



ISSUE 11

# geoxperience

## **Earth Observation:**

Environment & marine monitoring services in Europe  
Monitoring Coastal Archaeological sites  
Waste Earth Observation Services

## **Interoperability & SDI:**

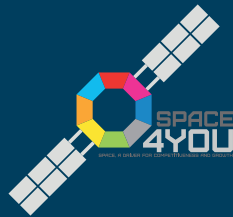
Geographic open data & interoperability  
The INSPIRE Geoportal  
Towards geographic linked open data

## **Government, Planning & business solutions:**

Preciso<sup>®</sup> Family  
Cart@net 2014  
Civil and Construction Workflows with EO data  
Fleets monitoring and smart cities

## **Space:**

From On Board Payload Data Processing, to the Cosmic Exploration. The satellite ground segment. SHIRA, the first Italian 'user oriented' satellite mission



NEREUS, is an initiative by regions from all over Europe, which share as Full Members its governance.

The network aims to explore the benefits of space technologies for Regions and their citizens and to spread their applications.

NEREUS is a strong voice for the regional dimension of European Space Policy and programs as well as end-user needs.

[www.nereus-regions.eu](http://www.nereus-regions.eu)

# Why space is so relevant for Regions? The space activities are very peculiar in their capacity of



stemming growth and competitiveness and in their continental dimension are a strategic asset for peaceful competition and defense in troubled epoch. For

these reasons, the Lisbon treaty define Space as a shared policy of the European Union, in some way a strategic asset for a global power.

At local scale, other peculiar capacities of space emerges, the dual faced development of sophisticated supply side and the stimulus of a modern, mostly but not only, public, demand side.

The term “Rocket Science” is not casual, in the last 50 years space systems have been at the heart of innovation race, leading to the development of a healthy industry ranging from advanced materials to informatics. Nevertheless as stimulating as the supply side is, the power of space service is no less fascinating. Let’s consider as an example satellite navigation, nowadays satellite provide

precise position and timing globally, enabling services that few decades ago was unimaginable or pure science fiction.

The big question is, “how to harmonize the multiples dimensions of Space?”

To try to answer this question, the Puglia Region Aerospace Cluster (DTA) invited the Nereus regions, the European network of space regions, to meet in Bari in 2014 with all the other space stakeholders: users, the space agency, the industries and the EU. Two days of intense debate, with an open innovation approach, in order to depict a more coordinate approach of regions to space, but also to ignite a renovate attention from the Space Agencies and the Union to regional dimension of space, in a strong user centered approach. Planetek Italia, as a founder of the DTA, is a part of this effort and shares the conference results with the large community we serve since twenty years.

*Giovanni Sylos Labini  
CEO Planetek Italia*



# Summary



## APPLICATIONS

- OPEN GOVERNMENT
- ENVIRONMENT
- CIVIL PROTECTION
- AGRICULTURE AND FORESTS
- INFOMOBILITY
- INFRASTRUCTURES ENGINEERING
- TOURISM AND TERRITORIAL MARKETING
- ENERGY AND UTILITIES
- SECURITY AND DEFENCE
- SPACE SOFTWARE
- PLANETARY EXPLORATION
- LAND PLANNING
- SEA AND COASTAL AREAS

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Planetek: Simplifying the use of geo-localized information



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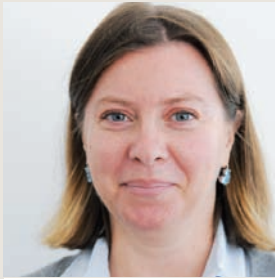
p. 01, 08, 34, 47, 48 ESA/AOES; p. 04 ESA - M. Pedoussaut; p. 09 GIO Land Copernicus; p. 10 NASA; p. 11 EATIP ASBL (top image), MarCoast consortium (bottom image); p. 12 U.S. Department of Transportation; p. 13 ESA Ò P. Carril; p. 15 Robert de Vaugondy; p. 16 Edward Burtinsky ph.; p. 19 USGS; p. 23 Navid Baraty ph.; p. 26, 27 Intergraph; p. 30 Anja Jentzsch; p. 32 [www.suedtirol.info](http://www.suedtirol.info); p. 35 Lucasfilms; p. 36 NASA/JPL/Cornell University; p. 36 NASA, ESA, Hubble Heritage; p. 38 ASI/Italian MoD; p. 39 ESA; p. 40 Lockheed Martin Corporation (top left image), NASA/NOAA/GSFC/Suomi NPP/VIIRS/Norman Kuring (top right image); p. 43 EUMETSAT; p. 44 ESA (right top and bottom images); GracieusetÉ (left bottom image); p. 46 NASA/GSFC.



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# Contributors



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## **Daniela Iasillo**

European Institutions SBU – Sr. Technical Manager Geoservices. Degree in Physics, since 1997 she works for Planetek Italia where she was involved in many European projects for water quality monitoring, environment, land use mapping and risk mitigation.



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## **Giulio Ceriola**

European Institutions SBU – Sr. Technical Specialist. Degree in Physics, he published some papers related to satellite derived data processing techniques. From 2006 he works for Planetek Italia involved in many projects for water quality monitoring, land use mapping and risk mitigation.



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## **Francesco Coletta**

Business to Business SBU - Technical Manager. In this position, he has direct responsibility for project execution, technical proposal writing, team management, analysis and development of Spatial Data Infrastructures (SDI).



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## **Stelios Bollanos**

Planetek Hellas, Director. Part of the Planetek group since 2004. In 2005 he returned from Italy to Greece and cofounded Planetek Hellas. Since then he managed different EU and ESA projects for the company in the Earth Observation and Geomatic field. He has matured experience in the Greek and International Space Market.



PAG. **16**

## **Dimitrios Biliouris**

Planetek Hellas, Earth Observation Specialist and project coordinator. Forester, with a M.Sc. and a PhD in Remote Sensing. He has an international experience as researcher and project coordinator and is author of a number of published papers related to E. O. and Hyperspectral Remote Sensing.



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## **Alessandro Ferri**

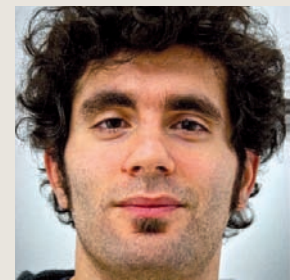
Government & Security SBU – Sr. Technical Specialist. Degree in Economics, since 2002 he works for Planetek Italia where he was involved in main activity in the design and development of systems for Spatial Data Infrastructures on the Web, for water quality monitoring and real time Fleet management.



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## **Andrea Navarra**

Business to Business SBU - Sr. Account Manager. Degree in Political Science. Masters in e-Business Management. He works in Planetek Italia since 2004, involved in the business development of Earth Observation services for private sector in the field of Engineering, Energy and Oil & Gas industries.



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## **Davide Passarelli**

Business to Business SBU – Geoservices Technical Assistant. Degree in Telecommunications Engineering. He works for Planetek Italia, involved in E. O. and image processing activities, mainly focused on photogrammetry, cartography, Marine environment and DEM research and production.



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**Valentina Urbano**

Government & Security SBU - Business Development Specialist. Degree in Forestry Sciences. She is specialized in "GIS and Remote Sensing for the evaluation of territorial and infrastructural systems".

Since 2009 she works in Planetek Italia in the Marketing sector, in charge of Public Administration users.



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**Mauro Casaburi**

Government & Security SBU - Spatial Data Infrastructures (SDI) Technical Manager.

Degree in Electronic Engineering, he published several papers in the field of Geographic Information System on the Web. Since 2002 he works for Planetek Italia, involved in the design and development of SDI and Regional / National GeoPortals.

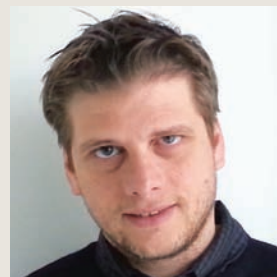


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**Nicky Lunanova**

European Institutions SBU - Senior Technical Specialist. Degree in Computer Engineering, he has several years of experience in GIS and Spatial Data Infrastructures through Enterprise and Open Source software solutions.

Currently is working on the implementation of the INSPIRE Geportal at European level.



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**Marco Fago**

Government & Security SBU - Software Technical Manager. Degree in Electronic Engineering and PhD in Information Engineering, he works for Planetek Italia as Project Manager. He designs and develop Spatial Data Infrastructures, Regional / National GeoPortals, focusing to Linked Open Data.



PAG. **32**

**Diomede Illuzzi**

European Institutions SBU - Sr. Technical Manager SDI & System Engineering.

Msc. Electronic Engineering. In 2009 he joined Planetek Italia where, as project manager, he is responsible of the integration of infrastructures for the management of geospatial data.



PAG. **34**

**Leonardo Amoruso**

Space Systems SBU - Technical Manager. MSc degree in Electronic Engineering, he matured experience in satellite data (SAR & optical) processing techniques. Member of Planetek Italia since 2009, involved in the design and development of satellite systems components, for ground or space segments.



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**Luigi Agrimano**

Space Systems SBU - Sr. Technical Specialist. Degree in Electronic Engineering, he has matured an extensive experience in SAR data processing techniques, and analysis, design and development of system components for satellite ground segments. Member of Planetek Italia, he is expanding his skills on multi-mission data systems and cloud storing.



PAG. **40**

**Daniela Drimaco**

Space Systems SBU - Business Development Manager. Degree in Telecommunication Engineering, Since 2007 she works in Planetek Italia at first in Earth Observation applications field and afterwards in technology and infrastructure for Space Systems domain.

# Environment monitoring services in Europe



Europe is one of the most urbanized continents on Earth. More than half a billion people live in European Union countries and this number is increasing. Approximately 75% of the population lives in urban areas and, consequently, some of them have reached the dimension and the importance of global cities. Although the rate at which the population is increasing is quite low, European urban areas are characterized by a significant sprawl phenomenon, which has the most important impact on natural and rural environments. This also affects biodiversity since it decreases habitats, the living space of a number of species, and fragments the landscapes that support and connect them. Furthermore, urban sprawl has a direct consequence on the increase in greenhouse gas

emissions, on the reduction of air quality and on noise pollution, on the increase of surface run-off. To sum up, it reduces the quality of the life and the security of European citizens.

**# Since the 1980s the need for European Institutions to monitor land cover and land cover change on the continent has arisen #**

The European Environment Agency (EEA) is the European Union

authority devoted to monitoring the environment of Europe. Many initiative have been taken with this aim by EEA, and, one of the more recent is GIO-land, an operational project with the aim of producing several land cover dataset using satellite images. In 2011 within the framework of the pan-European component of the project, the production of five high resolution layers (HRL) regarding five land cover classes in 39 European countries started (32 EEA member countries plus six Balkan countries and Turkey). Artificial surfaces, forest areas, agricultural areas (permanent grasslands), wetlands, and bodies of water are the five land cover classes to be mapped. The output is composed by a series of raster maps related to these classes. Planetek Italia leads a consortium



formed by Geoville and Planetek Hellas for the production of Lot 4: Imperviousness and forest in Southern Europe, partim West and Central Mediterranean region (1.202.046 km<sup>2</sup>). This lot includes the following countries: Albania, Bosnia and Herzegovina, Croatia, Cyprus, Greece, Italy, Kosovo under the UN Security Council Resolution 1244/99, Montenegro, Malta, Portugal (including the Azores and Madeira), Spain (including Baleares and Canarias). The Copernicus services are considered “public goods” and, thus, full and open access to the five HRLs will be organized at the end of the project, which is foreseen for the end of the year 2014.



**Project resources and video:**  
[www.planetek.it/eng/projects/geoland2](http://www.planetek.it/eng/projects/geoland2)

Planetek has promoted and supported the Global Change Research Symposium event, held in Ostuni, Brindisi, Southern Italy, on September 16-18, 2014.

The Symposium has brought international leading scientists from relevant fields to discuss the theme of how global change research can support management, decisions and interventions, needed to mitigate different stressors and protect ecosystem services and human wellbeing.

Planetek contributed with presentations, providing examples of successful case studies on remote sensing applications (including LIDAR).



**Event page:**  
[www.global2014.it](http://www.global2014.it)



## The Copernicus European Earth monitoring program

Copernicus is the European programme for the collection of environmental information through Earth Observation (EO) data. This programme, previously named GMES (Global Monitoring Environment and Security) aims at providing information to European Member States on the status of the environment, integrating different data sources such as EO data and in situ.

There are six themes: land, water, atmosphere, climate change, emergency and security. For each theme many applications have been analysed including territorial planning, agriculture, forestry, health, transport, protected areas, civil protection, marine and coastal zones, among others.

Copernicus users are the public authorities and planners who address laws for environmental protection and who act in case of emergency.

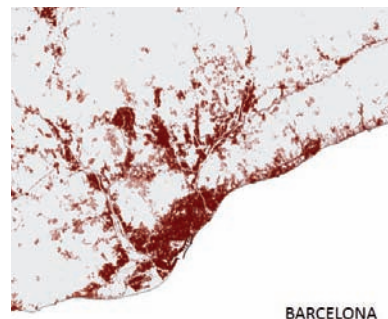
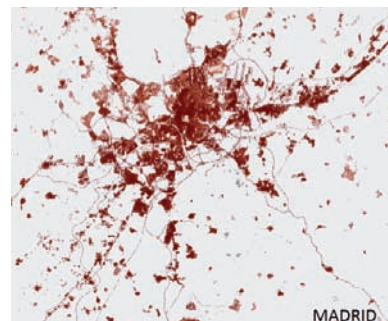
The Copernicus programme is coordinated by the European Commission. The European Space Agency is responsible for the infrastructure for the space component and the EEA, with cooperation of the Member States, is responsible of the in situ component.

Planetek has been participating in Copernicus since 2008 in the Geoland2, SAFER, G-Mosaic, Aquamar and BIO\_SOS projects, and is the Service Provider for GIO Land.



Above images: maps of dominant leaf type for Sicily, Italy (broadleaved trees and Coniferous trees).

Below images: Maps of the artificial areas of the two biggest cities of Spain. The darker is the red, higher is the impervious fraction of the pixel (values from 1 to 100%).





# Remote sensing to support marine environment monitoring in Europe

Achievements from the FP7 AquaMar project to exploit Earth Observation services in coastal areas monitoring

**Wa**ter quality (WQ) is a focus of monitoring agencies and the public and it is subject of several European Directives and regional conventions. WQ refers to the physical, chemical and biological characteristics of water. It is a measure of the state/condition of a water basin relative to certain requirements and is most frequently used with reference to a set of standards against which compliance can be assessed. Some European policy directives and international conventions actually set common rules for all the member states, such as:

- EC Water Framework Directive (WFD) (2000)
- Marine Strategy Directive - (EMS) (2008)
- EC Bathing Waters Directive (2006)
- Environment Impact Assessment Directive (EIA) (1985, amended in 1997)
- EU Integrated Coastal Zone Management (ICZM) Recommendations (2002)
- Regional Seas conventions: Helsinki (Baltic Sea), Oslo and Paris (NE Atlantic), Barcelona (Med. Sea)

In order to be effective, the implementation of such legislations needs to be rigorously monitored. In this respect, and in the context of European Global Monitoring for Environment and Security initiative (GMES), water quality services are paramount.

The most accurate measurements of WQ are made on site; more complex measurements are often made in a laboratory using water samples. However on-site measurements present the disadvantage of a limited temporal and spatial view of a sea area and of high operative costs. WQ measurements from Earth

# **Securing water quality is a key European priority. AquaMar provides valuable information for aquaculture or infrastructure impact in the coastal environment** #



Observation (EO) can provide valid support to and complement on-site data. At the European level, the GMES Marine Core Service (MCS) provides basic products also concerning WQ, which however need further added value to meet the institutional European and national end user requirements. Various ESA and FP7 GMES projects have been conducted to develop pre-operational support to institutional and private users with EO data for WQ monitoring. For example, the two GMES MarCoast projects (2006–2012) have aimed to develop operational services using satellite data, paving the road for building a reference organizational and technical body at European level for water quality services, service quality management and services validation. This was complemented by various FP7 research projects, among them AquaMar (2009-2013) had the objective to improving existing services and develop new products for supporting users' reporting duties at European level, further matching their requirements. A parallel key objective was to bring benefits to the European citizens: e.g. on all

European beaches, the blue flag that signals good quality of bathing water comforts families. Securing water quality is a key European priority and AquaMar developed products aimed in helping to monitor this quality. Beyond health benefits, AquaMar aimed in bringing economical added value by providing valuable information for aquaculture or infrastructure impact in the coastal environment. The AquaMar project developed downstream services transforming MCS products into WQ services, demanded by end user. The research and development (R&D) activities focused on five innovative lines of services allowing to bring EO

- applications to novel sectors or to strengthen their use:
- 1) Support to EU Water Framework Directive and European Marine Strategy
  - 2) Harmful Algal Blooms (HAB) Detection
  - 3) Support for assessment and monitoring of large scale marine coastal infrastructure projects
  - 4) Quality of bathing water, supporting the EU Bathing Water Directive
  - 5) Support to aquaculture precision farming.

➔ **Project resources:**  
[www.planetek.it/eng/aquamar](http://www.planetek.it/eng/aquamar)





# Fleets monitoring and smart cities

**Sm**art Cities are cities equipped with technological infrastructure made of sensors, communication systems and systems for sharing data collected. These infrastructures are able to self-regulate in order to achieve predetermined levels of performance through analysis and interpretation, even automatic, of these data.

In a Smart City these sensors are a fundamental technological infrastructure, producing data on the status of the city updated in real time. Systems that provide updated data on the speed of the vehicles passing along the streets belong to this category. Their processing and interpretation is

potentially an excellent source of information for the smart planning and management of urban mobility. The systems for fleet (buses) are today widely adopted by companies that provide services to Local Public Transport (LPT). Their main purpose is to provide real-time information to users and to support the monitoring, optimization and management of the service. Depending on the goal for which they were made, they may have different technological characteristics. Generally, these systems collect the geo-location data of the vehicle at a certain instant (date / hour / minute / second) with a variable sampling frequency ranging from a few seconds to a few minutes. These

parameters are usually measured by GPS and transmitted to the central board with different types of communication systems (radio, GPRS, Wi-Fi) in real-time or delayed, for example, when the vehicle is back in the depot. The information archived inside the information systems databases owned by LPT companies has a huge potential informative content, but it is sadly underused due to a lack of analysis algorithms. For example, the analysis of a vehicle's speed on individual sections can help to understand the average traffic at different times of the day along the lines on which these vehicles are moving. This information is important in the definition of mobility management

measures implemented at the urban scale and is traditionally measured through expensive campaigns or, alternatively, through the installation of specific sensors along the road for counting vehicles in transit. In a field trial that we conducted with AMTAB, an LPT company in Bari within the IMPULSO research project (funded by the Ministry of Economic Development as part of Industry 2015), we developed analysis algorithms based on remote data to state the level of traffic along the lines of moving bus.

The status of average traffic along arcs of road a few hundred meters in length was determined through the statistical analysis of historical data.

The result was a standardized and objective index useful for assessing the state of traffic over time, which enables the measurement of the effectiveness of the measures provided for in the Mobility Plans. For example, the evaluation of the impact of a new one-way road or a road closed to traffic, through historical analysis, pre-and post-

intervention, can be done easily, at any time, and without needing to plan specific measurement campaigns or install expensive sensors along the streets.

These indicators can be used as a basis of reference for analyzing data acquired by remote control in real time and determining the status of the real-time traffic. This information is critical to support the Municipal Police in the Smart management of mobility or to provide information to citizens to encourage sustainable mobility.

## IMPULSO: Integrated Multimodal Platform for Urban and Extra Urban Logistic System Optimisation

Integrated Multimodal Platform for Urban and Extra Urban Logistic System Optimisation.

The IMPULSO project is part of the “Industry 2015”, initiative presenting a new system, which participates in a group of Italian companies and research institutions. The goal is to develop new products and innovative solutions in the field of mobility and transport of goods monitoring and management processes (more efficient and at the same time more respectful of environmental and social constraints), increasing the competitiveness of the industries involved.

IMPULSO aims to create an integrated logistics management system covering management of freight transport for medium / long distances and in urban areas. IMPULSO is therefore placed in sub- B2.3, “system components and logistics for the transport of manufactured goods in urban areas” and sub- B2.4, “multimodal system, safe, integrated and timely for the

transport of goods medium and long range”, providing:

- the definition of a model of city logistics and multimodal logistics applicable for the transport and delivery of goods both in metropolitan and medium and long-range distances;
- the implementation of the ICT system necessary for the implementation of this model.

Planetek Italia is responsible for the implementation of subsystem tracking and tracing vehicles and vehicle traffic modelling subsystem tracers, both in inland and metros. These subsystems provide the highest level of efficiency possible in the process of transport and delivery of goods, reducing the impact on local traffic and the environment by calculating optimal paths taking into account both the current traffic and road conditions.

Both subsystems have influence during the entire “terrestrial” transport within which the various means, carrying the goods from the

last “nautical mile” to the various logistics platforms sorting and detail. They allow the immediate identification of the most appropriate route to take by monitoring traffic conditions.

The subsystems thus:

- significantly contribute, through the constant monitoring of the movement of the vehicle, the optimization of the path followed by the vehicle;
- increase the general level of efficiency at every stage of the shipping service;
- increase knowledge and monitoring of the state of general driving roads in support of the planning and programming of transportation companies.



# ITACA

## Innovation Technologies and Applications for Coastal Archaeological sites

The monitoring of the underwater cultural heritage is a priority of Public authorities (e.g. Ministry of Cultural Heritage, Institutions and local entities) that deal with conservation and restoration activities. These public bodies need cost effective, reliable and systematic survey techniques and means to accomplish their mission and everyday work.

The ITACA (Innovation Technologies and Applications for Coastal Archaeological sites) project aims to prove a management system for underwater archaeological sites in coastal regions. The discovering and monitoring service uses innovative satellite remote sensing techniques combined with image processing algorithms. The project develops a set of applications integrated in a system that pursue the following objectives:

- Search and location of ancient ship wrecks;
- Monitoring of ship wrecks, ruins and historical artefacts that are now submerged;

- Integration of resulting search and monitoring data with onsite data into a management tool for underwater sites;
- Demonstration of the system's suitability for a service.
- The development of specific techniques, methods and tools

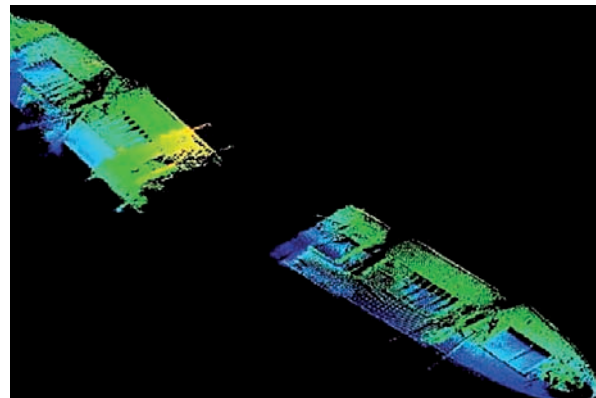
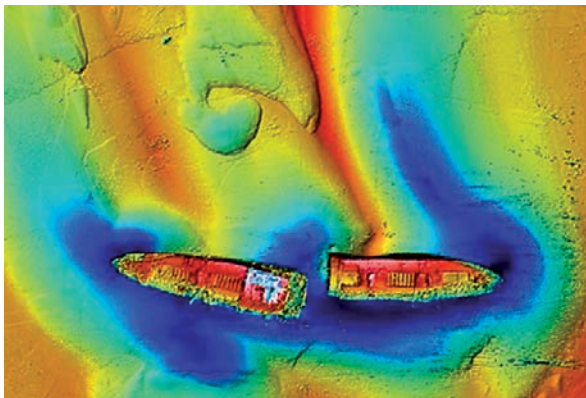


based on the processing of Earth Observation satellite data makes possible the production of systematic survey of wide coastal areas, without any destructive impacts. In such way, ITACA is promoting a real integration between the use of compatible, non-invasive technologies,

protection and conservation of resources and local cultural identities by providing high value tools in a cooperation framework. Analytically, high resolution synthetic aperture radar (TerraSAR-X, Cosmo-SkyMed) and multispectral satellite data (WorldView-2) will be combined to derive the relative bathymetry of the bottom of the sea up to the depth of 70 meters. The resulting data fusion will be processed using shape detection algorithms specific for archaeological items.

The new algorithms, the physical modelling and the computational capabilities will be integrated into a Web-GIS, together with data recorded from surface (2D and 3D modelling) and from underwater surveys. Additional specific archaeological layers will be included into the WebGIS to facilitate the object identification through shape detection techniques and mapping.

The main specific objective of the ITACA project can be further defined as the assessment of the benefits of implementing a specific service for location and monitoring





archaeological sites, coupled with technologies for underwater mapping using state-of-art data processing and fusion techniques and tools to manage underwater sites and guide excavations for the sake of:

- ➔ Improving the capabilities to locate and monitoring underwater archaeological sites in coastal zone towards the implementation and deployment of an innovative system integrating remote sensing and image processing techniques.
- ➔ Develop and deploy a management and operation tools for underwater archaeological sites. ITACA project includes the development of a WebGIS management and operation tool to integrate remote sensing data with a 3D representation of the underwater “reconstructed site” to provide guide the underwater operations ad complementing traditional mapping.

The system will be verified and validated through an extensive on-ground (sea) campaign carried out with both cutting edge technologies (side-scan sonar, multi beam

## # Providing Earth Observation and webGIS tools to locate and monitor underwater archaeological sites in coastal zone #

echo sounder) and traditional means (submarine exploration with professional scuba divers) addressing a number of user test cases, such as:  
 Search and location of ancient ship wrecks;  
 Monitoring of ship wrecks, ruins and historical artefacts that are now submerged.  
 Verification of the developed methodologies will be provided using data sets from Greece (Metohi, Northern Greece), and Italy (Egadi Islands, Sicily)  
 The innovation character of ITACA addresses:  
 remote sensing data processing methodologies which, at present,

have not yet been analysed and exploited especially with the availability of new, high resolution active and passive sensors; enhancement of the image processing techniques already used in the frame of a project targeting archaeological items on land and development of fine tuning algorithms to consider the more complex underwater scenarios; web management and operation tools for archaeological coastal sites targeting the definition of risk maps and by integrating several information layers in a consistent tool;

Analyses the impact of the new achievable observation products and tools on the marine market and related follow-up applications. ITACA project is coordinated by Planetek Hellas (GR) and includes the following institutes and companies: Kell Srl (IT), NAIS Srl (IT), DHI GRAS (DK), I.EN.A.E (GR), FFCUL (PT), ANESTI Ltd (UK), Regione Sicilia (IT), ALMA sas (IT), CODEVINTEC Srl (IT), SME4SPACE (BE)

 **Project resources:**  
[www.planetek.it/eng/itaca](http://www.planetek.it/eng/itaca)



# Waste Earth Observation Services

WEOS is helping authorities in rapid response mapping and long term monitoring of illegal waste treatment sites.

There is growing worldwide concern regarding the trans-frontier shipment of hazardous and other waste within the western economy itself and between western economies and developing countries.

In short there is a major awakening to the potential risks of waste shipment. The risk associated with the international transshipment of waste includes the following:

- Terrorism and state sponsored terrorism
- The illegal trafficking of arms

- The illegal trafficking of dual use technology
- Drug trafficking
- Human trafficking
- Environmental pollution
- Health and safety risks

Yet there is no quantifiable information or statistics that inform us how much waste is transhipped out of the EU or North America each year, or what types of waste are being trans-shipped and to where.

WEOS (Waste Earth Observation Services) project, financed by ESA (European Space Agency), looks

at the area of waste management with the aim to extend the uptake of the Earth Observation (EO) based geo-information services already tested and demonstrated in previous projects.

The proposed WEOS services will follow a further customisation of the already existing WASTEMON services, using Optical and Radar EO data, in order to respond to the different needs of the European user community involved into law enforcement and intelligence fields of action. Among the International users (i.e. EEA) and stakeholders (i.e. World Bank), the project will





# How we do prevent environmental crimes

Tools, procedures and infrastructures solutions to increase the control and the intervention capacity on the territory

Illegal building, misuse of natural resources and other environmental abuses are just some of the elements that lead municipal governments to pay attention to human activities that involve changes of the territory and threats to human health. To keep track of the progressive changes of the territory, and to avoid the risks associated with environmental crimes, Planetek Italia has set up a set of tools, procedures and infrastructure solutions, aimed at implementing an Integrated Environmental Crime Prevention service.

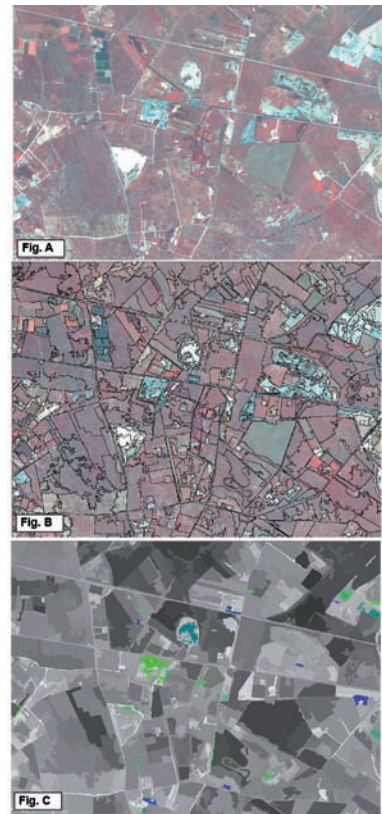
This integrated service, for the monitoring and prevention of urban and environmental crimes, allows the analysis and the control of the urbanization and the impact of other human activities in the urban area.

Through the use of satellite imagery, sensors, cameras and web reporting tools for citizens, and thanks to the support of geospatial intelligence, we enable

operators of the municipality and the Police to get a quick acknowledge of the phenomena related to their areas, to process information, and to identify priority. All this in a very short time, enabling quick actions and effective interventions.

Those services, already adopted by several municipalities in Italy (eg. the city of Canosa, in a land very attentive to the issue of prevention of environmental risks, or the city of Giugliano in Campania, epicenter of an area with important issues of environmental significance), supports decision making and intervention strategies through workflows accessible via a Web platform (Smart Client) by a potentially unlimited number of users.

The workflow is oriented to the maximum ease of use. Using Geospatial Intelligence softwares, base maps, Earth observation data collected on a regular basis and other information sources



accessible through the integration with external systems (such as, for example, the Information System for the Environmental Protection of the Italian police), the operators can update cartographic themes dedicated to the land monitoring. Those new information can be compared with geocoded records and reports, in order to provide information for the planning of interventions, and to manage afterwards the results of the actions taken.

This approach increases the level of control of the territory, the capacity and resources of local operators committed to a continuous control of the territory, whose presence and intervention is the best deterrent for environmental crimes, and provides citizens important resources for their active participation in the policies for land conservation and prevention of environmental crimes.



# Decision Support for emergency management

The Civil Protection case in Calabria region



Natural phenomena with catastrophic developments is a topic which has become of the utmost importance in recent years. The risk level in areas known to be dangerous has also increased due to the careless use of land and resources. One of the major challenges for civil protection operators is to be prepared to handle the “uncertainty”, which from time to time, characterizes these calamitous events, making each of them somewhat “unique”. The better answer to this challenge is the immediate availability of the most up-to-date and accurate information about the situation and the available resources. New innovative technologies in these scenarios must allow for a more rational use of resources and a safer use of the land through sustainable planning models.

## A geoportal for Civil Protection

The Civil Protection of the Calabria region has used, for several years, an integrated tool for planning and emergency management, organized in a geoportal specially designed by Planetek Italia.

The geoportal is the front-end part of a bigger project aimed at the engineering, development and implementation of a GIS (Geographic

Information System) as part of the Decision Support System (DSS) of the Civil Protection in Calabria. The solution implemented allows for the support of prevention and emergency planning, including all methodologies and specifications (the organizational model required by the Italian Augustus method) adopted by the local government offices responsible for the management and design of Civil Protection plans.

Based on Cart@net® (see page 27), the tool developed by Planetek Italia for geoportal creation, the Civil Protection GIS is implemented with advanced tools that provide a highly advanced state-of-the-art platform. The Geoportal represents the unique access point for both the regional Administration and all users and stakeholders. As an essential management tool, the geoportal is a secure reference point for all the activities related to regional Civil Protection at any level and competence: territorial, functional and operational.

## The Decision Support System

The system fulfills many functions of considerable help for forecast and prevention activities, as well as for emergency and post-emergency management:

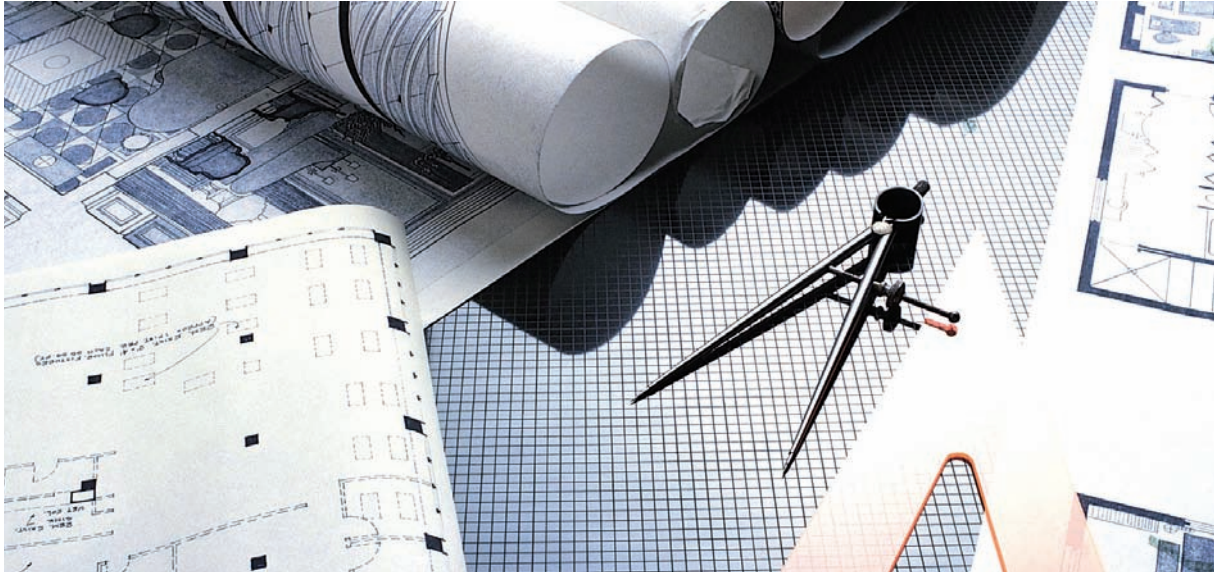
- query, view, analyze, store and share geographical (and not only) information among all civil protection operators;
- access and cross the information stored into an extensive database, which is constantly updated about natural hazards and their implications to the area;
- anticipate and simulate scenarios and events;
- access the information even in adverse environmental situations (eg. through satellite connections);
- access the information even in emergency situations where there is no internet connection available.

Especially in risk situations, the use of the Geographic Information System improves the efficiency and timeliness of decisions, optimizing economies and priorities of actions. The Civil Protection GIS is therefore a perfect tool for the monitoring of policies and strategies to deal with all environmental and urban emergencies.



### Project resources:

[www.planetek.it/eng/civil\\_protection\\_calabria](http://www.planetek.it/eng/civil_protection_calabria)



# Improving Civil and Construction Workflows with EO data

How remote sensing products and services can help the development of infrastructures

**Wh**en an engineering company approaches the phases of planning and design of an on-shore or off-shore infrastructure, from railways to pipelines, from highways to dams, it must take care of the environment it will serve, considering different points of view. Updated cartographic and topographic information like land use and coverage, soil composition and orography set up the bases for a modern design. The use of these instruments gives architects and engineers the possibility to evaluate the morphology of the area, the

impact of construction activities on environmental dynamics, the possible future coexistence between works and neighbouring areas. All of these activities contribute towards the achievement of many correlated purposes: reducing the impact on the environment, optimizing investments, limiting maintenance and management duties. The availability of this kind of information, updated and accurate,

is not always guaranteed in difficult to reach areas. Operating in this area, performing ground surveys or using aerial sensors can be costly and difficult to realize. The analysis of satellite remote sensed images proposes itself as a new frontier in the field of design and environmental monitoring support. Cooperating with other technologies based on aerial/UAV/ lidar surveys and measurement campaigns of environmental and cartographic features, satellites allow for the improvement in the relationship between performances and costs, reducing the time needed



to acquire the information. Modern satellite sensors, capable of acquiring Earth data quickly worldwide, give the chance to obtain updated pictures of the environmental situation with resolutions, accuracies and costs that can vary according to the project's requirements.

Satellite image datasets can be used not only as a reference layer for environmental assessments and preliminary infrastructure design, but also to create added value services and data, obtained by merging different sources through automatic and photo-interpretation processing techniques, useful for supporting engineering companies in their activities. This is done using their radiometric content, in terms of reflected energy from the ground, and their spatial content, in terms of distribution and shape of the objects positioned on the ground.

An example of added value data obtained from satellite imagery is a digital elevation model, commonly referred to as DEM, which reproduce the orography of an area in digital formats, thus allowing virtual 3D representations to be adopted for direct, impressive and visual renderings. This type of data can be considered a valid support to simplify the understanding of

reality, through simple picture and motion representations of different environments. Moreover, they represent the optimal solution for fast data procurement in all situations in which it is essential to have accurate orographic data quickly for studies and projects, even in remote areas. DEMs are created by mappers in different ways. The fastest and most practical involves the use of remote sensing methods. One of the most powerful techniques for extraction, DEM makes use of stereo pair satellite images, i.e. images of the same area acquired according to some constraints, which involve the position of the satellite in space and related to the ground. Considering some well-known photogrammetric principles and algorithms, a process of digital image correlation applied to the stereo images permits a direct height measurement from the ground, with results that can be considered very promising, taking into account the high level of automation. The obtained resolutions are comparable to the ones obtained from traditional aerial surveys.

Data processing systems can be used to extract a great quantity of information from a DEM. For example, it is possible to evaluate the shape and distribution of shadows knowing

the sun's position; to estimate the possible impact of flooding on a valley or a town; to quantify digging activities during works and excavations; to calculate isolines; to model mass movements; to simulate flights and disaster recognitions, and much more. Every above-mentioned example shows how this kind of data can greatly support engineering companies in a variety of activities, which cover preliminary and feasibility studies, infrastructure design and monitoring, and the study of transformations in the environment. The innovation represented by satellites and the information they are capable of providing must be seen as an opportunity for an engineering company to improve its daily activities. Considering the high capacity to be used and manipulated in a GIS and CAD environment and the various standard formats in which these data can be supplied, satellite remote sensed products, services and instruments can be easily included into robust workflows, making them more efficient, in exchange for short efforts in terms of integration and learning.



**More resources:**

[www.planetek.it/eng/preciso\\_zeta](http://www.planetek.it/eng/preciso_zeta)

## Earth Observation and Oil Spill Monitoring

The exploration of seas and oceans, searching for possible hydrocarbons spills, defined as "Oil Spills", is a very important topic. It involves both International Institutions, in marine environment protection and in ecological disaster prevention, and Oil&Gas companies, for the control and monitoring of existing

infrastructures and the search for new offshore oil fields.

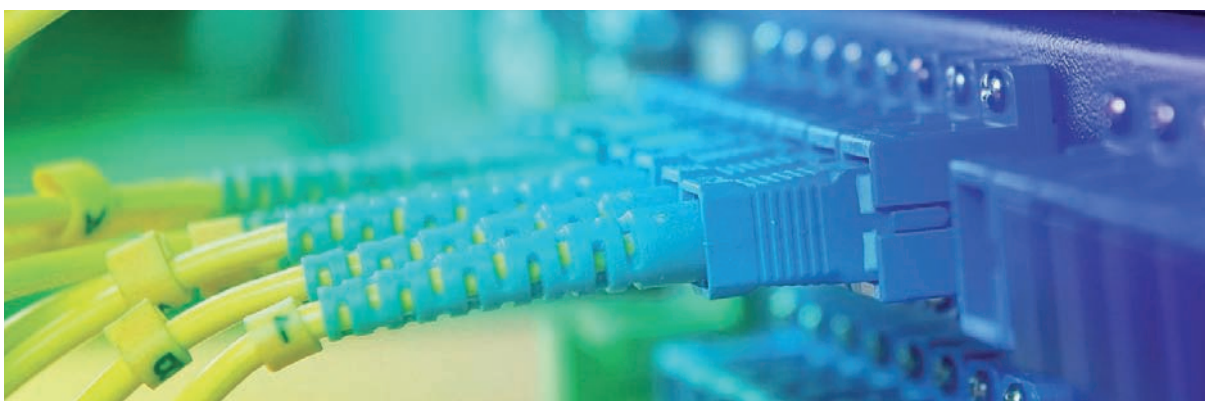
These activities can be effectively supported by satellite technologies and, among these, by Radar SAR (Synthetic Aperture Radar) sensors. The technical principles that make SAR valuable for such activities are very simple. The presence of hydrocarbons on the water surface damps the motion of the waves causing the reflection of electromagnetic energy emitted from the satellite sensor in the specular direction. In this way, the measured reflected energy is minimal and the

areas interested by oil spills appear on the radar datasets as dark patches, which can be identified with automated algorithms and characterized by a certain confidence level, assigned from an expert operator.





# Are your geographic open data really interoperable?



# Open data is the idea that certain data should be freely available to everyone to use and republish as they wish, without restrictions from copyright, patents or other mechanisms of control. Open Data is linked to the wider governing doctrine of the Open Government which holds that citizens have the right to access the documents and proceedings of the government to allow for effective public oversight and encourage public participation in the decision-making processes #

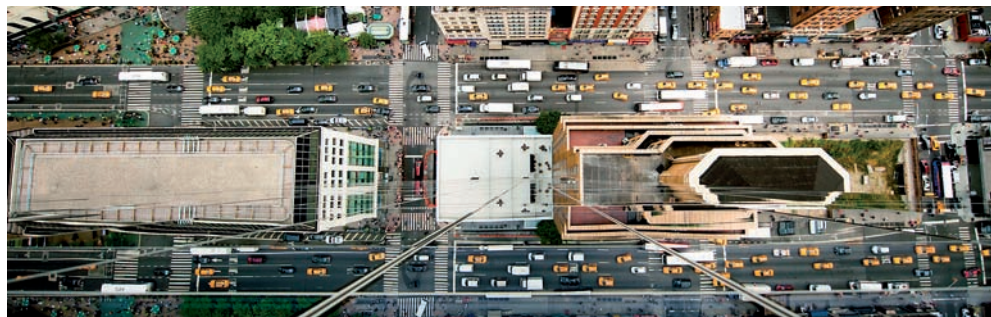
Source: Wikipedia

The theme of Open Data has become relevant for quite some time, even in Italy. The two main reasons are: firstly, the European Directive PSI (Public Sector Information) prompted the member states of the European community to adopt legislative instruments that address the publication and reuse of government data; secondly, the demand for open data is strongly present at the national level, also as a result of their natural capacity to produce value and stimulate economic growth.

In fact, Open Data are useful not only for increasing the efficiency of the public system, but also for commercial purposes and to create new business opportunities: for example, they can be crossed or aggregated with other information sources to derive new data or used in new Apps to provide value-added services to the community.

Among all the data that the public administration produces and that must be made available with open licenses, on the basis of Law n.221/2012, geographic data represent a true common heritage and attention to them is always high: spatial datasets, when they are made available with open licenses, are those with the highest absolute number of downloads on Italian sites that publish open data. However, there is a further consideration to be made: publishing the data and making it accessible is not enough. The spatial datasets must not only be open but must be usable. We must look to their quality in order to encourage re-use because publishing a dataset with no standard format and not organized according to the rules defined at the national level means preventing its interoperability.

At this point the INSPIRE Data Specification comes into play. It



provides guidelines for the proper mode to produce spatial datasets related to Annex I, II and III of the INSPIRE Directive (2007/2/EC, 14 March 2007) with the aim of promoting the harmonization of geographic information and its free exchange among national institutes. The importance that all the people involved set in motion concrete actions to help this process is clear and there are many reasons for this: having data freely available and conveyed in a way that is clearly and easily interpretable is a big help for the knowledge of our territory and consequently, in the decision-making processes that concern its management or prompt intervention in case of emergency. Planetek, as a leading producer of value-added services from Earth observation data, wanted to engage these issues and enrich its Family Preciso® geoinformation products in order to make them compliant with what we believe to be the five basic rules of producing geographical Open Data of quality.

- ➔ Rule n. 1 - Have the data model compliant to INSPIRE
- ➔ Rule n. 2 - Provide structured informative layers as a geodatabase and not as single shape files
- ➔ Rule n. 3 - Respect the EARSC ISO 9001 standards
- ➔ Rule n. 4 - Have a metadata compliant to the National Repository of Spatial Data (RNDR)

- ➔ Rule n. 5 - Have a use license clear and compliant with the standards

The whole process of Preciso® production, from analysis of satellite data to the extraction of informative layers until their sharing with open licenses, is designed with a greater logic that allows for one further step: data can be used in the best way possible and can become “five-star” according to the paradigm of Tim Berners-Lee.

This is because the big advantage of geographic datasets produced according to these five rules is that the step of turning them into Linked Open Data is quite short, thus facilitating aggregation with other data, processing, querying and analysis automatically by computer applications.

Standardization, compliance, certification and knowledge are the key words that sum up the philosophy of the Preciso® line, which guarantees public administrations immediate, accurate spatial information updates compliant with the legal requirements they must satisfy and ready to be shared to support social participation policies.

➔ More resources:  
[www.planetek.it/eng/preciso](http://www.planetek.it/eng/preciso)



# EARSC ISO 9001 standards on remote sensing services

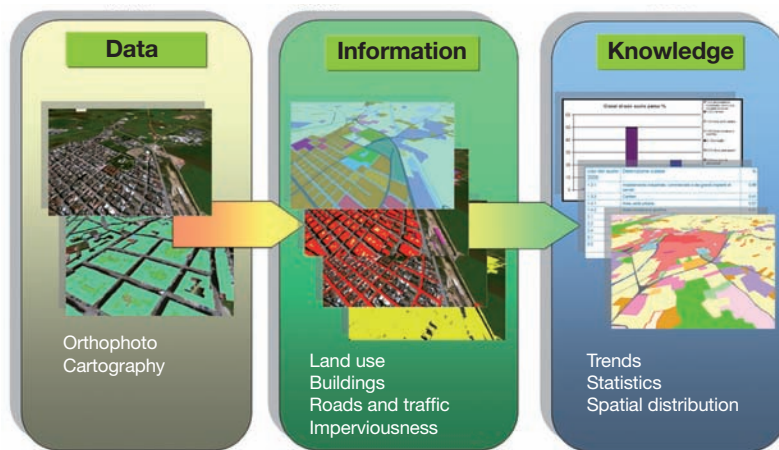
Everyone, when buying a service, would like to know in advance what he or she is going to receive. Not only in terms of output specifications, but also, in general, regarding all the details of the service, starting from the on time availability of the result and including details of equal importance, such as the absence of errors in the execution. The solution in the field of service is that we need to trust our provider. Quality can be defined as a measure of the capability to deliver the promised results. Therefore, we need a quality provider. This is not news. For decades, the industry has put in place ways to ensure quality and one of the most adopted rules to achieve such results is the ISO 9001 standard. The ISO 9001 standard provides all the requirements that an

organization needs to be reliable in satisfying the requirements of its customers.

The ISO 9001 standard can be applied to any process as well as any kind of service provision. Moreover, some organizations can have rules in place that are verified to follow the standard, but not covering all the activities that generate the result we are interested in.

To overcome this limit, the European Association of Remote Sensing Companies (EARSC), with the support of the European Space Agency, has started an activity for the definition of guidelines for the application of ISO 9001 guidelines to the provision of remote sensing services. Such guidelines help implementers to reach the maximum benefit adopting an ISO 9001 management system and giving EO service users more guarantees on the organization's capability to satisfy requirements. The guidelines cover all the aspects of service provision, from the need for process definition and documentation, to the availability of resources, which for many services could be skilled operators. Planetek is an active member

of EARSC, and has embraced the purpose of these guidelines. Planetek took part in the early workshops for the definition of the methodology, and has presently started a review of its ISO 9001 certified organization system. The purpose of the review is to ensure that all the Planetek EO activities will follow the guidelines identified by EARSC for the application of ISO 9001 to earth observation data based products and services. The final step of the activity will be a third party certification of such compliancy to allow our customers to be even more confident of the overall excellence of Planetek services.



Example: the geospatial information workflow of Preciso® products





# Geospatial products and solutions

Focus on solutions and COTS distributed and developed by Planetek

## Preciso® family

Urban planning, environmental monitoring, controls and assessments of agricultural and forestry production, map updates, pre-and post-emergency management for civil protection, defense and security are the application areas that usually benefit from satellite data.

The Preciso® product family consists of geoinformation products, derived from satellite data, designed to provide cognitive frameworks that meet the specific needs of each application field.

The products of the Preciso® family are fully integrated with each other and can be combined to meet the most complex and diverse application and operational requirements. This feature makes them a flexible and modular solution.

The Preciso® family includes:

**Preciso® Italia:** satellite orthoimages for the timely monitoring of changes on the territory. This is the foundation of all products of the Preciso® family.

**Preciso® land:** Cognitive Framework for Urban Planning and monitoring of Strategic Environmental Assessment

**Preciso® urban:** Urban monitoring and recognition of illegal construction.

**Preciso® coast:** Cognitive Framework of marine and coastal areas and public defense works.

**Preciso® index:** Geospatial Indicators for Territorial Planning and Strategic Environmental Assessment. Monitoring of soil loss.

**Preciso® fast:** Fast acquisition

of satellite imagery in emergency situations.

**Preciso® on-line:** Geoportals for e-Collaboration and dialogue between organizations and citizens in the planning process.

Preciso® products are characterized by speed of production, high update frequency and low costs. They are ideal for the analysis of the territory

and the activation of monitoring processes. Preciso® products come from long and intensive research conducted within the framework of national and international projects and have been tested in multiple operational projects. All products are "Ready to use" and ready for use, do not require specific skills and can be used with common GIS software.

## Satellite Data and DEM

GeoEye-1 or WorldView-2, the constellation Pleiades or COSMOSkyMed, more and more, today, the Earth observation satellites, that provide multispectral imagery with a ground resolution of up to 50cm, can support your business efficiently and rapidly.

This unprecedented availability of information sources with a higher revisit time, enables more punctual monitoring activities very helpful to follow the frequent changes in urban areas, with acquisition intervals that can be reduced up to a few days.

Thanks to their high flexibility, these new sensors can collect images of large areas, even more than 1.000 km<sup>2</sup> in a single passage. This means that the entire administrative area of a medium-large City can be covered in a morning and an entire province can be collected just in a few days.

To have a synoptic view of the entire municipality or county, with this level of detail,

is a huge of information with great value. If we consider the possibility of receiving the data in a few hours after their acquisition, the advantages in using them is clear.

Digital models for 3D simulation are widely used in planning and spatial planning, environmental monitoring, to support the organization of civil protection emergency response in case of natural disasters (flooding, floods, earthquakes) or in the defense sector. In general, high-resolution elevation models are fundamental for applications that require a detailed elevation information.

Planetek Italia has several solutions with worldwide coverage, with different levels of resolution, available as archive data or as new imagery collections. If needed we provide as a unique pack the high-resolution digital model, the orthorectified stereo images and the contour lines information layer, of the area of interest.



## Hexagon Geospatial

Planetek Italia takes care of the distribution and support of some of the most well known products used in land management applications.

**P**lanetek Italia is the Italian Master Dealer for the Hexagon Geospatial Intergraph product suite. The Power Portfolio is a geospatial product suite which includes a market-leading portfolio of GIS, remote sensing, photogrammetry, and data management technologies that continue to lead innovation in the geospatial industry. GeoMedia is a powerful GIS management package that enables the realization of the maximum value of geospatial resources, integrating them into present, clear, actionable information. It provides simultaneous access to geospatial data in almost any form, uniting them in a single map view for efficient processing, capture and maintenance, analysis, presentation, and sharing. ERDAS IMAGINE is the world's leading geospatial data authoring software. It performs advanced remote sensing analysis and spatial modeling to create new information that can be visualized in 2D, 3D, movies, and on cartographic quality map compositions. The core of the ERDAS IMAGINE Suite was designed to scale with any geospatial data production need; from IMAGINE Essentials, through IMAGINE Advantage and on to IMAGINE Professional. Optional add-on modules providing specialized functionalities are also available to enhance productivity and capabilities.

IMAGINE Photogrammetry is a complete suite of photogrammetric production tools for triangulation, generating terrain models, producing orthomosaics and extracting 3D features. Automating precision measurement, maintaining accuracy, and including flexible operations such as terrain editing and feature extraction, IMAGINE Photogrammetry increases productivity while ensuring high accuracy. Offering a variety of functional add-on modules, it adapts to any specific business need, enabling a seamless, process-driven workflow. ERDAS APOLLO is an enterprise-class data management, delivery and collaboration solution providing remarkable business value for our customers. ERDAS APOLLO is scalable through clustering to meet your organization's specific needs. From a low-cost, remarkably fast image server to a comprehensive data management system, ERDAS APOLLO is the most advanced geospatial enterprise solution, ensuring unprecedented performance even when handling the largest data archives. Geospatial SDI is for providers that need to manage and serve secure or licensed information using standards-based web services. Geospatial SDI offers an extensive set of web services, extending those offered in GeoMedia WebMap and GeoMedia WebMap Professional for SDI implementations.



CHANNEL PARTNER

[www.planetek.it](http://www.planetek.it)

# Cart@net 2014

## Open Government policies through INSPIRE compliant geoportals

Smart city SDIs play a key role in supporting the creation of spatially enabled cities, assigning a central function to their users. SDI, designed and managed adopting a user-centric vision, increases users' spatial practical ability, hence their spatial enablement. By focusing on the needs of individuals, and on their point of view with respect to geospatial data exploitation, a powerful and innovative social structure for online work may be achieved. All of society can participate in SDI considering it, in a broad sense, as a social network.

This topic is becoming more and more relevant with respect to the evolution of the SDI concept, from the provision of fundamental services (i.e. discovery, view and sharing geospatial data) to the delivery of "spatially enabled" platforms, designed according to a user-driven approach.

### Open Government & Open Data policies support

To respond to this growing need, Planetek Italia has increased the features of its well-known geoportal tool, Cart@net®. The outcome of multi-year company experience in the field of spatial data infrastructures at national and international levels, Cart@net® is a simple tool for the creation and management of INSPIRE compliant Geoportals, useful for supporting Open Government policies. It simplifies communication

between citizens and stakeholders, by allowing the users to make annotations directly on a map that they can share through direct links or via social networks like Facebook, Twitter and Google+. Those annotations can also be exported and constitute a brand new geospatial working basis, which can be enriched through free interactions among users in a network.

Thanks to Cart@net®, public entities and governments may support the creation of a spatially enabled society, involving citizens in democratic life and in Public Administration decisions. Two-way communication is guaranteed through the availability of the Forum, the multimedia Agenda and integration with social networks; any type of content can be geolocalized.

### Geospatial Content Management

Cart@net® is a software product compliant to OGC® standards, useful to create and customize Geoportals, which provides powerful workflow to support content management, to keep contents up-to-date easily and to geocode information and documents. Its graphical layout is consistent with the Web portal that hosts the Geoportal: it ensures both, continuity aesthetically and full functionalities of the service offered. Cart@net® exposes the services foreseen by INSPIRE (Discovery, View, Download and Transformation Services). All spatial data are accompanied by their own license thanks to the content management



interface of the Geoportal that helps, while publishing the data, to choose and easily produce the appropriate license to be associated with each dataset. This way it is possible to deploy catalogs of geographic open data with interoperable geoportals. Full compliance with OGC® WFS standards allows the publishing of geospatial information as Linked Open Data as well (see page 30). Available also via mobile devices (smartphones, tablet etc.), Cart@net® promotes cooperation within public administrations, across levels of government, and among public authorities, private institutions and individual citizens. Cart@net® is a software product developed by Planetek Italia s.r.l., which is the sole and exclusive distributor in Italy and worldwide.

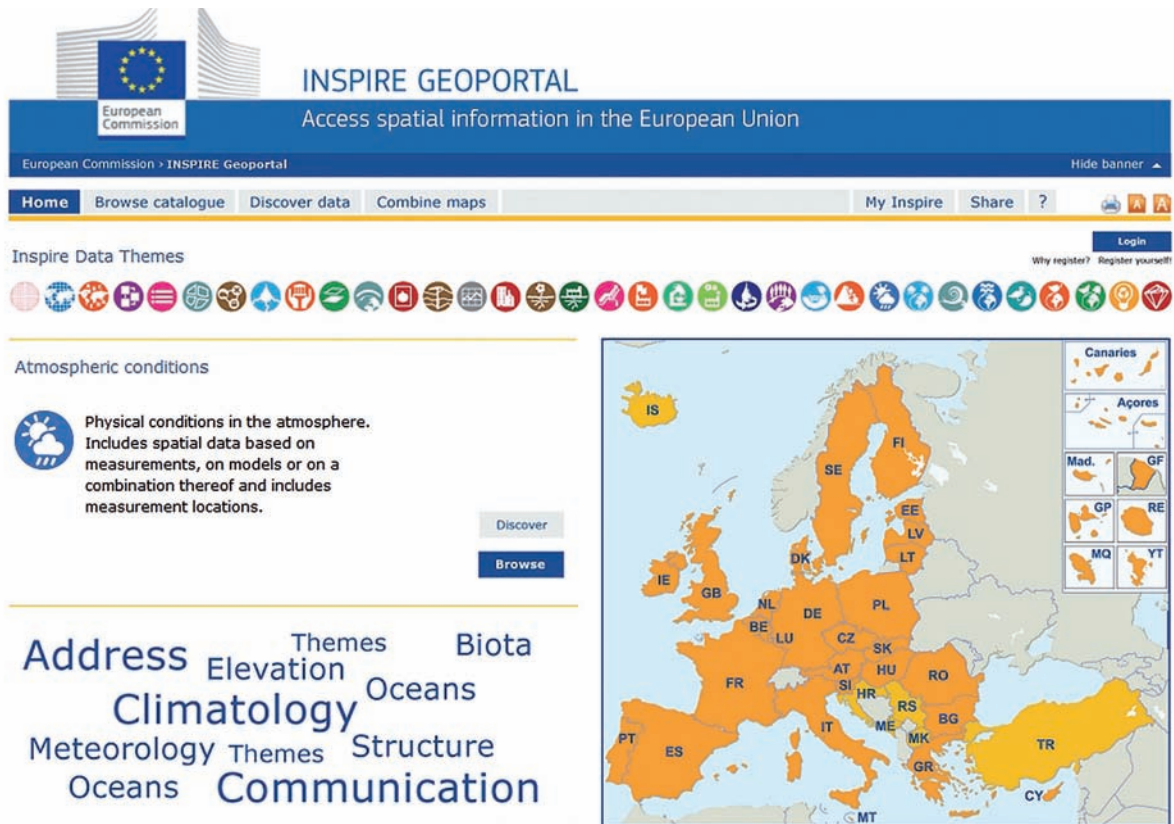


#### Project resources:

[www.planetek.it/eng/cartanet](http://www.planetek.it/eng/cartanet)



Registered trademark of Planetek Italia s.r.l. at the Italian Patent and Trademark Office in Rome on 29/07/2002



# The INSPIRE Geoportal

The unique access point to global European environment geoinformation resources

The INSPIRE Directive of 2007 aims at establishing an “Infrastructure for Spatial Information in the European Community”. It builds upon existing infrastructures in the European Member States in order to provide access to electronically available spatial data sets held by or on behalf of Public Authorities to assist policy-making in relation to policies and activities that may have a direct or indirect impact on the environment. In order to make these spatial data sets discoverable and accessible, the Directive requires the Member

States to set up INSPIRE discovery, view, download, transformation and invoke network services.

As a central European point of access to these INSPIRE network services, the European Commission must set up an INSPIRE geoportal. This geoportal shall allow cross-border, multi-lingual and harmonized access to the Member States’ INSPIRE network services. The technical specifications for this INSPIRE geoportal are based on past research and prototyping experience gained by the Spatial Data Infrastructure unit of the European Commission’s Joint



Research Centre. They form the basis for the current development of the operational components for this Geoportal, carried out by a consortium consisting of Planetek Italia and lat/lon. Developments started in March 2011 and the components have been delivered to JRC in the course

of 2013, which is going to host them operationally. As of the contract, the current version lacks support for download services, which will be added soon.

The main objective of this project was to provide the operational version of the INSPIRE Geoportal at European level, including integration interfaces for discovery and view services from member state portals and thus to foster the harmonization of member states' national geoportals implementations through the adoption of open standards and open source products.

Its scope, in users' perspective, is "to access INSPIRE spatial datasets and services through a unique entry point, with seamless integration of member states' services, enabling multi-lingual searches, iterative refinement of result sets and cross-border combination of datasets in customized user maps".

### **Under the hood: MS Discovery & View Services' integration**

To ensure quick responses to the users' data searches, the Web Portal is connected to a 'proxy' component.

Initially some Discovery Service endpoint per Member State is registered. A crawler harvests metadata from these Discovery Services and stores them in a cache. From these metadata sets, INSPIRE relevant View Service endpoints and layers are derived and registered. Map tiles for small scale views are stored in a tile cache, while map requests for larger scales are forwarded to the offering View Service from the respective Member State. The caches are initially filled and regularly updated.

### **Open source commitment**

The project makes high usage of open source products. The proxy services are based on deegree and jackrabbit and new code will be contributed to deegree. The portal itself is based on the CMS plone and the newly developed portal components "Interactive Discovery" and "GeoNavigation" will be made available under the EUPL license.




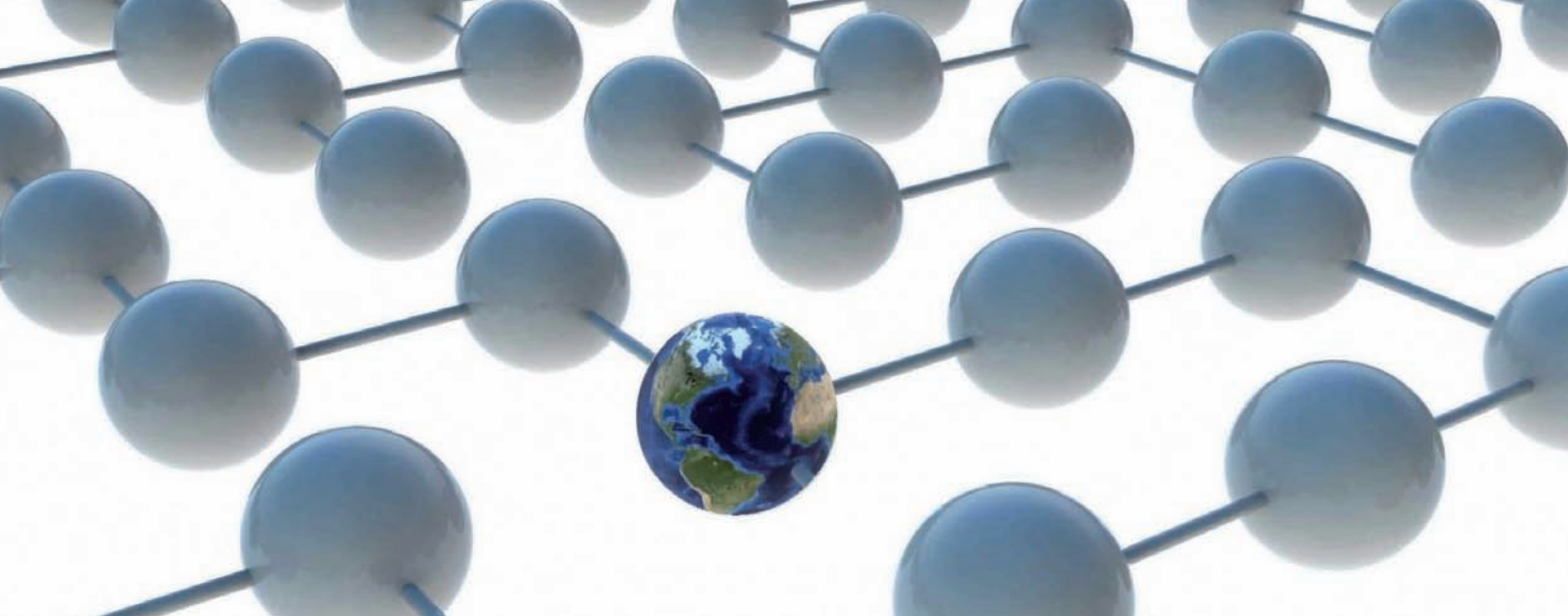
**Project resources:**  
[www.planetek.it/eng/inspire\\_geoportal](http://www.planetek.it/eng/inspire_geoportal)



During the INSPIRE Conference 2013 Planetek Italia has been assigned the AWARD for Academic Excellence and Innovation in INSPIRE related to the Small & Medium Enterprises (SME's) for the innovative activities in the field of INSPIRE and SDI development. This AWARD, promoted by the Technical Committee "Geographic information" of the European Committee for Standardization, CEN/TC 287, has been assigned for innovative parts of the developments made by Planetek Italia and lat/lon in the frame of the "Development of the technical components of the INSPIRE Geoportal at European Level" for the Joint Resource Center (JRC) - Institute for Environment and Sustainability.

In particular the introduction of the concept of "anticipative counting" of potential results into the domain of spatial data infrastructures and the implementation of this feature on interface level through extensions of existing OGC protocols and INSPIRE standards have been awarded. The work has been described and submitted to the CEN/TC 287 in the paper "Anticipative CSW-Counting enhances the Discovery UI (Jens Stutte and Lyn Goltz).

 **Geoportal presentation:**  
[youtu.be/txNuPKhh9QQ](http://youtu.be/txNuPKhh9QQ)



# Towards geographic linked open data

In compliance with the PSI directive, governmental entities are called on to contribute content to national “Open Data” infrastructures. An increasing number of public and private bodies, therefore, are making their geographic data available as open data, with licenses that allow their free use and exploitation. More and more public organisations nowadays are implementing Open Data infrastructures, deploying web catalogues for the discovery and re-use of open data.

We have designed, in cooperation with SINERGIS Srl, a software application called getLOD, which allows for the transformation of data and web mapping services into open data compliant with the “five star” classification given by Tim Berners-Lee – i.e. a standard format and structure that can be directly used by computer applications without manual intervention. By making geographic information available in the form of open data, with particular attention to the

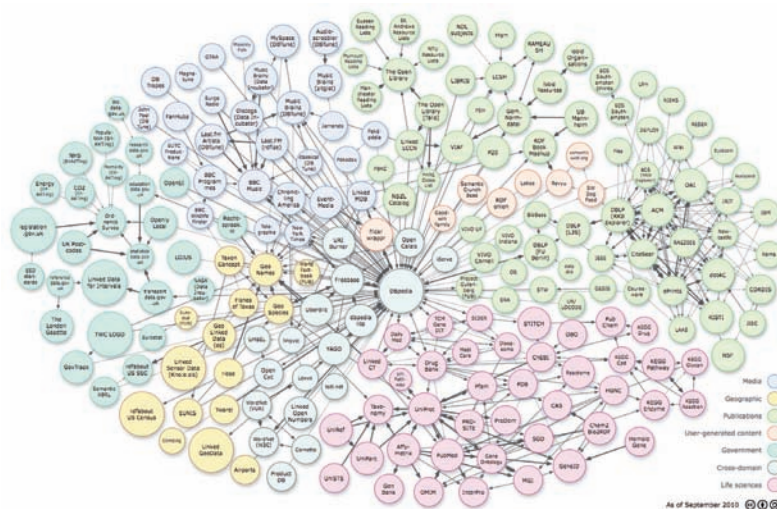
RDF / XML format, we ensure the use of data as Linked Open Data and then their reuse, the indexing on open data search engines, the integration with open data portals or with the Comprehensive Knowledge Archive Network (CKAN), and the cataloguing of free dataset and projects.

We aimed to create an open and reusable solution, which can be integrated into any cartographic

Geoportal or SDI (Spatial Data Infrastructure) based on the interoperability standards defined by the Open Geospatial Consortium (OGC®). Geographic open data can be exploited both in RDF and in other interchange formats (for example in Shape File format).

## The Emilia-Romagna Region case

In 2012, Emilia-Romagna defined



a new project for publishing its geospatial data as Linked Open Data (LOD). The first components of the solution were generated along with the evolutionary development of the spatial infrastructure of this Italian Region. This SDI is based upon a metadata catalogue and a repository manager that organizes the access to geographical data, and it was completed by applications and services oriented at different levels of government, which are now accessible through a single interface, the regional GeoPortal (“GeoPortale ER”, <http://geoportale.regione.emilia-romagna.it>)

Developed by Planetek Italia, GeoPortale ER provides access to regional data and metadata through several services that allow users to discover data in the catalogue, using both graphical and alphanumeric criteria, and to browse, use and download the data of interest. Thus, GeoPortale ER enables the dissemination, use and publication of data, information and geographical services both to the public and the staff of local / national Public Administrations, in

## # Transforming data and web mapping services into open data compliant to the “five star” classification given by Tim Berners-Lee #

accordance with the latest regional and national directives (AgID) and international standards (INSPIRE, OGC®) related to interoperability. In this framework, the Emilia-Romagna regional administration has decided to provide access to Data and Metadata handled by its SDI as Open Data, with particular attention to the RDF / XML, and therefore in the form of Linked Open Data.

Addresses, buildings, geographical names and administrative boundaries were the first geodata chosen: these geographical datasets represent

crucial information coming from authoritative sources, to be used as reference data for interlinking external datasets from remote and heterogeneous sources in the cloud.

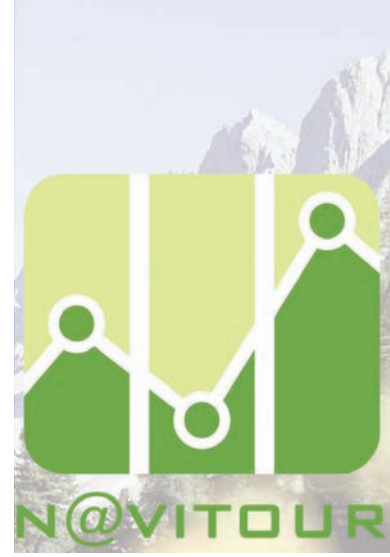
The data and metadata extraction services are based on the use of the standards defined by the OGC® for Geographic webservices. The data suitable for publication in the form of Linked Open Data are extracted in RDF format by leveraging the Web Feature Services (WFS) provided by Emilia Romagna SDI. While the extraction of geographic metadata in RDF format is carried out using the standard OGC Catalogue Service for the Web (CSW). The metadata can therefore be associated to the RDF (Linked Open Data) and the shapefiles of the data.

GetLOD is now part of the regional geoportal as a download service (<http://geoportale.regione.emilia-romagna.it/it/download/linked-open-data>). The dynamic generation of RDF starting from web service exposed by the regional Geoportal ensures the continuous alignment of data with the regional Open Data Portal [dati.regione.emilia-romagna.it](http://dati.regione.emilia-romagna.it), which operates as the repository / indexer of data and metadata (including RDF). The ontologies modelled and used in the GetLOD project are based on GeoSPARQL ontologies. Future developments will look at the convergence towards INSPIRE ontologies and those defined within the Interoperability Solutions for European Public Administration (ISA). The solution is based entirely on free open source software.



➔ **Project resources:**  
[www.planetek.it/eng/getLOD](http://www.planetek.it/eng/getLOD)

[www.planetek.it/eng/solutions/key\\_topics/inspire](http://www.planetek.it/eng/solutions/key_topics/inspire)



# Satellite Technology for Natural Parks

Today, protected natural areas have become tourist destinations of increasing importance. They are not seen as places to be preserved intact and turned into museums, but rather as areas that need investment to favor the development of sustainable tourism. For this reason, the strategic aims of parks are increasingly focused on tourist marketing activities aimed at new tourist segments, often market niches, which should create extra wealth and employment whilst respecting the environment. Therefore, to become competitive in tourism, parks must carry out strategic marketing activities, identify the main target markets and create tourism products to be promoted. To achieve these aims, they need to involve all the private and public subjects operating in the park, to jointly develop marketing strategy and to try to exploit new tourism-related professions, such as park guides and promoters, who bring together all the tourism resources of the destination. This scenario represents a very interesting context for the coming of N@VITour, the feasibility study led by Planetek in the context of the

ARTES20 Integrated Application Program, which is an initiative promoted by the European Space Agency and dedicated to the development, implementation and pilot operations of Integrated Applications, with the aim to provide innovative services through the integration of different satellite assets and terrestrial technology. N@VITour, by integrating the satellite navigation and telecommunication and E. O. assets, aims to set-up a service that supports both the park's operators, easing the management of the park territory and the tourists, assisting them during tours in natural parks. N@VITour, therefore, aims to be an integrated system with the capability to provide a set of functionalities derived from existing technologies and building-blocks, with the added value given by the expertise of Planetek in the field of E. O. The resulting system will include also additional features, such as the Virtual Travel service and the safety service, as well as in-situ data collection capabilities for efficient surveys on the field or validation campaigns. The customers will benefit of the

N@VITour services in the following terms:

- Better quality of the monitoring level for the managed resources, improved also through the visitors' contribution.
- Saving of operational costs, thanks to the availability, for park operators, of a complete tool for the efficient monitoring and management of resources.
- Increase the level of tourist services, both in term of safety and in terms of provision of information, offered through technological innovation.
- Possibility to ask tourists to pay a fee for the download of the Virtual Travel Assistant (the mobile app equipped with the high precision navigation technology), and eventually a smaller additional fee for the multimedia o augmented reality contents downloaded.

All these aspects will be deepen in the demonstration project which should follow this feasibility phase.



**Project resources:**

[www.planetek.it/eng/projects/navitour](http://www.planetek.it/eng/projects/navitour)



# Environmental Permits on the Cloud

The eEnviPer system is an integrated web and cloud-based platform for the application, administration and consultation of environmental permits. By making the environmental permits process more transparent, accessible and efficient, eEnviPer will help to reduce the environmental impact of economic activities through the environmental permits process in a cost-effective manner. The project is supported by the European Commission's ICT Policy Support Programme, whose objective is to pursue the competitiveness of the Public Administration in EU countries. This has to be achieved through the technological innovation applied to e-Government services. The eEnviPer platform, therefore, has been tested in different countries, through the deployment of local pilot projects, with the aim of verifying the actual benefits that the



**eEnviPer**

Environmental Permits for the 21st Century

adoption of such a solution would bring. The cooperation between Planetek and ARPA Puglia led to the implementation of the Italian pilot, in the frame of which the portal [italy.eenviper.eu](http://italy.eenviper.eu), has been setup. The portal drives the various users, according to the different roles within the authorization procedure, in carrying out their activities for the procedures taken into account. The eEnviPer platform will lower the effort involved in the environmental permits process for both public authorities and for operators: information will be more easily

accessible, and defined workflows will increase the speed of the process. After the initial investment to install and customize eEnviPer, the regular cost for the system will be kept low as a result of the cloud-based architecture. Citizens will benefit from the system through the easier means of finding information about current permits and submitting comments and contributions. As compared to existing, mostly paper-based permits processes, eEnviPer offers more benefits for the same price. Beyond the authorities involved in the process of evaluating the application and releasing the permit, several stakeholders could benefit of the eEnviPer services: enterprises can manage their own environmental permits application, environmental engineers can have access to relevant spatial data and applicable regulations to conduct the environmental impacts assessment, and citizens can provide comments on ongoing application processes online.



**Project resources:**

[www.planetek.it/eng/projects/eenviper](http://www.planetek.it/eng/projects/eenviper)

# On Board Payload Data Processing

## Transferring Earth observation data processing from the Earth to the Space Segment

**T**oday we are faced with an ever increasing stream of data provided by space missions focussing on Earth Observation, Astronomy and Planetary Exploration. Matching that stream with the needs of its users, scientists and their institutions, is therefore becoming a more and more complex task.

To face both the data management (available mass memory) and the data transmission (available bandwidth), many recent R&D activities study how to move the data processing from the Ground Segment to the Space Segment through the development of so-called On-board Payload Data Processing.

The main idea is that, often, the “useful” part in acquired (raw) data is only a piece of the whole, so it makes sense to process final information already on-board and transmit only them to the ground. Data reduction work flow is thus moved from the ground to the space segment. In addition, having such information already on-board can increase the efficiency with which the actual space mission is operating. For example, pieces of information processed with on-board payload data processing can be used to steer the automatic control of a satellite constellation, modifying the data acquisition schedule. The instrument pointing can be moved to the spot of interest, or an acquisition request

can be transmitted to the next cooperating satellite. For example, this will increase the efficiency of monitoring specific events that are limited in time, such as oil spills or illegal traffic, as compared to the traditional ground segment workflow. Planetek has solid experience in the design and development of on-board processing systems starting from the development of the SpacePDP (Space Payload Data Processing) project, co-funded by the Italian Space Agency (ASI). SpacePDP is an Open and modular Payload Data Processing system, composed of Hardware and Software modules and completed by a dedicated SDK, by which it is possible to perform both the mission’s standard tasks (e.g. sensors control, mass storage devices management, uplink and downlink), as well

as specific scientific tasks. Its advanced processing system can be fully adopted both as an on-board module for Satellites and for Planetary Exploration rovers.

### The Solar Orbiter Mission

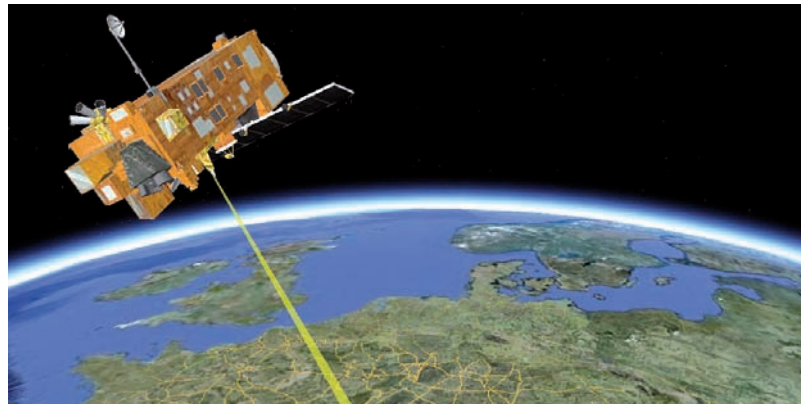
The Sun and its extended atmosphere, the heliosphere, is a very complex system. The inner planets of the Solar System, including the Earth, lie within the heliosphere and its influence can sometimes be clearly detected by researchers and scientists during phases of high solar activity. The Solar Orbiter mission, part of the European Space Agency’s Cosmic Vision program, is a new mission (launch planned in 2017) intended to explore the Sun and its heliosphere to improve our understanding of Space weather and its effects on



the Earth. It will observe the Sun and collect measures in an orbit ranging from 0.28 (closer than Mercury) to 1.4 AU (the Earth is at 1 AU). In addition, this mission will be provided with a natural laboratory to study processes in fundamental physics, astrophysics and plasma physics that cannot be studied elsewhere in such detail.

The scientific payload of Solar Orbiter is composed of ten experiments. Among the instruments, the Solar Wind Analyser suite (SWA) will provide comprehensive in-situ measurements with very high temporal resolution of solar wind's particle composition (ions, protons and electrons) and velocity distributions. The final goal is to establish the fundamental physical links between the highly dynamic magnetised atmosphere of the Sun and the solar wind in all its quiet and disturbed states.

SWA is, in turn, composed of four sensors devoted to the analysis of particles at different energy levels. Two of the instruments measure electrons (Electron Analyser Sensor, or EAS), one measures protons and alpha particles (Proton Analyser Sensor, or PAS) and one measures heavy ions, which are a minor constituent of solar wind



(Heavy Ion Sensor, or HIS). The instruments will independently measure 3D velocity distribution functions, evaluate density, speed, temperature and the thermal flux of the plasma composing solar wind. Italy will participate in the SWA experiment providing the Data Processing Unit (DPU) through a project involving Roberto Bruno from the Institute for Space Astrophysics and Planetology (IAPS) as the chief scientist and SWA Co-Principal Investigator. The DPU project will:

- Provide single interfaces to the spacecraft for power, telemetry, tele-commands and power management;
- Provide commands management, data handling and data compression for the

four instruments;

- Provide the Electrical Ground Support Equipment (EGSE) for the instrument suite;
  - Contribute to the on-board data compression SW definition.
  - Contribute to the implementation of the Mechanical Ground Support Equipment (MGSE);
  - Contribute to sensor definition;
- In charge of the project is a group of companies composed of TSD, Planetek Italia, Sitael and SSI. Planetek activities focus on the EGSE SW layer and on the on-board software for scientific data processing.



**Project resources:**

[www.planetek.it/eng/solar\\_orbiter\\_dpu](http://www.planetek.it/eng/solar_orbiter_dpu)





# Access tools to the Cosmic Exploration

An overview to the activities conducted by Planetek to support the international scientific community

**O**ver the last few years, the increasing number of planetary and Cosmic missions have brought about the need to have more performing systems able to manipulate, store, analyse, compare, share and display data acquired by different satellite platforms. One of the reasons to have tools like these available, is to facilitate planetary research and Cosmic exploration. Planetek, with its sound experience in the design and development of Spatial Data Infrastructure (SDI) for planetary data as well

as its capability to be close to users providing them with tailored solutions, is strongly involved in activities focused on the design and implementation of innovative technologies to solve issues related to data access, sharing, processing, fusion, and the creation of derived scientific products. These individual solutions help scientists to portray morphologic, topographic, and spectral data compositions and prove to be even more valuable by bringing the observations into a common spatial and visualization system. All the information extracted by

scientists using this kind of planetary data access tools is fundamental input for future Universe exploration programmes.



A short description of the main programmes Planetek is involved in, is shown below:

### ESA Science Archives Publication System

A DSS to support the analysis of scientific publications in Cosmic exploration

The ESA-SAPS project has the objective of providing a Decisions Support System (DSS) for the storage and analysis of scientific publications in the field of Universe exploration.

The main objective of the activity is to develop a system that can provide information on the scientific performance of ESA's operating missions by examining the publications and the observational data used to produce them.

The project, funded by ESA- ESAC (European Space Agency – European Space Astronomy Centre) provides the design, implementation and maintenance of the ESA SAPS system for archiving, classification and business intelligence of scientific publications of the ESA, NASA and other international missions focused on cosmic exploration.

The ESA-SAPS system process starts with the ingestion of scientific publications in electronic format. Next, a “parsing” of the documents is performed automatically in order to extract the data necessary for

# The target is to support, through this analysis, the decision-makers in the evaluation of scientific productivity of a mission #

the classification of the papers and to relate them to the type of space program, instrument used, modes used, etc. and, mainly, to the observation data stored in the ESA archives.

The target is to support, through this analysis, the evaluation of scientific productivity of a mission and how it evolves over time, as well as the evaluation of all the parameters that could support decision-making regarding future science missions, such as the role of sensors, areas of the sky of major interest or observed bands.

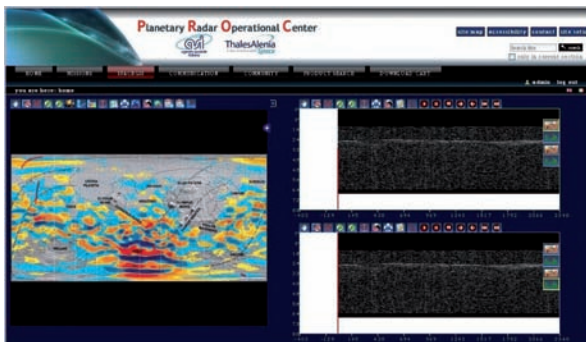
This information will be of fundamental support for the definition and development of future scientific missions intended for Cosmic exploration.

### PROC reference scenario: Spatial Data Infrastructure

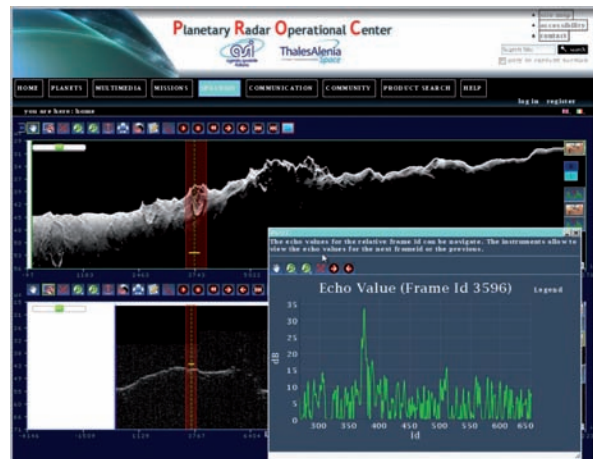
The PROC system is an SDI (Spatial Data Infrastructure) like system, which automatically catalogues and archives standard scientific products (in PDS format) and delivers them on the Internet, according to OGC standards, after a conversion in JPEG2000 format. Once processed by the different operational centres SHOC, MOC and C-PAD, the data are catalogued, converted and stored in the PROC dissemination system. Then, the administrator decides whether to publish such data on the web, and activates OGC services, such as WMS, WFS, WCS, WMC and GeoRSS. So the published data are accessible to the scientific community (which can also download them for further analysis with dedicated tools) and to the public as well.

In addition to the typical spatial data, the system editors (who also include scientists) can write and publish articles, diagrams, scientific analyses, videos and anything else that populates the portal.

The technologies used are the best of FOSS (Plone, PostGIS and GeoServer) and commercial (ERDAS Image Web Server) ones.



PROC system: two screenshots showing the interface to access published data by the scientific community and public.



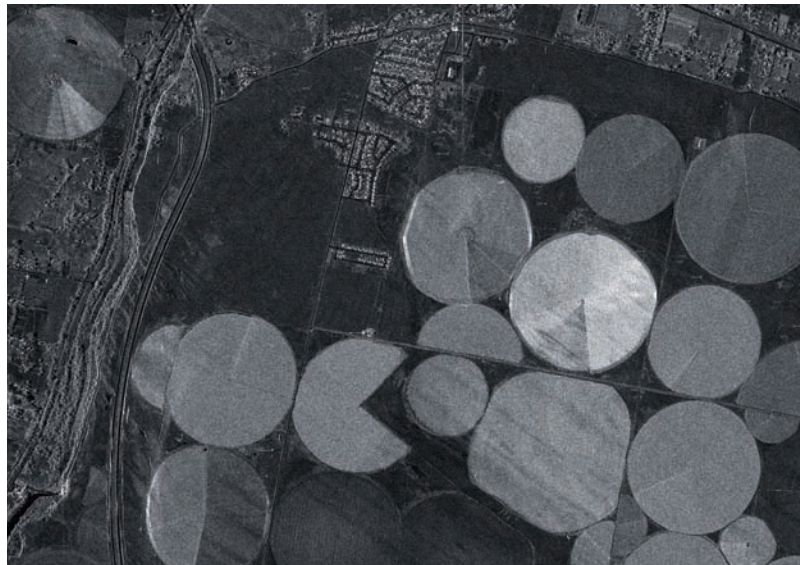
# Satellite ground segment

Software infrastructures development for the management, acquisition, processing and archiving of satellite data

In the most current sense and for the recently launched satellite platforms, the Satellite Ground Segment performs the whole operational data management of the acquired data. This includes well-known functions such as reception, systematic and on-demand processing, archiving and cataloguing, ordering and dissemination of digital satellite products.

In addition, it includes new functions like large-scale multimode acquisition ordering by users, integration with a commercial service segment, and new interfaces and workflows within the complete ground segment.

Planetek has a sound experience in the definition and implementation of Software for Space Systems for E. O. and Planetary missions, such as ERS, Envisat, COSMO-SkyMED, Mars Express, Mars Reconnaissance Orbiter and Cassini Huygens. This activity is addressed to payload operations, including control and image/data processing. The Space team's capabilities range from the system definition, the design and development, to the validation and the on-site delivery. Planetek provides "Ground Segment" systems and technologies to receive and process satellite data acquired by the spacecraft's instruments to archive, disseminate, publish and share the generated products as well as engineering consulting services for new missions definition, feasibility studies, ground control system architecture definition, requirements specification



and design.

Within European and Italian Space Agency Earth Observation Programmes, Planetek Italia is involved in many activities focused on the design, development and implementation of more than one part of specific Mission Ground Segment architectures.

## **COSMO-SkyMED Performance Estimator**

Whithin the COSMO-SkyMed Mission Planning and Control Centre (CPCM), we developed the Performance Estimator module for the settings of satellites acquisitions parameters. The automatic and manual setting tool allows the selection of the setting parameters (e.g. Pulse Repetition Frequency, Sampling Window Start Time, Chirp duration) and performance parameters (e.g. Range resolution, Data rate, Azimuth resolution),

useful to fulfil the user performance requirements. Tailored and developed for the Cosmo-SkyMed mission instruments, the Cosmo PE subsystem can be easily customized for other radar satellite missions.

## **COSMO-SkyMed Mosaicking Processor**

is a project of Cosmo-SkyMed UGS (User Ground Segment) program, that defines and implements the mosaicking processor for SAR (1B - Detected Ground Multi-look product, 1C - Geocoded product GEC, and 1D - Geocoded product GTC products) and DEM images acquired by the Cosmo-SkyMed satellite platform. The processor performs a coregistration to remove coarse errors from the images and then applies the mosaicking of SAR images or DEM into a common grid, in order to generate large scale "Mosaicked Products".



### **Hyperspectral Precursor of the Application Mission**

is an ongoing Italian Space Agency EO mission with innovative electro-optical instrumentation that combines a hyperspectral sensor with a medium-resolution panchromatic camera. The main PRISMA objectives are to develop a small mission entirely in Italy for monitoring of natural resources and atmosphere characteristics testing the hyperspectral payload in orbit. Planetek has the responsibility for the design and development of the full automatic geocoding sub-system under the Ground Space Segment. This S/S takes in input products of level 1 and produces geo-located and geocoded products of level 2.

### **Decision Support and Real Time EO Data Management**

is an ESA project addressing the technology, architecture and G/S interfaces needed to streamline the planning, ordering and access to ESA and Third Party Mission Earth Observation for two identified

institutions: i.e. EMSA (European Maritime Safety Agency) and EUSC (European Union Satellite Center). The overall system addresses the issues, which arise when a decision process needs to exploit information based on EO data, both on long term planned scenarios and on specific events. Planetek is responsible for the analysis, design and development of the Reference Coverage Server sub-system. This S/S has the role to automatically build and update (and provide to users) the best “reference coverage”, selecting data covering specific areas of interest (as well as the entire globe) among all the available Sentinel-2 data. Selection of data will specifically take into account users’ needs, such as absence of clouds, update frequency, other quality factors or peculiar conditions (viewing angle, sun angle). Our reference user is EUSC.

### **Multi Mission National Centre**

One of the main Italian Space Agency objective is to share information (Data, Products and

Services) coming from different Earth Observation Missions to be used by EO community. Planetek, together with other Italian partners, designed and developed the Multi Mission National Centre focused on the management of the ASI Earth Observation data asset, that is data acquired by heterogeneous sensors and arisen from various missions. The CNM main functions are EO data acquisition, storage, catalogue & processing; data and services distribution, Users management; data, metadata and related documentation handling. Planetek Italia is responsible for the design and development of some User Interface Sub-System components: Help Desk Environment (HDE); OnLine Navigation Facility (ONF) and User Manager (USM).



#### **Project resources:**

[www.planetek.it/eng/projects/cosmo\\_pe](http://www.planetek.it/eng/projects/cosmo_pe)

[www.planetek.it/eng/projects/cosmosaic](http://www.planetek.it/eng/projects/cosmosaic)

[www.planetek.it/eng/projects/prisma](http://www.planetek.it/eng/projects/prisma)

[www.planetek.it/eng/projects/cnm](http://www.planetek.it/eng/projects/cnm)



# SHIRA, the first Italian 'user oriented' satellite mission

A new HR TIR satellite mission join the user needs by a Data Fusion Centre that supports the Regional Authorities in the environmental and security activities.

**T**oday, small satellites are changing the economics of space. Spacecrafts that embraces cutting edge COTS technology, they permit novel and less expensive ways to perform meaningful observation missions. And currently both SAR and hyperspectral imaging missions

on minisatellites are in operation and in planning. A major challenge, for both high resolution imaging missions and hyperspectral missions on small spacecraft, is the thermal stability on the imaging instrument and bus – to provide sharp imagery. In the early 21st century, the

spectrum of microsatellite services is by all means as impressive as that of their bigger brother satellites, but at considerably reduced costs. Microsatellites make it possible to open up new fields of services previously considered too expensive. As a consequence, all space agencies as well as the



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military establishments of the world have been (or are) re-evaluating their programmes, in favour of smaller systems, to offer a solution for ever tighter budgets. Another important aspect is focused on the necessity to cover as much as possible the whole frequency spectrum, especially the section that is neglected by the majority of satellite missions, that is the thermal infrared band. The above needs derive by an explicit users request of having products and services in environmental and security application fields with highly detailed informative content. The users needs, translated in technical requirements, drove us to start and to define research activities focused on the study and preliminary design of a High Resolution Thermal Infrared new satellite mission. As a consequence, the new trend

of small satellites on one hand, and the necessity to have a 'user oriented' mission, led Planetek Italia and other 4 Apulian Space companies to start the SHIRA project. SHIRA - Satellite for High resolution InfraRed Application – is an on-going program co-funded by Apulia Region, in Italy, in the framework of the POR FESR 2007-2013 (Regional Operational Programme of the European Regional Development Fund 2007-2013). The SHIRA agreement includes the feasibility study of an high-resolution thermal infrared band Earth observation satellite and the



design of a Data Fusion Centre (DFC) located in Apulia. The whole SHIRA design approach is based on the actual users' needs in terms of application fields, in order to overcome the currently existing gaps between the current satellite technologies and the Value Added products and services required by the final users. So the study of the Thermal Infrared HR Satellite is based on the user involvement in the design lifecycle to collect requirements and to

better define applications, technical and economical mission feasibility and sustainability study. Technical objectives are the setup of the mission elements (orbit and space segment, launch segment, GS, communication and control, etc.), the study of thermal infrared sensors for medium and high resolution, the assessment of the platform in the Space Segment, the assessment of the Mission Control Segment and the analysis of the User Segment (Ground Segment). The Data Fusion Centre will be the regional data fusion and integration centre for multi-mission and multi-sensor products from spaceborne, airborne and field data.

The centre is designed to be a node of SDI regional network. The centre will manage data, metadata and geospatial services in compliance to the INSPIRE standard specifications. Data and information will be published following the Linked Open Data paradigm to maximize their value. The quality of data and services provided by the Data Fusion Centre will be granted by the compliance to ISO 9001 guidelines identified by EARSC for Earth observation based products and services. The project duration is 24 months and it is entirely promoted and managed by a consortium of Apulian companies, with a consolidated experience in the field of Earth Observation: Planetek Italia s.r.l., Mer Mec S.p.A., Sital S.p.A., VVN s.r.l. and IMT s.r.l.

 **Project resources:**  
[www.planetek.it/eng/shira](http://www.planetek.it/eng/shira)



Shira program is co-funded by Puglia Region within the framework: PO FESR 2007-2013 - Asse VI - Linea di Intervento 6.1 - Azione 6.1.1; Asse I Linee di intervento 1.1 - Azione 1.1. - Determinazione n. 590/08 - Avviso per l'erogazione di "Aiuti ai programmi di investimento promossi da Grandi Imprese da concedere attraverso Contratti di Programmi Regionali".

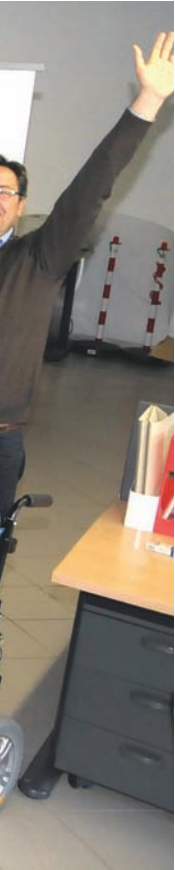
# Simplifying the use of geo-localized information



The growing availability of geo-localized data is a condition that had never occurred to date. These data have informative content, which, to be valorised, require an in-depth revision of the processes by which the data are produced, shared and used. 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. In 2014 for the celebration of twenty years of activity, this approach found its illustration and synthesis in the visual concepts expressed by the new brand. We operate in different application

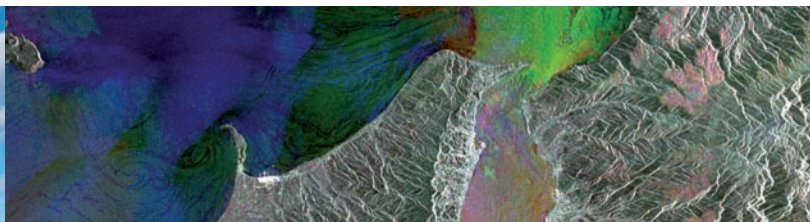


areas: scientific missions for planetary exploration, environmental and land monitoring, developing solutions for open-governments and smart cities. Through the Planetek group, we operate at an international level by providing solutions for the European Commission and its agencies, space agencies, national 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



**T**he 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.

## **Government & Security**

It offers application solutions and services in the public administration market at national and international levels, and for the Defence, Educational and scientific research markets in Italy. It develops solutions for the Observation of the Earth with remote sensing data from satellite, aircraft and drones. It develops spatial data infrastructures (SDI) to conform to Inspire based on the Cart@net@ platform using Free Open Source free and commercial software from major vendors. It offers solutions for the creation of open data geographies and metadata catalogs. It distributes remote sensing

satellite data from major international operators through the Precise @ product family. It looks after the distribution of Intergraph I ERDAS products within the Italian market.

## **European Institutions**

It provides geospatially powered solutions to the agencies and institutions of the European market such as the European Environment Agency, the European Union Satellite Centre, the European Defence Agency, the European Union (EC, REA, JRC), the European Space Agency (which provides services for Earth Observation, geospatial data infrastructures, user segments and embedded applications) and the Italian Space Agency (Earth Observation sector). It operates primarily in the development and integration of the chains for Earth observation data processing aimed at the provision and distribution of user data derived from optical and radar data, as well as integrating them into the SDI of the user segment. It also has expertise in the development of large scale SDI for the management of multi-source data and elements of the user segment.

## **Space Systems**

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).

## **Business to Business**

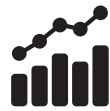
The target market consists of companies operating in the Oil & Gas, Renewable Energy, transport (railways, roads) sectors and engineering work and infrastructure activities. Its products range from systems for business intelligence on geographic data to the creation of geoinformative products to value-added data from Earth observation.

# Our team leaders



## Giovanni Sylos Labini

Chief Executive Officer and Co-founder of Planetek Italia. Degree in Physics. He cooperated with NASA and ESA, and was director of the Center of Space Geodesy of the Italian Space Agency. He is also Professor at Venice University Institute of Architecture (IUAV) and Chairman of AIPAS. Board of directors member of, EARSC Association and of the Apulian Aerospace Cluster (DTA).



## Mariella Pappalopore

Chief Financial Officer and Co-founder of Planetek Italia. Degree in Geology, Masters in GIS and Remote Sensing. Accountability Auditor of AIPAS. President of the Innovative Service & Communication sector of Confindustria Bari and Bat.



## Massimo Zotti

Head of Government & Security SBU. Degree in Economics. Specialized in Open Community he is Planetek's delegate at Open Geospatial Consortium and is founder and forum manager of the Italian OGC Forum.



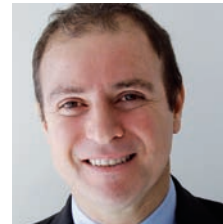
## Cristoforo Abbattista

Head of Space Systems SBU. Degree in Electronic Engineering. From 2002 he works in Planetek, mainly involved in the design and development of SDI and satellite Ground Segment. He has been teacher of WebGIS at Venice University (IUAV).



## Paolo Manunta

Head of European Institutions SBU. Bsc. in Agronomy and Msc. in Micrometeorology, PhD Computer Modelling. He published several papers in signal processing for environmental applications. Member of IMG-S Integrated Mission Group for Security and EO/(GMES) Copernicus working group.



## Vincenzo Barbieri

Chief Marketing Officer & Head of Design Lab. Co-founder of Planetek Italia. Degree in Agronomy, specialized in

Land planning and management. He matured expertise in the market of geospatial applications for Public Administration.



## Sergio Samarelli

Chief Technical Officer and Head of Business to Business SBU. Co-founder of Planetek Italia. Degree in Electronic Engineering. He

has been teacher of Remote sensing image processing at Venice University (IUAV).





# The group

The Planetek group consists of 4 companies. In addition to the Planetek Italia s.r.l. parent company, Hellas Planetek 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 2005, 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](http://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. [www.geok.it](http://www.geok.it)

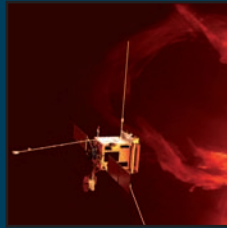


## GAP

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](http://www.gapsrl.eu)





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