



SPOKE 7

SPACE FOR THE SUSTAINABLE DEVELOPMENT OF THE PLANET

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AGENZIA SPAZIALE ITALIANA



Ministero
dell'Università
e della Ricerca

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Spoke 7: Partners

- 5 Research institutes
- 12 Universities
- 5 companies



Centro Italiano Ricerche Aerospaziali



ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA



IUSS

Scuola Universitaria Superiore Pavia



GRAN SASSO
SCIENCE INSTITUTE

SCHOOL OF ADVANCED STUDIES
Scuola Universitaria Superiore



Sant'Anna

Scuola Universitaria Superiore Pisa



POLITECNICO
MILANO 1863



Politecnico
di Torino



Politecnico
di Bari



UNIVERSITÀ
DI TRENTO



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



UNIVERSITÀ
DEGLI STUDI
FIRENZE



UNIVERSITÀ
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DI PADOVA



Università
di Genova



UNIVERSITÀ DEGLI STUDI
DELLA BASILICATA



AN ASI / TELESPAZIO COMPANY



AN ANGEL COMPANY



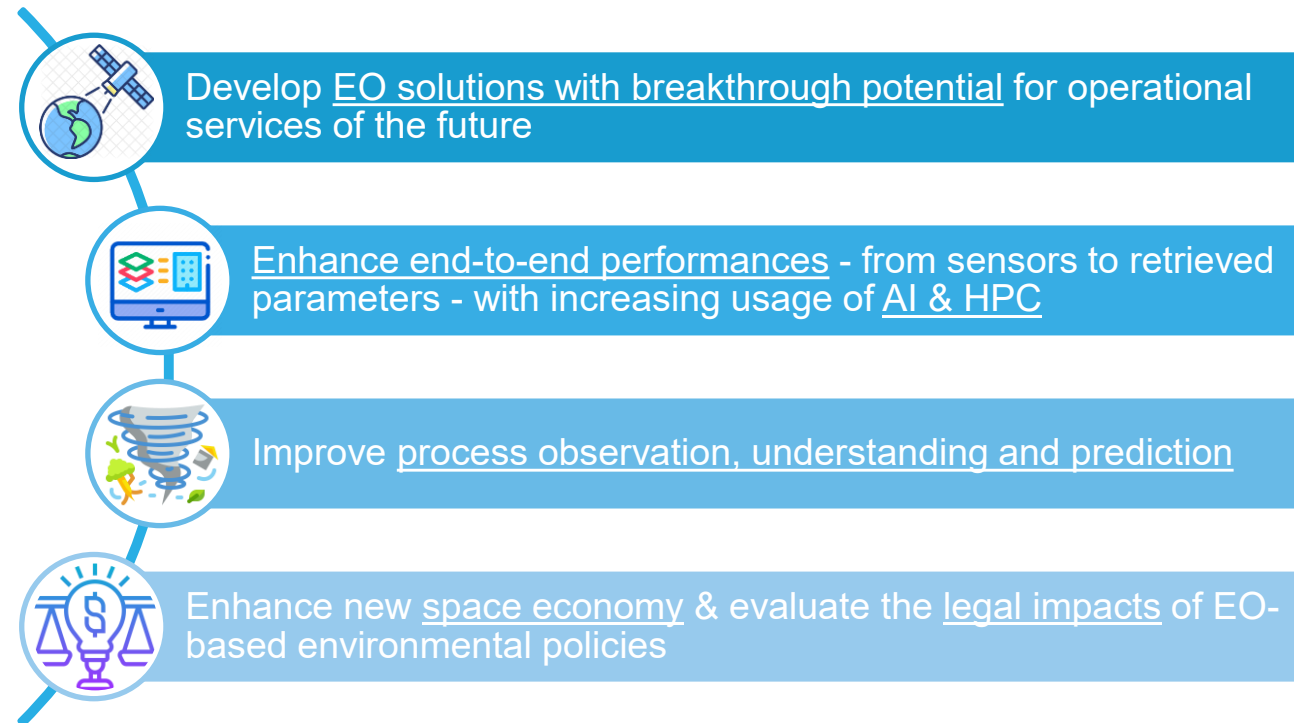
PASSION FOR INNOVATION



we see the world for you

Spoke 7: Mission statement

Earth observations (EO) solutions to support the achievement of several **Sustainable Development Goals (SDG)** set by United Nations (UN) for 2030



Spoke 7: Work packages

Earth observations (EO) solutions to support the achievement of several **Sustainable Development Goals (SDG)** set by United Nations (UN) for 2030

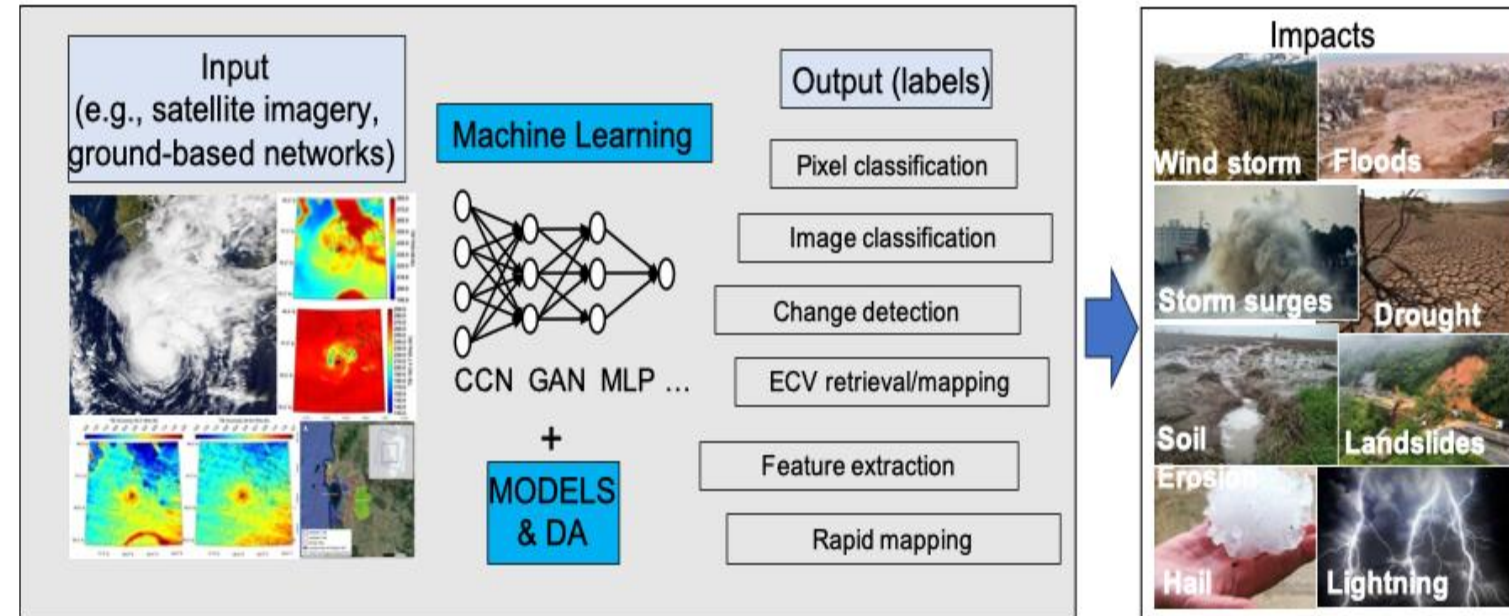


WP 7.2: Resilience to extremes

L: CNR, CL: UNITN, TL: CNR, POLITO, UNIPD
Others: CMCC, GSSI+, LEONARDO, LINKS

Topics and activities:

- Advanced EO for NRT monitoring of hydro-meteo-climate extremes
- Integrated observational and data assimilation tools to support hydro-meteo-climate and air quality modelling
- Automated procedures for rapid mapping of risks and impacts
- Data-driven tools for the analysis of extreme events in support to mitigation strategies



More tomorrow at Sessions M1 and P3

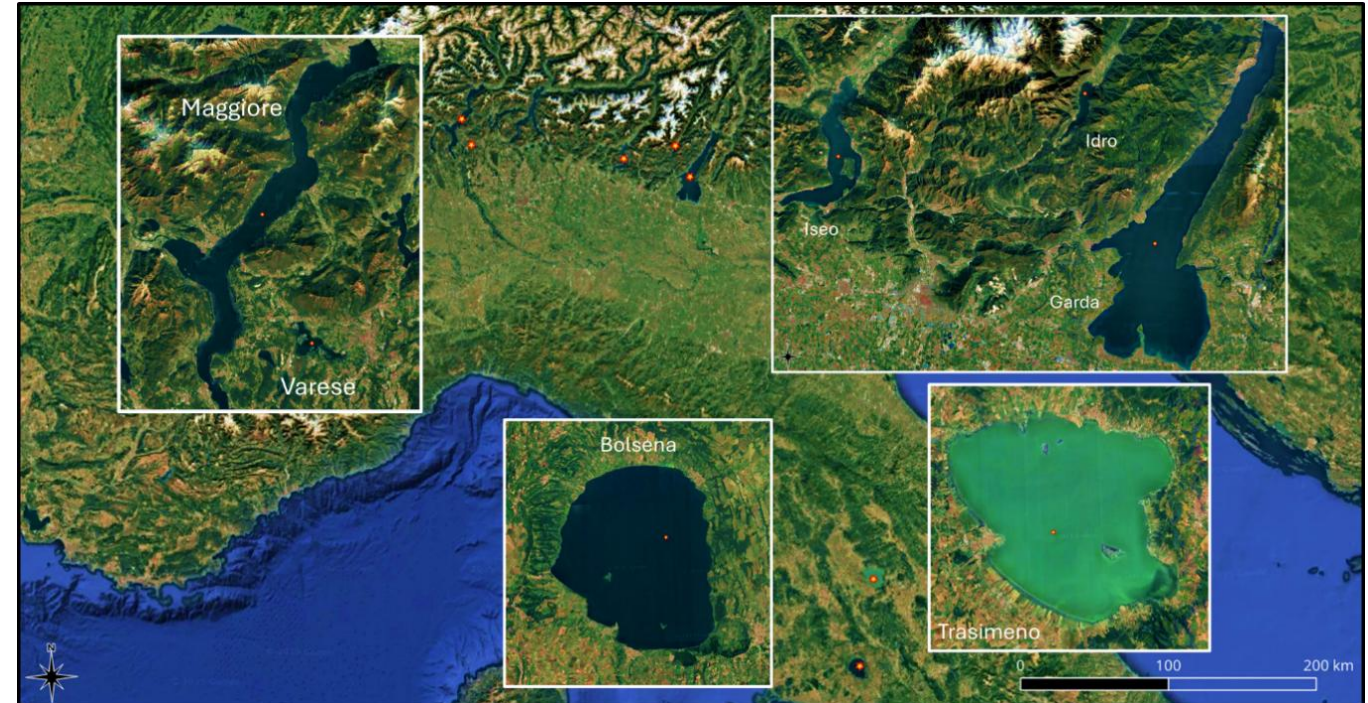
WP 7.3: Sustainable water and food

L: GSSI+, CL: UNITN, TL: UNITN, CNR
Others: CIRA, E-GEOS, LEONARDO,
SITAEI, UNIFI, UNIPD



Topics and activities:

- Water reserves monitoring, modelling and management
- Monitoring water and marine ecosystems
- Monitoring land cover, soil, and vegetation
- Field campaigns, data survey and analysis



More tomorrow at Sessions M2 and P3

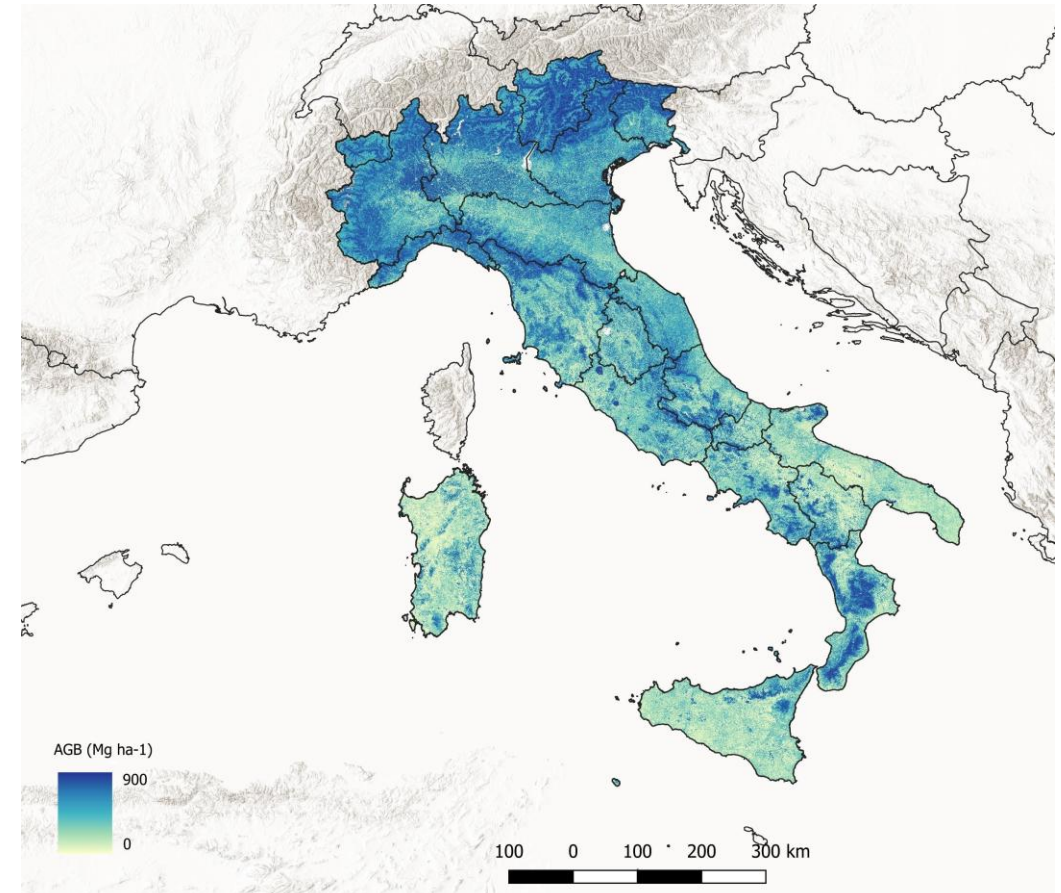
WP 7.4: Zero emission society

L: POLIMI, CL: UNIBO, TL: POLIMI, UNIBO, UNIFI
Others: CMCC, E-GEOS, INGV, INRIM, MAPSAT,
POLIBA, UNIFI, UNIPD



Topics and activities:

- Monitoring atmospheric, sea and land pollution
- Urban environment: land loss, urban heat island
- Monitoring carbon cycle: carbon source, sinks and storage in forest ecosystems
- Innovative methods to derive water/vegetation/soil/air quality indicators from multispectral/hyperspectral EO



More tomorrow at Session P3

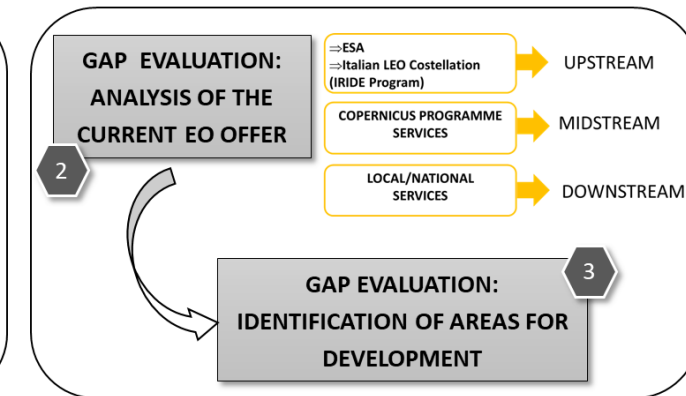
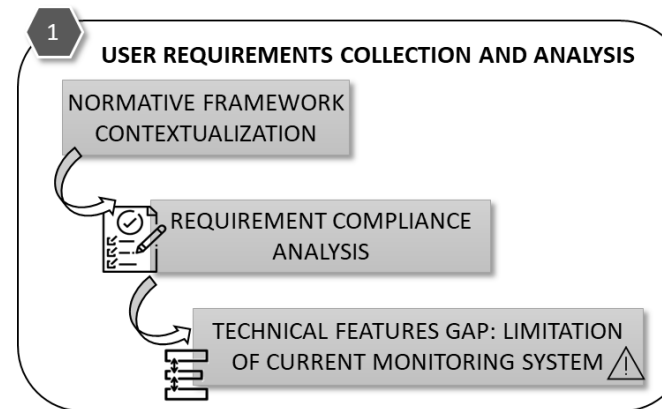
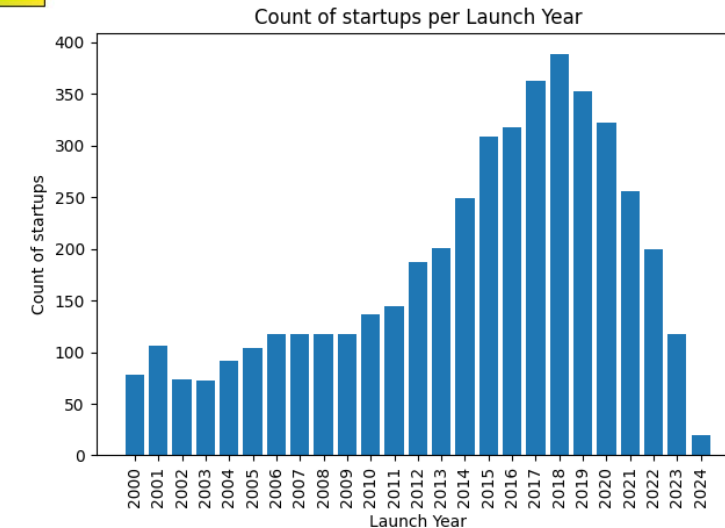
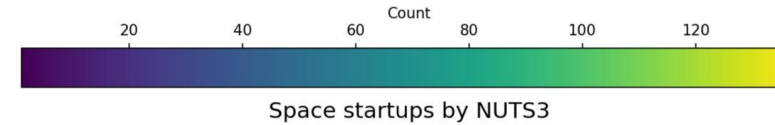
WP 7.5: Sustainable economic growth

L: POLIBA, CL: POLITO, TL: POLITO, POLIBA, POLIMI, GSSI+ Others: EGEOS, LEONARDO



Topics and activities:

- Innovation ecosystems & space economy
- Identification of European space startups
- Database of space-related patents at global level
- Business model & space economy transition
- Data collection on investors, financials, technologies and business models
- Techno-socio-economic assessment of EO-based applications & services
- Legal impacts of EO-based policies



More tomorrow at Session P3

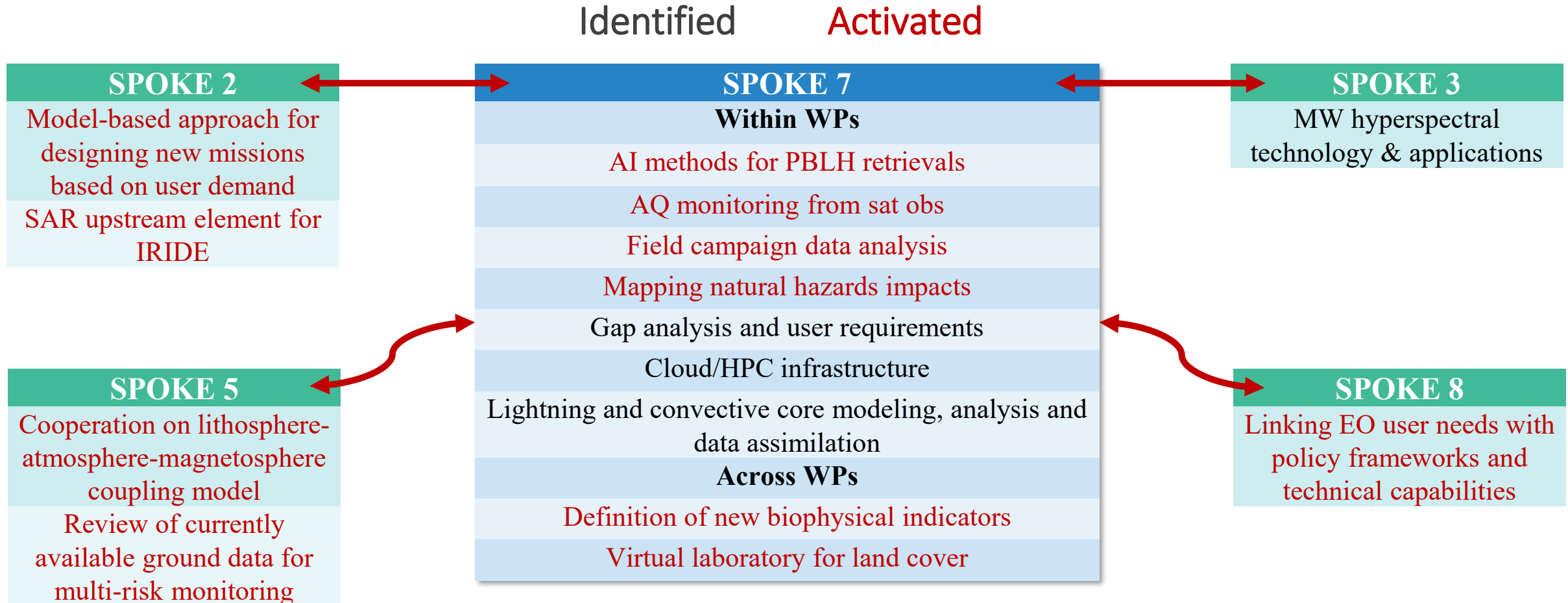
Spoke 7: Synergy

Identified

Activated

SPOKE 7	
Within WPs	
	AI methods for PBLH retrievals
	AQ monitoring from sat obs
	Field campaign data analysis
	Mapping natural hazards impacts
	Gap analysis and user requirements
	Cloud/HPC infrastructure
	Lightning and convective core modeling, analysis and data assimilation
Across WPs	
	Definition of new biophysical indicators
	Virtual laboratory for land cover

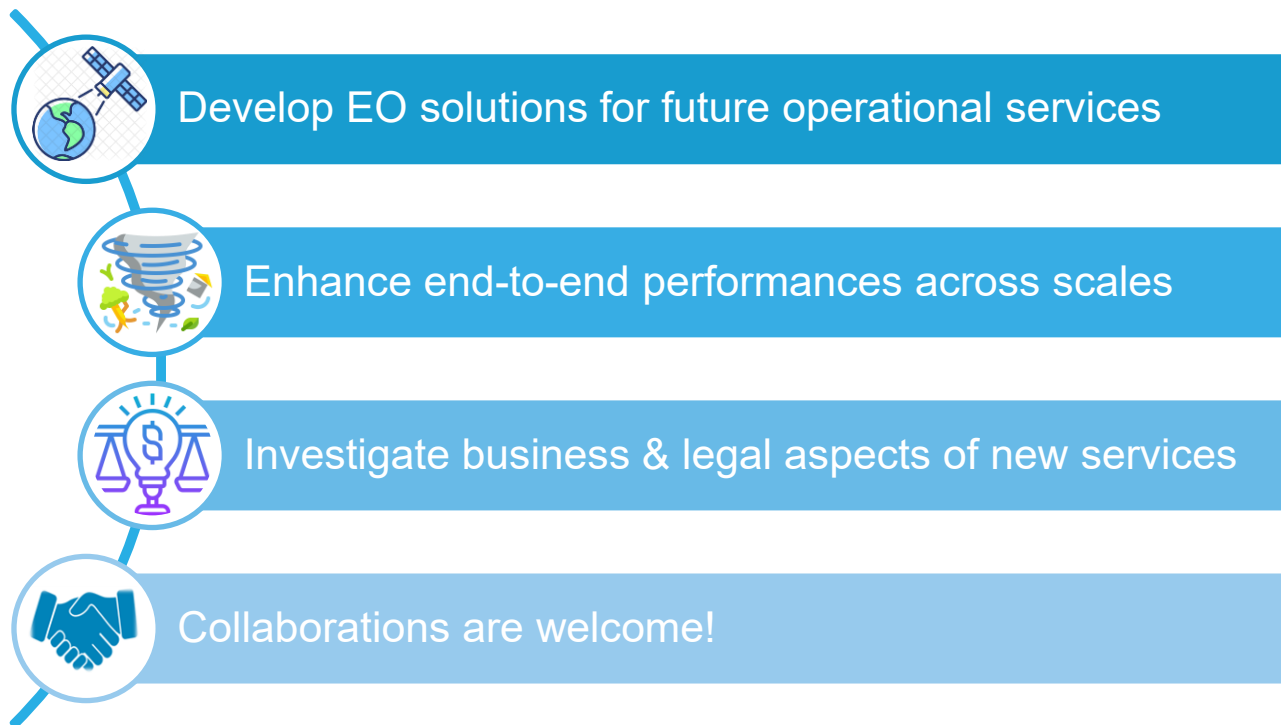
Spoke 7: Synergy



Spoke 7: Take-home message

Thanks much for
your attention!

Spoke 7 aims to:



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More tomorrow at Sessions M1, M2, and P3

Spoke 7: Identified synergies

Within Spoke 7

Within WPs

- AI methods for PBLH retrieval from spaceborne radiometric observations (LINKS, CNR)
- Gap analysis and user requirements for PBL profiling payloads (CNR, UNITN, & LEONARDO)
- Use of the Cloud/HPC development infrastructure (UNIGE, CNR, LINKS)
- Cooperation on analysis of data from satellite and from field measurements (UNITN, UNiBAS)
- Lightning and convective core modeling, analysis and data assimilation (CNR, UNIGE, UNIPD)
- Multisensor unsupervised change detection for mapping the impact of natural hazards (POLITO, UNIGE)
- Satellite monitoring of air pollution in the case studies Milan and Bologna (POLIMI, UNIBO)

Across WPs

- Operational production of new biophysical indicators for the definition of biological and geophysical characteristics of the diverse surface coverage components (WP 7.2 & 7.3)
- Virtual laboratory for testing and consolidating land cover retrieval algorithms through multi-source and multi-sensor satellite (WP 7.2 & 7.3)

Spoke 7: Identified synergies

Across Spokes

Spoke 2: AI and design of new missions

Spoke 3: MW hyperspectral technology & applications

Spoke 5: Early warning, multi-scale analysis, atmospheric correction and magnetosphere coupling, EO data fusion, HPC usage, ML models

Spoke 7: Activated synergies within Spoke 7

Lead	Partners	Topic
Within WPs		
7.2.1	7.2.3	AI methods for PBLH retrieval from spaceborne radiometric observations (LINKS, CNR)
7.4.1	7.4.2	Satellite monitoring of air pollution in the case studies Milan and Bologna (POLIMI, UNIBO)
Across WPs		
7.3.3	7.2.4_2	Operational production of new biophysical indicators for the definition of biological and geophysical characteristics of the diverse surface coverage components (GSSI+, IUSS,...)
7.3	7.2	Virtual laboratory for testing and consolidating land cover retrieval algorithms through multi-source and multi-sensor satellite (GSSI+, IUSS,...)

Spoke 7: Activated synergies with other Spokes

Lead	Partners	Topic
7.2.1	5.3.7	Collected and provided atmospheric data during notable earthquakes to test their lithosphere-atmosphere-magnetosphere coupling model. Atmospheric profiles from a radiosonde and numerical model reanalysis were used to assess whether the 2009 L'Aquila and 2016 Norcia earthquakes were capable of generating a acoustic-gravity wave (AGW) able to reach the ionosphere triggering plasma waves. vTEC data over a 3°x3° latitude by longitude square centered on the earthquake's epicenter were analyzed to check for possible ionospheric plasma fluctuations. The analysis is still ongoing (CNR, UNICAL, UNIVAQ)
7.3	2.2.1	Identification general framework of analysis of a wide range of user needs and their correlation with technical requirements for space, with the identification of a general procedures able to provide a model-based tool for the identification of optima constellations considering different objectives like return of investment and combination of different payloads (IUSS, UNIROMA1)
7.3	2.2.3	Model-based approach for the preliminary design of the SAR Upstream element for the Italian IRIDE EO constellation based on users' demand (IUSS, UNIROMA1)
7.4.2	5.2.1	Review of currently available ground data, and systems addressing the following risks: earthquakes, volcanic eruptions, sudden landslides, tsunamis, fires and floods and storm surge (INGV)
7.5.4	8.1	Legal framework of the Space Law, involving several key steps aimed at systematically linking user needs with policy frameworks and technical capabilities in the EO domain