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COUNTRY REPORT OF ITALY 2021

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Summary

The geospatial data are a key component for the development of the society. Market development and new jobs depend upon the availability of geospatial information. In the coming years this information is going to play a central role in many themes such as: the process of reorganization and modernization of the public administration (at local, regional and national level) in the management of land resources and environmental services of public interest; the development of applications involving the use of common geographic references and access to various available geospatial database and finally the creation and dissemination of new media necessary to implement and favor capacity building, both education and professional. In this context, it is evident the need of using the wealth of information and experience already available, but it is also evident, at the same time, the need to evaluate the profound changes in the manner and time required for data acquisition, their certification, their updating. The commitment, therefore, is to provide the appropriate conditions to ensure the availability of a minimum set of geospatial data that correspond to those of more widespread use for the majority of users.

The present document summarizes the main activities developed by Italy in the fields of geospatial information as carried out by different stakeholders and updates the Report issued in 2017.

The governance of geospatial information

Geospatial Information Management institutional arrangement

Italy's cartographic organization differs from the structure present in many countries, as the geospatial information is held by many institutional organizations that collect, produce or manage geospatial data according to their responsibilities: we have then a scattered distribution of responsibilities from the national ones till to the local realities.

Official cartography

Let us first mention the organic cartographic main Institutions, who have the task of producing the official cartography (Law February 2, 1960, n. 68):

- Geographical Military Institute (IGMI)
- Naval Hydrographic Institute (IIM)
- Air Force Geo-topographic Information Centre (CIGA)
- Revenues Agency, former Real Estate and Land Registry Agency,

IGMI

As the institute is both the Italian Army's geographic supporting office and the National Cartographic Authority, it has been necessary to combine the geospatial requirements of the Ministry of Defence, also depending on the agreements signed with NATO, with those asked by national and EU regulations. In 2007 the EU issued the INSPIRE¹ Directive, that establishes an infrastructure for spatial information in the European Union in order to enhance the sharing of spatial data. The IGMI activities have therefore a dual nature because of the two tasks that are carried out and are the results of Italy's international relations within the new international geostrategic framework.

As the institute has to carry out a variety of tasks, it plays an important role as a centre for production, study, collection and sales within the geographic information field (Cartography, Geodesy, Remote Sensing and GIS – Geographic Information System). The IGMI also plays a key-role internationally because of the need to integrate and standardize geographic information shared with NATO and the EU partners.

a. Production Department

(1) Geodesy

- Setting up, updating, management and maintenance (field measurements and data processing) of national geodetic networks such as: the National Fundamental Dynamic Net (RDN)², created in accordance with the Prime Minister's Decree of 10th November 2011 and the NRTK³ network (still in the planning stage) that provides real time GNSS correction and a highly accurate levelling network;
- Maintenance, measurement and benchmarking of the state borders by means of periodic mapping on the ground, in accordance with the applicable international bilateral agreements. Taking part in the activities of joint commissions and groups of experts

¹ INSPIRE: Infrastructure for Spatial Information in Europe; Directive 2007/2/EU of 14th March 2007;

² Network of permanent GPS GNSS stations that are regularly recalculated in Europe.

³ Network real-time kinematic (NRTK). Network of permanent GPS GNSS stations transmitting corrections to mobile GPS GNSS units in order to have a high precision positioning without post-processing.

established on the basis of bilateral agreements, signed with the bordering nations and in close collaboration with the Ministry of Foreign Affairs;

- Performance of geophysical measurements (gravimetry and Earth’s magnetism) and geodetic astronomy;
- Processing and maintenance of the transformation parameters among the various national systems (Roma 40, ED50, WGS84 and ETRS89-ETRF2000);
- Monitoring, calibration and verification of the geodetic instruments on behalf of third parties;
- Performance of high precision measurement, useful for checking the stability of historical buildings and monitoring crustal and surface movements in case of major national events or natural disasters.

(2) Cartography, Geographic Databases, Photogrammetry and Remote Sensing

- Acquisition, derivation and integration of the regional data, in order to create, update and manage different topographic databases (DBT) at a medium and a small-scale (DBSN⁴, ERM);
- Production and updating of the official state cartography, at a medium and a small- scale (scale 1:25 000, scale 1:50 000, scale 1:250 000, scale 1:1 000 000);
- Acquisition of high-resolution photogrammetric data of Italy through agreements with other public entities;
- Studies, researches and testing in cartography and topography in collaboration with national universities and other Italian and European public entities.

b. Training activity

The Superior School of Geographic Sciences, is a national benchmark for basic and advanced training in the field of cartography and topography.

Every year, several courses and a master’s degree are organized for the technical staff working at the IGMI, the Ministry of Defence and other public entities.

c. Archives and culture

In this sector, the IGMI is responsible for:

- Ensuring the conservation and development of collections of geographical, topographic and cartographic works, including books and periodicals, along with the terrestrial, panoramic and zenith photographic shots heritage, original campaign documents and instruments acquired or used by the IGMI to carry out institutional activities and stored in the archives and in the “Attilio Mori” Library;
- Cataloguing, digitizing and archiving of all technical documents;
- Making available all documents stored in the library to the IGMI staff and researchers for consultation, study and reproduction;
- Repairing and restoring damaged paper documents;
- Supervising the implementation and updating of the official database for Italian place names;
- Publishing the magazine “L’Universo” and other publishing products, both in hard-copy and digital format;
- Organizing scientific and cultural exhibitions related to the activities carried out by the institute;
- Printing and packaging of the institutional publications.

d. Sales Department

In this sector, the IGMI is responsible for:

⁴ *Data Base Sintesi Nazionale.*

- The sales of cartographic, photogrammetric and geodetic products in order to recover their marginal costs;
- Working on behalf of third parties, for both private and public entities (with priority given to institutional commitments);
- Providing advice to private and public entities, upon request.

e. 2020 activities

In 2020 IGMI activity focused mainly on the development of web-tools for a full automatic map generation, starting from data of DBSN, in order to create maps at different scales, 1:10.000, 1:25.000 e 1:50.000 to cover the whole Italian territory.

IIM

The Italian Hydrographic Institute (IIM) is the National Agency for nautical cartography, located in Genoa since its foundation in 1872.

Its tasks include the production of nautical charts and documents aimed at the safety of navigation, and extend to the processing of scientific, technological and environmental data connected with the sea. Furthermore, one of the main tasks of IIM, in addition to contribute to safety of navigation, is the geospatial, meteorological and oceanographic support to the Navy, the National Defense and to other Governmental Authorities.

The IIM activity mainly develops within three fields: production, applied research and education.

In the domain of production, the IIM provides users with the official nautical documents and disseminates nautical information, both at a national and international level, in order to contribute to the safety of navigation and to the safeguard of human life at sea.

As regards oceanography the IIM sees to the collection and processing of the physical and chemical parameters of the water masses and of particular hydrologic features. IIM activities include the experimentation of prototypes of nautical, oceanographic and meteorological instruments to further the advancement of nautical sciences, in cooperation with Universities and scientific institutions.

The Institute has a specialized library, open to the public, of about 35 thousand books. These include modern texts on the various marine themes, and various collections of historic pilot books, atlases and charts, and quite a large corpus of scientific reports of the most celebrated voyages of exploration.

The IIM represents Italy within the International Hydrographic Organization (IHO), which is appointed to coordinate the activity of the National Hydrographical services, to see to the standardization of nautical documents, and to promote international cooperation in the development of the hydro-oceanographic techniques and surveys.

The activity of the IIM within the IHO is mostly aimed at the production of international charts of the Mediterranean, and at the technical assistance to the hydrographical services of emerging Mediterranean countries.

REVENUE AGENCY AND CADASTRAL CARTOGRAPHY SYSTEM

The Italian Revenue Agency has the role of “National Cartographic Body” as established by the Law n. 68/1960⁵ and is responsible for the management of the cartographic national system of the Cadastre and its continuous updating.

The cadastral cartography is a “large scale” representation, as it was originally created mostly in a scale of 1:2000, and also includes, to a lesser extent, maps in different scales (1:4000, 1:1000 and 1:500). The Italian Cadastral cartographic archive, which covers the whole national territory⁶ (roughly 300,000 Km²), consists in about 300,000 cartographic files (one file for each map sheet). It is directly related to the administrative census database of the Land Cadastre by a single, unique identifier: the parcel number.

The cadastral system manages about:

- 85.8 million parcels
- 20 million buildings
- 74.8 million residential units.
- 52.4 million property owners

Each piece of land and building located on the national territory is geo-referenced without ambiguity through the cadastral cartography system.

The Cadastral Cartography System is available for the whole national territory in vector format and in the ETRF2000 Reference System⁷; this allows full interoperability with other geographic data bases, becoming a fundamental element in land information systems of central and local Public Administrations.

In Italy the update of Cadastre is assigned to the technical professionals. Licensed professionals submit via Internet 24/7 their digital proposals of update of the cartographic, land and urban census Cadastral archives through an IT System named Pregeo10, that allows the survey data management and the automatic recording on the database. A management and control system checks the proposal and, in case of positive outcome, updates the archives, notifying the professional of the result.

The automatic registered updates amount to 90% of the submitted updating documents, confirming the excellence of this technical-organisational model and the prerogative of a “citizens-participated” public service.

The Revenue Agency is evolving the entire Cadastral Information System into a modern web GIS called Integrated Land Information System (SIT), based on the cadastral cartography, aimed to the improvement of the archives of the cadastral, land registration and real estate valuation services, in a perspective of a unified management of the technological infrastructure and integration of data, processes and quality control.

In the SIT the cadastral cartographic system is integrated by high-resolution ortho-images (GSD 20 cm/pix) updated every 3 years.

The Revenue Agency provides two online services for consulting the cadastral cartography. The

⁵ From 1st December 2012 the Italian Revenue Agency has incorporated the Real Estate and Land Registry Agency (Agenzia del Territorio), as provided for in Article 23 quater of Decree-Law number 95 of 2012.

⁶ With the exception of the territories in which the Cadastre is managed, by delegation of the State, by the Autonomous Provinces of Trento and Bolzano.

⁷ Decree 10 November 2011, art. 2: “... ETRF2000” – at the time 2008.0 – of the European geodetic reference system ETRS89, ...”.

available information covers the whole national territory and is aligned with the cadastral cartographic database and is also usable through mobile devices:

- **WMS Cadastral Cartography View Service:** in execution of the European Directive INSPIRE, it is based on the international standard Web Map Service 1.3.0 and allows the viewing of cartographic contents also in an integrated way with other geospatial data, supporting public bodies and private users who use cadastral cartographic information in various fields - urban planning, local taxation, civil protection and emergency services, management of the environment and the cultural heritage. In reference to the use of this service, the Revenue Agency adopts the license: creative commons CC – BY 4.0 (web link to the service: [https //wms.cartografia.agenziaentrate.gov.it/inspire/wms/ows01.php](https://wms.cartografia.agenziaentrate.gov.it/inspire/wms/ows01.php)).
- **National Cadastral Cartographic Geoportal:** it is a free access web platform that makes possible to search and view the cadastral parcels included in the cadastral map easily and without needing to download any software. Recently a new release has been published that allows users to view the cadastral map related to the user's current location (web link to the service: <https://geoportale.cartografia.agenziaentrate.gov.it>).

Data on the usage of WMS show a relevant utilization of cadastral maps by citizens, institutions, professionals and enterprises (on weekdays the current numbers are around 11 million of daily requests and more than 12,000 daily users) in the context of several land and real estate management processes. With this in mind, the Agency is committed to striving for constant improvement both in data-quality and in usage opportunities through increasingly better services

Public cartography producers

In addition to this first group there are a large number of Organizations and Administrations, producers/managers of geographic data, such as:

- Ministry of the Ecologic Transition (MITE)
- Ministry of Agriculture, Food and Forestry (MIPAAF)
- Ministry of Infrastructures and Sustainable Mobility (MIT)
- Ministry of Cultural Heritage and Activities (MIBACT)
- Ministry of Economic Development (MISE)
- Department of Civil Protection (DPC)
- Regions and Autonomous Provinces
- Metropolitan Cities and Municipalities
- Agency for Agricultural Payments (AGEA)
- National Institute of Statistics (ISTAT)
- Research Institutions (Universities, CNR, etc.).
- Basin Authorities
- National System for Environmental Protection (ISPRA / ARPA / APPA).

The acquisition and/or the management of geo-spatial data by public authorities is related essentially to its institutional role often distributed among multiple parties.

MITE

The MATTM, presently MITE, implemented in the mid-2000s the Extraordinary PST Remote Sensing

Plan (Article 27 of Law 179/2002), acquiring a national interferometric radar database, from 1992 to 2013 (first nation in the world), and a high-resolution (1x1 and 2x2 m) aerial Lidar morpho-altimetric information database with semi-national coverage (first nation in Europe).

The LiDAR data of the PST is considered by national users to be the most accurate, updated and geographically most reliable representation of the national territory, capable of providing territorial bodies and companies that carry out planning, monitoring and assessment of hydrogeological risks, a unique geographical reference metric for hydraulic, hydrological and morphological modeling and for the design of risk mitigation and containment works.

Application areas of LiDAR PST data distributed by the National Geoportal from 2007 to today:

- Soil modeling for hydrological and hydraulic simulations
- Design of earthworks
- Forest management and planning
- Precision forestry
- Identification of the main forest species
- Topographic mapping of agricultural areas
- Precision farming
- Calculation of forest biomass by carbon uptake
- Management of tourism and park areas
- Environmental assessments
- Coastline mapping and management
- Tsunami modeling
- Drainage analysis
- Support for civil protection emergencies
- Road mapping and planning
- Modeling of the dispersion of pollutants
- Design of photovoltaic and wind farms
- Control of mining activities
- Morphological changes of glaciers
- Vocation of the soil to crops
- Urban area survey
- Airport infrastructure modeling (obstacles to flight)
- Planning of the basic cellular radio network
- Visibility analysis
- Analysis of landslides and the evolution of the slopes
- Assessment of earthquake damage
- Detection of faults, morphostructural steps and elevation changes in the soil
- Coastline change and coastal morphological changes
- Bathymetric mapping
- Archaeological investigations
- Orienteering
- Cycling tourism
- Video and virtual reality

Furthermore Article 11 of Legislative Decree 32/2010 establishes at the Ministry of the Environment the National Council for Territorial and Environmental Information for the purpose of direct coordination of the contributions of all those interested in the effective functioning at the various levels of administration

of the national infrastructure for territorial information and environmental monitoring" well known as CNITA.

The operating methods of the National Council for Territorial and Environmental Information are defined in the Decree of the President of the Council of Ministers of 12 January 2016.

The Consulta ensures the institutional connection between the public administrations that produce territorial data sets and the technical direction for the preparation of the measures of the Minister of the Environment and the protection of the territory and the sea appropriate to the functioning of the national infrastructure for territorial information and environmental monitoring (Art.2). Therefore, the Ministry of the Environment, represents the National Council for Territorial and Environmental Information (CNITA) as the main coordinating body in national and European policies on territorial and environmental information and its use.

The activities of the Consulta are aimed at a dual objective, in terms of the availability of public and widespread geo information without charge:

(i) the European Context (INSPIRE);

(ii) National needs.

Both objectives should be pursued at the same time by CNITA's coordination activities as well as ensuring participation in the activities of the United Nations Committee in its European component UNGGIM Europe through official cartographic information to support sustainable development policies and the achievement of the objectives of the United Nations 2030 Agenda (Sustainable Development Goals -SDGS).

The achievement of the European goal is linked to legislative decree 27 January 2010, n° 32 that transposes the European Directive 2007/2/EC (Inspire Directive) thanks also to the integration between territorial data and environmental monitoring in the National Geoportal and to the technical and information cooperation between the different national and local levels.

Other cartography producers

There are also many public and/or private entities now providers of public services (ENEL, the Italian Mail and related services Structure, RFI, ANAS, ENI, ACEA, etc.) They hold or manage large volumes of data that are directly relevant and compose an overall framework of a consistent information asset, particularly fragmented, ensuring numerous public activities relevant to the territory.

The **Agency for Italy Digital (AGID)** is instead the competent body, on a national basis, as regards advertising, availability and searching metadata about geo-spatial data and related services.

The MITE has been identified as the Authority for the implementation of the INSPIRE Directive in Italy and uses ISPRA, its in house research institute, as a coordination structure.

The Academy and Research Centers

Some Italian Universities and Research Centers are involved in the UN-GGIM Academy Network. In particular:

CNR IREA, Responsible: Dr. Paola Carrara

Roma Tre University, Responsible: Dr. Roberto Bianchini

Polytechnic of Milan, Head: Prof. Maria Antonia Brovelli.

The main activity in Italy was the promotion of the network in the Italian context (some universities have expressed their interest in joining and it is hoped to have a greater presence by the end of 2021). An activity related to SDGs has been started this year with the La Sapienza University Rome, also involving ISTAT, which gave a seminar for both students of Rome La Sapienza and Politecnico di Milano. The title of the seminar, kindly offered by Dr. Angela Ferruzza, was: Sustainability: frameworks (SDGs, Sendai, CC), evolutions, inter-linkages. Students at La Sapienza will work on SDG 11, paying attention specifically on Target 11.3: Inclusive and sustainable urbanization.

Politecnico di Milano, with the support of CNR-IREA, is also working on SDG 6, within an Italy-Swiss Interreg project (SIMILE), aiming at enabling the monitoring of the quality of the water of Insubric Lakes (Maggiore, Como and Lugano) with new geomatic tools designed and developed in the view of availability and sustainability of water for all. The developed tools are provided as open source and therefore freely usable and adaptable by other interested actors.

Moreover, at the Politecnico di Milano a Geoinformatics Engineering Master of Science Course is available (unique of the kind in Italy), where seminars, workshops and projects on geospatial information and sustainability are offered to students. A Student Association (the Polimappers, Politecnico di Milano chapter of the International YouthMappers Association) is very active regularly (at least monthly) organizing events on Humanitarian Collaborative Mapping.

Beside these national activities, the Politecnico di Milano contributes to the international activities, having been Prof. Maria Antonia Brovelli deputy chair and, starting from the beginning of 2021, chair of the international network. In addition to the commitment to the governance of the network, the Politecnico collaborated in the publication (coming soon) of a book (edited by Abbas Rajabifar, previous chair of the network) "COVID-19: Geospatial Information and Community Resilience" with a chapter, written with Serena Coetzee, University of Pretoria, South Africa, entitled "Open geospatial data for responding to the COVID-19 challenge", as well as two summits organized by UN GGIM Americas related to the COVID-19 issue.

Politecnico di Milano is also strongly involved in the activity of the UN Open GIS Initiative, which is an ongoing Partnership Initiative led by the United Nations Geospatial Operations. The Initiative, established in March 2016, is supported by several UN Agencies and mission partners (Member States, technology contributing countries, international organizations, academia, NGOs, and the private sector) and takes full advantage of their expertise. The target is the creation of an extended spatial data infrastructure (with the term "extended" it is meant that the whole ancillary applications which are nowadays part of the procedures and activities of the organization are also subjects of the initiative) that meets the requirements of the UN Secretariat (including UN field missions and regional commissions), and then expands to UN agencies, UN operating partners and developing countries.

Mandates and operations which must be considered in the design and the development of the system includes activities in support to:

- the UN Security Council;
- the Executive Committee & Deputy Committee (EC/DC);
- the UN Operations & Crisis Centre (UNOCC);
- the UN Secretariat (all departments/offices, Regional Commissions);

- the UN Peace operations and field missions (DPO, DPPA & DOS);
- the UN-GGIM, as Co-Secretariat (with DESA/Statistics Division);
- Member States for technical assistance on international boundaries;
- UN agencies.

The main commitments of Politecnico di Milano, besides the governance (Prof. Brovelli is one of the three co-chairs of the Initiative) is within the two working groups of Capacity Building and GEO-AI (Geomatics and Earth Observation – Artificial Intelligence). Politecnico di Milano is coordinating courses on open geospatial GIS applications (QGIS, PostGIS) to UN staff and is co-organising, together with several UN agencies, webinars/panels/workshops about Machine Learning and spatial data information.

Roma Tre University, in partnership with other Italian universities started a research project to produce an Atlas of the Covid-19 in Italy. The project aims at analysing the geographic progression of the infectious disease, and its relationships with the physical and human environments. The research project is expected to be concluded in 2021.

In addition to the academic courses in cartography and geospatial related subjects, Roma Tre University continued to provide training programs on the use of geospatial tools for the management and monitoring of cultural heritage, working on case studies through the training infrastructure available at the Geocartography Laboratory “Giuseppe Caraci”, which is part of a national network of GIS laboratories of Italian universities (Labgeonet).

In the framework of a research partnership established in 2015, between Roma Tre University and the Italian Geographic Society (SGI), a presentation titled “Geospatial information and GIS for generating and disaggregating SDG indicators using Population and Housing Census data” was delivered at the workshops organized by the United Nations Statistical Division (UNSD) in October and November 2020, *United Nations Regional Workshop on Measuring SDG Indicators through Population and Housing Census and Civil Registration and Vital Statistics Data* and *UN Regional Training Workshop on Measuring SDG Indicators through Population and Housing Census and Civil Registration Data*. Researchers from Roma Tre University and SGI are working to support the integration between geospatial information, SGDs and census data, mainly for the SDG indicators 9.1.1, 11.2.1, 11.3.1, and 11.7.1.

The Private sector

e-GEOS

e-GEOS, an ASI (20%) / Telespazio (80%) company subject to the joint direction and coordination of Leonardo S.p.A and Thales S.A, is a leading international player in the Earth Observation and Geo-Spatial Information business offering a unique portfolio of application services. Today e-GEOS counts on a staff of over 500 employees, including the colleagues from GAF, a German company owned at 100%, specialized in land and forestry management services.

e-GEOS is the exclusive global distributor for the COSMO-SkyMed data, the most advanced and performing Radar Satellite constellation available today. Thanks to the superior monitoring capabilities of COSMO-SkyMed constellation and to the fusion with a broad range of EO and non-EO data, e-GEOS has become one of the global leaders in geospatial services, leading the evolution to GeoInformation digital services through CLEOS, its digital market place, and application platforms by vertical, covering the whole value chain from data acquisition to the generation of analytics. E-GEOS application platforms

provide services for: environmental protection, rush mapping in support to natural disaster management, specialized products for defense and intelligence, oil spill and ship detection for maritime surveillance, interferometric measurements for landslides and ground subsidence analysis, thematic mapping for agriculture and forestry. E-Geos has also acquired leading position within European Copernicus Program, In support to its operational applications, e-GEOS operates the Matera Space Centre for acquisition, archiving and processing of multi-mission satellite data including COSMO-SkyMed and ESA Sentinels.

e-GEOS manages national and international customers, in both private and public sectors, such as EMSA (European Maritime Safety Agency), EUSC (European Union Satellite Centre), JRC (Joint Research Centre of the European Commission), Frontex, US Government Agency, Italian Ministry of Environment, various UN Organizations and the Italian Civil Protection, the Italian Ministry of Agriculture, the Italian Ministry of the Environment, major international oil & gas companies and railroads.

e-Geos supports UN-GGIM with membership in working groups at regional (UN-GGIM:Europe) and global level, contributing to the generation and release of documents. Services and geospatial layers provided by e-Geos can also contribute to monitor several SDGs indicators. Through its services in agriculture, based on the continuous extraction of information and analytics down to over each single agricultural plot with Agrigeo platform, e-Geos enables a more sustainable usage of the land resources. For example is mapped the presence of EFA (Ecological Focus Area), or monitored the status of the crops, thus supporting the reduction in the usage of water and chemicals, maintaining land and soil quality, supporting sustainability and environment preservation.

Services provided through e-Geos AWARE platform support the whole lifecycle of buildings and infrastructures, from planning to maintenance, improving their resilience. In planning phase, the integrated usage of multisource satellite data, with the generation of three dimensional descriptions of the territory, enables a proper selection of the sites for installing plants or develop technological lines, taking into account morphology, environment, land cover, existing infrastructures and human settlements. During the lifecycle of buildings and technological, industrial and communication infrastructures, as well as their surrounding areas, high density InSAR analysis (historical and monitoring) through PSP-IFSAR e-Geos proprietary algorithm, allows the early detection of suspicious potentially damaging displacements trends with millimeter precision. In urban environment, other e-Geos services support a better safety and quality of life, such as the detection of urban heat islands, therefore identifying area that can be dangerous during the hot seasons for the safety of fragile people, like elder population. In support to disaster resilience and safety increase, e-Geos provides solutions based on simulation modules for a better assessment and management of risks, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030. At the same time, support to recovery and rehabilitation phases following a disaster event is provided through its Emergency Mapping Service, supplying timely and detailed maps with the delimitation of the area affected by the event and related grading of damages.

In marine environment E-Geos solutions available through the its SeonSe application platform provide services in support to marine environment preservation, such as the oil spill monitoring service for a timely detection of oil spill events, or the support in the identification of illegal and overfishing situations. At the same time, through the platform it is possible to detect illegal access to marine protected area, therefore identifying possible threads for the marine environment.

Land cover maps from optical and radar Earth Observation data, generated at different level of detail and temporal frequency, allow to monitor the status and the extension of forests, wetlands, mountains and drylands, supporting the conservation, restoration and sustainable usage of terrestrial and inland freshwater ecosystems and their services.

Planetek Italia

Planetek Italia can contribute to UN-GGIM programs for Sustainable Development as an expert in spatial data and Earth Observation to help achieve Global Goals.

Planetek will help the working groups understand how EO can contribute to calculate SDG indicators and how EO can be used to increase granularity (spatial resolution) of UN statistics. Planetek Italia is an Italian company, established in 1994, which employs 60+ women and men, passionate and skilled in Geoinformatics, Space solutions, and Earth science.

Through its cloud-based platform called Rheticus® the company provides continuous monitoring with satellite data of Earth's surface, seas, marine coastal areas, infrastructures, and urban dynamics in support of decision-making and operational activities. More than 25 years of experience in Earth Observation will help understand how UN-GGIM can use the satellite information provided by Copernicus' Sentinels to detect and characterize the extension of human activities (e.g., pollution, human settlements, etc.) and how COPERNICUS Sentinel datasets and services (e.g. the Copernicus Core Services provided by the Entrusted Entities [Mercator, SatCen, JRC, EMSA, EEA] can be exploited and integrated the national and the UN reporting systems.

EO products can inform SDG Indicators (partially or totally) and can support the countries (especially the developing countries) to achieve the SDG Targets.

As an example, Planetek can help supporting National Statistical Organizations in the country's alignment towards the SDG 14.1.1 indicator related to coastal eutrophication and Floating Plastic Debris Density. According to the Oslo-Paris Convention, "eutrophication means the enrichment of water by nutrients causing an accelerated growth of algae and higher forms of plant life..." .

The importance of this sub-indicator can be tracked as social, e.g. water areas dangerous for health and economic, e.g. fish/mussels die resulting to production losses, while it has also legislative support (Marine Strategy Framework Directive). Eutrophic areas are usually detected in coastal waters due to nutrient inputs from anthropogenic coastal and land activities. The Copernicus Marine Environment Monitoring Service (CMEMS) uses EO data and in-situ measurements to model these types of information over different coastal areas. Planetek implements a novel automated methodology for the estimation of the Index of Coastal Eutrophication and the provision of trend-based geo-analytics through an online application platform.

Its algorithms exploits the CMEMS models of Phosphate-Nitrates-Silica nutrients, Chlorophyll-a, Dissolved Oxygen and Water Transparency and computes a weighted indicator that segments water-bodies into four categories: non-problem areas, potential problem areas (low), potential problem areas (high) and problem areas. The indicator is calculated with respect to the Contiguous Zones (24nm from the coast), as determined by the United Nations Convention on the Law of the Sea (UNCLOS), while the threshold values for the water classification are adopted from the Water Framework Directive. The suggested monthly ICEP provision is obtained by aggregating daily products. Results indicate each country's percentile distribution (%) of eutrophication events.

Planetek is also a member of the *e-shape* team: a unique initiative that brings together decades of public investment in Earth Observation and in cloud capabilities into services for the decision-makers, the citizens, the industry and the researchers. 27 pilot applications under 7 thematic areas address societal challenges, foster entrepreneurship and support sustainable development, in alignment to the main priorities of GEO, where the first is the contribution to the Sustainable Development Goals.

Planetek is involved in the pilot 6.3 "Assessing Geo-hazard vulnerability of Cities & Critical

Infrastructures”. Its ambition is to contribute to the UN SDG Goal 11 “make cities inclusive, safe, resilient and sustainable” reducing the economic losses caused by disasters, developing and maintaining safer and more secure cities and infrastructures, by developing products and services exploiting Earth Observation technologies. The UN SDG Goal 11 aims, among others, to significantly reduce the human and economic losses caused by disasters, with a focus on protecting the people in vulnerable situations.

In order to develop safer and more secure cities, products and services exploiting Earth Observation technologies can be used to map vulnerable urban areas that could be potentially affected by geo-hazards. The pilot aims to increase the use of multi-mission Earth Observation derived products and services to assess Urban Vulnerability and Geohazards, to systematically map vulnerable urban areas and critical infrastructures threatened by Geohazards, and to raise early awareness and train key users and decision makers on the use of the EO derived products and services and increase urban resilience against geo-hazards.

Key Users of the solution implemented are urban planners and managers, policy makers, industry and engineering companies, insurance companies, civil protection authorities, urban citizens, EU entities and Member States. ESA satellites Sentinel 1A/B images are the core data for this pilot area, integrated with *in situ* data such as GNSS stations for validation, geological and Geohazard layers available from the Geological Surveys and urban layers from the Local Authorities.

Planetek Italia can implement in its Rheticus platform similar methods of continuous monitoring of indicators to demonstrate how Earth Observation products can support the achievement of the SDGs Targets and the calculation of the SDGs Indicators.

Data of general interest

The list of data of general interest was recently revised as part of the updating of the “Technical Rules for the definition and updating of the content of the national catalog of geospatial data” (Digital administration code – art. 59). This activity was carried out by the "Metadata" technical section which operates in the context of the [National Committee for Territorial and Environmental Information](#), established with the transposition rules of the INSPIRE Directive (art. 11 del D. Lgs. 32/2010). The new list of data of general interest is available [here](#).

Technical rules on spatial data

Art. 59 and art. 71 of Legislative Decree no. 7 March 2005 n. 82, Digital Administration Code, have established the procedure for the definition of the technical rules for spatial data.

Until 2010, the Committee for the technical rules on the spatial data (set up by the paragraph 2 of the mentioned art. 59, repealed in 2016) operated in order to define and propose technical regulations (to be adopted with special measures) for the collection of spatial data sets, its documentation, availability, accessibility and the sharing of data between the central and local governments.

In addition, the Committee was also responsible for proposing rules and costs for the use/reuse of spatial data, in a coherent and harmonized manner with the relevant legislation and with the objectives of e- Government policies.

In the first three years of activity (from 2007 to 2010), the Committee has issued the following

technical specifications, still in force or being updated:

1. Use of cadastral data between the information systems of all the public administrations;
2. Definition of the content and procedures for setting up and updating of the National Catalogue for spatial data, with the simultaneous identification and definition of the data of general interest that need to be documented in the Catalogue itself This technical specifications are recently updated and approved by the [National Committee for the Spatial and Environmental Information \(CNITA\)](#);
3. collection, documentation and sharing of digital ortho-imagery at a nominal scale of 1:10000, with reference to applications as mapping and thematic scopes;
4. Adoption of the National Geodetic Reference System, in line with the European reference system;
5. Collection and definition of the content of the geo-topographic Database, for a consistent and structured representation of the main layers of geographic information.

The technical specifications referred to in point (1) have been adopted by the Decree of the Director of the territories on November 13, 2007; those ones referred to in points (2), (3), (4) and (5) have been adopted by the decree of the Minister for Public Administration and innovation on November 10, 2011, in consultation with the Minister of the Environment, Land and Sea.

After 2010 the Committee was no longer renewed due the repeal of the law provision that had established it.

In the same year 2010, the national law for the transposition of the INSPIRE Directive has established the National Committee for the Spatial and Environmental Information .

Meanwhile, given the increasing focus on geographical information, the Agency for Digital Italy, AgID, has launched an initiative aimed at maintaining the specifications already produced and defining new technical rules in the field of GI, consistent with those ones developed in the context of the INSPIRE directive.

Specifically, the following activities have been completed:

- The definition of technical specification on utility networks;
- The definition of the data model of the national information system of the utility infrastructures (named SINFI, Sistema Nazionale Federato delle Infrastrutture);
- The revision of the technical specification on geo-topographical database;
- The definition of technical specification for the public lighting under the PELL (Public Energy Living Lab) project carried out by ENEA, the National Agency for the new technologies, the energy and the sustainable economic development.

With respect to this latest point, AgID and ENEA have started a collaboration with the JRC (Joint Research Centre of the European Commission), through one of the use cases of the energy pilot project⁸, executed within the ELISE (European Location Interoperability Solutions for e-Government)⁹

⁸ <https://joinup.ec.europa.eu/collection/elise-european-location-interoperability-solutions-e-government/energy->

action of the ISA2 Programme¹⁰. This collaboration aims at contributing to provide a European perspective of the benefits of using digital platforms for the smart management of public lighting infrastructures.

National Programs – Achievements and Challenges

The Cartographic Cooperating System (CCS)

The General Direction of Soil Protection of the Ministry of the Environment, Land and Sea, for several years has extended the CCS to all Central and Local Agencies with specific projects. CCS is the National Spatial Data Infrastructure (NSDI) made consistently in accordance with the European INSPIRE directive and the standards of Digit PA. The CCS is based on the adoption of:

- the European Directive INSPIRE;
- the specific techniques indicated in the Applicative Cooperation Digit PA for the physical interchange of metadata;
- the specific techniques of the RNDT Digit PA for the creation of metadata;
- the specific techniques of the cartographic reference system for the system of the space coordinates of shared data;
- the specific technique indicated in the Open GIS Consortium for the interoperability of GIS systems.

The project aims at the creation of an infrastructure through which all levels of the Central and Local Public Administration can be informed about maps available on our territory through the National Cartographic Portal and then share the informative levels made available by various Agencies through the CCS and without the physical transfer of data.

This allows the knowledge of the available maps on the territory with an accompanying set of information from the fields covered by the Directory; this way all participating Agencies are able to plan the acquisition of data and to communicate the next acquisition. The result is a rationalization of costs for the benefit of a larger and more different availability of data. The Central and Local administration will be able to plan, run and control the territory in detail as required in their tasks through all CCS geographic data, both current and future, concerning main territorial and environmental themes.

The National Spatial Data Infrastructure

The CCS is a technological infrastructure supporting the efficient exchange of geospatial, territorial and environmental meta-information, characterized by a central entity, the National Cartographic Portal (PNC), which collects all the meta-information and peripheral entities data. CCS provides services and allows to access a national informative wealth and to expand them

location-applications

⁹ <https://joinup.ec.europa.eu/collection/elise-european-location-interoperability-solutions-e-government/about>

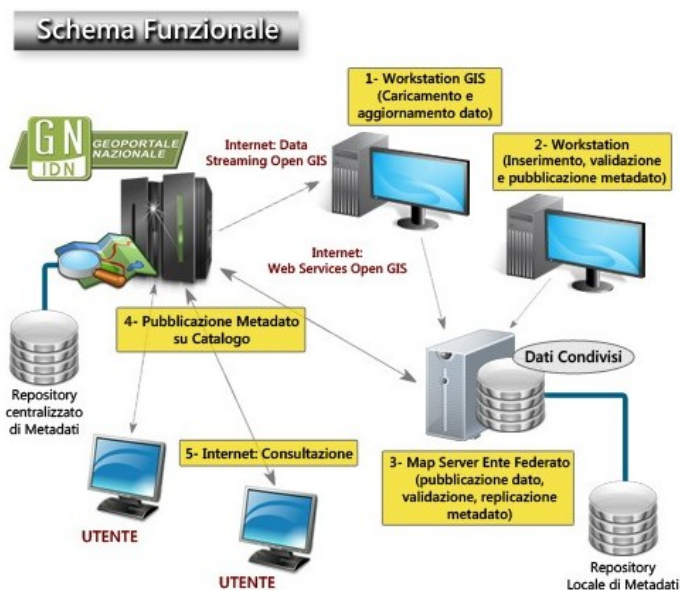
¹⁰ https://ec.europa.eu/isa2/home_en

to European and international partners through the Project INSPIRE.

The idea of this approach was to build a cooperative information system where heterogeneous information systems could share the same conceptual model and level of participation in the network. The CCS portal hosts a series of informative layers and databases with national coverage, called "Cartographic Reference base"(CRB), the cooperating agencies host the informative layers and data bases on local coverage.

The CCS, consistently with the "vision" of the Spatial Data Infrastructure (SDI) Project INSPIRE, is an open infrastructure. It is interoperable and cooperative for access and distribution of products based on geospatial and territorial information through a range of on-line services.

The structure of the National Geo-portal is such that for any datum made available there is also a meta-datum in a national catalogue whose function is to offer a range of information in support of the data itself.



Functional architecture of the cartographic cooperating System

The structure of this information complies with the specifications of the National Directory of territorial Data of Digit PA (NDTD). A specific software application (the Metadata Manager), whose role is to allow the management of a local database of metadata, allows to update and send them to NDTD. The task of the individual peripheral nodes is to ensure the correct compilation of the metadata.

The National Geo-portal (NG)

The NG allows the visualization and use of National maps that have been produced following an agreement between the State and Regions about reference cartographic system dated October

12th 2000.

The strategic aim of NG is to promote and diffuse the use of the Informative Territorial Systems, allowing access to the environmental information of the territory to a wide public, including non- experts, taking into consideration all the projects and activities that are now in course at a National and European level.

Let's think of a big National Library whose shelves are full of books regarding subjects of all kinds, whoever wishes to satisfy a curiosity, acquire further knowledge, study a subject in depth or find elements on which to base a research, can freely access the whole library and find the volumes that are of most interest to him.

We can imagine the NG as a "library" on the web whose shelves contain all the maps of the Italian territory that are available concerning territorial and environmental themes.

The maps that form the Cartographic base of reference have sets of data that are homogeneous and easy to understand, compare and exchange the content; this information gives life to the National repertory of territorial Data.

These maps are organized for cooperation between the various public Administration and also for a wider peripheral network of local Administrations that all interact with the Ministry of the Environment.

The NG allows everyone accessing to internet - students, researchers, administrators, and the general public to see and freely use any maps that may be of interest choosing them as they were extracted from a library shelf.

There are two types of possible users of the NG:

- The first group are persons simply interested in visually consulting available maps.
- The second group are persons needing to elaborate territorial and environmental data, available on the Portal, for professional or academic reasons. They can do this thanks to WMS, WFS and WCS available services, allowing the data to be inter-operational.

At the moment the layers of maps available which can be superimposed are:

- Black and white and color photo;
- IGM cartography;
- Digital model of the landscape;
- Toponyms;
- Administrative limits;
- Protected areas;
- Soil description;
- Plan of the territory;
- Sea bathymetry;
- Coastal erosion risk;
- Physical map of the coasts;
- Railways;
- Ortho photo data;
- Geological data;
- CORINE Land Cover.

The National Cartographic Portal is therefore a very useful instrument for:

- public administrators as a fundamental support to planning, running and controlling the territory;
- schools, for teaching history, geography, natural science and all subjects that require technical maps;
- Universities and scientific institution because it constitutes a catalogue containing all available information concerning the territory and the environment from the same source and at no cost;
- the safeguard of the environment, for the conservation of archeological sites,
- historical, artistic and architectural sites, allowing an exact delimitation of the site in the territory.

The National Catalogue for Spatial Data.

Art. 59 of the Digital Administration Code established the National Catalogue for Spatial Data, managed by the Agency for Digital Italy (AGID). The Catalogue collects metadata for spatial data sets and spatial data services managed by the public authorities, in order to facilitate their discoverability and availability through the discovery service related to the implementation of the INSPIRE Directive (Directive 2007/2/EC).

The National Catalogue was implemented by AGID; it is consistent with the technical requirements defined in the Decree of the Italian Minister for Public Administration and with the INSPIRE Regulation and technical guidelines as regards metadata and interoperability of network services.

The Catalogue serves the two functions typical of a catalogue:

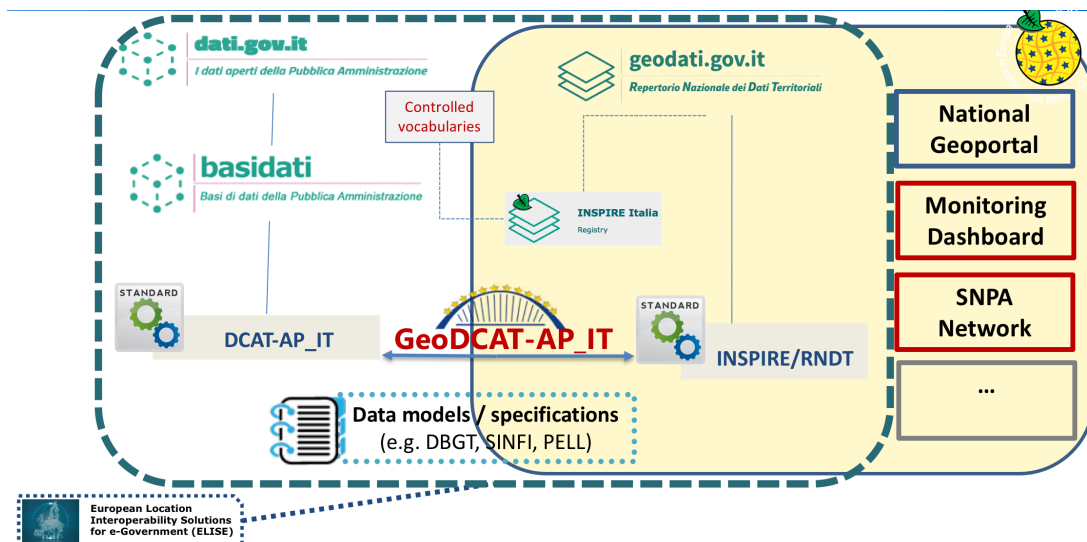
- the collection of metadata prepared by the administrations, by different channels (on-line editor, XML file upload, web folder, harvesting according to the CSW standard);
- the discovery via web interface and catalog services according to the CSW standard for all the users, both public and private.

The Catalogue is also declared as a database of national interest and represents the reference national discovery service harvested by the INSPIRE Geoportal.

The Catalogue is part of the so-called national PSI infrastructure, referring to the European framework of the public sector information. That infrastructure is composed of the following resources:

- the open data portal (dati.gov.it);
- the PA's Databases catalogue;
- the catalogue for spatial data (geodati.gov.it).

In that context, the national Catalogue for spatial data has been also harvested by the European Data Portal. The figure below shows the mentioned PSI infrastructure.



In this context, several actions are implemented or being implemented, in the more general framework represented by INSPIRE and the national three-year ICT Plan, the strategic and economic policy document for Public Administrations that oversees the digital transformation of the country.

The aim is, on one hand, to improve accessibility of the public information resources, including spatial data, by ensuring and facilitating their access and use to an ever wider and diversified audience. On the other side, the aim is to support public administrations, spatial data and services providers to foster and improve the process of definition, availability and discoverability of these resources, needed to enable what described above.

Furthermore, those actions include both the implementation of tools and the definition of common rules at organizational and technical level, involving public administrations and stakeholders through public consultation and participation processes.

Those actions include, inter alia:

- a. support to improve the accessibility of spatial data in the context of the similar INSPIRE action;
- b. revision of national metadata guidance including requirements and recommendations to cover the issues linked to open data;
- c. pre-defined views of spatial open data in the national catalogue in addition to the usual tools for data discovery (i.e. general search functions);
- d. discoverability of spatial data through the mainstream search engines, such as Google Dataset Search¹¹;
- e. definition of data models extending INSPIRE data specifications by ensuring that the definition of new thematic data models be consistent with the national and European reference specifications and by promoting the INSPIRE data and services in domains and projects beyond the environment, wherever possible;
- f. publication of the source code of the solutions and APIs developed for reuse.

An issue addressed was the integration of the national catalog for spatial data (based on ISO/INSPIRE/national standards, profiles and rules) and that one of open data (based on

¹¹ <https://datasetsearch.research.google.com/search?query=site%3Ageodati.gov.it>

DCAT-AP specification), both managed by AgID.

The Public Administrations provide to document the information resources they hold in those catalogs to make them discoverable to the users. That documentation activity has produced an overlapping of the two scopes (spatial data and open data), precisely represented by the open spatial data. That led, for example, to a duplication of the descriptions in the two reference catalogs, with the risk that they are not aligned and / or updated, and in some cases are even conflicting, compromising the reliability of the information itself.

In order to overcome the duplication, the misalignment or even the lack of relevant information in the two catalogs, it has become necessary to provide specific rules with the definition of national guidelines and implement specific tools.

The GeoDCAT-AP implementation guidelines¹² can be considered the national extension of the European specification (named GeoDCAT-AP_IT) in order to take into account the Italian extensions to INSPIRE metadata profile and to DCAT-AP. The document also defines some organisational rules for PAs in order to avoid the double burden to document the open spatial data in both catalogues (spatial data and open data) and to overcome the above highlighted criticalities.

Indeed, the main rule reads as follows: spatial data (also available as open data) shall be documented ONLY in RNDT (“once only” principle) in according to INSPIRE/RNDT metadata profile; then RNDT will make available the metadata also in dati.gov.it through GeoDCAT-AP_IT.

In implementation of those guidelines, some relevant tools are developed, i.e. a customized and extended API and XSLT¹³ with respect to those ones available within the the ISA program.

Another important tool linked to the national catalogue for spatial data and also in relation with the implementation of GeoDCAT-AP is the [INSPIRE Italia Registry](#), that provides a central access point to a number of nationally managed registers (means to assign identifiers or 'reference codes' to items and their labels, definitions and descriptions, also in different languages, and consistently manage different versions of resources), both in order to comply with INSPIRE requirements regarding the publication of extensions to the code lists set out in Regulation (EU) No. 1089/2010 on interoperability of spatial data sets and services and for identified and nationally defined purposes (eg, for objects defined in the DBGT under Decree 10/11/2011).

The Registry has been published under the coordination activities carried out together with the National Institute for Environmental Protection and Research (ISPRA) and the Ministry of Environment. It's part of the [European Federation](#) including the INSPIRE and other Member States Registries.

¹² https://geodati.gov.it/geoportale/images/struttura/documenti/GeoDCAT-AP_IT-v1.0.pdf

¹³ https://geodati.gov.it/geodcat-ap_it/

SNIPC (National Integrated System of Civil Protection).

Context

The "Civil Protection" is the set of activities put in place to protect the integrity of life, property, settlements and the environment from damages or risk of damage arising from disasters: risk prediction and prevention, rescue of affected populations, confronting and overcoming the emergency and mitigation of risks.

The Italian National Civil Protection Service has as the following institutional components: the central government of the State, the Regions and Autonomous Provinces, Provinces, municipalities and mountain communities, the National Fire Department, the Armed Forces, the Police, the National Forestry Corps, the scientific community, the Italian Red Cross, the structures of the National Health Service, voluntary organizations, the National Mountain and Alpine Rescue Corps form the operating structures.

The National Service operates at a central, regional and local level, in compliance with the principle of subsidiarity. The local context of our country, subject to a variety of risks, makes a civil protection system necessary which, in every area, ensures the presence of human resources, facilities and operational capabilities able to intervene quickly in case of emergency, but also to operate for prevention and, as far as possible, predict potential disasters.

The first response to an emergency, whatever the nature and extent of the event, needs to be guaranteed at the local level, from the municipal structure, which is the closest institution to the citizen. The first head of civil protection in each municipality is, therefore, the Mayor. But when the event cannot be met by means available to the municipality, the higher levels are activated through an integrated and coordinated action: the Province, the Prefecture, the Region, up to the involvement of the State in the event of a national emergency.

The strength of such a complex system of competences is the guidance and coordination entrusted to the President of the Council of Ministers, which makes use of the Civil Protection Department.

The System

In this context the **SNIPC (National Integrated System of Civil Protection)** has been implemented and it includes a number of geospatial technologies and tools used both for Emergency Preparedness and in Emergency Response.

The SNIPC project has been developed by the Civil Protection Department. The technological partner being Leonardo (one of Italy's main industrial groups, leader in the high technology sector, and ranks amongst the main groups worldwide operating in the Aerospace, Defense and Security sectors) joined with the Italian National Council of Research - CNR, (since 2004 a Competence Center that deals with Earth observation; with its design and implementation based on Information Management Systems, used to quickly share geospatial information, especially in emergency scenarios).

The main component of the SNIPC system is SITDPC (Geospatial Information System of the

Civil Protection department). It consists of a complex Hardware/Software Architecture that performs the various levels of Spatial Data Infrastructure of which the Department of Civil Protection actually make use.

Functional goals and achievements

Specific emergency plans are needed by Civil Protection structures to be ready for tackling and managing an emergency. These identify the objectives that must be followed through to organize a suitable response by the Civil Protection when the event occurs. An **emergency plan** prepares structured deployment of men and means for intervention, organized logically and coordinated in time.

The cognitive base for sizing resources to be sent into the field is made up of **damage scenarios**; in other words tools that forecast possible damage and consequent effects on the population. These scenarios are calculated using territorial exposure and vulnerability data and based on reference events deemed to be more likely to occur depending on the selected time interval.

Assessment of these scenarios, not limited to an estimate of the triggering event, but focused directly on immediate loss assessment, is particularly important for the tasks that the Civil Protection Department must carry out.

Knowledge about a “damage scenario” allows a territorial picture to be drawn up of the area involved in the event, therefore providing important information such as the localization and extension of the worst hit area, whether transport networks, communication media and distribution lines are working, in addition to the expected losses in terms of human lives, the injured, the homeless, collapsed and damaged buildings and relative economic damage, with obvious repercussions on Civil Protection activity, for both emergency planning and management.

In the former case, the information permits identification and description of the reference event/s with a view to sizing human resources, materials to be used and their allocation within the plan.

In this context, the **Civil Protection Department provides support to Regional Authorities** for the latter’s planning and policies for smaller local bodies, provincial and municipal authorities and mountain communities, supplying information regarding impact on the territory for one or more reference events with corresponding different levels of Civil Protection plan activation.

Whereas in the latter case, the information immediately provides a description of the actual event and its impact on the territory, to support emergency aid.

The SNIPC System is currently used by the Civil Protection Department for emergencies and to provide support to regional and local authorities. Hazard and vulnerability assessment methods, practically the same for all the tools, have been designed to meet a need for pragmatic supply of a response that can be used by Civil Protection operators on both a national and local level.

Extraordinary Plan of Environmental Remote Sensing

The Extraordinary Plan of Environmental Remote Sensing (EPRS-E), pursuant to Law 179,31st July 2002 art.27, is an agreement program between the Ministry of Environment and Territory of the Sea (METS), Chairperson of the Council of Ministers-Department of Civil Protection (DCP) and the Ministry of Defense (MD) in agreement with the Regions and Autonomous Provinces.

The main aim of this plan is to create and make available to the public administration the geospatial information necessary for the creation of high-value elaborates. The data are obtained from remote processes, or from remote capture of data on the territory and the environment.

The Extraordinary Plan of Environmental Remote Sensing undertakes, for the first time, the establishment of a database representative of the national territory with particular emphasis on its configuration and its relation to the environment.

It has a database with very high resolution, obtained by using the most advanced technologies flying on satellite and aircraft platforms.

In particular, the project involves the acquisition of data produced by remote sensing observations performed with laser-scanning LiDAR and radar Interferometric techniques and the classification of these data in the data base of the National Geo-portal(NG).

The database is a valuable contribution to the Government decisions on the territory, particularly supporting the activities of topography, mapping and digital photogrammetry, three- dimensional modeling, Geographic Information Systems and, above all, the Information Systems Supporting decisions.

The first aim of the EPRS-E has been to create, as quickly as possible, a most comprehensive database to support decision making in all areas subject to hydrogeological risk and encourage the sharing of a "data set" of methodologies and results incorporating both the "set of data" already implemented or being implemented by the central government or local authorities.

Global Reference System

In Italy the first adoption of the global reference system refer to 1996 and was decided following the increase in the use of survey methods with satellite observation, in particular the GPS. As reference system it was chosen the ETRS89, recently adopted by Europe, in the realization ETRF89, the only available at that time.

The reference was materialized through the establishment of a special geodetic network called IGM95 entirely determined by GPS differential method, and made in the first time of 1230 points, which covered the country with a spacing of 20 km, then the network has been incremented up to the present about 2.000 points. Many regions have been furtherly incremented with another 3000 points with spacing of 7 km. The precision of the three-dimensional points IGM95, with high confidence level, is about 5 cm.

In order to support the evolution of GPS techniques, for which the precision of IGM95 was no longer sufficient, such as the Real Time Kinematic Network (NRTK), the IGM has developed in 2008 a new geodetic network: the National Dynamic Network (RDN), characterized by uncertainty in the position of the points less than 1 cm in the plan and less than 1.5 cm in height.

The RND consisted of 99 GNSS permanent stations covering the whole national territory with an average distance variable between 100 and 150 km, and sending daily update to the Computing Centre of the IGM geodetic service.

The calculation was performed in the realization ETRF 2000 (then 2008.0) of the ETRS89 System,

adopted by IGM from 1 January 2009. In the spring of that year the RDN was presented to the EUREF and accepted as European densification of "B" category. Italy adopted the Reference ETRF2000 epoch 2008.0 by Ministerial Decree of 10 November 2011 and the RDN is the materialization the official national system. Since 2008, the network was continuously monitored with weekly calculations, resulting in a series of solutions that, after five years (2008-2012), made it possible to carry out a first calculation of the speed of the sites. The absolute speed of the Italian stations, refer to the ITRS System, were on average 0.028 m/ yr, perfectly in line with the data provided of EUREF.

Standardization of geographical names

Within the framework of the UN Work Program, Italy, through the IGMI, led a campaign in the field to increase and update the current *Toponymic database 25K* (Topo DB25), in order to produce, by derivation, also the national *Toponymic database 50K* (Topo DB50).

In practice, while the Topo DB 25K (dated 1996 and consisting of about 750000 geographical names extracted from topographic maps of Italy at scale 1:25000) was built through cartographic activities and direct reconnaissance, with an updating process based on the comparison between the Italian topographic map sheets at 1:25000 and 1:50000 scales, the Topo DB 50K is the result of an interactive process deriving from the Topo DB 25K.

It consists of all existing toponyms of topographic maps of Italy at 1:50000 scale.

Concerning the legislative aspects, it is worth recording that, on June 2008, the Italian Parliament has decreed the suppression of the “Permanent Committee charged of direction of toponymic revision of Map of Italy” (created by the Law n. 605/1949).

In consequence of such political decision and in order to maintain the permanent toponymic functions within the competences of IGMI, as National Mapping Agency, it was decided (in March 2012) to create the “Commission for the Italian Official Toponymy”.

Furthermore IGMI has started the procedures of authorization for the adhesion of Italy to the EUROGEONAMES, setting up a specific Working Group to organize all available toponymic data to be loaded in the Euro Geo Names database.

Beside these initiatives, other activities have been conducted as follows:

- Signature of special cooperation agreements between IGMI and the Italian Regions/Autonomous Provinces in the field of geographical information;
- Establishing a cooperation with schools and academic organizations for didactic activities in the field of geographical names.

The integration of statistical and geospatial information

ISTAT and GeoSpatial information

Users and policy makers are increasingly demanding for more sophisticated statistics to describe and to analyse the society, the environment, the economy. The integration of statistical and geospatial information seems to answer to that; it became necessary for planning, monitoring and developing projects and policies regarding different thematic areas, such as environment, economy, society, culture, etc.

To facilitate the integration of statistical and geospatial information that will enhance the production and the dissemination of statistical information, Istat, the Italian National Statistics Institute, is in favour of strengthening the partnerships among the NSIs and the NMCA's. Moreover Istat endorses the adoption of the GSGF by the United Nations Committee of Experts on GGIM in August last year, for achieving the targets of the Agenda 2030 of the United Nations.

Istat is formally involved in the UN-GGIM Europe initiative and participates in the working B Data Integration, Subgroup II, to analyse the classification of methods/examples related to geospatial information, together with other UN member states national statistics institutes and mapping and cadastral agencies.

Istat is involved, within the CNITA (the Italian Committee for Territorial and Environmental Information) for the adoption of INSPIRE directive. INSPIRE, Infrastructure for Spatial Information in the European Community, is driving in the direction of enhance the European Statistics System through the harmonization of statistical units and population distribution. INSPIRE gives directives and specifications to EU member states to share geospatial information through discovery, viewing and download services published on standard National Spatial Data Infrastructure (NSDI).

Istat is contributing to populate the RNDT geoportal, National Repertoire for Territorial Data (Repertorio Nazionale Dati Territoriali - RNDT). The geoportal has been implemented by the AGID, the national agency supervising the adoption of the digital code for public institutions in Italy. Public institutions have to contribute to the RNDT geoportal to make geospatial information discoverable and interoperable.

As a National Statistical Institute, Istat produces on a regular base the SDGs report. The 2030 Agenda, adopted by the United Nations General Assembly, represents the Global Action Plan for the achievement of a sustainable transformation of society, economy and environment.

The 17 Sustainable Development Goals (SDGs), and the relative 169 specific targets in which they are declined, balance the three dimensions of sustainable development, extending the 2030 Agenda from the social pillar provided for by the Millennium Goals, to the other two pillars, economic and environmental, to which is added the institutional dimension.

They are universal, interconnected and indivisible, they must take into account specific

territorial realities and are potentially applicable everywhere, on a global, national and local (regional and / or urban) level. There are numerous references to the well-being of people and to an equitable distribution of the benefits of development, intra generational and intergenerational. “No one left behind” is one of the key principles.

The United Nations Inter Agency Expert Group on SDGs (UN-IAEG-SDGs) has proposed a list, revised in 2020, of 232 indicators necessary for their monitoring, which constitute the statistical reference framework worldwide.

The dissemination of the third edition of the Report on Sustainable Development Goals (SDGs) takes place in the presence of the COVID-19 pandemic, which has accelerated the need for a unified vision capable of developing and implementing an appropriate strategy for economic, social and environmental development, paying attention to the interdependencies of the various aspects and oriented towards sustainability.

https://www.istat.it/it/files//2020/06/Rapporto_SDGs_2020_Eng.pdf