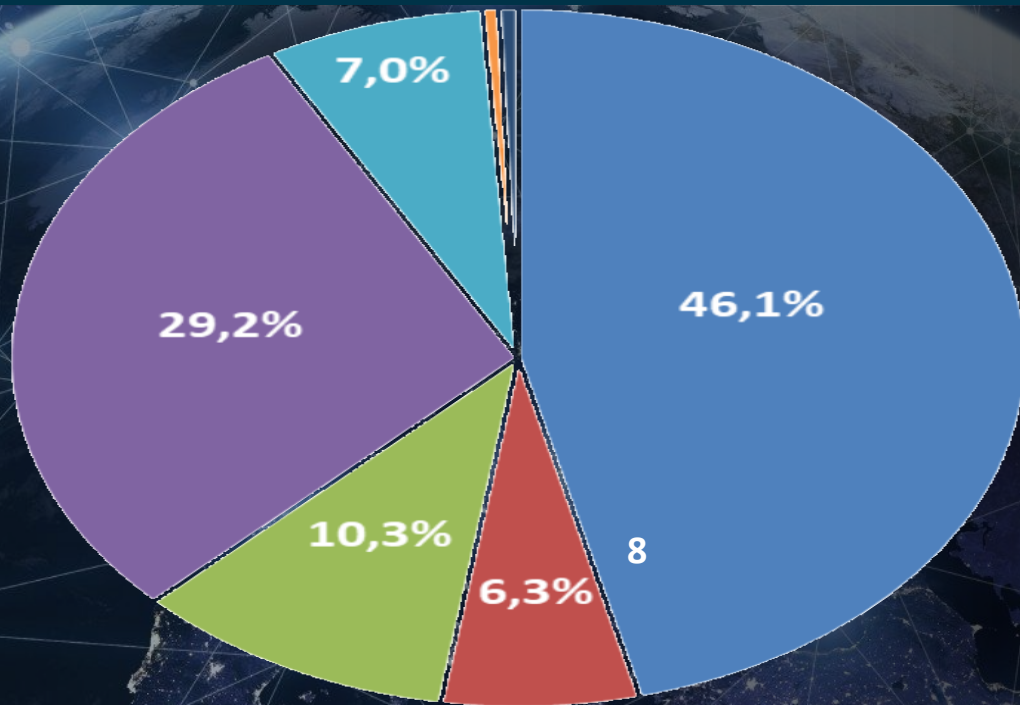




# The IRIDE Programme: Overview of the System, Constellations and Services

Citta' della Scienza, Napoli; 27/07/2023

# The IRIDE System and its objectives



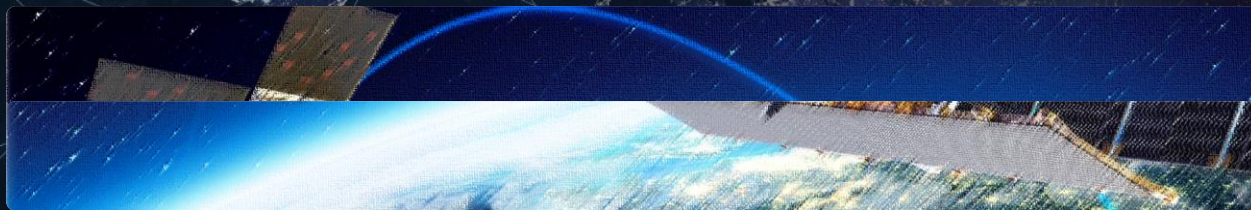
**Operational End-to-End System for developing a geospatial-based service market at national and European level: focus on observations over Italy**

Services will rely on the needs expressed by the National Authorities (User Driven)

Strengthen the ecosystem of national capabilities & promote the competitiveness of Italian companies

**Augment existing Italian and European systems**

Progressively involve local administrations and private customers in the use of geospatial information (space economy)



*A constellation of constellations, comprising several sensing technologies: radar, optical, multispectral & hyperspectral, complementing existing systems and contributing with increased resolution and improved revisit*

# IRIDE Project Budget



Budget ~ 1.1 B€

800 M€ EU RRF *(committed in 15 months)*

300 M€ National Complementary Fund

System

Upstream *(satellite constellation)*

Downstream *(FOS, PDGS, marketplace)*

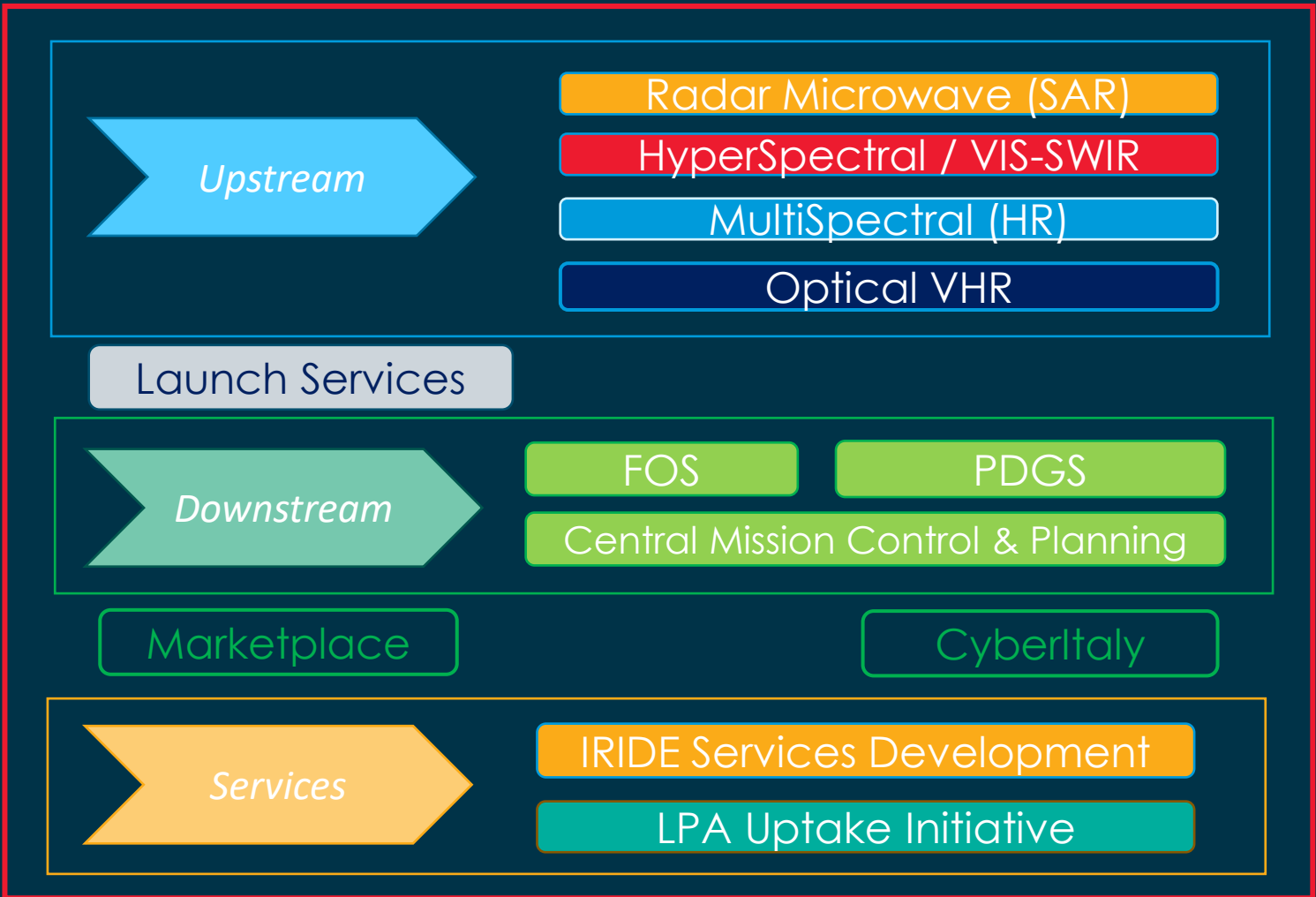
Services *(8 to PA, by National Users Forum)*

Milestone M1C2-22 : All contracts assigned by 31 March 2023

**MILESTONE ACHIEVED**

Milestone M1C2-24/25: Deliver the whole system to the Italian Government authorities (or to the Entity formally designated by those authorities) no later than 30 June 2026 in an "Operation-Ready" status

# IRIDE SYSTEM Components



Constellation of Constellations

- User-Driven System
- Italian Institutional Users
- Commercial Applications
- Job Creation
- Sustainability
- Scalable

# IRIDE : Component and DEVELOPMENT PARTNERS

(1/2)



*Upstream*

Microwave (SAR)

HyperSpectral

MultiSpectral (HR)

Optical VHR

Launch Services

Inter-Satellite Link

*Downstream*

Central Mission Control & Planning

Flight Operation Segment

Payload Data Segment

TAS-I

D-ORBIT / METASENSING

SITAEI / LEONARDO

OHB-I / OTEC  
ARGOTEC / OFF STELLARE

TAS-I / MEDIALARIO

Arianespace / AVIO

STELLAR PROJECT  
D-ORBIT (IOV)

SCIENCE & TECHNOLOGY ITALY

TELESPAZIO

EXPRIVIA

# IRIDE : Component and DEVELOPMENT PARTNERS (2/2)



IRIDE Marketplace

CyberItaly

Services

1. Coasts & Coastal Waters

2. Air Quality

3. Ground Motion

4. Land Cover

5. IdroMeteoClima

6. Water Management

7. Emergency

8. Security

Local PA Uptake Initiative (5)

E-GEOS

CAP GEMINI

SERCO

PLANETEK

E-GEOS, SERCO, MEEO, CIMA, CMCC

E-GEOS

NHAZCA, TRE-A, PLANETEK, TERRADUE

PLANETEK

E-GEOS, CGI, SERCO, SAM

E-GEOS

ITHACA, PLANETEK, CGI, LDO

AGRICOLUS, MAPSAT, GMATICS,  
PLANETEK, ENGINEERING D.HUBS,

# IRIDE Constellation of Constellations



## SAR CONSTELLATIONS

Name	BATCH 1	BATCH 2
NIMBUS SAR	6	4
NOX D/ORBIT	1	1

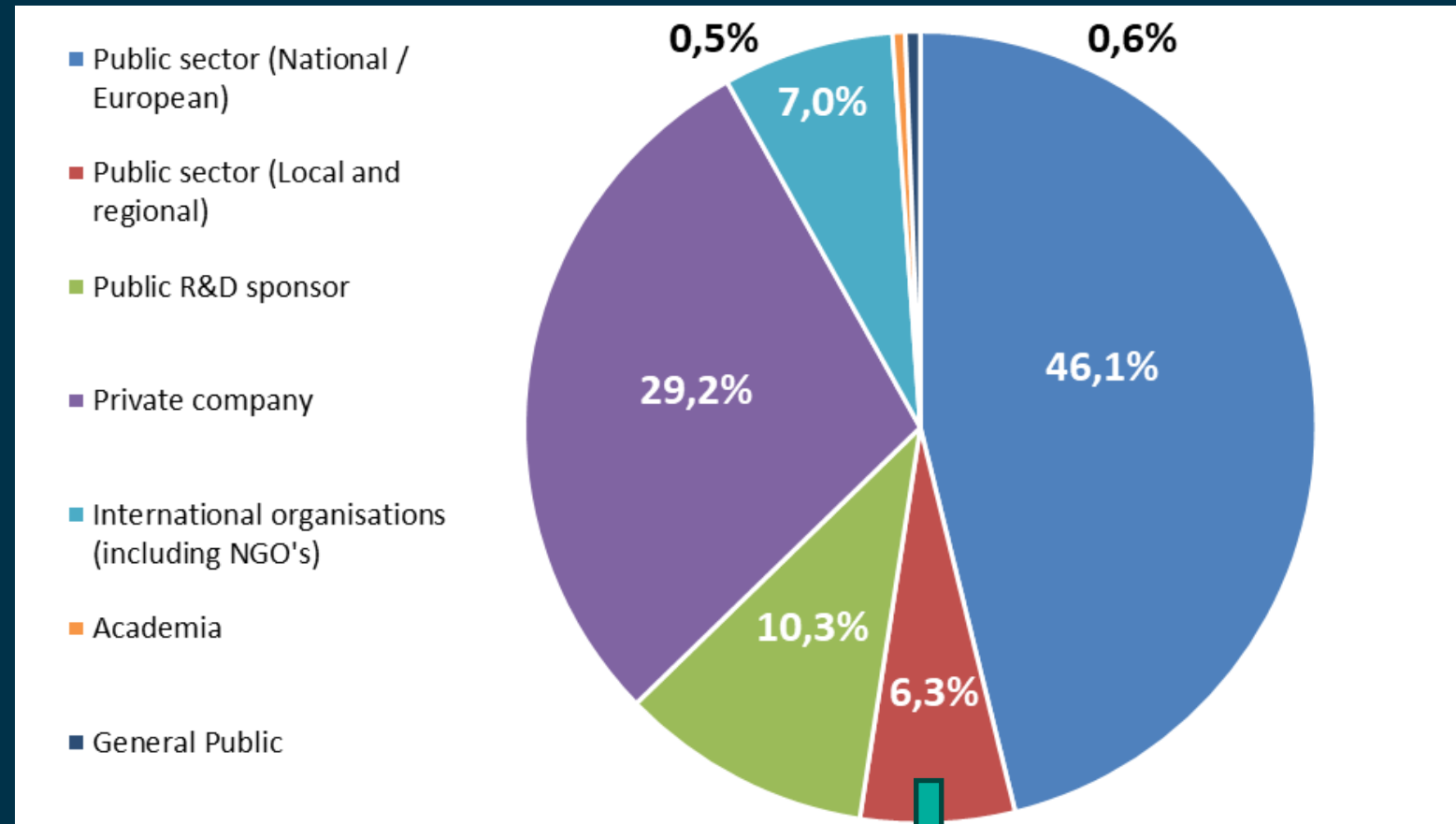
## OPTICAL CONSTELLATIONS

Name	BATCH 1	BATCH 2
Argotec Hawk	10	15
OHB Eagle 2	12	12
PLATINUM HYP	4	N/A
NIMBUS VHR	1	1

# The EO market in Public Sector in Europe

The 46,1% is at National and European Level (\*)

Only the 6,3% represents the public sector at local and regional level.



**2.175 EURO** per year per each Italian Local Administration

(\*) Source: EARSC (European Association of Remote Sensing Companies) 2021 survey



# The Italian Market by Customer Type in 2021 (\*)

Total Italian EO data & services Market (*)	100%	344.4
Type of Customer	EU share	Value in Italy (*)
ITALY. Public Sector: Central	46.1%	158.77
ITALY. Public Sector: Local and Regional	6.3%	21.70
ITALY. Public R&D Sponsors	10.3%	35.47
ITALY. Private Company	29.2%	100.56
ITALY. International Org. (incl. NGO)	7.0%	24.11
ITALY. Academia	0.5%	1.72
ITALY. General Public	0.6%	2.07



(\*) The numbers do not include the effect of the IRIDE project and **confirm that IRIDE is a great opportunity of growth for the Italian public local administration and the entire value chain providing EO data and services.**

# Main issue

---

EARSC reports that the main issues preventing more take up from the local and regional public sector are:

- I. the **lack of awareness** regarding the benefits of the EO data and services
- II. the **lack of trust in new technologies**, which limit its introduction into legislation.

*(\*) Source: EARSC (European Association of Remote Sensing Companies) 2021 survey*

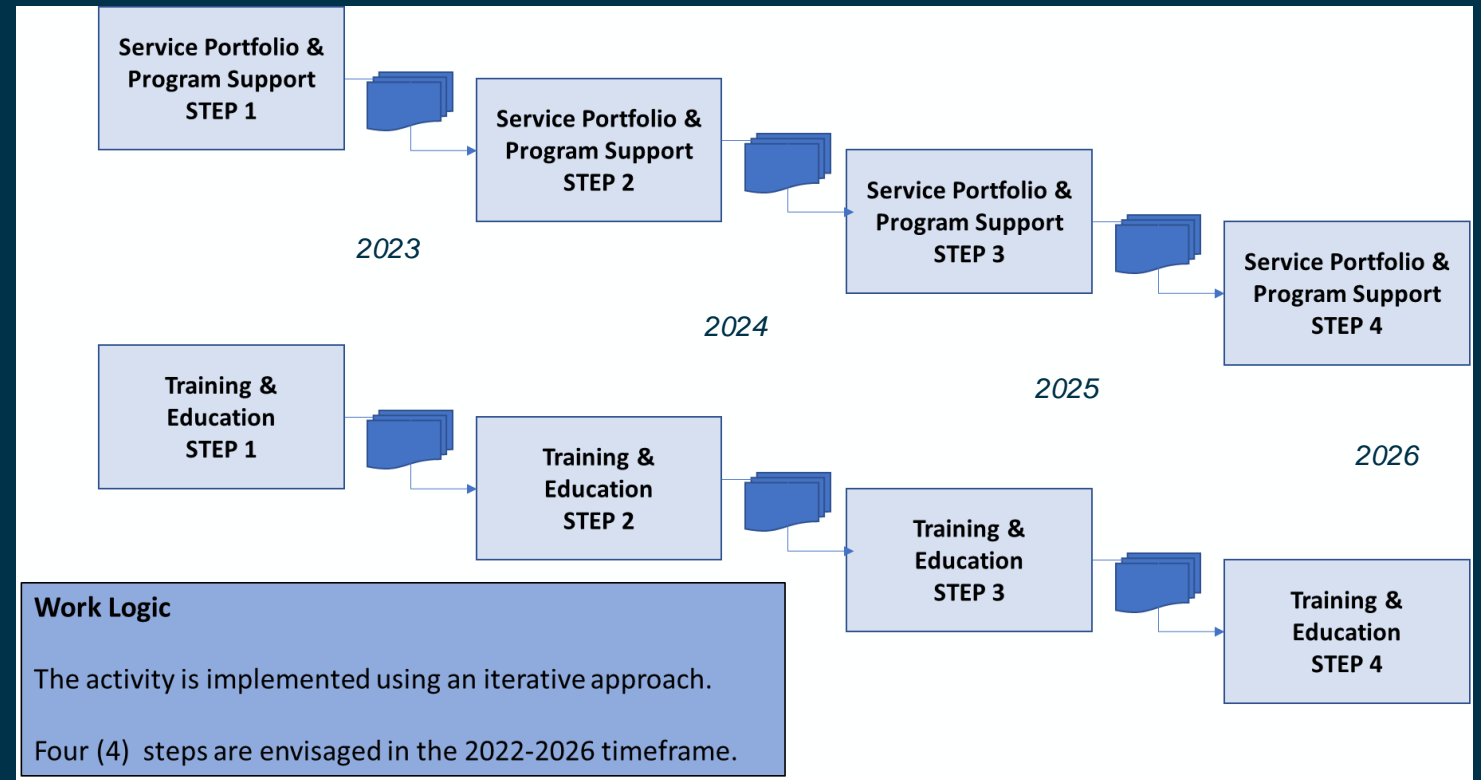
# The BEO4LPA project objectives

---

- Increase the usage of the EO-based information in the Italian Local Public Administration operational activities.
- Transform a “considerable” number of Italian Local Public Administrations from "potential users" into users who will use EO data in their operational activities.

# Main Activities of the project

1. Provide an **operative service portfolio** ready to use by the **Local Public Administration**.
2. Define and execute a **Training Package** for local administrative officers, undergraduates, postgraduates, start-ups and SMEs personnel.

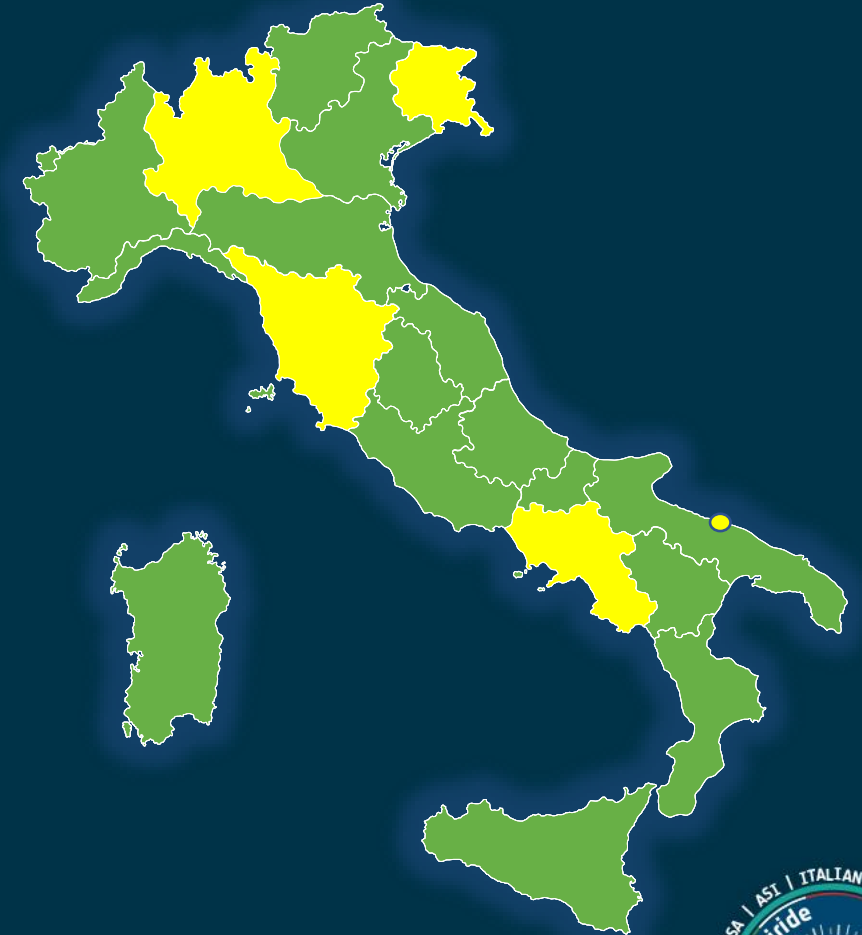


# The Local Public Administrations involved in the project: The Champion Users

1. Regione Campania
2. Regione Lombardia
3. Regione Toscana
4. Regione Friuli Venezia Giulia
5. Autorità di bacino distrettuale dell'Appennino Settentrionale
6. Comune di Bari
7. Area Metropolitana di Milano
8. Comune di Milano
9. Comune di San Giuliano Terme
10. Comune di Bollate

The Administrations involved in the project represent:

- About **23%** Italian surface
- About **37%** of the Italian population
- About **33%** of the Italian GDP



# The Service Portfolio implementation (EO4LPA)



The four main objectives of the call are:

1. to create an environment allowing for the increase of **Local Public Administration awareness** regarding the benefits of the EO data and services.
2. to increase the **trust** in new technologies like EO data and **services**, which limit its introduction into legislation.
3. To support the **industry**, i.e., value adding and servicing companies, in establishing useful and cost-effective services for the Italian Local Public Administration.
4. to stimulate the **market** of information products derived from **Earth Observation**, mainly from the ASI, ESA/EU missions and the future Italian **IRIDE** constellation.



# SMALL WOODY FEATURES

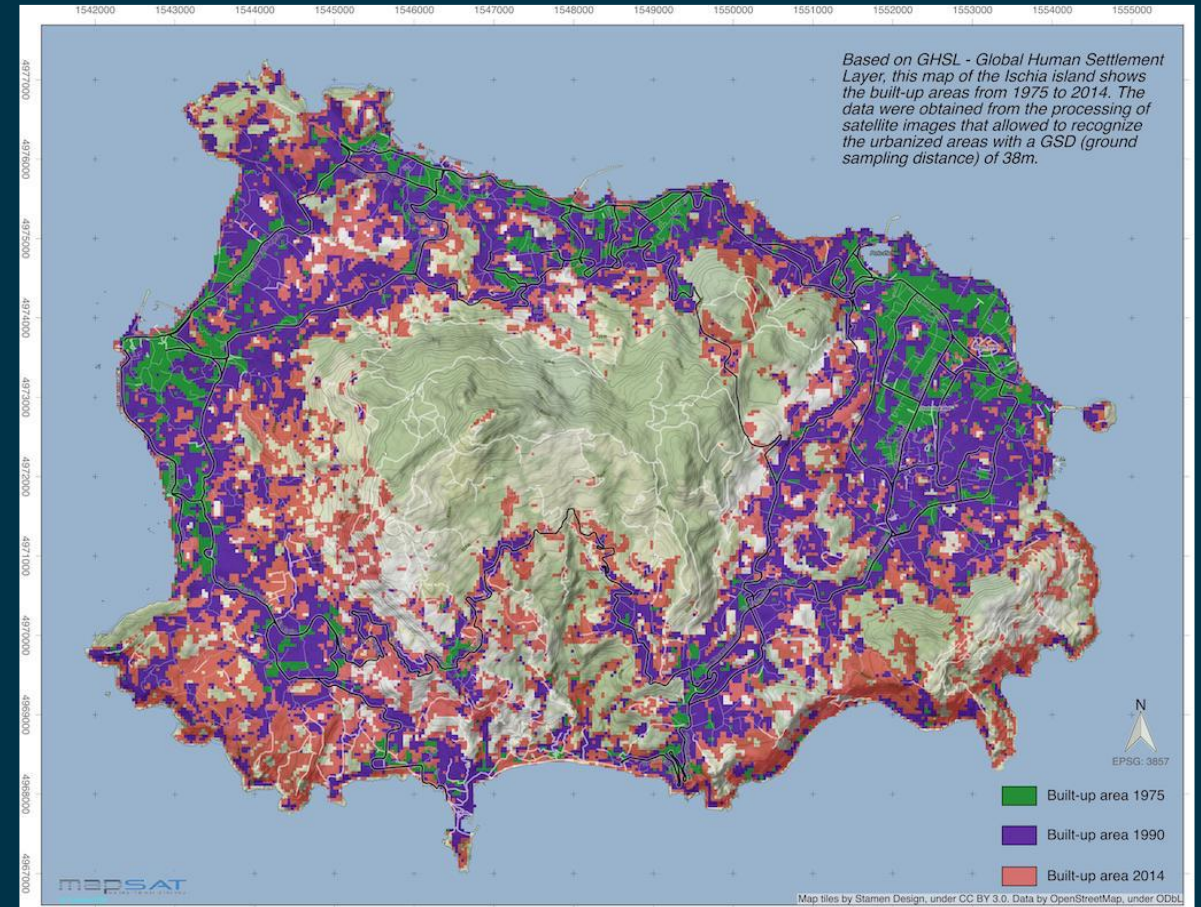
Through targeted insights for rural areas only, it should also be able to classify the following main types of minor vegetation elements:

- **tree rows,**
- **hedges and tree belts,**
- **and riparian belts**



# ASSISTANCE SERVICE IN THE PLANNING OF URBAN SPACES

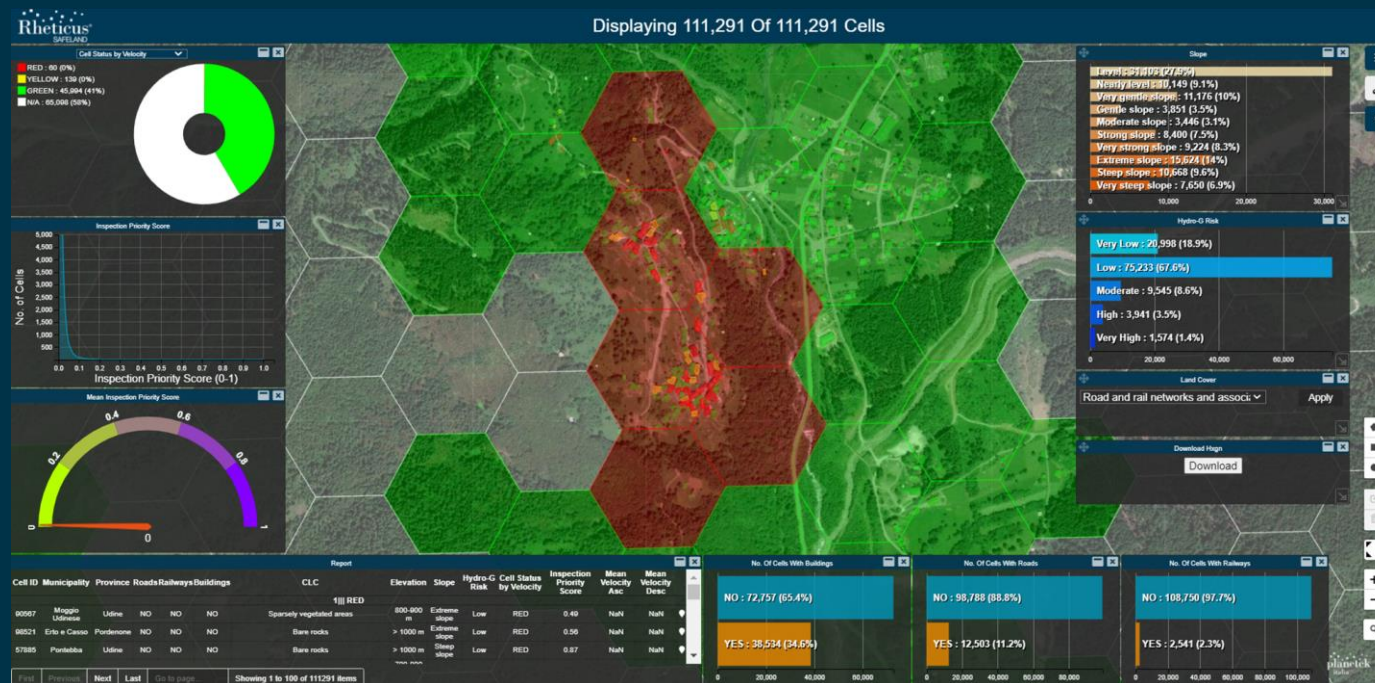
- **Imperviousness layer**, raster showing the soil sealing and the sealing density in urban areas
- **Impervious built-up layer**, raster/vector providing binary information about building and no building class in urban areas;
- **Built-up change layer**, raster/vector providing binary information about change and no change in built-up in urban areas
- **Land cover layer**, raster/vector providing the land use/land cover in urban areas



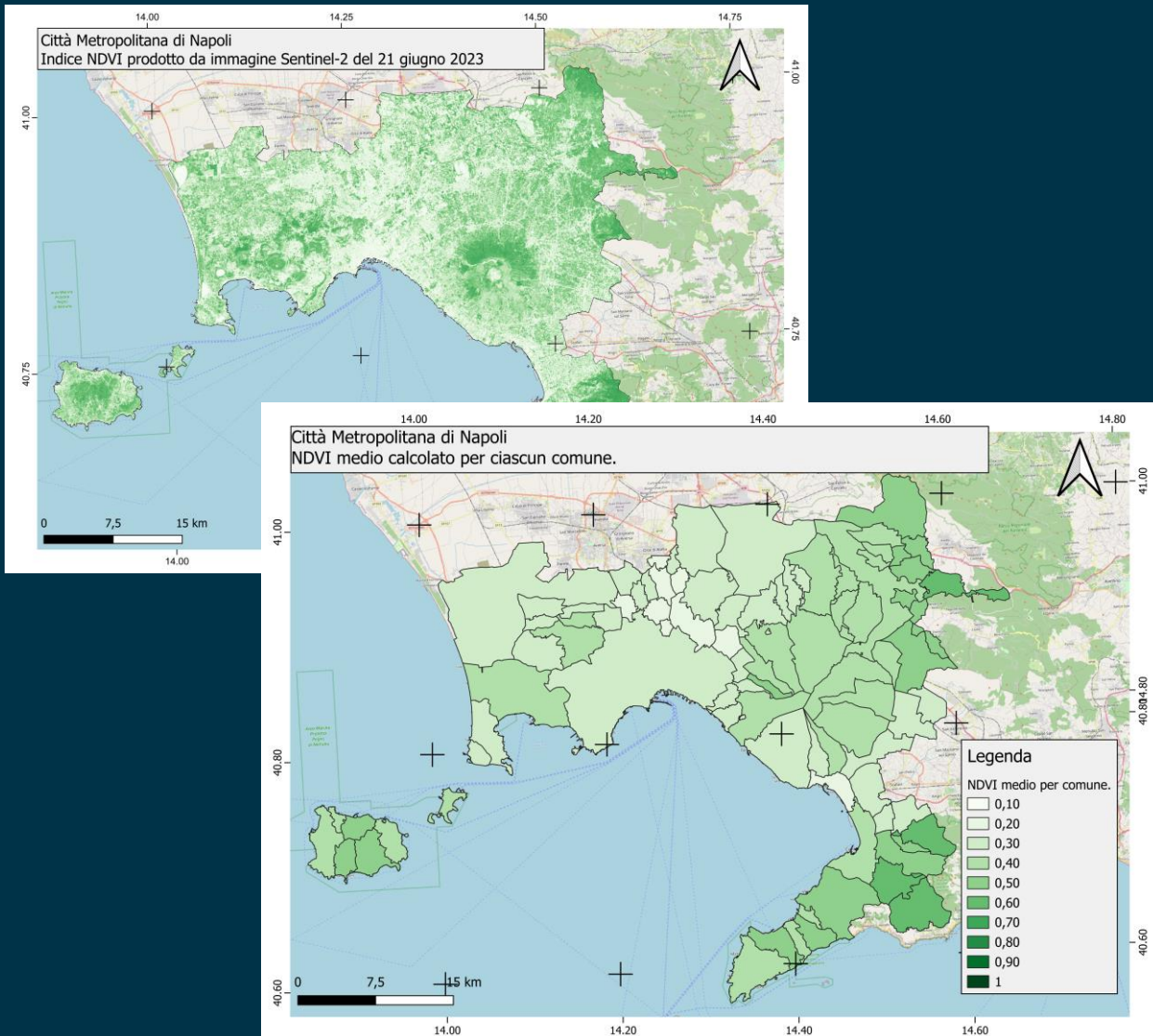


# CROSS-MONITORING OF GROUND MOTION AND "HOT SPOTS" OF LAND COVER CHANGE

- **Thematic grid based on differentiated levels of attention**, based on trends and surface displacement anomalies. (i.e. the presence of buildings, presence of transport infrastructure, main land cover, mean elevation above sea level, mean slope, presence of burnt areas, information on flood susceptibility, mean ascending speed, ...).
- **Burnt area map**, as vector polygon. The burnt area map shall provide information about surface extent, main land cover, sensing date of the pre-fire satellite data, sensing date of the post-fire satellite data.
- **Land cover changes**, as vector polygon, with information of previous land cover class and the actual land cover class, according to the CORINE legend.



# MONITORING OF PUBLIC AND PRIVATE URBAN VEGETATION

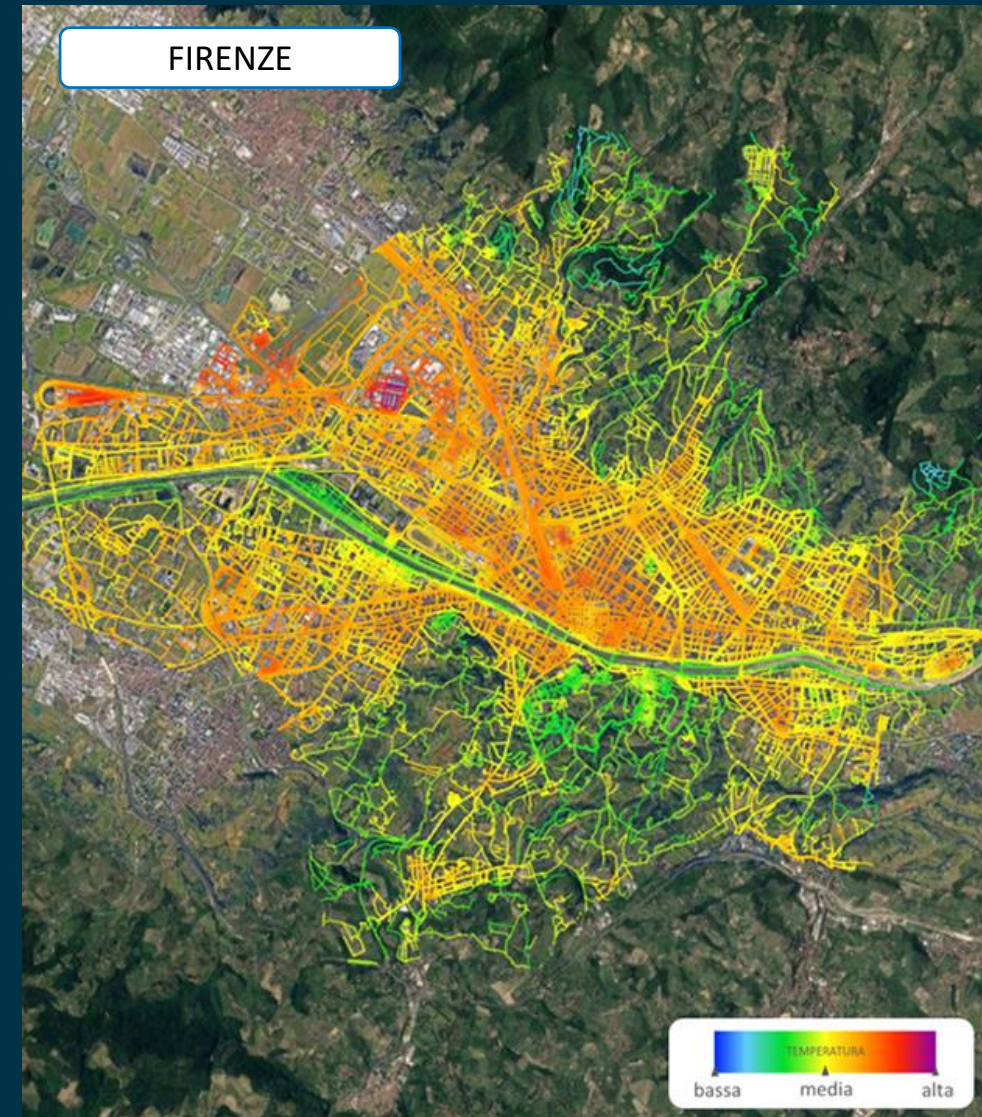


- **Vector layer with polygon or multi-polygon** type features with the relative NDVI classes. The NDVI levels must be customized according to the user's needs.
- **Raster Layer providing the NDVI** data layer.
- **Descriptive report containing:**
  - qualitative and/or quantitative analysis of the results found in the area under investigation;
  - specific focus on any identified problems (felling of tall trees, vegetative stress).



# ASSISTANCE SERVICE IN THE MONITORING OF HEAT ISLAND EFFECT

- An elaboration of available historical temperatures and the consequent real-time monitoring of temperature related phenomena in urban context.
- A cross-analysis of temperature-related data with other kinds of layers (population density, population age, green areas, critical areas as schools or hospitals, ...) in order to build a real risk analysis of the territory.



TEMPERATURA SUPERFICIALE SU RETE STRADALE

# The 5 pre-operative selected services for Champion Users

SERVIZIO	Caratteristiche del servizio		
	Gli Utenti (Champion Users)	Le Informazioni prodotte.	Date di disponibilita' e aggiornamento dei dati
<b>LOTTO 1. ASSISTENZA AL MONITORAGGIO DEGLI ELEMENTI VEGETAZIONALI MINORI (e.g. filari, siepi, fasce boscate oppure Small Woody Features in lingua inglese).</b>	<ul style="list-style-type: none"> <li>• Regione Lombardia (i.e. incluso il Comune di Milano, Comune di Bollate e l'Area Metropolitana di Milano)</li> <li>• Regione Toscana (i.e. incluso il comune di San Giuliano Terme) (2023-2026)</li> <li>• Regione Friuli-Venezia Giulia</li> <li>• Regione Campania</li> <li>• Comune di Bari</li> <li>• Autorità di bacino distrettuale dell'Appennino Settentrionale.</li> </ul>	<p>Il data layer Small Woody Features, vuole mappare le aree non comprese nelle foreste come definite dall'art. 3 del "Testo Unico in materia di foreste e filiere forestali".</p> <p><b>Il piano prevede una produzione incrementale sui 3 anni. Vedi dettagli del servizio nelle slide seguenti</b></p>	<ul style="list-style-type: none"> <li>• 1/1/2024</li> <li>• 1/1/2025</li> <li>• 1/1/2026</li> </ul>
<b>LOTTO 2: ASSISTENZA NELLA PROGETTAZIONE DEGLI SPAZI URBANI.</b>	<ul style="list-style-type: none"> <li>• Capoluoghi di provincia nelle seguenti regioni: <ul style="list-style-type: none"> <li>▪ Regione Lombardia (12)</li> <li>▪ Regione Toscana (10)</li> <li>▪ Regione Friuli-Venezia Giulia (4)</li> <li>▪ Regione Campania (5)</li> </ul> </li> <li>• Comune di Bari</li> <li>• Comune di Bollate</li> <li>• Comune di San Giuliano Terme</li> </ul>	<ul style="list-style-type: none"> <li>• Strato di impermeabilità, (raster).</li> <li>• Strato edificato impermeabile, (raster/vettoriale)</li> <li>• Strato di cambiamento dell'edificato, (raster/vettoriale)</li> <li>• Strato di copertura del suolo, (raster/vettoriale)</li> </ul>	<ul style="list-style-type: none"> <li>• 1/1/2024 (*)</li> <li>• 1/1/2025 (*)</li> <li>• 1/1/2026 (*)</li> </ul>
<b>LOTTO 3: ASSISTENZA AL MONITORAGGIO INCROCIATO DEI PUNTI CALDI INTERESSATI DA MOVIMENTI DEL TERRENO E CAMBIO DELLA COPERTURA DEL SUOLO</b>	<ul style="list-style-type: none"> <li>• Regione Lombardia (i.e. incluso il Comune di Milano, Comune di Bollate e l'Area Metropolitana di Milano)</li> <li>• Regione Toscana (i.e. incluso il comune di San Giuliano Terme)</li> <li>• Regione Friuli-Venezia Giulia</li> <li>• Regione Campania</li> <li>• Comune di Bari</li> <li>• Autorità di bacino distrettuale dell'Appennino Settentrionale.</li> </ul>	<ul style="list-style-type: none"> <li>• Mappa Tematica del movimento del suolo</li> <li>• Mappe delle aree percorse da incendio (Burnt area map) e della gravità degli incendi (Fire Severity Map)</li> <li>• Mappa del Cambiamento della copertura del suolo (Land Cover Change)</li> </ul>	<ul style="list-style-type: none"> <li>• 1/1/2024</li> <li>• 1/1/2025</li> <li>• 1/1/2026</li> </ul>
<b>LOTTO 4: ASSISTENZA AL MONITORAGGIO DEL VERDE PUBBLICO E PRIVATO IN AREA URBANA</b>	<ul style="list-style-type: none"> <li>• Capoluoghi di provincia nelle seguenti regioni: <ul style="list-style-type: none"> <li>▪ Regione Lombardia (12)</li> <li>▪ Regione Toscana (10)</li> <li>▪ Regione Friuli-Venezia Giulia (4)</li> <li>▪ Regione Campania (5)</li> </ul> </li> <li>• Comune di Bari</li> <li>• Comune di Bollate</li> <li>• Comune di San Giuliano Terme</li> </ul>	<ul style="list-style-type: none"> <li>• Data Layer vettoriale con feature di tipo poligono o multipoligono con le relative classi NDVI.</li> <li>• Data Layer raster che fornisce il valore dell'NDVI</li> <li>• Relazione descrittiva contenente: <ul style="list-style-type: none"> <li>• analisi qualitativa e/o quantitativa dei risultati riscontrati nell'area oggetto di indagine;</li> <li>• focus specifico su eventuali problematiche individuate (abbattimento alberi ad alto fusto, stress vegetativo)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• 1/1/2024</li> <li>• 1/1/2025</li> <li>• 1/1/2026</li> </ul>
<b>LOTTO 5: ASSISTENZA AL MONITORAGGIO DEGLI EFFETTI DELLE ISOLE DI CALORE NEGLI SPAZI URBANI</b>	<ul style="list-style-type: none"> <li>• Capoluoghi di provincia nelle seguenti regioni: <ul style="list-style-type: none"> <li>▪ Regione Lombardia (12)</li> <li>▪ Regione Toscana (10)</li> <li>▪ Regione Friuli-Venezia Giulia (4)</li> <li>▪ Regione Campania (5)</li> </ul> </li> <li>• Comune di Bari</li> <li>• Comune di Bollate</li> <li>• Comune di San Giuliano Terme</li> </ul>	<ul style="list-style-type: none"> <li>• Elaborazione delle temperature storiche disponibili e il conseguente monitoraggio in tempo reale dei fenomeni relativi alla temperatura nel contesto urbano, (raster /vector)</li> <li>• Analisi di rischio del territorio tramite l'analisi incrociata dei dati relativi alla temperatura con altri tipi di data layer (densità di popolazione, età della popolazione, aree verdi, aree critiche come scuole o ospedali, ...), (raster /vector).</li> </ul>	<ul style="list-style-type: none"> <li>• 1/1/2024</li> <li>• 31/3/2024</li> <li>• 30/6/2024</li> <li>• 30/9/2024</li> <li>• 1/1/2025</li> <li>• 31/3/2025</li> </ul> <ul style="list-style-type: none"> <li>• 30/6/2025</li> <li>• 30/9/2025</li> <li>• 1/1/2026</li> <li>• 31/3/2026</li> <li>• 30/6/2026</li> </ul>



# Thank you!



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@\_\_iride



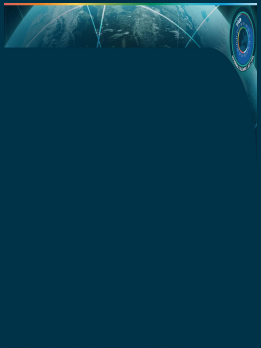
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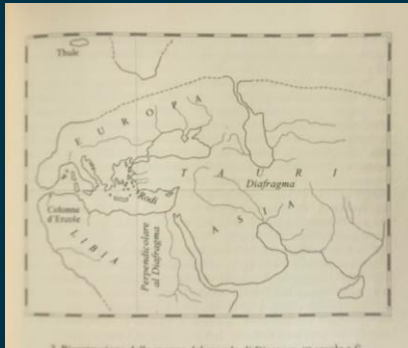


# What is a Map

“Maps are graphic representations that facilitate a spatial understanding of things, concepts, conditions, processes, or events in the human world”, J. B. HARLEY, History of Cartography.



Sippar VI a.c  
Iraq



Dicearco from Messina  
III a.c



Tolomeo 150 d.c  
Egypt



Joan Blaeu 1664  
d.c  
The Netherland



Apollo 17  
1972



Google Earth  
2012

“Maps are fundamental tools helping the human mind make sense of its universe at various scales. Moreover, they are undoubtedly one of the oldest forms of human communication.” J. B. HARLEY, History of Cartography.



# New Space Economy

## The new Space Billionaires (\*)

- Elon Musk (Space X)
- Richard Branson (Virgin Galactic)
- Paul Allen (SpaceShipOne)
- Jeff Bezos (Blue Origin)
- Why space is considered a New Gold Mine (\*)
- Expanding Use of Space in Remote Sensing, Communication, Navigation and Weather Satellites.

## Space Transport and Low-Cost access to space

- Space Mining
- Clean Energy from Space
- New Infrastructure and Habitats in Space
- On-Orbit Repair; Satellite upgrade and Active Debris Removal
- Strategic Space System That can Enforce New Cosmic Space Enterprise
- Spin Off of products derived from the new space technologies.

(\*) Source: "The new Gold Race. J.N. Pelton



# New Space Economy

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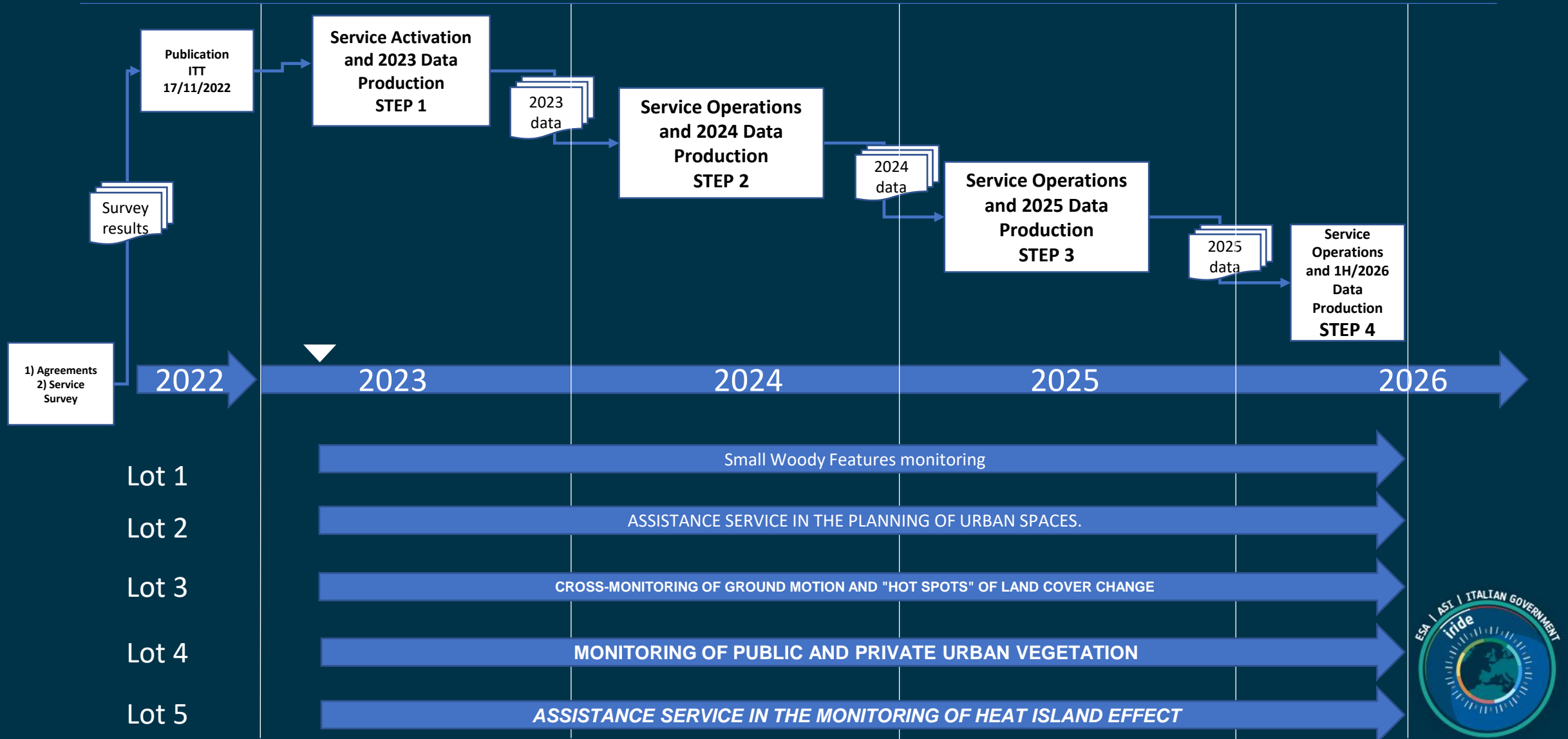
- Expanding Use of Space in Remote Sensing, Communication, Navigation and Weather Satellites.
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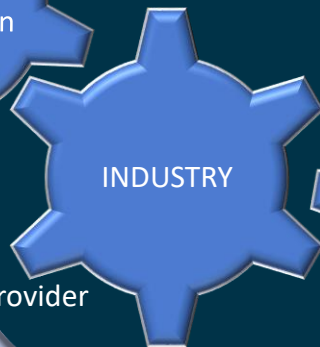




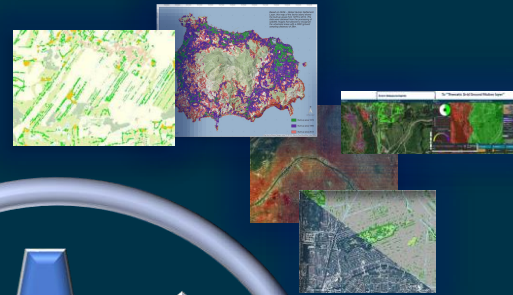
# The Work Plan



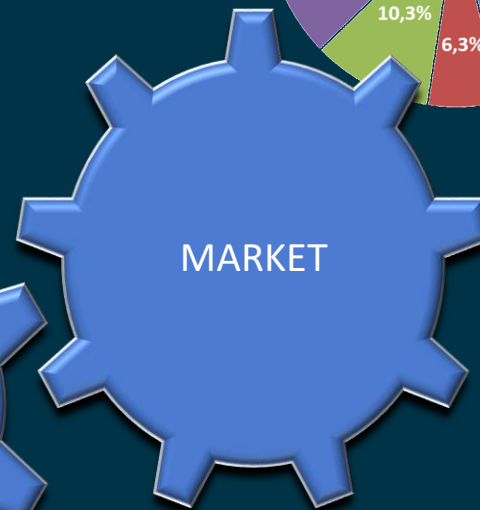
# EO SERVICES FOR LOCAL PUBLIC ADMINISTRATION (EO4LPA) ESA Project



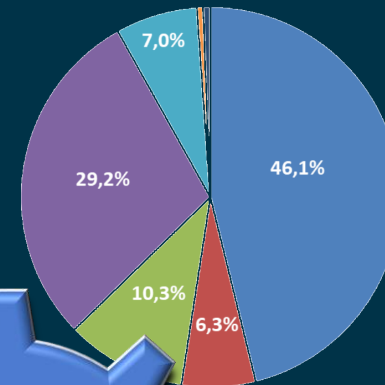
Value Added Service Provider  
SME/Startups  
Academy  
GIS operators  
Cloud Services Providers



Regione Lombardia  
Regione Toscana  
Regione Campania  
Regione Friuli Venezia Giulia  
Autorità di bacino distrettuale  
dell'Appennino Settentrionale



Comune di Bari  
Area Metropolitana di Milano  
Comune di Milano  
Comune di San Giuliano Terme  
Comune di Bollate





# Thank you!



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