SIMP Canosa: Integrated System for Monitoring and Prevention of environmental crime

Video surveillance and satellite imagery for the territory monitoring

by MASSIMO ZOTTI

The SIMP Canosa system has developed a software platform, compliant to INSPIRE, combining and harmonizing data from several sources, and enabling geospatial intelligence tools to the Municipality departments and the police staff involved in the monitoring and prevention of environmental crimes.

The protection of the environment from crimes against it is today a priority for any city. The monitoring of large or urbanized areas, with a high level of human pressure, requires efficient organization for the management of complex administrative procedures. In ad-dition, this happens in a context of chronic shortage of economic resources and personnel.

Illegal building, traffic and disposal of special waste and substances hazardous materials, illegal dumping, damage to the ecological, archaeological and natural heritage, are the main factors that threaten our territory. Modern survey technologies can be a valuable aid in order to fight these illegal activities. With satellite imagery, sensors, video surveillance systems, web reporting tools for citizens, it is possible to extend the abil-ity to observe the territory in a widespread and timely way. These technologies are spreading and they are now considered as standard for the municipal activities.

We can consider for example video surveillance systems or social web channels to collect reports from citizens about illegal activities. Their integration and inclusion in a unique process of monitoring and land management permit the maximum expression of their potentiality. Urban Control Centers collect all data and information in a single environment, managing the information through processes and presets and optimized workflows. This allows the management of the complex administrative processes, arising from an alert of environmental crime.

An Integrated System for Monitoring and Prevention of environmental crime.

The SIMP system, Integrated System for Monitoring and Prevention of environmental crime, adopted by the Municipality of Canosa di Puglia is a component of the municipal Urban Control Center, dedicated to the activities of monitoring and prevention of urban environmental crimes, as well as to the analysis and control of the impact of other human activities in the urban areas. The whole system is based on a control center, which is connected with the three video surveillance systems active at municipal level. The SIMP allows streaming of images captured by video surveillance directly on the map and allows to store and archive georeferenced images extracted from videos of the crime (ie. Illegal waste releases in real-time).

The detection of a waste release can also be made through alerts by citizens who communicate with the administration both in the traditional way (phone, email) and through social channels like Facebook, Twitter or the municipal web portal.

The SIMP also provides regular analysis of high-resolution satellite images over the entire municipality to identify key changes on the surface, which may indicate the presence of potential illegal construction or illegal dumping.

All reports, regardless of the means of generation, flow into the SIMP that have different pro-tocols for the management of different types of warning. The system allows management on map of all the resources and the deployment of operational teams through their geoloca-tion. In this way the control of the means on intervention is always possible, with a logistics optimization of displacements. The classification of the warnings also allows management of priority actions based on the type of operation. This will reduce the response time and the environmental impact of the crimes.

The SIMP, based on Hexagon technologies, consists

of a control center, a data repository and an information management platform. The system allows locating on the map and in real time alerts submitted by both automated detection and external sources.

Hexagon Geospatial and Intergraph technologies for the SIMP

The system supports decision-making and intervention strategies using established technologies (Intergraph Planning & Response IPR) and accessible workflow through a web platform (GeoMedia Smart Client). IPR is a web-based effective solution for Special Operations Rooms (SOR) and Command Staff, which uses Smart Client tech-nology. It is designed specifically for contexts of command and control, mission planning

and monitoring events and offers both the opening and integration with existing infra-structure and high scalability (using specific vertical modules or, where necessary, custom-ized ad hoc macro). IPR allows simple and reliable information sharing, browser independence and simple administration, to enable users to focus on the leadership challenge, even in extreme situations. It uses ac-tive server-based message and news delivery in real time (push system) and all dialogue fields, forms and workflows can be configured on the basis of open standards (using XML).

GeoMedia Smart Client is a solution that fits right in between desktop applications and web GIS mapping platforms, which supports decision-making and intervention strategies, using consolidated workflow, acces-sible to potentially unlimited users. Providing web tools to develop efficient and customiz-able workflow with advanced geospatial analysis capabilities and data editing, it enables the entire organization to access and utilize rich geospatial data in their processes and to operate full desktop products. Thanks to these technologies, users have access to a robust desktop GIS solution in a simple web client, with which
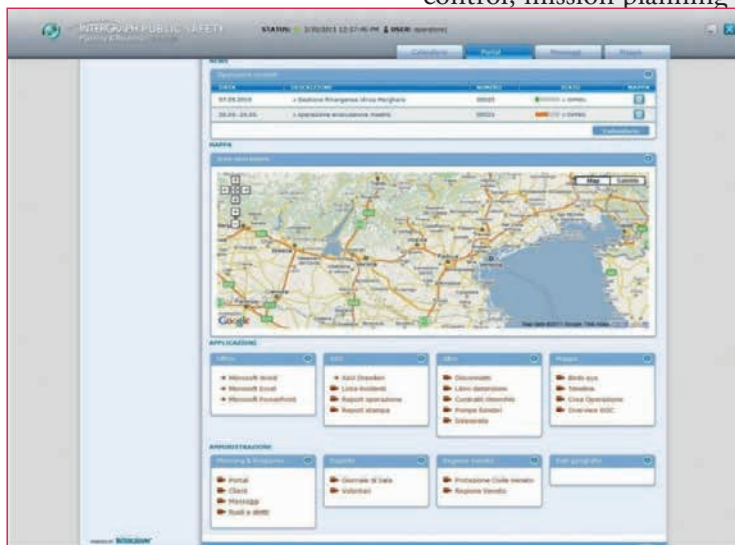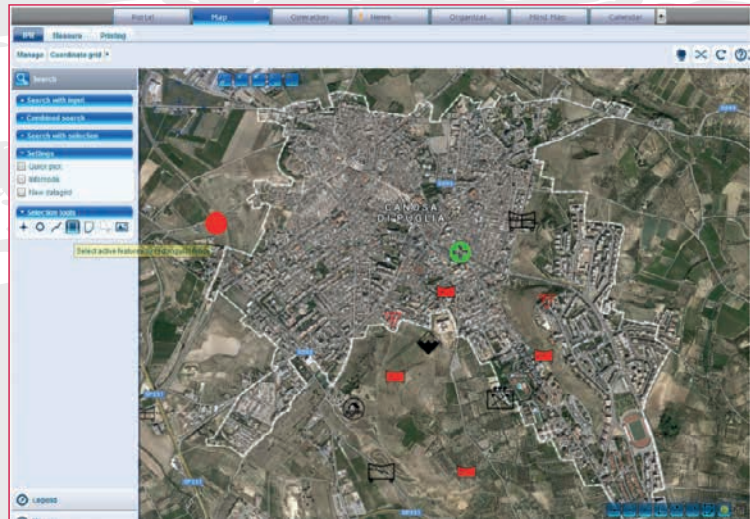
they can access shared data within the infrastructure, build specific workflows, customized geospatial analysis, and real-time sharing of its results reaching a much larger audience. In this way, the SIMP system allows management of phases of the operations, from data and warnings collection, to management and storage of them, thus consolidating a coordination protocol. The workflow consists of different steps:

a) Data Management
The operator can find the list of various messages and provide their integration into the system with data extracted from documents of interest and warnings from sensors and cameras. A full suite of remote sensing software tools, based on ERDAS Imagine and its add-ons, allows the monitoring of the whole city area through satellite images and their fast analysis.

b) Dossier Management
Dossier is the main data structure of SIMP, which allows the operator a comparison between the new and exist-ing data and highlights the presence of a previously set dossier, related to the same location or the same type

of event even if in different places.

c) Representation of the territory
On the cartographic component the most important part of the work of the operator takes place, as the map will present a thematic symbol-ism (symbol, pattern, color) that will indicate the current status of the situation and helps in the decision making processes.

d) Intervention action
Because of its evaluations, the operator will propose interventions by the municipality or by other persons called to collaborate with it.

Moreover, the SIMP provides operator a work agenda useful to propose actions, places and teams involved.

Main elements of the SIMP can be schematically summarized as follows:

▸ System: consists of hardware, software and infrastructure in an integrated set of tools for the collection and management of data and documentation of warnings;

▸ Database: the periodic acquisitions of very high reso-

lution satellite images and thematic data extracted are the main inputs of the system. Such inputs, combined with warnings from citizens and video surveillance allows to monitor any part of the municipal area;

▸ Training: training on the job and manuals aims to transfer the entire know-how to manage system and input data;

▸ Technical assistance: to guarantee the proper functioning of the system. To increase the speed of intervention tools for fault reporting are used in combination with assistance through help desks and web-based bug tracking.

The SIMP was created by Planetek Italia s.r.l. and Intergraph Italia LLC.

ABSTRACT
A Decision Support System improving the capacity of the Municipality forces to prevent and fight crimes such as traffic of dangerous waste, illegal landfills, illegal buildings or archaeological and natural heritage damages.

AUTHOR
Massimo Zotti
zotti@planetek.it
Head of Government & Security SBU
Planetek Italia Srl