



ISSUE 16

geoxperience

Earth Observation:

Protecting the marine coastal ecosystem
Xylella, a challenge to win
Critical Infrastructure security and resilience
Predictive maintenance of water and sewage networks
Rheticus® Geoinformation services
Free and Open Satellite Data

Government:

Climate change and sustainable development
Decision-making in a fast-changing world

Security and defence:

Disaster risk management and prevention
Defence and Geospatial Intelligence

Space:

SpaceStream. Reshaping the Space Value Chain
The ground segment of satellites

Corporate:

Creating value with sustainability, and culture
Research and innovation



Looking at the Earth from space is a fascinating experience. Since 1994, we have been committed to transforming this experience into knowledge useful for improving the well-being of people and the protection of our planet.

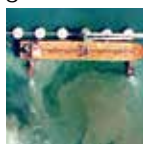
**SIMPLIFYING THE
COMPLEXITY OF SPACE**

There is a Space App for this



In my communication to Planetek at the end of 2021, while commenting on the positive growth of our group despite the pandemic, we are now more than a hundred people between Planetek Italia and Planetek Hellas, I warned everyone: the only prediction we can make for 2022 is that it will be an unpredictable year, we remain agile and we continue to evolve. The facts have sadly confirmed this prediction, and the drums of war on the borders of Europe do not bode well. This issue of GeoXperience in themes and contents confirms how agile and evolutionary Planetek is. Planetek Italia transformation into a Benefit Company allows us to reaffirm in our statute the good practices of environmental and social sustainability that have always been followed over the years by Planetek, is a way of making our link with the ideals that have characterized our business for 28 years permanent. Our commitment to the environment emerges through our projects ranging from the monitoring of coastal areas to the fight against Xylella and, in many cases, are precursors of analytics to support our industrial customers' SDGs and ESG practices. Those who follow us on social media will have noticed how our commitment is increasingly oriented to provide our customers, whether public administrations or private companies, with increasingly integrated

tools with operational, economic and environmental performance indicators made available through the Rheticus® platform. We continue to expand the offer of commercial data from multiple platforms, always choosing the data that best suits the needs of our customers. Today we offer "data as a service" subscription solutions that allow you to access a bouquet of different and complementary data, associating the latest New Space innovations with the best incumbents. You may also have noticed our effort towards training in EO. Both Planetek Italia and Planetek Hellas are strengthening ties with universities and research centres to confirm themselves as attractors of new talents, fundamental to fuel our rapid growth in all markets. As you will see, our commitment to developing capabilities on the ground and on board grows. We continue to build our capabilities to analyze onboard data to make data more easily accessible and provide analytical information when it is needed and where it is needed. This vision developed by the AI^x program is evolving towards an entirely new ecosystem aimed at facilitating the exchange of value between different subjects, and destined to achieve a real revolution in the EO value chain, the era of SPACEDGE™ begins.



Giovanni Sylos Labini
CEO of Planetek Italia

Summary



APPLICATIONS

- ☐ OPEN GOVERNMENT
- ☐ ENVIRONMENT
- ☐ LAND PLANNING
- ☐ MARINE COASTAL ZONES
- ☐ CIVIL PROTECTION
- ☐ AGRICULTURE AND FOREST
- ☐ INFOMOBILITY
- ☐ INFRASTRUCTURE ENGINEERING
- ☐ ENERGY AND UTILITIES
- ☐ SECURITY AND DEFENCE
- ☐ SPACE SOFTWARE
- ☐ PLANETARY EXPLORATION

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Cover image: Sundarbans National Park, Bangladesh. Copernicus Sentinel data (2016), processed by ESA, CC BY-SA 3.0 IGO.

The Sentinel-2A satellite natural-colour image shows this region comprising southern Bangladesh and a small part of the Indian state of west Bengal, the whole area of the Sundarbans incorporates some 10,000 square km, consisting of mangrove and swamp forests.

The region of the Sundarbans appears in dark shades of green in this image, while the adjacent areas in brighter colours are densely populated and dominated by agriculture. The Sundarbans National Park, established in 1984 and a designated UNESCO World Heritage Site, is the world's largest single chunk of tidal halophytic mangrove forest.

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The logo for Planetek Italia. It features the word 'planetek' in a dark blue, sans-serif font, with the word 'italia' in a smaller, red, sans-serif font directly below it. Above the text, there is a decorative graphic of several small red squares arranged in a grid-like pattern.

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PAG. **12**

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Creating value with sustainability, and culture

Our actions, when we act as individuals and as a company, have an impact on society and the environment. This impact can be changed based on the choices we make.

For this reason, since the establishment of Planetek Italia, we have nurtured the ambition to be part of the solution, rather than being part of the problem.

In these years of activity we have matured the awareness that economic growth, as we have known it so far, has led to an unsustainable environmental pressure in the long term and produced unsatisfactory results in terms of equality and social inclusion.

We are persuaded that companies can contribute significantly to the achievement of challenging objectives to combine development and sustainability. For this reason in 2021 we have evolved into a Benefit Company and in 2022 we started monitoring our sustainability performances. A long path officially started in 2008 with the adoption

of an environmental management system compliant with the UNI EN standard ISO 14001:2004 and EC regulation 761/2001 (EMAS). In the same period, we adapted our procedures to the SA8000 standard for social responsibility.

Within Confindustria, we have promoted a cultural debate on the issues of economic and social

There is no business

to be done on a dead

planet.

(Y. Chouinard. Founder of Patagonia)

development that is respectful of man and the environment through the Culture Club and since 2006 we have been members of Costellazione Apulia, a consortium of Apulian companies that discuss new sustainable development models. The United Nations' 2030 Agenda for Sustainable Development includes a strong involvement of

all components of society, such as private and public sector, citizens and philanthropic institutions, universities and research centers, information and culture operators. In Italy, the 2030 Agenda is promoted by the Italian Alliance for Sustainable Development (ASviS), which has been organizing the "Sustainable Development Festival" since 2017.

In the framework of the Festival, Costellazione Apulia organizes the "Colloqui di Martina Franca" also with the support of Planetek.

The 2030 Agenda, with its 17 Sustainable Development Goals (SDGs), represents a reference framework for all organizations.

At this point we asked ourselves:

"what are we at Planetek Italia doing to support the achievement of the SDGs?"

We tried to list here following what we do as a company to achieve the goals of the 2030 Agenda. We know that ***"what we do is just a drop in the ocean, but if we didn't do it the ocean would have one drop less"*** (Mother Teresa of Calcutta).

SDG	ACTION	WHAT WE DO IN PLANETEK
	No poverty Eradicating poverty in all its forms.	Since 2009, we have been supporting Sarah, a little girl who lives in a small Kenyan town with 7 brothers and sisters. With our support, we allowed her to go to school.
	Good health and well-being To build good health for all, and at all ages	Our premises are designed to be comfortable, bright and with little noise. Since the location is at a few steps from the sea, walks along the seafront are part of a daily ritual. A table football is also available. All staff can play sports at a partner sports center thanks to the flexibility of working hours. Futsal and volleyball are moments of leisure and socialization.
	Quality Education To ensure quality, equitable and inclusive education, and to promote lifelong learning opportunities for all.	Fighting people's obsolescence is a primary goal for us and therefore we promote refresher courses and participation in conferences. We stimulate participation in degree courses, PhDs and Masters. We periodically organize internal seminars also open to outsiders, on topics proposed by the participants themselves on technological, social and environmental issues. We host internships and training internships through agreements with local universities and we participate in school-work integration projects. We support industrial doctorates.
	Gender Equality Achieve gender equality and empowerment (greater strength, self-esteem and awareness) of all women and girls.	We guarantee equal opportunities to people who work in our company and no form of discrimination is allowed based on the race, social class, national origin, religion, disability, gender, sexual orientation, family responsibilities, marital status, trade union membership, political opinions, age or other condition that could give rise to discrimination. Since 2009, our social responsibility system has been certified according to the international standard SA (Social Accountability) 8000. In the Board of Directors, 25% are women, in the company as a whole, at least 30% are women.
	Affordable and clean energy Ensure access to affordable, reliable, sustainable and modern energy systems for all.	We have chosen an electricity supplier that guarantees, through the Guarantee of Origin issued by the GSE, to purchase exclusively green energy, produced exclusively from renewable sources, without the use of fossil fuels and without greenhouse gas emissions into the atmosphere.
	Decent work and economic growth Encourage lasting, inclusive and sustainable economic growth, full and productive employment and decent work for all.	In 2015 we were awarded as the best company in Puglia in the aerospace sector by the Industria Felix Award. Since 2016 Planetek is listed among the 100 best Italian companies according to the PMI Welfare Index, which certifies companies that we have a welfare system that is decidedly higher than the sector average.
	Industry, innovation, infrastructure Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.	We invest over 15% of our turnover in research activities. We collaborate with local, national and international research institutions and universities for the realization of training internships, degree theses, research doctorates and scholarships. We share our know-how and expertise through our learning platform (https://elearning.planetek.it) and by organizing conferences, workshops, seminars with free participation.
	Sustainable cities and communities Make cities and human settlements inclusive, safe, resilient and sustainable.	We promote sustainable mobility through the use of public transport and bicycles. In the company missions, the use of public transport is strongly advocated.
	Sustainable production and consumption Ensure sustainable consumption and production patterns.	Company computers are all low energy consumption and we use servers in a cloud environment that guarantee a high level of energy efficiency. We have made investments to improve the energy efficiency of the workplace by gradually adopting LED lighting, improving the thermal insulation of the offices and the conditioning of the environments and the server room. We carry out the separate collection of glass, plastic, paper and organic. We are committed to reducing the use of plastic with the exclusive adoption of compostable products. We have replaced the pod coffee machine with one with coffee beans, eliminating the consumption of about 15,000 pods per year.
	Climate Action Take urgent action to combat climate change and its impacts.	Thanks to the investment plan made in 2013 for the energy efficiency of the workplace, our energy consumption has progressively reduced. In the last 5 years, the savings in terms of energy consumption have resulted in an estimated saving of approximately 92 tons of CO2 emissions into the atmosphere.



Climate change and sustainable development

The Anthropocene is the current geological epoch, in which the terrestrial environment, in all its physical, and biological characteristics, is strongly affected on both a local and global scale by the effects of human activity, with particular reference to the increase in CO₂ and CH₄ concentrations in the atmosphere.

Climate change is its main effect and is already causing significant impacts in terms of frequency and intensity never seen in human history. The Amazon rainforest and Siberia in flames, heat waves in cities, melting glaciers and sea level rise that are making the first islands and atolls disappear in the Pacific, the increase in the frequency and intensity of

hurricanes, are just some of the known examples. Linked to these phenomena are the consequences in terms of suffering, loss of life, disruption of ecosystems and the wealth of biodiversity that sustain our life.

Let's care for our common home

Already in 1972, the Report on the limits of development (from the book "The Limits to Growth"), commissioned by the Club of Rome, highlighted the non-sustainability of the current growth model.

In 2015, Pope Francis published the encyclical "Laudato si" inviting everyone to take care of the common home. A few months later the United Nations expressed a clear judgment on the unsustainability of the current development model, considering the environmental, the economic and the social matters. With the release of the 2030 Agenda, divided into 17 sustainable development goals, 169 targets and over 240 indicators, the UN requires a strong involvement of all components of society, such as private and public sector, philanthropic institutions, universities and research centers, information and culture operators, up to the individual citizen, as Greta Thunberg is doing with Fridays for Future.

UN Framework Convention on Climate Change & Kyoto Protocol

The Kyoto Protocol signed in 2005 is one of the first global initiatives to combat climate change. This protocol committed the contracting nations to limit the emissions of the six gases considered to be the main causes of the greenhouse effect. This led individual States to request services capable of monitoring and assessing Land Use Changes, Forest, Reforestation and Deforestation (ARD) activities, and to track changes in Carbon Stocks. To answer these needs, was realized the European Space Agency (ESA) funded project

KYOTO-INV.

Planetek Italia cooperated with an international consortium of companies to develop a set of Earth Observation-based support services capable of providing reports and indicators, on a national basis, to Institutional Agencies and to all the bodies involved in the project.

The monitoring services developed for the Kyoto protocol has been taken as a reference base for the development of the indicators defined by the targets of the 2030 Agenda.

H2020 & Sustainable Development

The European Commission has included the SDGs among the objectives of the European research programs. To make the use of EU funds more effective, it has launched synergistic initiatives with the European programs already underway.

An example of synergy is the use of HORIZON 2020 funds for the development of operational application services based on data and services from the European Copernicus program to support the achievement of SDGs. The e-shape project, funded by H2020, aims to support the activities of EuroGEOSS (European contribution to GEOSS, the Global Earth Observation System of

Systems) within the GEO (Group on Earth Observations).

About 27 pilot applications were developed in 7 thematic areas: agriculture, health, renewable energy, ecosystems, water, disasters, climate. The applications developed ensure support for the implementation of the objectives of the 2030 Agenda, the Paris Agreement and the Sendai Framework for disaster risk reduction. The project is carried out by a team of 54 partners from 17 European countries, including Planetek Italia.



Resources:

<http://www.e-shape.eu/>

Agenda 2030 and SDGs

On 25 September 2015, the United Nations approved the 2030 Agenda for sustainable development and the related 17 Sustainable Development Goals (SDGs). The achievement of the objectives defined by the Agenda is monitored through a system based on 17 Goals, 169 Targets and over 240 indicators. In Italy, the 2030 Agenda is promoted by ASViS, the Italian Alliance for Sustainable Development which organizes the Sustainable Development Festival every year.

Space and Agenda 2030

Space operators have launched initiatives consistent with the objectives set by the UN Agenda 2030. The United Nations Office for Outer Space Affairs (UNOOSA) and EUSPA, the European Union Agency for the Space Programme (former GSA), which manages Galileo and EGNOS, have released a study on the support that satellite navigation technologies and the EU Copernicus programme can provide in achieving the Sustainable Development Goals. It emerges that for as many as 13 of the goals these technologies can make a significant contribution. The report presents 38 successful cases, which show how they can be applied on a large scale to contribute significantly to the achievement of objectives.



Resources:

www.bit.ly/2FNaxYJ





Decision-making in a fast-changing world

In a world that is changing faster and more complex, it is crucial to make informed decisions based on solid standardized data quickly. The availability of data to monitor these changes is no longer a limit, thanks to the multiplicity of sensors that pervade our life. The internet of everything, where everyone is a sensor thanks to their smartphone, produces impressive volumes of data, which travel and are stored on the cloud in real time. All of this data can help build what is termed 'situational awareness'. This is a concept that implies the ability to perceive the environment around us, understand its meaning and trends, and estimate the impact of the decisions that can be made. The typical application areas are those characterized by being complex and dynamic systems, such as aviation and air traffic control, emergency response,

military command and control operations, management of large critical facilities, such as offshore oil platforms and nuclear power plants, autonomous vehicle driving and the management of large cities. Geospatial data and technologies play a decisive role, both in producing information content, and in the analysis and representation

Perceiving the environment around us, understanding the meaning and estimating the impact of our decisions

of where, with a single glance, on a cartographic basis, it is possible to transmit awareness of the situation to the operator who has to make decisions. These tools give the possibility to browse the databases, to filter the information and to access all the information sources useful for improving the understanding of the current situation.

At the basis of this it is necessary to build processes that generate data flows in real-time and to have technologies that are able to transfer, manage, analyze huge volumes of data and synthesize the information content in an immediately understandable way. This application context should be also able to exploit state-of-the-art technologies such as 5G, Artificial Intelligence, HPC and GPU processing.

Supporting law enforcement & public safety in Turin

The value of information, especially in critical/emergency situations, depends on how fast it can be delivered and how accurate it is. Many Law Enforcement, fire, civil protection structures already have IT systems for managing calls and monitoring the territory, however they find it difficult to enrich their activities with cutting-edge services, which require a huge effort of technology, data sources and devices. The ESA IMMAGINA project aims to support existing Control Rooms and Public Safety Bodies with state-of-the-art features to provide a real-time point of view on the intervention scene. Planetek is part of the team led by Regola Srl which will provide the City of Turin, IPLA and

Civil protection of Piedmont, an operational platform, and specific tools that will integrate existing systems. The functionalities range from aerial remote sensing (aerial vehicles, UAVs and Earth observation satellites), to mobile-based tools to receive live video and analytic-base investigation systems for image recognition. The Rheticus platform is part of this ecosystem that will enhance the capacity to monitor environmental aspects like Urban Heat Island, or to prevent and manage industrial and natural disasters, like forest fires.



Resources:

<https://business.esa.int/projects/immagina>

Drone and satellite-based geoinformation services for Smart Cities

Sustainable urban development is an essential planning goal for local governments. To achieve this goal Municipalities and city planners need to increase the capacity to collect territorial knowledge from multiple sensors, and to manage the complexity of urban environments. The SAPERE project aims to define and develop innovative solutions based on the exploitation of images captured by satellites and unmanned aircrafts' airborne sensors (drones, UAVs) to provide information on land and infrastructures to support the management of the municipality's competence plans. Specific software

applications will be designed to enable professionals (engineers, geologists, planners, etc.) to the management and distribution of satellite / drone images as a source for their analysis and elaboration activities. These applications, based on Rheticus (www.rheticus.eu), will also support the development of cartographic documentation for the Municipality of Bari (this project's end user) for its land management activities.



Resources:

<https://bit.ly/3Pt82zy/>



Rheticus® Safeland

Ground motion detection and monitoring supporting regional geological survey information services.

Pinpoint any displacement to the millimeter.

Land instability can cause serious damage to infrastructure and the environment, and it poses a threat to citizen safety. Falling rocks may destroy roads, pipes, and buildings and even kill bystanders. In recent years, a continuous growth of the intensity and frequency of land stability phenomena has been observed, and there is a clear relation with both human activity and climate change.

The use of advanced technological solutions for monitoring and predicting instability gives an opportunity to prevent disasters by monitoring ground motion phenomena to detect potential risks in time.

Rheticus® Safeland provides invaluable assistance with damage prevention and mitigation. Users get an in-depth analysis, which tracks any relevant event, such as ground displacement, average slope, existing infrastructures or buildings, within the area of interest. The analysis leads to a reliable, user-friendly, periodical report, that pinpoints any displacement to the millimeter, while also tracking emerging trends and anomalies.



Resources:

www.rheticus.eu



COPERNICUS LAND
MONITORING SERVICE

Protecting the marine coastal ecosystem

The monitoring of marine coastal zones is a global priority, as most of the human activities are concentrated in the thin strip near the coastal areas. About 40% of the population of the European Union lives in territories less than 50 km from the coast, producing about 40% of the EU's GDP. Productive and residential activities are concentrated here generating considerable pressure on the fragile coastal ecosystems. In 2014, Directive 2014/89/EU established a reference framework for the integrated management of the coasts and maritime space. On the basis of this directive, the European Environment Agency (EEA) has decided to include a new "Coastal Zone Hotspot Thematic Mapping" service within the core services of Copernicus, with the aim

of monitoring the dynamics of the territory in the coastal zones. The entire EU coastline was monitored for a 10 km wide band, which in some sensitive areas (port areas, river deltas, protected sites, etc.) was further enlarged towards

Protection of the sea and blue growth

the hinterland for a total of approx. 730,000 km².

The result is a 71-class land cover map with a minimum mappable unit of 0.5 hectares referred to the years 2012 and 2018 plus a change map that provides the trend on the changes between these two years.

The EEA thematic hotspot products will be updated every 6 years. The creation of this information level was assigned by the EEA to a consortium led by Planetek Italia in partnership with Planetek Hellas and two other European companies. It was a very challenging activity due to the high production volumes in areas with very heterogeneous characteristics, both from a natural, anthropic and political point of view, which required to standardize the specifications of products and processes. The active involvement of the different European coastal communities during the project activities was fundamental to collect of the widest range of requirements for the development not only of this product but also for future Copernicus products in the pipeline on the coastal areas.

Earth observation for sustainable development

EO4SD is an ESA initiative to support the uptake of EO-derived information in sustainable development. Working closely together with the International Financing Institutions (IFIs) and their client countries, ESA promotes specific programs addressing three top-priority thematic areas: Urban Development, Agriculture and Rural Development, Water Resources Management.

In this context, Planetek Italia is involved in three projects (EO4SD, EO4WR, CRITE) delivering satellite-based environmental information to support the Asian Development Bank initiatives for developing countries in land, water and food resource monitoring.



Resources:

<https://www.eo4sd-drr.eu/>

Pre-Commercial Procurement in Europe on Earth Observation

A Pre-Commercial Procurement (PCP) is an innovative way of purchasing goods and services in the public sector, which aims at stimulating the research, development and innovation of goods and services not yet existing on the market.

Since 2009, the EU Commission has launched PCP initiatives at European level to stimulate the use of this tool and create the basis for its dissemination to member states. Marine-EO is the first pre-commercial research and development contract (PCP), financed with European H2020 funds, in the Earth Observation (EO) sector, coordinated by the Directorate-General for Maritime Policy (DGPM) of Portugal. This project aims to acquire services based on the enhancement of EO data for monitoring the marine environment. (<https://marine-eo.eu>). Through the three project phases,

the best operational applications based on Copernicus data have been selected, capable of satisfying the needs of the users of the project. In the selection process Planetek coordinated a consortium of companies who developed the 3 requested services and was awarded the access at Phase 2:

- Marine Environmental Status in Hot Spots;
- Fish Farms: Detection of Fish Farm Threats;
- Detection of Vessels and Icebergs in the Arctic zone.



Resources:

www.planetek.it/eng/MarineEO

Rheticus® Marine

Satellite monitoring service of marine-coastal water quality (Chlorophyll-a, Water Transparency, Turbidity and Sea Surface Temperature). The service can be adopted for multiple applications from public and private administrations:

- P.A. national: monitoring of the quality of the water in compliance with the Community directives "Marine Strategy" and "WFD".
- P.A. local: environmental reporting and planning of aquaculture facilities.
- Desalination Plants: monitoring of algal blooms that can cause damage to plants for the production of drinking water.

Rheticus® Aquaculture

A service for the optimal management of fish and shellfish farming activities in marine environment designed to prevent risks and increase production and profitability.



Resources:

www.rheticus.eu





Xylella, a challenge to win

The Italian olive sector generates a turnover of over 1.2 billion € (source ISMEA 2016) with around 820,000 olive farms and over 1 million hectares of olive groves under cultivation. The main olive producers in the world are Spain, Italy, Greece, Turkey and Tunisia. Puglia region produces over 50% of the Italian production, followed by Calabria and Sicily.

The olive sector is threatened by the presence of the *Xylella fastidiosa*, which causes the drying of olive trees (Complex of rapid drying of the olive tree - CoDiRO).

The pathogen is currently confined to Apulian Salento area, but outbreaks of the infection are occurring in other areas and also in other European countries, such as France, Spain and Germany. In the 2018/9 olive campaign this disease caused a 90% reduction in production in some areas of Salento. To counteract the damage of this

pathogen, which is able to infect a multiplicity of species of arboreal and herbaceous plants and which is carried from an insect commonly called Sputacchina, it is possible to implement different strategies: the selection of resistant plant varieties

Early detection

**of infection hotspots
over large areas before
the appearance of the
phenomena**

such as the Leccino variety, the fight against the vector to reduce the propagation of the disease and the early detection of infection hotspots for the activation of agronomic

practices of containment.

To this end, remote sensing techniques from aircraft, drones and land can provide a significant contribution, for the survey both of large areas such as an entire region, and of individual plants or portions of them for the identification of infections before the appearance of drying out phenomena.

The effectiveness of remote sensing for the recognition of infected plants has been demonstrated in recent European projects funded with Horizon 2020 funds and implemented in the Apulian area. The use of hyperspectral images acquired from aircraft, allowed the identification of plants with no visible signs of desiccation, but were found to be infected in laboratory analyzes. These results bode well for the possibility of implementing operational procedures to identify infected plants over large areas and at sustainable costs.

Coffee Rehabilitation in Timor Leste

According to East Timor MAF (Ministry of Agriculture and Fisheries), improvements in coffee production and processing offer one of the clearest pathways for poverty reduction and growth of their non-oil economy.

In East Timor, there is an urgent need to increase coffee production volume and quality to support livelihoods without adversely affecting the environment.

One way of increasing productivity of coffee crops is performing crop condition assessments and season-long monitoring, to support agronomic decision-making. CRITE is an ESA funded project offering support to ADB's Timor-Leste Resident Mission with EO-based information to characterise coffee-

growing practices in the country. The output of the project is a land cover mapping service over a site of about 4,000 km² which includes a web-based dashboard with geo-analytics indicators on crops health status. Exploiting multitemporal data from Copernicus Sentinel-1/2 satellites. Automatic classifiers based on Machine Learning and Deep Learning methodologies have been applied to complex image data stacks composed by seasonal composites, vegetation indices statistics and textural features based on satellite data.



Resources:

<https://eo4society.esa.int/projects/crite/>



PON - REDoX - Remote Early Detection of Xylella

Identification of olive trees affected by *Xylella fastidiosa* through remote sensing techniques from airplanes, drones and land surveys at the first onset of symptoms, making monitoring activities faster, more precise and more comprehensive. This is the goal of the REDoX a PON funded project which involves Planetek Italia in partnership with the Apulian Aerospace District (DTA), 4 CNR institutes (IREA, IPSP, ISPA, IRSA) and ENAV. The expected benefits are the possibility of implementing monitoring programs over large areas with the timely identification of new outbreaks, the cost reduction for monitoring activities,

for the same investigated area, thanks to the reduction in the number of operators necessary for open field investigations and for the reduction of sampling and analysis of laboratory that are carried out to certify the presence of infection. The investigation activities will be conducted in Puglia with the possibility of extending the tests to other areas of the Mediterranean basin where the olive tree is present.



Resources:

<https://bit.ly/39xNEg2>





Critical Infrastructure security and resilience

Development, security and quality of life in the modern world depend on the continuous operation of a set of infrastructures, that based on their role in this, are defined as critical. For various economic, social and political reasons all these infrastructures are nowadays always more complex and related among themselves. The continuous evolution of such assets allows an enhancement of the provided services with an efficiency in terms of costs, and at the same time it generates new unplanned vulnerabilities. Such infrastructures are subject to heavy risks related to natural phenomena like the extreme climatic events or the man-made events due to the critical sociopolitical global situation. EU directive 2008/114/ CE defines two kind of infrastructures

**Threads are coming
from extreme climatic events
and from instabilities related to
social and political events**

Threads are coming from extreme climatic events and from instabilities related to social and political events as critical: energy and transportation. Other critical infrastructures that need to be kept in account are telecommunication, water resources, health care, banks and finance, production, storage and distribution of food. The definition of new approaches and tools to enhance the resilience

of these infrastructures is needed to allow the stability of the level of welfare that everyone expects. Space technologies can take a priority role in the monitoring of the critical infrastructures and can support the definition of actions and measures to prevent and reduce the risks related to natural and man-made events. Many different technologies can be used together to enhance the resilience and the security of all these infrastructures: Earth observation (SATEO - Copernicus), localization (SATNAV - Galileo) satellite telecoms (SATCOM). Even Space Weather is needed to enhance the resilience of electronical, computing and telecommunication devices to solar driven electromagnetic interferences.

Monitoring critical infrastructures: water and sewage networks

Water and sewage networks are absolutely included among the infrastructures defined as critical, as a blockage to the water supply service or the pollution of the water used for drinking use, can cause not only serious sanitary problems, but also economic and social as well. Monitoring of reservoirs, dams and the main adduction pipes that connect sources to the distribution network is a critical task for the companies managing the integrated water service, which have the responsibility to prevent malfunctions and service interruption. Planetek Italia developed a portfolio of solutions, to monitor the territory and the infrastructures, that aim to identify situations of alert affecting infrastructures and the territory. The vertical solution dedicated to the monitoring of water and

sewage networks is called Rheticus Network Alert and is nowadays widely adopted by water utilities worldwide. Key Italian players that adopted this solution are Acea, Iren, Hera, Metropolitane Milanesi among the others. Some important international benchmarks have been set in Brazil, UK, France, U.S. and many other countries. This unique satellite monitoring provides a risk assessment analysis of entire networks and has the capability to pinpoint the segments interested by medium and strong displacement phenomena, enabling the end user to perform a predictive maintenance of the network and to fix problems before they generate big failures, interruptions and serious issues to people.



The resilience of the transport system

Based on the indications of the European TEN-T guidelines, it must be performed an assessment of the level of risk as well as an evaluation of the measures that can be put in place to increase resilience, during the design phases of the infrastructures. The SAFEWAY project aims to design, validate and implement methods, strategies, tools and technologies to increase the resilience of land transport infrastructures through a holistic approach to prevent and mitigate the effects on transport infrastructures caused by natural and anthropogenic disasters. This project sees the involvement of Planetek Italia in the use of remote sensing data from satellite for monitoring the stability of road and rail infrastructures. As part of the demonstration pilot projects

with the European infrastructure managers participating in the project, there will be the integration of the monitoring services of the Rheticus platform within the specific DSS in the railway sector. With Rheticus the infrastructures and the surrounding area will be monitored in order to identify early signs of instability and to implement preventive maintenance to avoid damage to infrastructures and avoid service interruptions. Furthermore, the effectiveness of the use of artificial intelligence techniques for the analysis of posts published on social media will be investigated in order to identify phenomena and events in near real-time that can provide useful information to understand the state of health of road infrastructures. The vertical solution described

is called Rheticus Safeway, a vertical web service for the satellite continuous monitoring of instability phenomena affecting transportation infrastructures (roadways, railways, including bridges and tunnels) and/or their surrounding areas, caused by structural defects or ground displacements such as landslides or subsidence phenomena. This solution is more and more adopted by network managers since it helps to monitor the entire road and bridge network in the territory quite easily, this is the experience of the Metropolitan City of Milan.



Resources:

www.planetek.it/eng/projects/safeway



Predictive maintenance of water and sewage networks

Water leaks in water and sewage networks are one of the main problems faced by water service operators. Most of the water networks worldwide suffer from water leakages due to the pipes age, subsidence phenomena and others.

This complex environment makes the water and sewage network management a very important and sensitive job, which is the reason why these networks need high maintenance budgets every year. A game-changer for maintenance activities is to switch from simple routine maintenance (on-demand), where you repair pipes

The use of satellite data and CCTV inspections improved maintenance efficiency by 30 %

having on-going leaks, to the predictive maintenance, where you proactively take actions on pipes before any leak or damage happens. Planning preventive maintenance interventions requires in-depth knowledge of the network, as well as having the tools and methods suitable for this purpose.

Remote sensing data from satellite can support the managers who are in charge of the maintenance of the networks by collecting accurate and updated information on the network sections with potential stress situations along which they can concentrate inspections.

Successful case histories report how the combined use of the satellite monitoring system called Rheticus® Network Alert, which pinpoints the segments interested by strong subsidence phenomena, together with CCTV inspections have improved maintenance activities efficiency by 30% on average.

The satellite for monitoring water and sewage networks

Utility companies always struggle with problems related to their networks. For example, a pipeline collapse could cause architectural heritage problems and compromise the public image of the company, as well as having an impact on the daily life of citizens, local shops and urban mobility. The Hera group, an Italian multi-utility with 4 million users in over 350 municipalities, which manages 34,900 km of water pipes 14,800 km of sewer pipes, has introduced the integrated use of information derived from satellite with video inspections, allowing to identify the sections of the network on which to act with predictive maintenance interventions. The identification of the segments with greatest levels of stress was performed with the help of Rheticus® Network Alert.

With the analysis of the network, divided by Rheticus in segments that are classified according to the

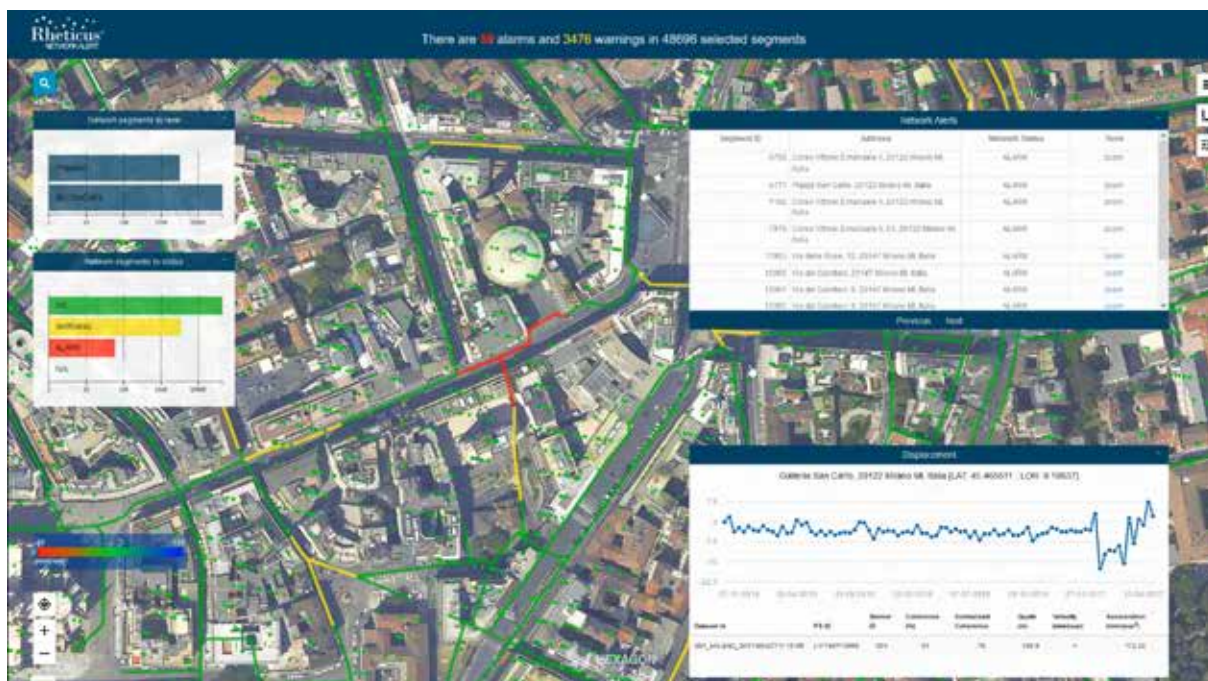
level of priority of inspection (the stronger the subsidence phenomena the higher the priority), it was provided a list of segments that presented a high likelihood of failure. These sections were inspected through CCTV and with a periscope for an objective assessment of the state of health of the pipelines. The combined use of satellite information with video inspection made it possible to identify pipelines with the presence of damage with a success rate of 4 times higher than the inspections carried out in the traditional way, even involving pipelines that did not have obvious symptoms of damage. A result that allows to change the paradigm that underlies the planning of maintenance actions, leading to prevention.

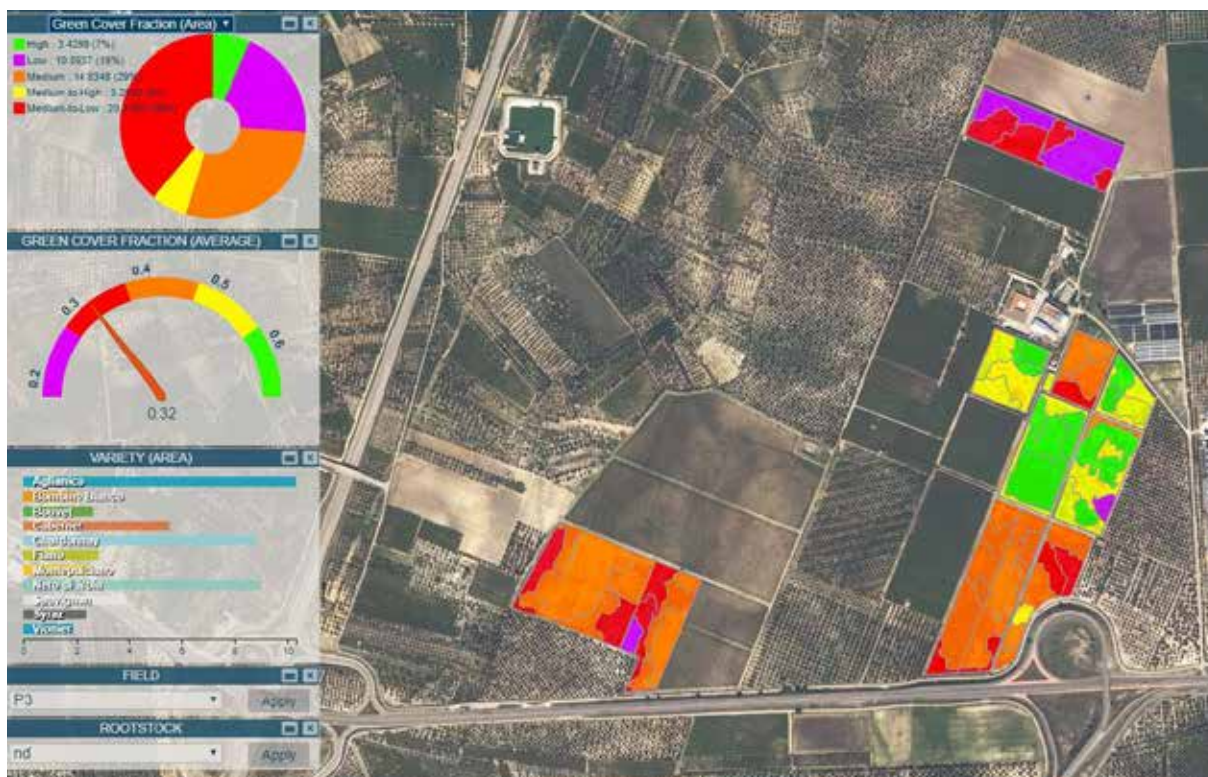
 **Resources:**
www.rheticus.eu

Rheticus® Network Alert

Predictive Monitoring of water and sewage networks

Rheticus® Network Alert is a turnkey vertical web service for the continuous satellite monitoring of instability phenomena affecting pipeline networks (water and sewage), caused by ground displacement. Doing so, Rheticus® Network Alert indicates locations of concern and lets operators to act upon the information, simplifying maintenance activities and prioritizing inspection. Thus, the service allows an “a priori” approach, helping to highlight problems before they become critical. As a result, operators better manage their financial resources and reduce service disruptions and/or threats for people. All those information are updated and delivered to utility companies with extremely intuitive Business Intelligence tools to add dynamic analysis and new features to their planning, management and maintenance activities.





Rheticus®

Geoinformation services by subscription to support production activities and land management

The availability of timely, up-to-date and accurate information is essential to make quick and informed decisions. Rheticus® is a geoportal that provides actionable information services designed to support decision-making in a growing number of business applications. Public Administrations and companies will access maps, reports and indicators, to monitor specific land related phenomena, satisfying multiple application areas. Rheticus® has the ability to detect millimeter displacements of the Earth's surface and infrastructures. This is essential to monitor

Maps, reports, and indicators for timely and accurate information

landslide and subsidence prone areas to help the management of spatial planning plans, the monitoring stressed water and sewage pipelines, the stability of transport infrastructures, and of electric towers, the areas affected by mining and geothermal activities. Thanks to its flexibility, it is possible to monitor areas affected by wildfires and the evaluation of the level of

reforestation, but also to monitor the quality of coastal marine waters, and to provide a vertical support service for aquaculture. Each services is offered through the activation of an annual subscription, which guarantees access to updated information and the receipt of periodic summary reports. information and the receipt of periodic summary reports. Rheticus® services are marketed internationally through a network of distributors.

Resources:
www.rheticus.eu

Industries



UTILITIES

Oil&Gas, Energy,
Mining, Sewerage,
District heating,
Desalination plants



ENGINEERING

Airport, Railways,
Roads, Tunnels, Dams,
Bridges, Subways,
Offshore drilling,
dredging



FOOD

Fishing,
Aquaculture,
Crop yield forecasting,
Precision farming



GOVERNMENT

Masterplan,
Illegal crops,
Wildfires,
Coastal marine
environment

Rheticus® services

Rheticus® Displacement

Designed for the monitoring of areas prone to subsidence or landslides it identifies millimetric movements of ground surface.

Rheticus® Network Alert

Identification of water and wastewater pipelines under stress to support preventive maintenance and field inspections campaigns. (see page 20)

Rheticus® Safeway

Timely identification of critical situations in the stability of road infrastructures and the surrounding areas. (see page 18)

Rheticus® Safeland

Ground motion detection and monitoring supporting regional geological survey information services. (see page 13)

Rheticus® Marine

Marine water quality assessment in coastal zones in accordance with the EU "Marine Strategy" Directive. (see page 14)

Rheticus® Aquaculture

Information service for fish and shellfish farming activities in marine waters, designed for environmental and production monitoring. (see page 14)

Rheticus® Oenoview

Supporting the agronomic management of vineyards and the selective harvesting of wine grapes.

Rheticus® Wildfires

Identification, localization and classification of areas burnt by wildfires, identification of illegal transformations and monitoring of renaturalization processes.

Rheticus® Urban Dynamics

Monitoring the progress of urban transformation plans (VAS) and the environmental impact assessment of works (EIA).

Rheticus® Building Check

Monitoring of buildings and facilities stability to provide predictive analysis of any movement within the area of interest, while also timely tracking any anomaly and its evolution over time.

Rheticus® Electric Towers

Monitors electricity infrastructure and suggests predictive maintenance prioritizing areas that need interventions.





Free and Open Satellite Data

Open data are resources that are made available to ensure transparency and create business opportunities. In the world of remote sensing satellite data, the turning point came in 2008, when the United States Geological Survey (USGS) decided to open the archive of Landsat satellite images collected for forty years. Today, Landsat 9 in orbit since 2021 is consistently capturing high-quality images across the globe. The free and open data policy has been confirmed by the government American in continuity with the previous Landsat 8 mission. The European Union with Copernicus, the Earth observation program, has launched a much more ambitious initiative, providing as open data both the data acquired by Sentinel satellites, and the services

**“A flywheel
for the creation of
initiatives”**

of the Copernicus program. The Copernicus constellation of satellites called Sentinel brings onboard the different missions a range of specific technologies to meet a wide range of applications, such as radar and multi-spectral instruments for monitoring the earth's surface, oceans and atmosphere. Beyond to the data coming from the Sentinels, the Copernicus program offers, in open data mode, the so-called “Core Services”, ie geographic added value

#

products or thematic maps on land, sea, atmosphere, climate change, emergency management and safety. These services are designed to meet the needs of monitoring the transformations that take place on a continental and global level and can be used freely by Member States, businesses or citizens. The challenge to be taken is to integrate the data offered by Copernicus with all the other databases available online, of national and local public administrations, non-profit organizations (eg. OpenStreetMap), private companies and even individual citizens, to use them as a flywheel for the creation of initiatives that can combine economic development and environmental protection to improve the well-being of citizens.

Satellite data, cloud platforms and pay-per-use

The world of satellite data is changing fast and there are dozens of image providers on market that differ in technical characteristics, geometric resolution, radiometric content and review times.

Untangling in space becomes more and more complex, as we have gone from scarcity to abundance of satellite data with an excess of options in the world of satellite remote sensing.

In addition to commercial data, there is also an enormous availability of free data thanks to the constellation of the Sentinel and Landsat satellites.

To simplify the complexity, platforms for processing are increasingly coming to the aid online and processing services that offer geospatial content in pay-per-use mode with tailored subscriptions.

The increase in supply is therefore

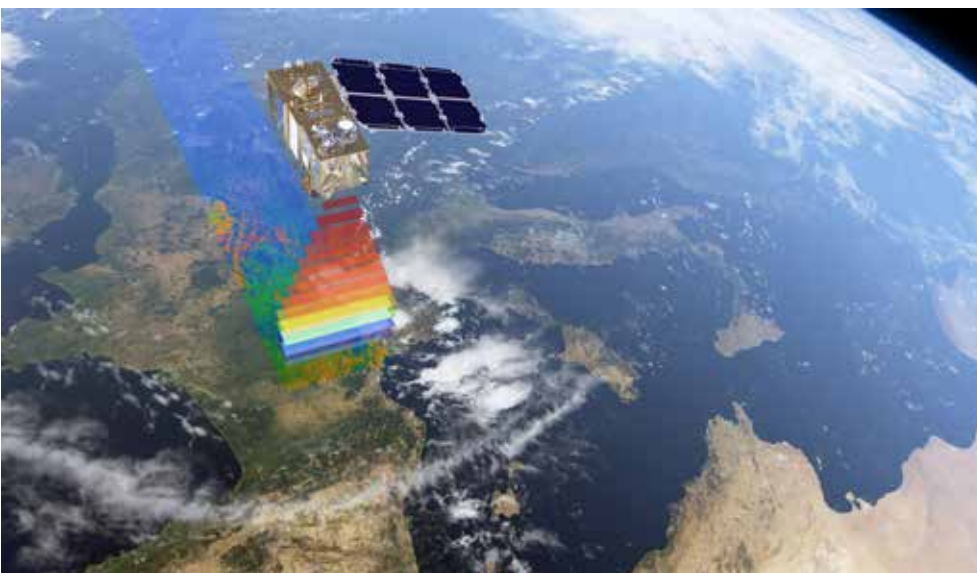
causing a significant reduction in the cost of purchasing images but especially the introduction of new commercial scenarios thanks to cloud-based platforms that provide centralized access to data and information.

Imagerypack is an integrated subscription solutions launched by Planetek that guarantee instant access to the best satellite images at very high, medium and low resolution all over the world, coming from historical archives that can reach up to 20 years of acquisitions, including coverage acquired a few hours ago and the possibility of planning new acquisitions and ranging over various constellations.



Resources:

www.planetek.it/imagerypack



Partnerships

Main partnerships for the distribution of satellite imagery

AIRBUS

Spot
Pléiades, Pléiades Neo
TerraSAR-X

deimosimaging
an astra company

Deimos-1
Deimos-2
Theia

e-geos
AN ASI/TELESPIAZIO COMPANY

Cosmo-SkyMed
Cosmo-SkyMed SG

planet.

RapidEye
PlanetScope
SkySat

WORLDVIEW
GLOBAL ALLIANCE

WorldView-4
WorldView-3
WorldView-2
WorldView-1
GeoEye-1
QuickBird
IKONOS

MDA

Radarsat

AT

Triplسات

HEXAGON

HxGN Content
Program Aerial
Imagery

RESTEC

Alos



Resources:

<https://bit.ly/3wo97kp>



Disaster risk management and prevention

In recent years, the continuous growth of the intensity and frequency of extreme events due to climate change is increasing the risks for citizens, infrastructures and the environment in general. Civil Protection departments need to easily access clear and updated information, both for prevention planning and for emergency management. Satellite Remote Sensing and Geographic Information Systems are essential operational tools for the prevention of risks (seismic, hydrogeological, wildfires). In the field of forest fires,

EO and GIS are essential tools for the prevention of risks

every year thousands of hectares of agricultural and forested area are destroyed by fires with high costs in terms of human life and ecosystem. Satellite images are a very

important source of information for monitoring emergencies, quantifying risks, identifying fires and assessing damage. This information represents essential data both for the Public Administrations involved and for the insurance companies that guarantee this type of risk. The detailed maps of the event therefore represent a support to the risk assessment phase and a contribution to the definition of models to be used for the planning of structural modification interventions.

ECFAS the European Coastal Flood Awareness System

Coastal floods are an increasing phenomenon due to climate change. At a European level, a flood forecasting system has been developed for the main river basins. The EFAS system (<https://www.efas.eu/en>) has been operational since 2012 and is part of the Copernicus Emergency service. The ECFAS project (<https://www.ecfas.eu/>) aims to integrate the existing service by adding a series of specific extensions for coastal floods. ECFAS coordinated by the University

of Pavia, proposes a monitoring service of the complete cycle, through the implementation of a system for the application of the removal of the coastal integrated risk areas (preparation phase) and impact assessment (post event), playing a fundamental role in the implementation of effective recovery and prevention actions. An essential information for the operation of the system is the LCLU Coastal Zone product of the Copernicus Land service.

EO mapping for border surveillance

The border surveillance is one of the Copernicus Security Services. The Reference Mapping service aims to provide a picture of the geographical context, with a focus on hydrography, topography, land cover, infrastructure and population. This information contributes to the improvement of the decision-making and response capacities of the authorities responsible for the control and

monitoring of European borders. For years, both Planetek Italia and Planetek Hellas have been committed to providing the Reference Mapping service to the European Union Satellite Center (SatCen).



Resources:

<https://bit.ly/3wkdD3j>

Hydrographic Institute of the Navy: UP Project

UP is an information system designed to improve the management and sharing of Nautical Documents between the Italian Port Authority - Coast Guard (CP-GC) and the Hydrographic Institute of the Navy (IIM).

The system is based on a software platform that implements a management, editing and distribution workflow of spatial data (nautical charts). The workflow involves the interaction between the Bodies prepared to report the evolutions and changes in the areas of competence (CP-GC) and the Institute (IIM), responsible for updating the maps.

The aim of the project is to eliminate the dependence on paper documents to start using natively digital and vector / formatted information.

The solution involves the creation of infrastructural modules of a Territorial Information System (GIS) that allows consultation via WebGIS of numerous cartographic layers. This system implements services and features available to operators who can use this tool to consult, update, search for information of interest and print map data.



Resources:

<https://www.marina.difesa.it/>





Defence and Geospatial Intelligence

The current war in Ukraine and in general all the outbreaks of conflicts near the external borders of Europe, in addition to the repetition of serious terrorist attacks, are just some of the elements that are changing the conditions in which the operators of the Defence. The availability of updated and accurate information can be decisive for reducing risks and countering threats. In this scenario, the need for geospatial information for Intelligence purposes is growing (satellite images, aerial photos and data collected in the open field), which can guarantee information “dominance”. It is no coincidence that the main satellite data market is defense, thanks to the huge

investments of the American defense in this field. Interoperability, security, on-the-fly distribution of data and information extracted from their processing are basic requirements in the development of solutions for Geospatial Intelligence (GEOINT). On the market there

Multi-source and multi-sensor analysis

are architectures based on OGC standards that allow you to produce, manage and share geospatial data and content, in an effective and secure way. Systems that have 2D, 3D visualization tools

and 3D virtual worlds useful for mission planning and situational awareness. Through simplified procedures, these systems allow for rapid analysis of changes, identification of objects and target recognition through multi-source and multi-sensor analysis of optical satellite and airborne sensors (E.O. e.g. Opsat -3000), hyperspectral (HSI), multispectral (MSI), LiDAR and Radar (SAR), such as those of the Italian constellation COSMO-SkyMed and CSG. A radical technological change which, thanks to solutions available on the market, can also be achieved with investments compatible with the limited budget available.

DECISMAR: European defence industrial development programme (EDIDP 2019)

Planetek Hellas is one of the companies that can claim the prestige, within the EU, of participating in one of the 16 selected projects of the European Defense Industrial Development Program (EDIDP 2019).

The project aims to develop a decision support toolbox (DSTx) in a feasibility study in updating maritime surveillance systems, integrating already consolidated solutions with new innovative solutions (DECISMAR). The toolbox, implemented in a “cyber

secured” and innovative IT environment, greatly facilitates and automates the decision-making process and procedures by adopting a holistic philosophy; the objectives are relevant to the program as they provide an innovative defense product. Ultimately, a new solution to conduct feasibility studies on enhancing the EU’s maritime surveillance capabilities through the adoption of new technologies that combine PESCO, EDIDP and innovation together.

An integrated system for monitoring the territory via drones

Planetek Italia and Sky Eye Systems have developed an integrated solution for monitoring the territory using drones.

Process the video streams and the optical and SAR data, acquired by the sensors on board the Rapier family drones, using artificial intelligence algorithms in order to automatically extract sensitive and useful information to IMINT analysts and to all entities that deal with territorial control and management of environmental emergencies: this is the object of the collaboration of the two companies in the aerospace sector.

Planetek’s thirty years of experience in the processing of geospatial and multi-source data

for IMINT and GEOINT well paired with Sky Eye Systems’ innovative family of drones, “Rapier”: a fixed wing UAS (Unmanned Aerial System) used in intelligence and surveillance missions. Among the main applications developed and made available in real-time on a rugged workstation dedicated to data exploitation, the system includes: change detection, data fusion, generation of 3D models and automatic object recognition. The information acquired by the drone, and the reports generated through the rugged workstation, can be shared, in real time, both with other units deployed in the field and with remote command centers.



ERDAS Geoprocessing in your cloud

More and more satellite data are available, today, with higher geometric resolutions and more frequent acquisitions, for this reason it is necessary to optimize data processing times through the use of GPU graphics cards and parallel and distributed computing techniques.

M.AppX, the web / enterprise version of ERDAS IMAGINE software was developed for this purpose. M.App X offers all the most important features geospatial data analysts need: orthorectification of optical and radar images, pan sharpening, optical / radar data fusion, automatic change detection, 2D and 3D analysis of digital terrain models, intervisibility analysis, coordinate measurement, vector data editing, deep learning algorithms for target detection, creation of annotations and reports. M.App X can also be installed on infrastructures and / or private clouds (on premises), and is based on a multi-node architecture that enables easy distribution of workloads on different servers and to scale performance over time.

The ability to manage several users through a single installation makes it possible to simplify the procedures for updating and maintaining the software usually required in the case of traditional software. It is compatible with all browsers currently in use, and can be used on both traditional PCs and laptops and laptops.



Resources:

www.planetek.it/mappx



Research and innovation

In companies facing the global market and world competition, one fact appears absolutely clear and unquestionable: they need to organize the continuous research for innovation. Innovation, both of process and product, is a key element to ensure the success of the company in the long term.

In Planetek Italia, innovation is planned in a systematic manner, aiming at transformational innovations capable of guaranteeing long-lasting competitive advantages. The characterizing element of innovation in the Planetek group is the work environment and business culture, which encourages and stimulates the innovative creativity of all the staff.

They are the ones who collect the application needs from customers and know the opportunities offered by the new technologies arriving on the market. Thanks to these stimuli, they can develop creative thinking oriented towards innovation, which is the driving force of research in an SME. At Planetek Italia, research activities

are coordinated by the Design Lab, which directs and defines research and innovation priorities, combining the need to develop solutions that can meet user needs, technological feasibility and economic sustainability. Every

The Business Unit is also autonomous

Innovation is

essential to ensure the

success in the long term

in activating research and innovation processes that aim to meet the specific needs of its reference markets.

A characterizing element is that all the research activities are carried out by the same people who work on the orders in production. Research projects, in addition to providing

the opportunity to create innovative solutions, represent a formidable opportunity to update technological skills and combat the technical obsolescence of personnel.

This context stimulates the search for new solutions and keeps the interest alive in keeping up to date on the state of the art of technologies. In Planetek Italia, the research activity also carries out an "Ethics" function towards the young talents who work in the company, ensuring that they are always in line with the needs of the labor market.

In this context, technological innovation represents the enabling tool. The main active research areas are: Big Data analytics, Artificial Intelligence, BlockChain and Novelty detection. From the point of view of processes, the main areas of innovation are the adoption of the Info-as-a-Service paradigm for geoinformative services derived from remote sensing data through the Rheticus platform.

A.I., Quantum imaging, Blockchain & Novelty detection

The huge Earth observation satellite data available, today, provide us with daily data of the entire Earth's surface. Artificial Intelligence (AI) techniques are able to extract knowledge from Big Data in the form of correlations, which would otherwise be impossible to deduce with traditional techniques. Deep Learning and Machine Learning allow the automatic processing and extraction of knowledge from satellite data, to develop new automatic processing chains. In the "DECISION project", funded by the Innonet program of the Puglia Region, AI techniques are used to create chatbots capable of interacting in natural language with heterogeneous databases, which contain structured and unstructured data, both geospatial and textual. Furthermore, the AI techniques associated with the interferometric analysis techniques for the processing of radar satellite images are used to accurately identify the points of the water and sewage networks with stressful situations, in order to activate predictive and preventive maintenance campaigns. AI techniques are also applied for the analysis of data available on the internet and in social channels (e.g. Facebook, Twitter, Instagram), to enrich the information content of geo-information services. This is one of the objectives of the with H2020 funded project Safeway, (learn more

on page 19), which aims to develop solutions capable of increasing the resilience of transport systems. Qu3D project aims at implementing 3D imaging devices, quantum plenoptic cameras, and speeding-up acquisition and elaboration of large amount of data exploiting high-performance computing (HPC) and GPU parallel processing, and investigating cutting-edge techniques such as compressive sensing, machine-learning and quantum tomography algorithms. The blockchain is also widely used in geomatics and space. In the ESA funded project CTEO (CryptoTradeable EO), the Blockchain is used to certify EO products through all the steps in the value chain, ranging from data acquisition, to its processing, extraction of information content, up to the use of these in geo-information products. In practice, keeping the historical memory of all the transformations and manipulations of a satellite image. AI techniques are used to implement novelty detection techniques for the analysis of telemetry data and data acquired by the onboard sensors of the satellites. These techniques were used in the ESA funded project CASTeC to preventively detect any anomalies and malfunctions, even before they could affect the operation of the satellites.



Horizon 2020

H2020 funds represent an important environment for research activities of the Planetek group, oriented towards technological development and the creation of new applications with the development of a network of relationships with international partners.

JUSTNature
EO data and technologies towards low-carbon cities.

PHySIS - COMPET
Real-time processing of hyperspectral data cubes

OP3C – Space SME
Image compressor to be installed on board satellites

SEO DWARF - MSCA-RISE
Big data semantic processing for marine monitoring

EUGENIUS - EO
European marketplace of Earth observation services

Flowered - Water
Integrated management of water resources in contaminated environments

Safeway – MG
Resilience of land transport systems to disasters

Beyond Planck - COMPET
Analysis of the gravitational waves generated by the Bing Bang

E-Shape – SC5
Development of operational satellite monitoring services

Impressive - Space
Real-time pollution monitoring of ports

Marine-EO – EO PCP
Environmental monitoring, aquaculture and navigation



Resources:
<https://bit.ly/3yHOMtQ>



Planetek Academy: EO at your fingertip

Every decision we make every day has an impact on the environment around us and on the quality of life of citizens. To reduce this impact, you need to make quick and informed decisions. Geospatial information is crucial for significantly improving the quality of our decisions and therefore can significantly contribute to making our choices more sustainable. For this reason, since the birth of Planetek Italia, we have always been committed to spreading geospatial knowledge with particular emphasis on the contribution of space. In 2021, when we became a Benefit Company, we formalized our commitment by including the promotion of the geomatic culture in our statute, among the objectives of the company. Our awareness raising action is aimed at everyone: managers of public and private companies, professionals,

Empowering
the next generation of
researchers, scientists, and
entrepreneurs

students, academics and researchers. In 2022 we launched the Planetek Academy by making all our initiatives converge in a single ecosystem. The initiatives of the Planetek Academy range from the organization of events such as Webinars and workshops to inform and train on the technological and applicative evolutions of geoinformation. As a natural evolution of our free online course on remote sensing, which in 20 years since its publication has been followed by over

20,000 people all over the world, we have released on December 16, 2021 during the first National Space Day in Italy, the EO-Learning platform which provides free online courses on Earth Observation and Aerospace in English and Italian, which in the first 4 months attracted over 2,000 subscribers. Through the creation of Hackathons and Challenges, we aim to encourage young students to learn about geoinformation. We also support students, undergraduates, graduate students and researchers by providing access to our facilities and the tutoring of our technicians. Similarly, we are supporting the creation of startups also through the joint development of solutions. In confirmation of our commitment in 2022 we have acquired the status of members of the Copernicus Academy network.

Academy & Hackathon

Planetek is part of the Copernicus Academy network. The goal of the network is to link research & academic institutions with authorities & service providers, facilitate collaborative research, develop training sessions, traineeships as well as educational and training material to empower the next generation of researchers, scientists, and entrepreneurs with suitable skill sets to use Copernicus data and information services to their full potential. Planetek partners, customers and stakeholders will be able to access and benefit from initiatives such as hackathons, workshops and webinars where qualified teachers, experience and technical-scientific skills will be made available.

The **Copernicus Hackathons** are events promoted by Planetek with the aim of involving students, young researchers and stakeholders interested in developing new ideas of application services and the possible creation of start-ups. Planetek organizes the Italian Hackathon in Bari since 2019.



Hackathon Bari

<https://hackcopernicus.planetek.it/>

Improving EO skills

Planetek is a member of the EO4GEO project, funded by the EU Erasmus+ program, where a team of 26 partners from 13 European countries cooperate to define the best strategies to cover the skills gap between industry requirements and the offer by young graduates in the field of remote sensing data analysis and processing. Planetek collaborates with local, national and international research institutions and universities for the realization of training internships, degree theses, research doctorates and scholarships. We share our know-how and expertise through our learning platform and by organizing conferences, workshops, seminars with free participation.



Resources

<http://www.eo4geo.eu>



Copernicus, the European Earth monitoring program

Copernicus is the European Union's Earth observation programme. Copernicus aims at providing information to EU Member States on the status of the environment, by integrating different data sources such as Earth Observation and in situ data. Six are the main themes covered by the programme: land, water, atmosphere, climate change, emergency and security. For each theme, many applications have been analyzed, including territorial planning, agriculture, forestry, health, transport, protected areas, civil protection, and marine and coastal zones. Copernicus users are public authorities and planners, but also private citizens, businesses and industries. The EU Commission coordinates the program. The European

Space Agency is responsible for the infrastructure for the space component and the European Environmental Agency, with the cooperation of the EU Member States, is responsible of the in situ component.

Planetek operates mainly in the development and integration of EO data processing chains, designed for the supply and distribution of user solutions derived from optical and radar satellite data. Planetek has also a great expertise in developing large-scale Spatial Data Infrastructures for managing multi-source data and user segment elements.



Resources:

www.copernicus.eu

Free online courses

EO-Learning is an e-learning platform launched by Planetek with free training courses and resources on Earth Observation and remote sensing. A new opportunity for students, and professionals in private and public entities (engineers, geologist, planners, etc.) to learn and stay up to date on technologies, methodologies and applications of satellite Earth Observation.



EO-LEARNING FREE ONLINE COURSES

<https://eolearning.planetek.it>



SpaceStream. Reshaping the Space Value Chain.

Mega-Constellations of mini and microsatellites with new-generation hyperspectral, radar or optical sensors are generating huge volumes of data that must be managed on board, transmitted and finally processed and stored into ground stations.

In this context, the classic distinction between UpStream and DownStream must be completely revisited with a new paradigm – SpaceStream – in which a complex ecosystem is able to regulate relationships between its various components.

In the SpaceStream, satellites can not only extract useful information directly on board but, if necessary or useful, thanks to that, can also take independent decisions. In fact, on board the satellite, the detection of anomalies or events such as fires or floods, is verified by real-time image processing, so that the satellite can directly send an alarm with the

An ecosystem without a sharp separation between UpStream and DownStream

coordinates of the point of interest. Similarly, the satellite can autonomously decide to task the following satellite to sense the area of interest. That can be useful both to track the evolution of the event and because it was unable to acquire images due to the presence of clouds.

This scenario introduces new security issues paving the way for using innovative technologies such as Blockchain.

AI-EXPRESS

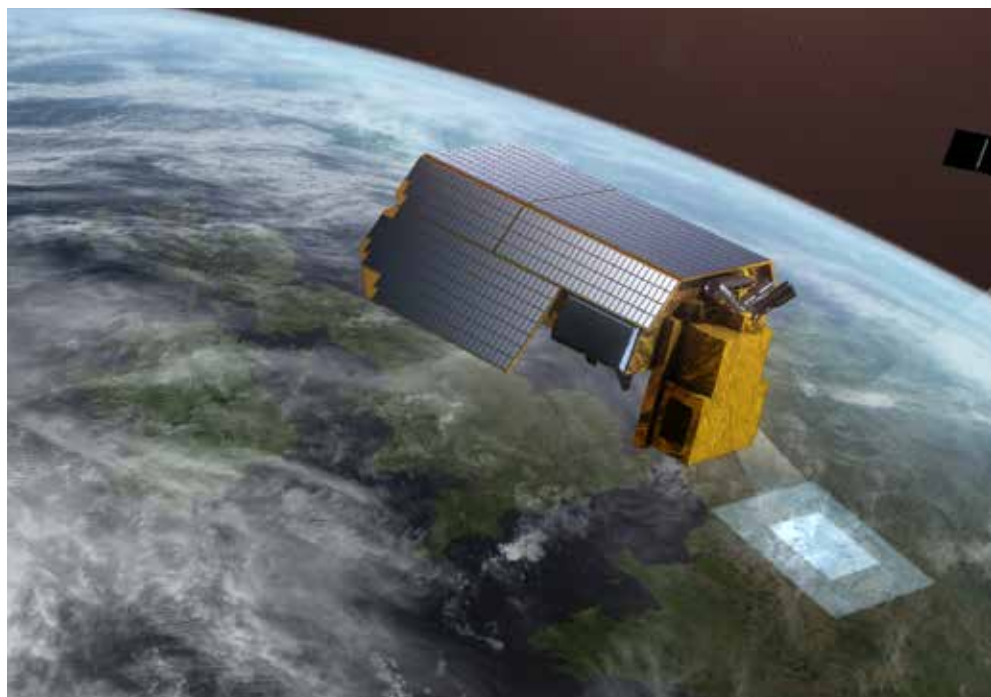
AI-express (AIX) is the first satellite implementing the SpaceStream. Flying from the first half of 2023 is able to demonstrate how we can change the Space Value Chain to improve the EO services for our customers.

AIX - www.aiexpress.eu – is a Planetek project, together with the partners D-Orbit and AIKO, co-funded by the European Space Agency through the IN3 program - incubed. phi.esa.int/portfolio/aix/



PLATiNO MCS

PLATiNO is an ASI program to create a mini spatial platform suitable for different missions. The purpose of it is the launch of two missions: PLATiNO-1 with SAR instrument and PLATiNO-2 with Thermal Infra-Red instrument. Planetek has in charge of development of the Mission Control System and Spacecraft Control Planner for the PLATiNO 1 mission. Both SW are based on the Planetek product ERMES.



ERMES - Mission Control Suites

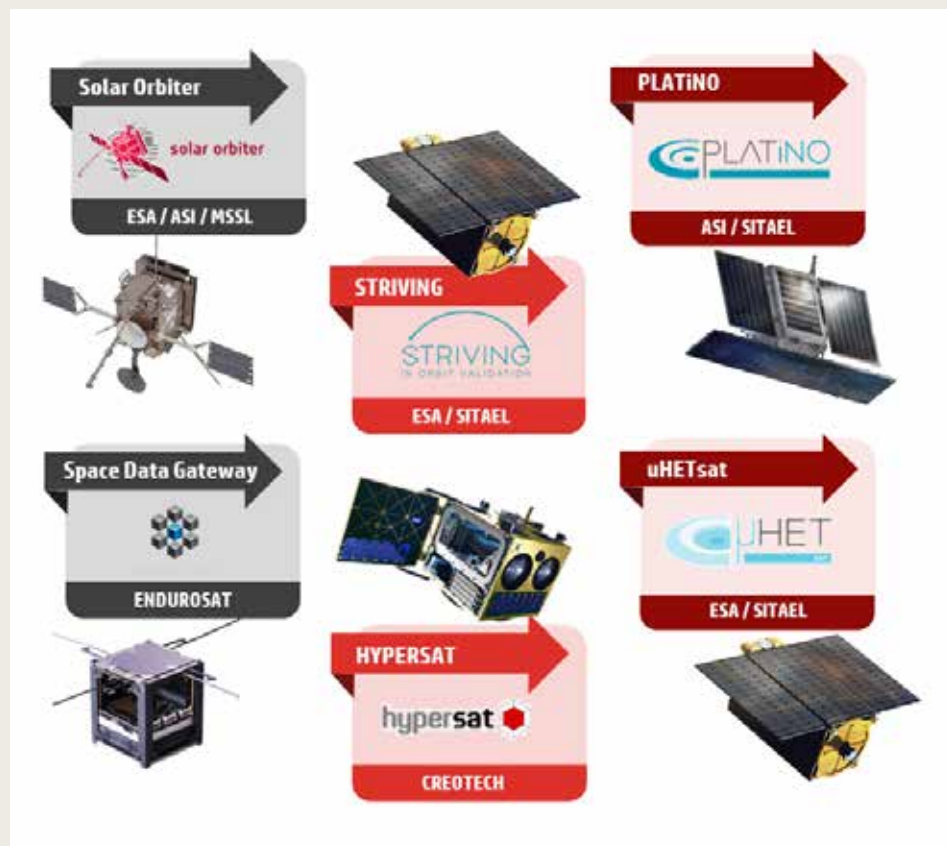
ERMES is a modular, flexible and interoperable SW suite, developed by Planetek, providing Mission Planning and Control functionalities for the operational activities of single satellites and constellations supporting all the mission phases, from A to F:

- Mission Control System
- Spacecraft Planner
- Payload Control Center
- Central Check-Out
- Master Test Processor
- Test Conductor Console
- SCOE Controller
- Front End Manager
- Spacecraft Simulator
- High Voltage Thruster Simulator



Resources:

<https://www.planetek.it/eng/ermes>



The ground segment of satellites

Software systems for flight operations, downlink acquisition and payload data processing of Earth Observation satellites

Planetek has built a long heritage in the design and development of components part of the payload data ground segment in institutional missions, where we leveraged our sound experience in EO and Cosmic Exploration data processing. Thanks to this competence we are now able to support all the phases of a mission, from O/A to D, and to provide an end-to-end infrastructure managing data just after the receiving antenna, till to the information delivery to the final user. In the last ten years we have been developing software components also inside the mission control and flight operations sub-systems.

HYPERSPECTRAL PRECURSOR OF THE APPLICATION MISSION (PRISMA)

As an EO mission of the Italian Space Agency, PRISMA is equipped with innovative electro-optical instrumentation that combines a hyperspectral sensor with a medium-resolution panchromatic camera. Planetek is responsible of design development and operations of the atmospheric correction and automatic geocoding subsystem of the PRISMA ground segment.



Resources:
www.planetek.it/prisma



COSMO SECOND GENERATION

Planetek collaborates in the COSMO-SkyMed Second Generation (CSG) mission, the Italian constellation formed by two satellites, and is responsible for the design and development of:

Non-standard processors:

- PFMOS: Processor for generating mosaicked products
- PFSFP: Processor for generating

Speckle Filtered L1B products

- PFCRP: Processor for generating Cropped products

Image Quality Assessment:

- PFQCA: quality control tool for standard and non-standard CSG products.



Resources:

www.planetek.it/cosmo_SG

Kadmos: PDGS as a service

Kadmos is a suite of services that enables precise co-registration and inter-calibration operations between the different sensors. Services include a set of capabilities ranging from Level-0 to Level-2 “standard” processing steps, implementing algorithms for ortho-rectification,

radiometric calibration and atmospheric correction. Kadmos relies on a knowledge base with a worldwide coverage, made by a set of targets and control points of well assessed and maintained quality. It is provided on a cloud infrastructure and can be integrated in any standard mission payload data ground segments workflow.



Resources:

<https://www.planetek.it/eng/kadmos>

ECARO

As part of the EU Agency for the Space Programme (EUSPA, aiming at adopting European GNSS systems, is a multidisciplinary project for the multiple domains concerned: PBN, Airports, Helicopter Operations, FIV Aircraft, RPAS. Planetek developed a service able to assess the presence of interfering signal, and GPS receivers' behavior, with respect to the L1 band



Resources:

<https://bit.ly/3sDleYQ>

CRUISE

It's an ESA Business Application (ARTES-IAP programme) project where a consortium led by Planetek and involving Leonardo, Telespazio, DTA, ENAV, ADP develops new services to assess and improve RPAS systems resilience to cyber-attacks del software scientifico di bordo (incl. l'elaborazione e compressione dei dati scientifici) e lo sviluppo del sotto-sistema software nel Electrical Ground Support Equipment (EGSE).

AURORA

It's an ESA project, where a consortium led by ENAC aims to design the Urban Air Mobility National distributed test facility for UAS/RPAS Navigations technologies development and assessment. Such facility will act as part of European ecosystem. Planetek has in charge the design of a system devoted to the monitoring of voluntary and not-voluntary RF interferences, including Space Weather, into the GNSS spectrum.

SWA-DPU Solar Orbiter

The Solar Orbiter mission, part of the European Space Agency's Cosmic Vision programme, is a mission designed to explore the Sun and heliosphere to improve our understanding of space meteorology and its effects on Earth. Planetek, together with TSD, LEONARDO and SITAEL provided its contribution

in the Solar Wind Analyser (SWA) instrument suite by developing the Data Processing Unit (DPU). In C/D phases, Planetek has been in charge of the development of the on-board scientific software (processing and compression of scientific data) and now that the cruise phase is completed and mission enters in the operational phase, is providing support to data analysis and instrument calibration activities.



Resources:

www.planetek.it/solar_orbiter

TRUTHS

The TRUTHS satellite is an initiative within ESA's Earth Watch program. The TRUTHS mission (Traceable Radiometry Underpinning Terrestrial- and Helio- Studies) aims to establish a traceable space-based climate and calibration observing system to improve confidence in climate-change forecasts. TRUTHS will carry a hyperspectral imager to provide benchmark measurements of both incoming solar radiation and outgoing reflected radiation with an unprecedented accuracy. Planetek Hellas is contracted to assist Airbus in defining the high-level functional requirements of the software linking space & ground segments, through phase A and creating, during the phase B1, the prototype software

architecture for the End-to-End Metrological Simulator (E2EMS) and the Observation Performance Simulator (OPSI)



Resources:

www.planetek.gr/truths

QUANTUM SENSING FOR EARTH OBSERVATION

Qu3D project aims at designing and implementing a 3D imaging devices, quantum plenoptic cameras, which exploit quantum correlation phenomena between photon pairs to enable the large depth of focus (DOF) and ultra-low noise. The activity includes aspect of speeding-up acquisition and elaboration of large amount of data exploiting high-performance computing (HPC) and GPU parallel processing, and investigating cutting-edge techniques such as compressive sensing, machine-learning and quantum tomography algorithms. typical refocusing and ultra-fast, scanning-free, but with enhanced performances of spatial resolution



Resources:

<https://bit.ly/3woeVe0>

Earthbit: monitoring the health of our planet

earthbit is a powerful SW tool specifically designed for managing very big EO data sources, such as SAR and hyperspectral images, as well as image streams in real-time, and configure and execute massively parallel processing tasks on big datasets by leveraging the power of a proprietary map/reduce framework. earthbit supports simultaneous



visualization of different types of EO images that can be navigated in co-registration mode, providing real-time graphical operation on them. It includes support for optical panchromatic, multispectral and hyperspectral imagery, and SAR data.



Resources:

<https://www.planetek.it/eng/earthbit>

Simplifying the complexity of Space



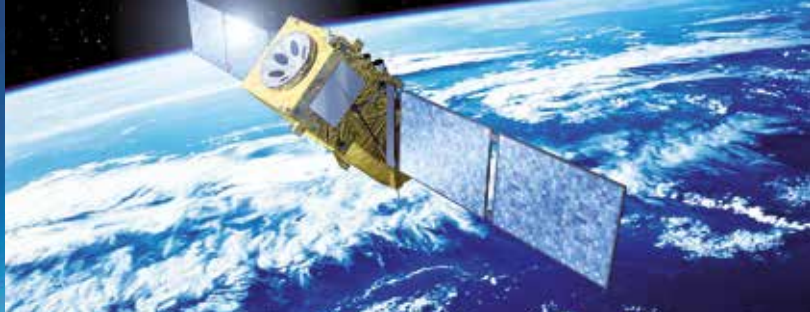
We are a Benefit Company established in 1994, which employs women and men passionate and skilled in Geoinformatics, Space solutions, and Earth science. Our mission is to simplify the adoption of geospatial data in order to live better and preserve the Earth. For this reason, we design new processes and solutions that simplify the use of geo-localized information to facilitate the understanding of the world around us. Our systems are designed to enable our users, public officials,

researchers, major industries, entrepreneurs or individuals, to act in an informed and timely manner. We work in all phases of the life cycle of geo-localized data from the acquisition, storage, management, analysis and sharing of information to produce and generate knowledge. At all stages, we adopt the principles of strategic design to create and develop solutions able to meet the requirements of our users, adopting the best technologies available on the market, with full respect for economic, social and

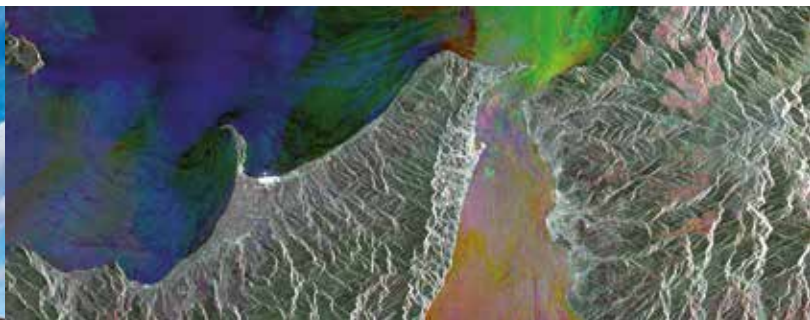
environmental sustainability. We operate in different application areas: scientific missions for planetary exploration, environmental and land monitoring, infrastructure engineering, energy, open-governments and smart cities. Through the Planetek group, we operate at an international level by providing solutions for the European Commission and its agencies, space agencies, national and international public administrations, research institutions, private companies and engineering firms.



We adopt the principles of strategic design to meet the requirements of our users, with full respect for economic, social and environmental sustainability.



From Space to applications: closer to users' needs



The organization of the company is structured into Corporate and Strategic Business Unit (SBU) functions, which constitute the Executive Committee. Strategic Business Units are segmented by market in order to better understand the needs of customers while at the same time ensuring continuity over time. The SBUs are structured to operate independently with planning, sales and production capacities. In our software development projects we use Agile and Dev-ops methodologies.

Government & Security SBU

It offers application solutions and services in the P.A. market at national and international levels, and for the Defence, Educational and scientific research markets in Italy. It provides geospatially powered solutions to the agencies and institutions of the European market such as the European Environment

Agency, the European Defence Agency, the European Union (EC, REA, JRC). It develops solutions for the Earth observation using optical and radar data from satellite, aircraft and drones. It develops Spatial Data Infrastructures compliant to INSPIRE, based on the Cart@net® platform, using Free Open Source and commercial software from major vendors. It offers solutions for the creation of geographic open data and metadata catalogs. It distributes remote sensing satellite data from major international operators through the Preciso® product family. It looks after the distribution of Hexagon Geospatial products within the Italian market.

Business to Business SBU

The target market consists of companies operating in the Oil & Gas, Renewable Energy, transport (railways, roads) sectors and engineering work and infrastructure activities. Its products range from systems for business intelligence on

geographic data to the creation of geoinformative products to value-added data from Earth observation.

SpaceStream SBU

The target market consists of space agencies (e.g. the Italian Space Agency with the COSMO-SkyMed program, and the European Space Agency with the Sentinel program); those related to them (such as Galileo) and the major players in the aerospace market. It develops and integrates hardware and software infrastructures for the acquisition, processing and distribution of remote sensing data along their entire chain of production: from Earth Observation to Deep Space; from the Space Segment to the Ground Segment to the User Segment. The main responsibilities of the SBU fall into Systems and Software Engineering with strong verticalization towards Space Mission Analysis and Design (SMAD).

Our leaders



Giovanni Sylos Labini

Chief Executive Officer and founder of Planetek Italia. He cooperated with NASA and ESA, and was director of the Center of Space Geodesy of the Italian Space Agency. Past President of AIPAS, Vice Chairman EARSC board member of SME4SPACE and Apulian Aerospace District. He was also Professor at Venice University (IUAV).



Mariella Pappalepore

Chief Financial Officer and founder of Planetek Italia. Vice President of Confindustria Bari and Bat.



Sergio Samarelli

Chief Technical Officer and Head of Business to Business SBU. Founder of Planetek Italia. He has been teacher of Remote sensing image processing at Venice University (IUAV).



Cristoforo Abbattista

Head of SpaceStream SBU. From 2002 he works in Planetek, mainly involved in the design and development of SDI and space systems. He has been teacher of WebGIS at Venice University.



Stelios Bollanos

Director and co-founder of Planetek Hellas. Since 2004, he is involved in different EU and ESA projects in the EO and Geomatics fields. He matured experience in the Greek and International Space Markets.



Vincenzo Barbieri

Chief Marketing Officer & Head of Design Lab. Founder of Planetek Italia, he matured expertise in the market of geospatial applications for Public Administration.



Massimo Zotti

Head of Government & Security SBU. Responsible for the business development in the Defence market and of the Hexagon Geospatial portfolios. He is also active in several associations dealing

with Open Data, Open Government and Geospatial innovation.



The group

The Planetek group consists of 4 companies. In addition to the Planetek Italia parent company, Planetek Hellas EPE and two university spinoffs, GAP s.r.l. and GEO-K s.r.l., also belong to the group and are specialized remote sensing data processing with optical and radar sensors.



Planetek Hellas

Founded in 2006, Planetek Hellas EPE is headquartered in Athens, Greece.

It operates mainly in the Greek market and with leading international agencies.

It provides solutions in the field of Geomatics, involving the use of E.O. data and systems that share spatial information for environmental monitoring, urban planning and civil protection.

It operates in the principal EU programs in the field of Space research, where it is experienced in developing systems for data management of Space missions.
www.planetek.gr



Geo-K

GEO-K s.r.l. is the first spin-off of the University of Rome Tor Vergata, founded in 2006.

Its mission is to carry out research and development and provide advice, services and products in the field of image processing and optical, hyperspectral, and microwave remote sensing. GEO-K personnel have vast experience on an international level in projects developed and promoted by the ESA and the EU Commission.
<https://www.geo-k.co/>



GAP

GAP s.r.l., a spin-off of the University of Bari. It develops products, processes and services of highly scientific or technological content in the field of remote sensing and related hardware and software technologies, with an emphasis on Geomatic applications.

The scientific component operates in close synergy with the Remote Sensing Group of the Physics Department of the University of Bari and CNR-ISSIA Institute. GAP has developed specific expertise in the detection of millimetre movements of the earth's surface by means of the analysis of interferometric data acquired by synthetic aperture radar satellite sensors, to estimate water quality via the analysis of passive satellite sensor operators in the dominion of optical radiation and in the development of environmental modelling.

www.gapsrl.eu



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