ASI strategy for National Downstream Development

In recent decades, Italy has invested a significant effort in space technologies for Earth Observation: COSMO-SkyMed, now in its second generation, represents one of the most advanced radar constellations and a unique example at global level, as well as the hyperspectral satellite PRISMA in Europe. The near future are PLATINOs satellites.

Downstream Development Targets

- **Promote the development** of value-added applications and services based on EO data (and the use of TLC/NAV satellite systems) also combined with each other and/or integrated with non-space data and services

- **Allow the acceleration** of scientific and technological development, through the implementation of demonstrators and pilot projects able to use national systems dedicated to the management of geospatial data

- **Encourage the use of data**, systems and territorial services, as well as the development of new techniques, including non-spatial origin, for the analysis and integration of increasingly numerous and complex data from multiband sensors

- **Prepare a new generation of downstream services**, useful for users engaged in the governance and monitoring of the territory and its resources, using entrepreneurial and scientific skills and enhancing the infrastructure investments made by the Agency

ASI strategy for National Downstream Development DATA Exploitation

PRISMA Scienza	SAR Multifrequenza	Open Calls COSMO-SkyMed
Data exploitation from the hyperspectral "PRISMA" mission by the scientific and industrial community	Definition, experimentation and demonstration of methodologies, innovative algorithms and products based on the use of multi-mission / multi-frequency SAR data	Promotion of the COSMO-SkyMed data utilization (1st / 2nd Gen) to basic and applied R&D in view of scientific and toward operational utilization of the products/services developed

Highlights

- Budget: 3 M€
- Co-fund ≤ 200 k€ / proposal
- 15 proposals co-funded
- AI, ML, Data Fusion, Resolution
- Projects ongoing

Highlights

- Budget: 2 M€
- 10 project financed
- Multithematic call
- Integration with other EO data or non EO data

Highlights

- Permanently open since 2015
- 2 types of call (Science/Industry)
- National industry / international scientific community
- Max 100 scenes free of charge

ASI Agenzia Spaziale Italiana

ASI strategy for National Downstream Development
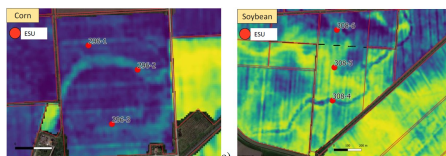
SAR Multifrequency

Definition, experimentation and demonstration of methodologies, innovative algorithms and products based on the use of multi-mission / multi-frequency SAR data
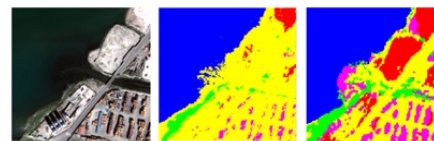
Focus

Use of data from national missions (COSMO Sky-Med) or acquired in the context of international cooperation (e.g. ASI-CONAE for SAOCOM data in L-band)
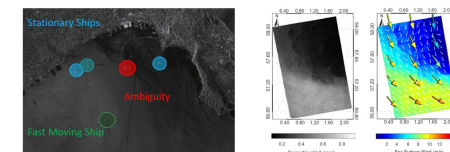
Agriculture

Development of algorithms for monitoring soil moisture water, stress of crops, irrigated areas

Urban Areas

Development of algorithms to improve the classification of urban changes / rural and cultivated

Sea and Coasts

Projects for sea wind field estimation for oceanographic application or for identification and classification of non-cooperative vessels

Natural Risks
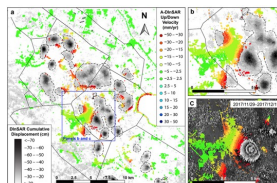
Projects for the detection / classification of deformation phenomena (e.g. landslides), also with machine learning methods

Creation of surface deformation 3D maps with high spatial-temporal coverage and high accuracy, for civil protection application scenarios, through integration / data fusion

ASI strategy for National Downstream Development

- ## I4DP – Innovation for Downstream Preparation

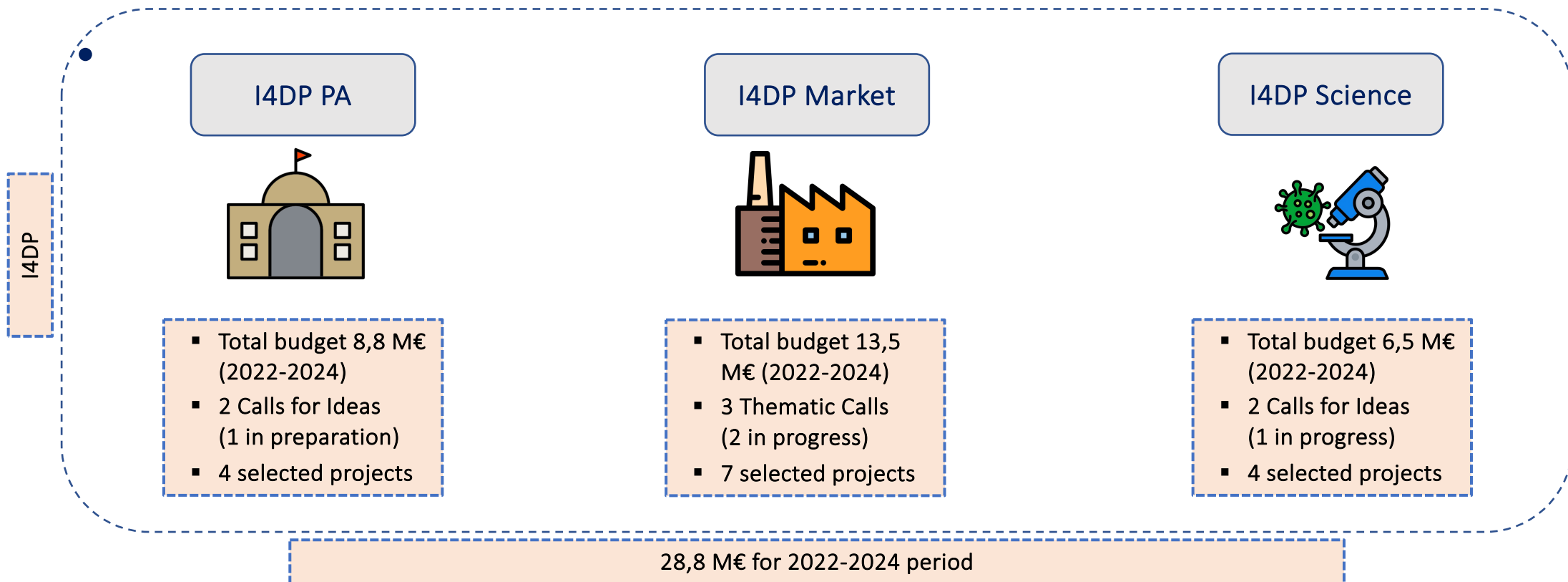 ▪ Born at the end of 2021, it's **the main ASI program for the development of the downstream sector,** which brings together the experience of previous initiatives in a single structured path to support public and private stakeholders

  ▪ **The main focus is to stimulate the downstream sector growth,** offering a concrete support to set-up innovative and powerful space solutions for emerging demand and, at the same time, consolidating and enriching existing national know how both at scientific and industrial level

  ▪ Articulated in **three intervention lines** to better leverage on needs of that communities: Public Institutional entities, Scientific community and Commercial operators

  ▪ The program implementation is based on **thematic periodic calls** for each category of target users, with different selection procedures (in respect of national legislation)

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ASI strategy for National Downstream Development

- I4DP – Innovation for Downstream Preparation

I4DP

| I4DP PA | I4DP Market | I4DP Science |

- Total budget 8,8 M€ (2022-2024)
- 2 Calls for Ideas (1 in preparation)
- 4 selected projects

- Total budget 13,5 M€ (2022-2024)
- 3 Thematic Calls (2 in progress)
- 7 selected projects

- Total budget 6,5 M€ (2022-2024)
- 2 Calls for Ideas (1 in progress)
- 4 selected projects

28,8 M€ for 2022-2024 period

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I4DP – Innovation for Downstream Preparation

- ## I4DP PA - Public Institutions – First call

Effects of climate change and extreme events

- Budget 2,5 M€
- Co-financing ≤ 500 k€
- TRL ≥ 6
- 24 months

PARACELSO – Predictive Analysis, monitoRing and mAnagement of Climate change Effects Leveraging Satellite Observations

TUS:CAN - Satellite Urbanized Territory: Classification and Analysis

MIRIFICUS – Monitoring of riforestation interventions for the Urban Heat Island through satellites

GARMOSAT – Garbage Monitoring Satellite

I4DP – Innovation for Downstream Preparation

- ## I4DP Market – Companies – First call

-
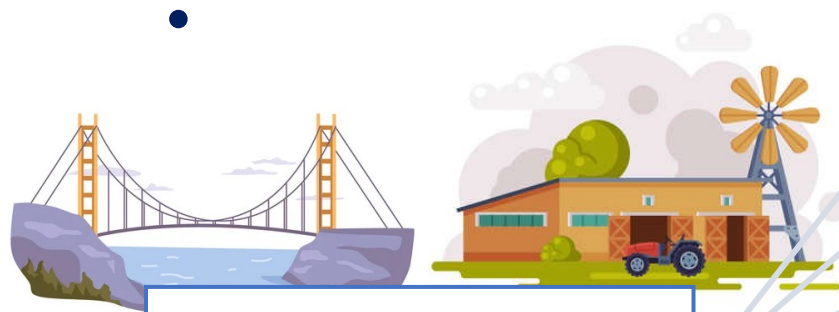
Management and monitoring of Infrastructures / Precision farming

- Budget 6 M€
- Financing ≤ 1 M€ - TRL ≥ 8
- Financing ≤ 500 k€ - TRL 6÷8
- 18 months

Safe Bridge - Monitoring services with satellite techniques for safe bridges
Rheticus Safeway
Fixyll - Fight Xylella
MODISAT - Bridge buffering by displacement measurements derived from satellite technologies
SAT4FARM
MIDS - Water infrastructure monitoring with satellite data
DEM-EO - Democratization of Earth Observation

I4DP – Innovation for Downstream Preparation

- ## I4DP Science – Research organizations – First call

Sustainable Cities

- Budget 1 M€
- Co-financing ≤ 250 k€
- TRL ≥ 4
- 18 months

EcoNet - Eco-sustainability of human settlements: sensor analysis from satellite and on the ground integrated by artificial intelligence, for the protection of surface waters

LCZ-ODC - Identification of Local Climate Zones and study of their correlation with air temperature in the Metropolitan City of Milan through the integration of geospatial data and Earth Observation technologies in Open Data Cube environment

GEORES – Geospatial application to support the improvement of environmental sustainability and resilience to climate change in urban areas
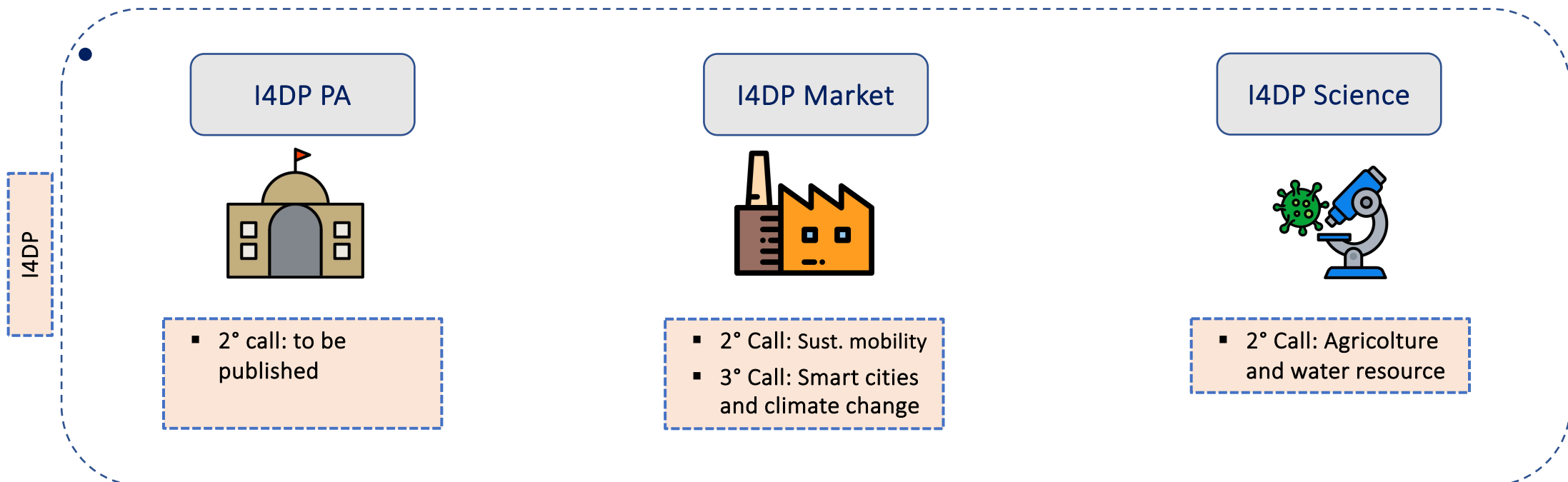
SatellOmic – Integration of satellite and metagenomic systems for monitoring and protection of reservoirs

Next Call: new themes

- ## I4DP – Innovation for Downstream Preparation

I4DP

I4DP PA

I4DP Market

I4DP Science

- 2° call: to be published

- 2° Call: Sust. mobility
- 3° Call: Smart cities and climate change

- 2° Call: Agricolture and water resource

CALL PNRR *SVILUPPO APPLICATIVI, SERVIZI E NUOVI ALGORITMI DI ANALISI DI DATI SATELLITARI*

TOURISM, ENVIRONMENT, ECONOMIC DEVELOPMENT OF TERRITORIES

https://www.asi.it/bandi_e_concorsi/bando-di-selezione-per-laffidamento-di-attivita-di-ricerca-e-sviluppo-inerenti-a-sviluppo-applicativi-servizi-e-nuovi-algoritmi-di-analisi-di-dati-satellitari-nellambito-de/

User Engagement and Service Development
Italian strategies

ASI Domain

- Open calls
- Mission exploitation
- Innovation for Downstream Preparation
- Framework agreements

User in the loop

Partnership
Needs as design drivers

IRIDE Service Domain

IRIDE Marketplace

CyberItaly

Services

1. Coasts & Coastal Waters
2. Air Quality
3. Ground Motion
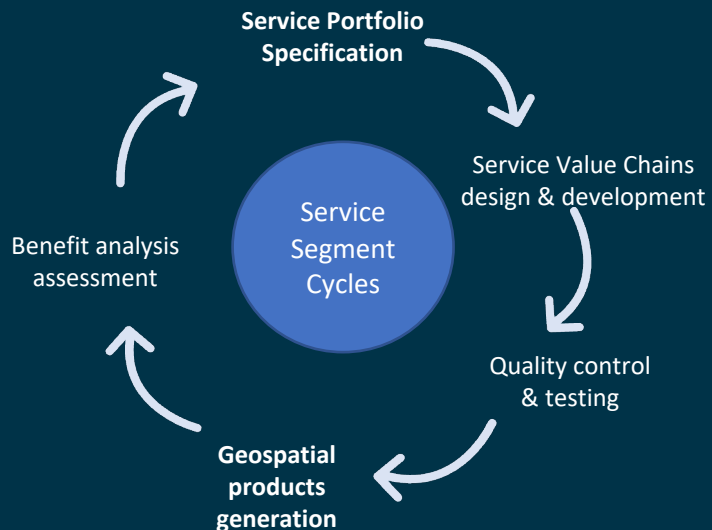4. Land Cover
5. IdroMeteoClima
6. Water Management
7. Emergency
8. Security

Local PA Uptake Initiative

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Services: Development Principles

- iterative development, progressive growth (**precursor, v1, v2**)

- immediate start: Precursor version improving the State-of-the-Art

- multi mission, multi source input data

- **users in the loop** (regular checkpoints)

- focus on the 'last mile'': inclusion of IRIDE services in the user workflow

-sustainability post June 2026

Service Portfolio Specification

Service Value Chains design & development

Service Segment Cycles

Benefit analysis assessment

Quality control & testing

Geospatial products generation

Precursor Phase (one cycle):

- In input: existing data sources

- Services include improvement with respect to State-of-the-Art

Phase 2 (two cycles):

- Progressive integration of IRIDE data

- Integration in IRIDE MArketplace

- Improvement of Services with respect to Precursor

S1. Coastal and Marine Monitoring: IRIDE Precursor Service Portfolio

SVC ID	Service Value Chain Name
SE-S1-01	Coastal Monitoring and Forecast - Wide Areas
SE-S1-02	Coastal Monitoring and Forecast – Specific Areas
SE-S1-03	Coastal Area Mapping and Monitoring

<u>Concerning the model driven SVC, IRIDE</u> Services contributes with EO based products.

S2. Air Quality: IRIDE Precursor Service Portfolio

SVC ID	Service Value Chain Name
SE-S2-01	Air Quality Monitoring and Forecast
SE-S2-02	Monitoring and assessment of pollutant emissions
SE-S2-03	Re-analysis of air quality at national scale

<u>Concerning the model driven SVC, IRIDE</u> Services contributes with EO based products.

S3. Ground Motion: IRIDE Precursor Service Portfolio

SVC ID	Service Value Chain Name
SE-S3-01	Mapping of Ground Motion - National Coverage
SE-S3-02	Landslide Monitoring
SE-S3-03	Cultural Heritage Areas Monitoring
SE-S3-04	Critical Infrastructure Monitoring
SE-S3-05	Monitoring of seismic wide areas during inter-seismic phase
SE-S3-06	Volcanic areas Monitoring
SE-S3-07	On-demand monitoring

DTM/DSM	Italian Territory HR DSM Italian Territory HR DTM

S4 Land Use Land Cover for Environment: IRIDE Precursor Service Portfolio

SVC ID	Service Value Chain Name
SE-S4-01	Land Cover/Land Use mapping & monitoring
SE-S4-02	Land consumption/soil sealing monitoring
SE-S4-03	Land consumption/soil sealing mapping
SE-S4-04	Habitat Mapping
SE-S4-05	Urban Heat Island Monitoring
SE-S4-06	Green Urban Areas Characterization

S4 Land Use\ Land Cover for Agricolture: IRIDE Precursor Service Portfolio

SVC ID	Service Value Chain Name
SE-S4-12	Soil Organic Carbon (SOC) Monitoring
SE-S4-13	Erosion Risk Assessment
SE-S4-14	CPA Mapping and Monitoring
SE-S4-15	Water Needs and Used Mapping
SE-S4-16	Identification of Indexes for Crop Health Assessment
SE-S4-17	a. CAP - Crop map to support CAP objectives (Crop map aggregated at crop groups levels- 1 output) b. CAP - Continuous monitoring of annual LPIS changes (permanent crops and artifacts) c. CAP - Pasture tare and permanent grassland d. CAP - Identification of potential spills from stables e. CAP - Cross-compliance checks

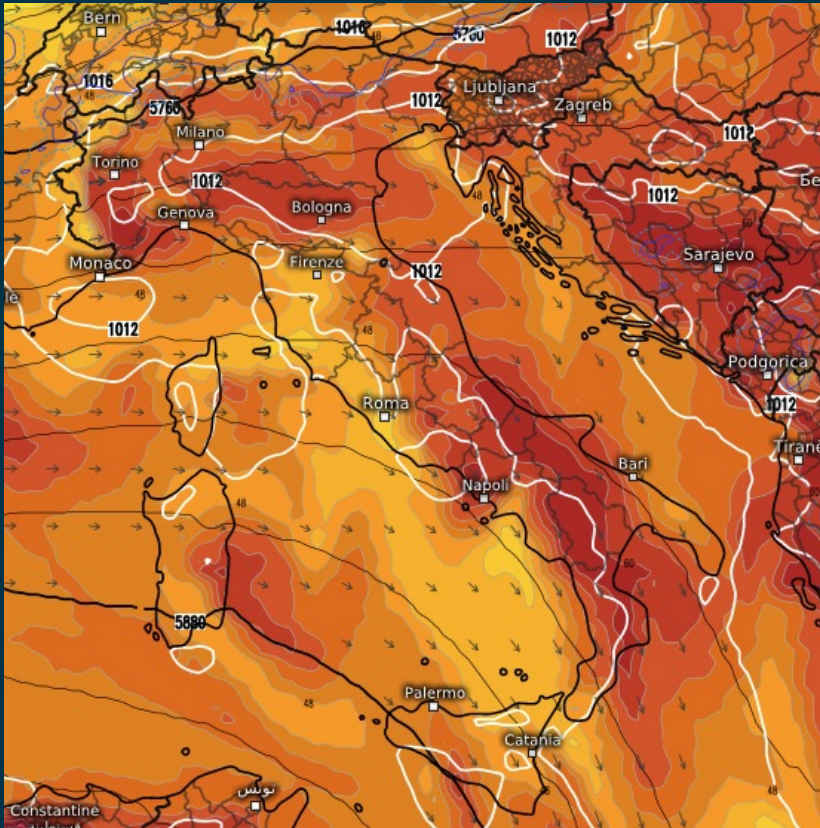# S4 Land Use\ Land Cover for Forest: IRIDE Precursor Service Portfolio

SVC ID	Service Value Chain Name
SE-S4-07	National Forest Mapping and Monitoring
SE-S4-08	Mapping of Burnt Areas
SE-S4-09	Fire Damage Assessment
SE-S4-10	Forest Health Assessment Indexes
SE-S4-11	Carbon Stock Indexes

S5. Hydro-Meteorological-Climate: IRIDE Precursor Service Portfolio

SVC ID	Service Value Chain Name
SE-S5-01	Hydro-meteorological mapping and monitoring atmospheric structure
SE-S5-02	Monitoring of greenhouse gases and other Essential Climate Variables (ECVs)
SE-S5-03	Classification of herbaceous agricultural crops
SE-S5-04	Lightening Monitoring

Concerning the model driven SVC, IRIDE Services contributes with EO based products.

S6. Water Management: IRIDE Precursor Service Portfolio

SVC ID	Service Value Chain Name
SE-S6-01	Hydrological and Hydraulic modelling, flood forecasting and sediment management
SE-S6-02	River hydro-morphological mapping and channel dynamics
SE-S6-03	Integrated water resource management

Concerning the model driven SVC, IRIDE Services contributes with EO based products.

SVC ID	Service Value Chain Name
SE-S7-01	Rapid Damage Mapping / Delineation - Earthquake
SE-S7-02	Rapid Damage Mapping / Delineation – Flood
SE-S7-03	Rapid Damage Mapping / Delineation – Volcanic Eruption
SE-S7-04	Rapid Damage Mapping / Delineation - Wildfires
SE-S7-05	Rapid Damage Mapping / Delineation – Extreme Meteo Event
SE-S7-06	Rapid Damage Mapping / Delineation – Landslide/Avalanche/Mudflow
SE-S7-07	Rapid Damage Mapping / Delineation - Tsunami
SE-S7-08	Detail Damage Mapping / Grading – Earthquake
SE-S7-09	Detail Damage Mapping / Grading – Flood
SE-S7-10	Detail Damage Mapping / Grading – Volcanic Eruption
SE-S7-11	Detail Damage Mapping / Grading - Wildfires
SE-S7-12	Detail Damage Mapping / Grading – Extreme Meteo Event
SE-S7-13	Detail Damage Mapping / Grading – Landslide/Avalanche/Mudflow
SE-S7-14	Detail Damage Mapping / Grading - Tsunami
SE-S7-15	Rapid Damage Mapping / Delineation / Grading – Other Natural/Man made disaster
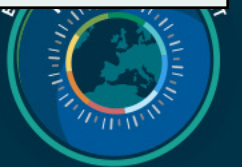
S8. Security Maritime: IRIDE Precursor Service Portfolio

SVC ID	Service Value Chain Name
SE-S8-03	Maritime Surveillance: Maps for Oil Spill detection and Sea Pollution management
SE-S8-04	On-demand Maritime Surveillance: vessels detection, identification, tracking and S&R Support Services
SE-S8-05	Systematic Maritime Surveillance: vessels detection, identification, tracking and S&R Support Services

S8. Security Land: IRIDE Precursor Service Portfolio

SVC ID	Service Value Chain Name
SE-S8-01	HR and VHR Monitoring Maps
SE-S8-02	Monitoring maps of human settlements (formal and informal)
SE-S8-06	Risk Analysis on Critical Areas
SE-S8-07	Environmental Intelligence Services
SE-S8-08	Cross Border and Pre-Frontier Surveillance Service (Migrants' Flow, Road Network Status Assessment

IRIDE Service Segment Implementation – Precursor Phase Industrial Teams

S1 - Coastal & Marine Monitoring

S2 - Air Quality

S5 – Hydro-Meteo-Clima

S6 – Water Management

Prime Contractor

planetek italia

The Industrial Team

cmcc Centro Euro-Mediterraneo sui Cambiamenti Climatici

MEEO Meteorological Environmental Earth Observation

cima RESEARCH FOUNDATION

exprivia

serco

ARIANET A suez company

s[&]t

e-geos AN ASI / TELESPAZIO COMPANY

[SoftWater]

ge.co

ALMA MATER STUDIORUM A.D. 1088

ARTHUR LITTLE

Annamaria Luongo

REPLY SPARK

bip.

Pilot Users

ARPA Puglia
OGS
ARPA Friuli Venezia Giulia
Autorità di Sistema Portuale del Mar Tirreno Centro Settentrionale (Porto di Civitavecchia)
Autorità di Sistema Portuale del Mar Ionio (Porto di Taranto)
Istituto Idrografico della Marina
Regione Emilia Romagna
INGV
Regione Lazio DEP
ISMEA
Autorità Di Bacino distrettuale del fiume Po
Autorità Di Bacino distrettuale dell'Appennino Meridionale

ESA | ASI | ITALIAN GOVERNMENT
iride

IRIDE Service Segment Implementation – Precursor Phase Industrial Teams

S3 – Ground Motion

The Industrial Team

Prime Contractor

Pilot Users

CPC- UNIFI
INGV
ENEA
ANAS
Italferr
Sovraintendenza di Roma Capitale
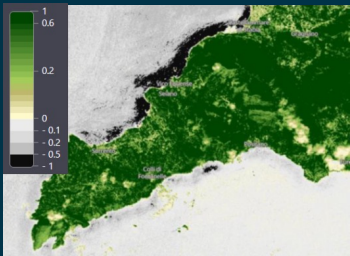Parco Archeologico dei Campi Flegrei
Parco Archeologico Appia Antica

S7 – Emergency

S8 - Security
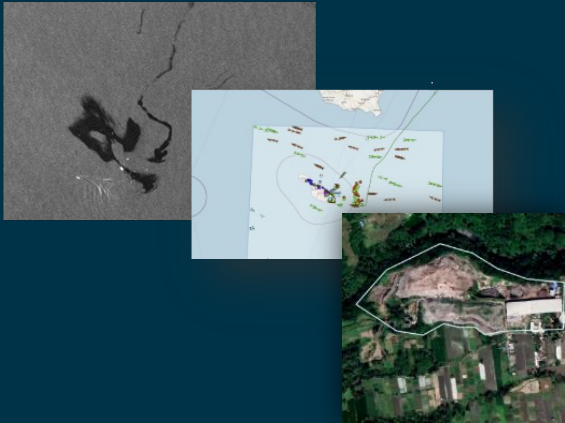
Prime Contractor

Industrial Team

ithaca

planetek italia

NHAZCA
NATURAL HAZARDS CONTROL AND ASSESSMENT

cima
RESEARCH FOUNDATION

MEEO
Meteorological Environmental Earth Observation

CMCC
Centro Euro-Mediterraneo sui Cambiamenti Climatici

aresys
Advancing remote sensing

CGI

serco

TELESPAZIO
a LEONARDO and THALES company

exprivia

LEONARDO

CHERRY DATA

TERRADUE

ARTHUR LITTLE

Pilot Users

- Marina Militare
- Istituto Idrografico della Marina Militare
- Arpa Puglia

- Vigili del Fuoco
- CIMA
- UNIFI
- INGV
- EUCENTRE

SE-S6-01. Hydrological and Hydraulic modelling, flood forecasting and sediment management: Precursor Service Details

Service Mode
Depending on product
- Systematic Monitoring
- On Demand

Temporal Characteristics
Depending on product
- Monitoring frequency: up to daily
- Temporal coverage: last 3 years

Geographic Coverage
Depending on product
- Italian Territory
- Po basin (sediment)
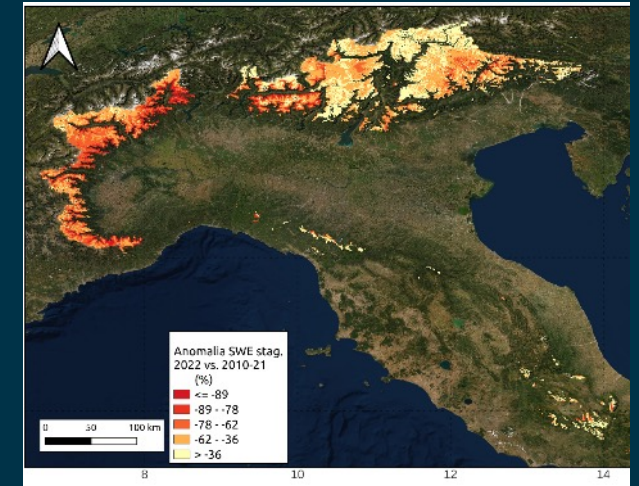- AOI (Flood Mapping)

Access to the Service

The Exploitation Tools offers several interfaces to access and exploit SVC product:

- UI (WebGIS) for CASCADE
- HIS Central Platform and myDewetra
- API (M2M)
- Direct Access (sFTP), for product download

Starting from November 2023

Flood Severity Maps

Snow Water Equivalent Anomaly

Use Case
Support services for hydrological and hydraulic modelling, flood forecasting and sediment management
- Soil Moisture map is input of Standard Operating Procedures (SOPs) of Civil Protection for evaluating antecedent soil moisture condition
- Soil Moisture maps are input of CDI for drought severity evaluation
- Flood Severity Maps and Flood hazard maps can be used by users to assess the severity of a flood event and estimate flood damages;
- Sediment budget: programming activities of interventions to manage the sediments of the riverbeds.
- SWE and SWE-Anomaly can be used by users for monitoring water scarcity conditions.
- Seasonal Forecast useful for "Gruppo tecnico delle previsioni mensili e stagionali"

ESA unclassified - releasable to the public

Conclusions

- The Italian Space Agency, through its I4DP – Innovation for Downstream Preparation program, has put in place a tool that constantly provides help for the development of services and applications useful for the management of multiple strategic sectors for the country, encouraging interaction with and between the communities of commercial and institutional users and preparing the operational downstream services of the future. I4DP calls requested to valorize existent asset and on-going developments.

- IRIDE is developing an operational framework for the institutional services, starting from the SOTA (in the precursor phase), and then, in phase 2, it foresees the exploitation of IRIDE constellation data for the evolution of S1-S8 services.

- The IRIDE precursor phase is also built on previuos downstream services and data exploitation programmes of ASI. I4DP themes are defined in harmonized way with other on-going service development attivities.

- The national future ecosystem (post 2026) of downstream institutional services will be based on the contribution both of IRIDE and ASI investments.

- Users are and will be deeply involved in both processes of service development: IRIDE and I4DP are intrinsically user-driven.

Thanks for your attention

Contact: laura.candela@asi.it