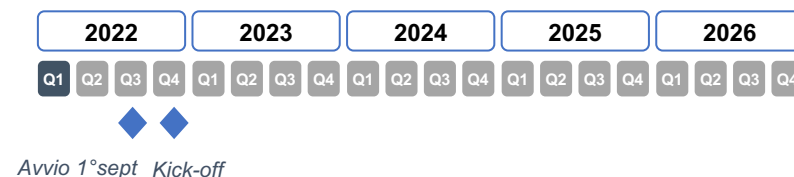
PNRR SIM

• **Advanced and integrated monitoring and forecasting system:** development of a system for identifying and forecasting land hazards, particularly hydrogeological hazards



PNRR MUR

• **HPC infrastructure:** development of a nationwide distributed computing infrastructure serving different scientific domains



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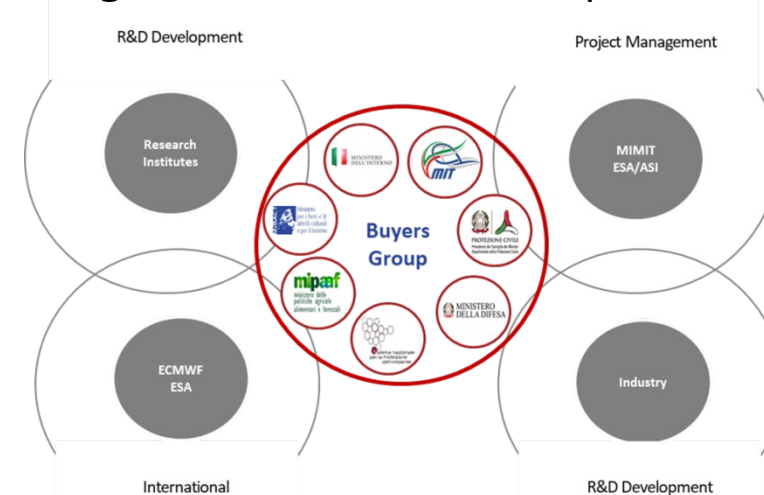
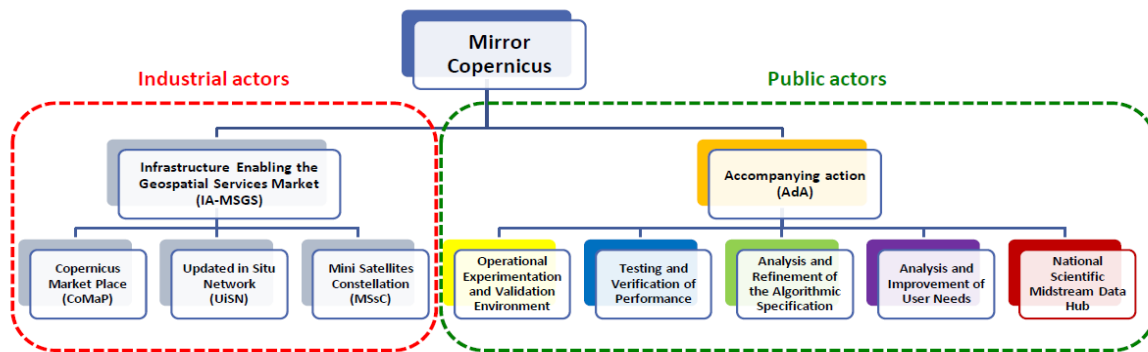
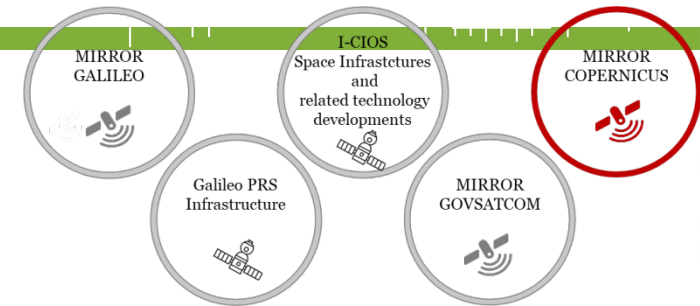
Ministero delle Imprese e del Made in Italy

Mirror Copernicus Programme

Mirror Copernicus Programme is the main initiative of the **National Space Economy plan** for the realization of the Infrastructure growing the Geospatial Service Market, with the strategic aim of *strengthening the positioning of the Italian Industry in the emerging European and global eco-system.*

Aims to create an operational **platform**, Copernicus Marketplace (**CoMaP**), for the provision of **value added services based on geospatial applications**, also through the integration of EO data and other types of information.

Such a system infrastructure has to be developed by the Industrial sector and supported by the Public sector (**Accompanying action**) that defines the Public sector needs and provide technical assistance in the form of algorithm definition, **benchmarking** of results and **pre-operational testing** of the industrial developments.



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Ministero delle Imprese e del Made in Italy

ICSC – National Research Center in HPC, Big Data and Quantum Computing

PNRR MUR



Investment 320 mln€ (partial)

The National Research Center in High Performance Computing, Big Data and Quantum Computing, implemented and managed by the ICSC Foundation, **is one of the five National Centers established by the PNRR National Recovery and Resilience Plan**, dedicated to five areas identified as strategic for the country's development:

- Simulations, high-performance computing and data analysis
- Agritech
- Gene therapy and drug development with RNA technology
- Sustainable mobility
- Biodiversity

The National HPC, Big Data and Quantum Computing Center is organized according to the **Hub and Spoke** model, where the Hub carries out *management and coordination activities* and the Spokes carry out *research and development activities*.



2-4 OCTOBER 2023



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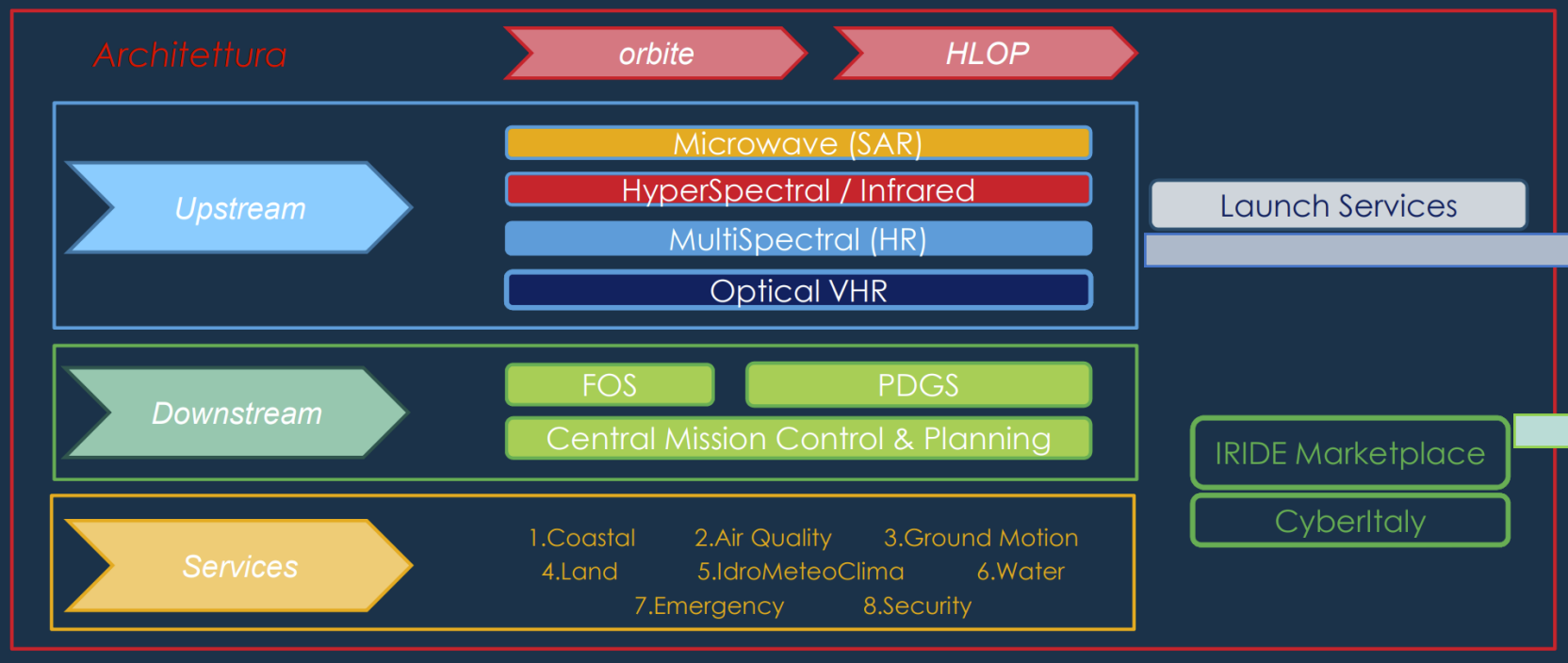
EUROGEO WORKSHOP 2023

PNRR EO

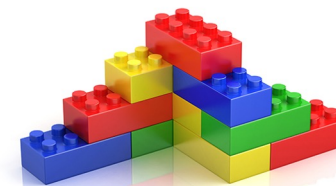
- **Earth Observation:** development of new applications and services for better land and environmental management using increasingly sophisticated satellite data



IRIDE SYSTEM: FUNCTIONAL OVERVIEW



How to organize the user requirements matrix?



IRIDE Service Segment: definition of the Service Value Chains

CYBER ITALY – Digital Twin of Italy

PNRR PCM



Investment 80 mln€

Cyber Italy will focus the development of highly accurate digital model of the Earth on the Italian territory and specific areas of interest, ensuring coherency and cross-fertilization with other Digital Twins initiatives at European level (e.g. DestinE and Digital Twin Earth), avoiding duplication of activities and maximizing synergies.

Cyber Italy will be composed of:

- ***The Digital Twins*** - each digital twin represents a replica of a process in the real world and thus of our environment and their interactions with human activities and ecosystems. They allow simulations based on an effective integration of a multi-variate underlying data structure based on EO datasets, model(s), AI and data analytics that provide users with a dynamic reconstruction, characterisation and prediction of its dynamic evolution and behavior in time.
- ***A framework hosting the Digital Twins*** and providing them with access to data, services and infrastructure based on an open, flexible, scalable, and evolvable secure cloud-based architecture.

National Monitoring & Forecasting Integrated System

PNRR MASE



Components

- *Aerospace remote sensing and in situ sensing*
- *Telecommunication System*
- *Central and regional analysis and control rooms*
- *Information security systems and services*

Applications

- *Slope instability monitoring and landslide and hydrogeological instability*
- *Precision agriculture*
- *Marine and coastal pollution monitoring*
- *Monitoring and detection of environmental emergency support (natural disasters), monitoring of forest fires*



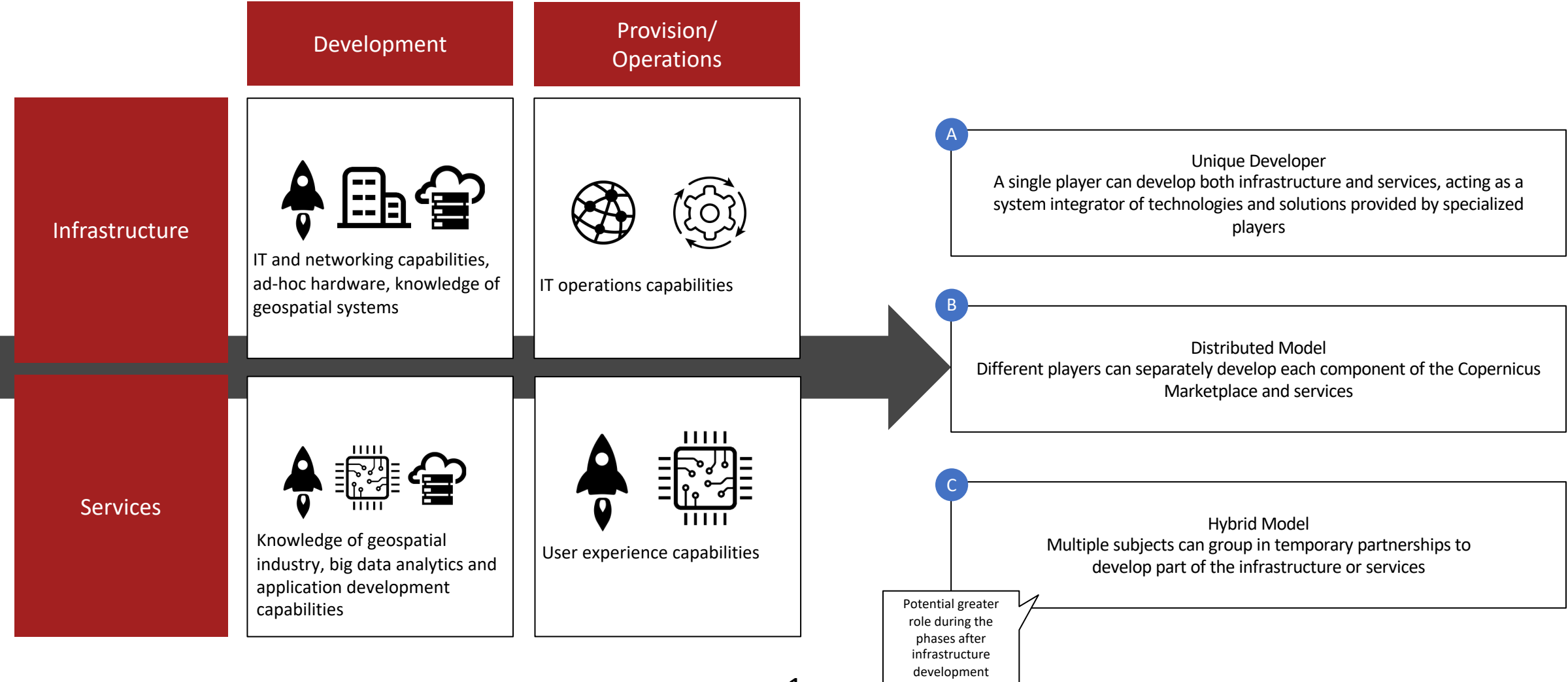
Investment 500mln€

- Ministero dell'Ambiente e della Sicurezza Energetica (MASE)
- Dipartimento della Protezione Civile (DPC)
- Ministero delle infrastrutture e dei trasporti (MIT)
- Ministero della Cultura (MiC)
- Istituto Geografico Militare (IGM)
- Ministero dell'agricoltura, della sovranità alimentare e delle foreste (Masaf)
- Agenzia per le Erogazioni in Agricoltura (AGEA)
- Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA)
- Istituto Superiore per la protezione e la ricerca ambientale (ISPRA)
- Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA)
- Istituto Idrografico della Marina (IIM)
- Ministero dell'Interno (MINT)
- Comando unità forestali, ambientali e agroalimentari dell'Arma dei Carabinieri (CUFAA)
- Agenzia ItaliaMeteo (AIM)
- Aeronautica Militare
- Corpo delle Capitanerie di porto – Guardia Costiera (CCP - GC)
- Dipartimento dei Vigili del Fuoco del Soccorso Pubblico e della Difesa Civile (VVF)

Players can arrange in multiple ways and play different roles in the development according to their capabilities

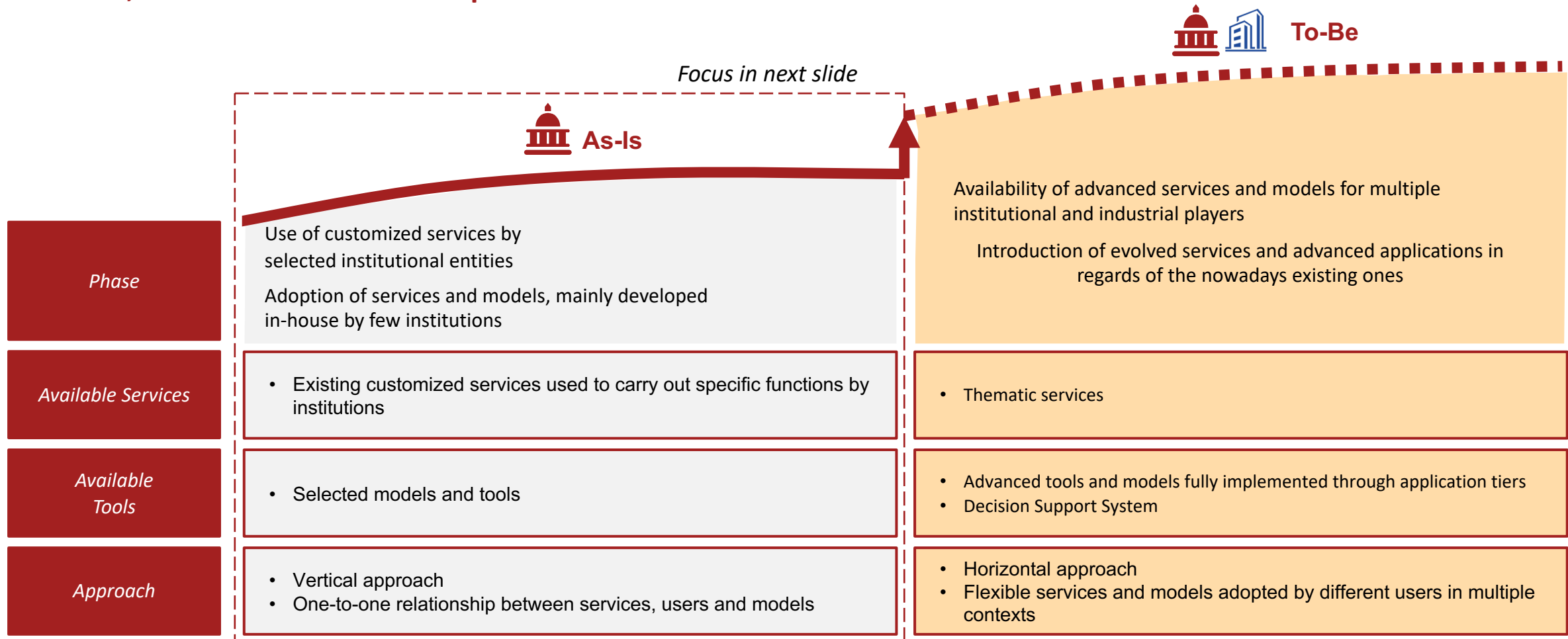
Infrastructure and services development

Alternative development models



In the Business model Existing services, tools and models will be gradually replaced by new and advanced ones or improved when feasible

Services, Tools and Models Development Path



POSITION PAPER: The National Doctorate in Earth Observation (DNOT)



SAPIENZA
UNIVERSITÀ DI ROMA

Dottorato di ricerca nazionale in Osservazione della Terra

Partners

UniBAS	UniPV	ASI
UniBO	UnivPM	CREA
UniBZ	UniROMA2	ISMEA
UniCA	UniROMA3	ISPRA
UniFI	UniTO	DPC
UniGE	Polito	OGS
UniMORE	IUAV	Fondazione CIMA
UniNA	IUSS-PV	Agricolus srl
UniCampania		Planetek srl
UniPD		Teamdev srl

Organization - Numbers

- Partners
**18 Universities, 2 Public Research Institutes, 4 Public Administrations
1 Public Foundations, 3 Private Companies**
- Coordination
Sapienza University of Rome, in cooperation with Coordinamento nazionale della Copernicus Academy
- Scholarships
**45 scholarships on specific topics, selected by all the Partners
36 scholarships assigned (24 Italian, 12 foreign PhD students)**
- MUR accreditation
- Kickoff: **01.11.2022 – End: 31.10.2025**
- PhD title: **awarded by Sapienza in agreement with all the Partners**

Partner roles in training courses and other activities

- **University:** **methodological courses**
- **Public Research Institutes:** **courses on specific topics**
- **Companies, Foundations, PA:** **courses on specific know-how**
- **All Partners:** **promotion of international exchanges, primarily (but not only) in the Copernicus Academy European network**

PhD in “Sustainable Development and Climate change”



The Consortium

Founders



Academic Partners



Knowledge Partners

