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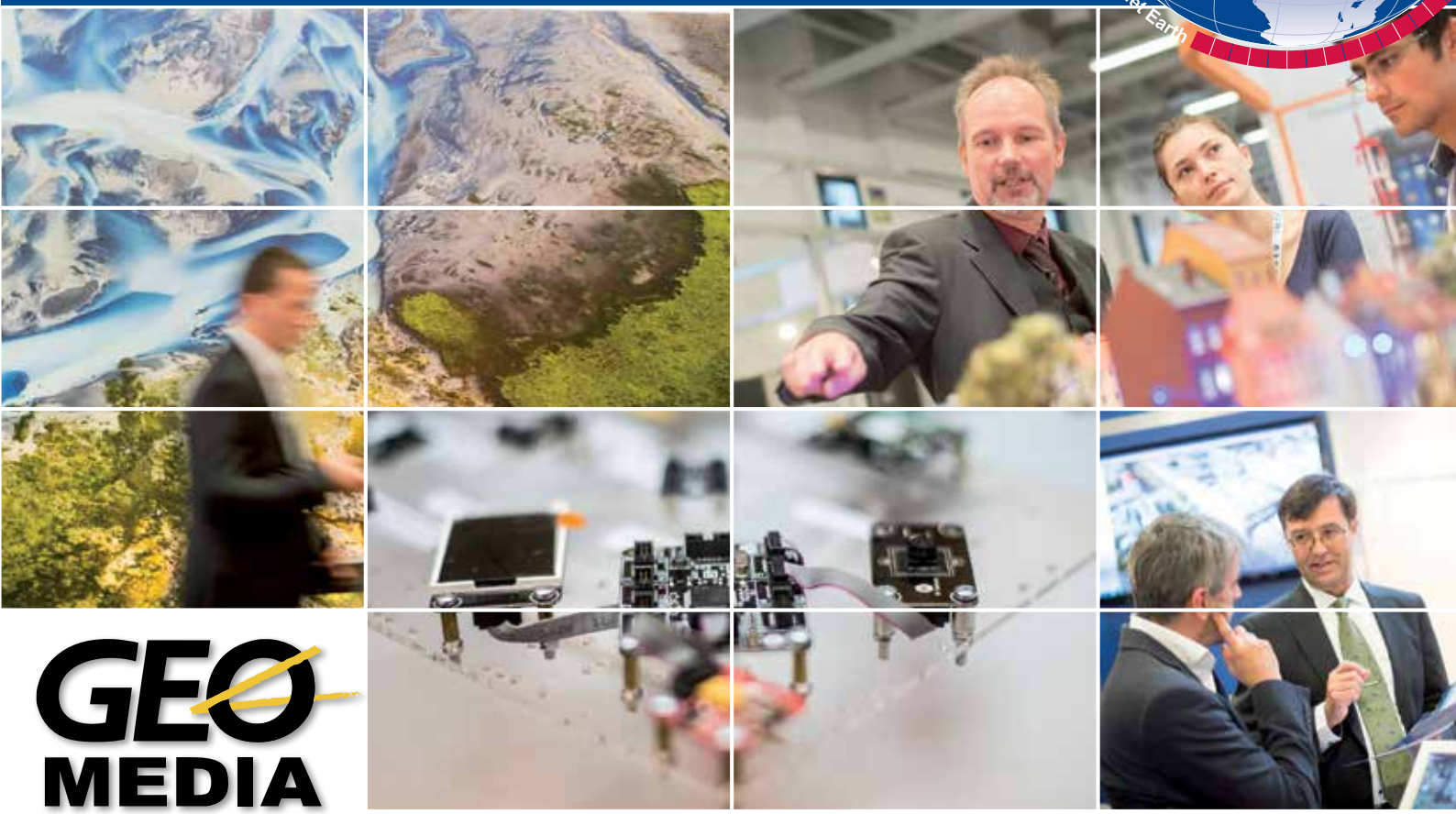

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Flood risk management: the role of geo-information in the insurance industry

by Franco Guzzetti and Alice Pasquinelli

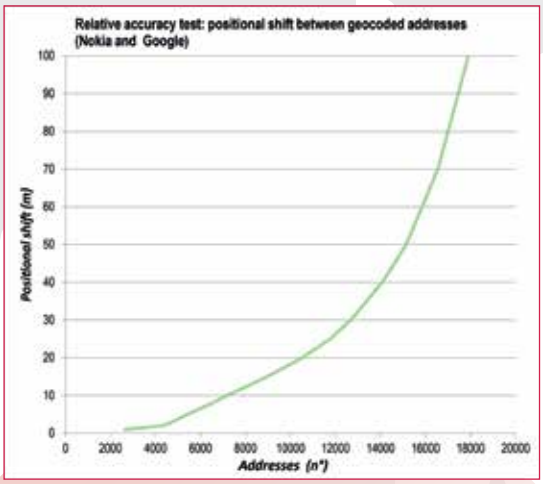
The use of Geographic Information Systems for management purposes is going beyond the traditional field of territorial government and new applications are developed supporting other sectors dealing with territorial issues: insurance industry is one of the sectors where spatial data are acquiring importance, introducing an innovative way for the definition of flood risk insurance premiums.

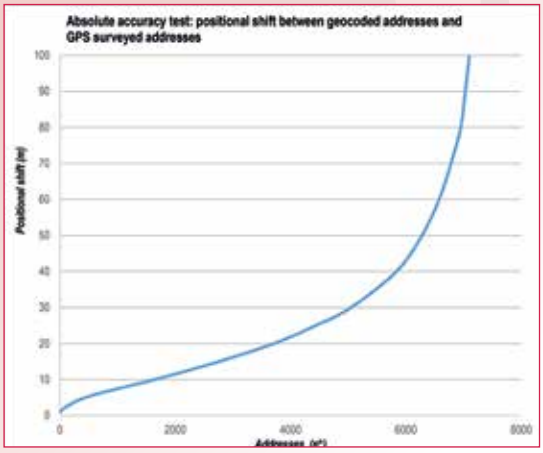
During year 2014 the ABC department of Politecnico di Milano, with the technical support of R3 GIS company, undertook a research project with a major insurance company: the scope was the development of a management system aimed to support the underwriting process of flood insurance policies in the consumer market. The topic of flood risk is strictly related with territorial and geographic features, such as the presence of a river, the interference of human activities, constructions and modification on natural environment, the protection and mitigation measures adopted in order to reduce assets exposure (FEMA, 2007): it is clear how, due to the objective of the project, GIS technologies and spatial information came to the aid (Thompson, 2013).
This partnership is due to the changes in progress on the national panorama that might force insurance sector to provide access to this kind of coverage not only in case of high value properties (like corporations or big factories) but also to house owners. The economic burden of losses related to natural disasters can no longer be borne exclusively by the State, especially in case of predictable and manageable events: for this reason since late 2013 Italian Government started a debate with the insurance industry hypothesizing the adoption of a risk transfer and sharing policy at national level, providing financial support to mitigate their impact on the society (Institution of Civil Engineers, 1995).
In this context, the need of insurance companies is to define a method that allow a quick estimates of the risk assumed in case of standard consumer policies and to deepen all relevant aspects in case of high value, tailor made policies: the value of the insured portfolio and its exposure have to be constantly monitored in order to be aware of the actual possibility to meet claims in case of event, as required by European law (European Directive 2009/138/CE "Solvency II"). Considering these needs, an informative system were structured in order to allow insurers to evaluate potential losses related to flood risks assumption, on the one hand, and to support commercial and price strategies in order to balance refund costs and guarantee financial solvency, on the other hand.
The main output of the project was the creation of a technological infrastructure supporting agents during the underwriting process step by step, up to the definition of the insurance premium: the latter is defined considering building exposure (its location within or outside flood prone areas) and all features that make a building more or less vulnerable in case of flood. Building vulnerability (its propensity to undergo dam-

ages) is a crucial factor in the determination of the insurance premium and its computation requires several input parameters (FEMA, 2007). As primary parameters concern the geographic positions of buildings, the whole management system were based on a thematic GIS.

The "Risk GIS"

In case of a new flood policy the building evaluation process, to be carried out at the early stage of the underwriting phase, consist of a first desktop assessment of building exposure, based on the confrontation between building position and flood prone areas; thereafter, if the policy value is relevant, the agent will proceed with an on-site survey collecting detailed information on building features that determine its vulnerability. Building are the objects covered by the insurance policy that occupy specific places in the territory: what determines the exposure of a building to hydraulic hazards is its location which might be inside or outside a flood prone areas. In order to detect this kind of information the geographic knowledge involved concerns, at least, two factors: buildings position and flood areas extent in case of overflow with different occurrence probability (return period). Theoretically, both these types of information are known: every building is referenced on the territory by an address; specific public authorities are in charge for the identification and mapping of flood areas in each watershed. Practically, the combination of the aforementioned information in a geographic information system is far from being easy and automatic: addresses may change in time, and those stored in archive, like the one in use in an insurance company, might be unstructured and out of date; Italian Basin Authorities, in charge of hydrogeological hazard mapping, do not follow common rules neither for the definition of flood areas nor for data structuring (hazard classification, coordinates system, …). Therefore the realization of a "risk GIS" required hard data cleaning and harmonization in order to allow interoperability among datasets. On the one hand addresses contained in the insurance company archives, related to insured properties, were structured and georeferenced through a geocoding tool. The choice of the geocoder used derives from a comparative assessment of position accuracy provided by three different geocoders (Nokia, Google and Mapquest).





Img. 1 and 2 - Results from the relative and absolute accuracy tests on geocoded addresses.

Quality tests, as described in (Guzzetti et al, 2014) concerned:

- relative accuracy, determining which tool located the most of addresses up to the level of detail of house number;
- absolute accuracy, confronting geocoded addresses and surveyed addresses in use in public administration.

Even if results deriving from the abovementioned test are satisfactory, geocoded addresses are not considered certain until they're verified on field. As a consequence buildings positions are considered as a temporary data: on-site GPS survey will be conducted whenever the company will consider it worthwhile, like in case of tailor made policies related to high-value properties.
On the other hand geographic data concerning flood areas were collected, cleaned and reorganized. Due to their deliberative and financial autonomy, each Basin Authority produce its hazard map independently and there are no common procedures or methodologies about how to model hydraulic risk: nevertheless, in order to accomplish the duties related to the "Flood Directive" 2007/60/CE, the Ministry of the Environment released national rules (MATTM, 2013) leading off a standardization process of all the risk zone classification identified by the Basin Authorities. In order to produce a nation-wide hydraulic hazard map the research group proceeded with a first quick normalization of existing maps following rules and specification delivered by the Ministry: several aspects made this a time-consuming process,

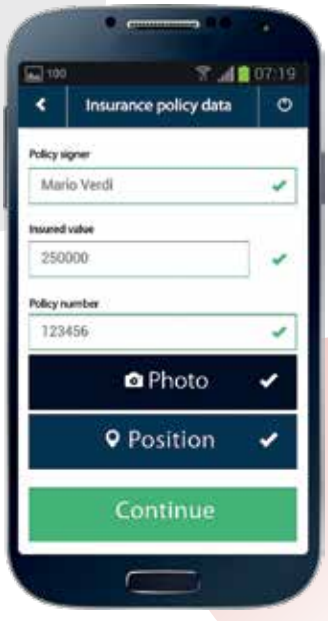
such as differences in hazard zones modeling and classification, coordinate systems, overlaps of different classification in cross-boundary areas, data availability and accessibility. Nevertheless it was possible to create a unified classification, in three hazard level, of all Italian flood areas, which may be substituted with new official data whose release is expected by June 2015.
The combination of these two spatial datasets allow a quick evaluation of hazard exposure of insured assets overlapping buildings positions, generated by geocoding, and flood areas, with different hazard level: this superimposition is realized through a web-GIS tool accessible by insurance agents, providing a first feedback about properties at risk. When the feedback is positive agents may consider, depending on the value of the properties involved, whether to apply a standard fare related to the hazard level detected or to proceed with an on-site survey in order to acquire more detailed information about building position and features that might increase or reduce losses in case of flood.
The pricing policy adopted by the insurance company follows a rewarding mechanism that make prices decrease when the hazard level is low or whenever flood-proofing measures, reducing buildings vulnerability, exist. On the contrary, policy premium for properties falling within frequently flooded areas with no mitigation measures adopted will increase. For this reason data collection on several parameters determining buildings vulnerability have to be submitted to the system in order to correctly define the

Img. 3 - Flood areas and geocoded addresses in Vicenza city.

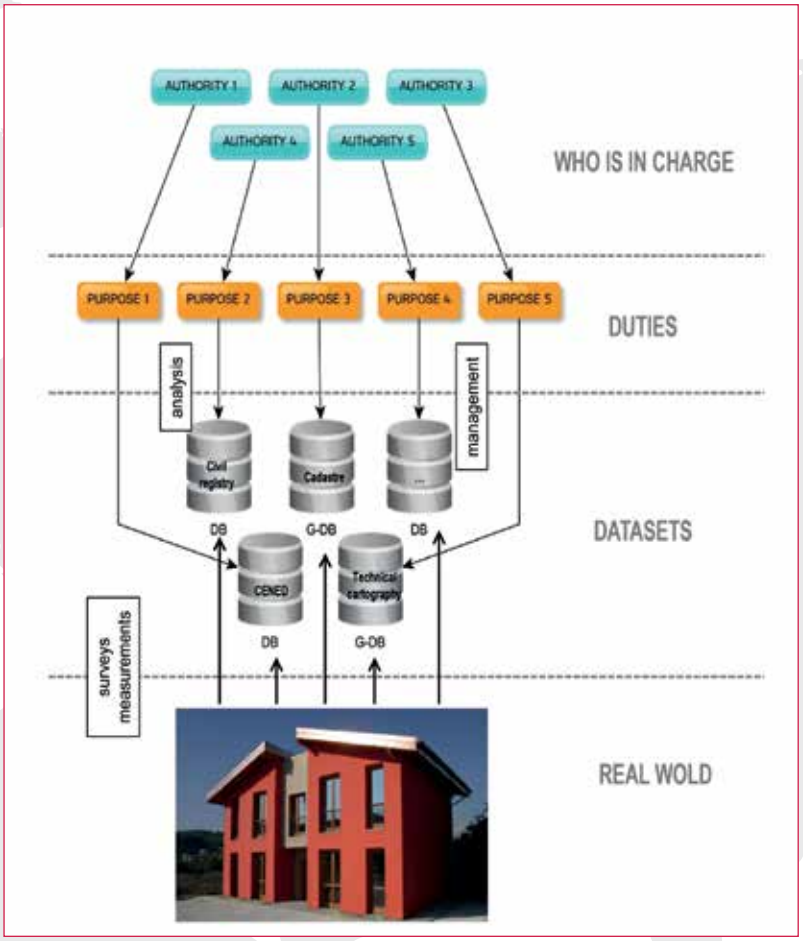
policy price: such parameters concern, for instance, the accesses and openings elevation compared to the height reached by the water, the presence of underground floors, the position of values inside the building, the adoption of flood proofing measures.
As a supporting tool for data collection, a mobile application integrated with the system were developed: this smartphone application lead insurance agents during the on-site survey, requiring them to insert information concerning the abovementioned parameters. Some of these information are acquired automatically, like the building position and height, thanks to the GPS antenna installed in each smartphone; others have to be inserted by the operator, like the number of floors included in the properties. Data gathered through the application are then uploaded to the system and used in the computation of the insurance premium.
After the research and testing phase, the new web-GIS management system is being progressively acquired by the ICT sector of the insurance company. The resort to GIS technology involved a cultural shift toward a geographic-based approach in a sector, like the insurance industry, that traditionally based its business on historic data and statistical analysis.

The potential for territorial risk reduction

The definition of a pricing policy that reward positive behavior in buildings protection contribute to trigger owners commitment in the adoption of protection measures, reduc-



Img. 4 - Mobile interface for data collection during on-site survey (smartphone version).



Img. 5 - One object, many data, different datasets: informative fragmentation concerning buildings.

ing the amount of damages that properties might be subjected to and, at the same time, allowing the company to apply fair and competitive price for insurance coverage. Moreover, the perspective of further damage reduction incentivize the insurance company itself to finance prevention services or the purchase of protection devices, whose price is decisively lower compared to refund costs in the aftermath. Even if not with structural interventions for risk reduction (like the construction of levees or overflow channels) the combined effect of many punctual protection measures will contribute in the general reduction of the effects and impacts of flood events. The experience accrued within this project opens up to some consideration concerning the general matter of territorial management and government. Traditionally, after catastrophic events, economic aid for recovery in disaster areas came from the central government: up to the present public resources have been mainly addressed to damage refunds, focusing on emergency intervention. Preventative measures hardly get public funding, even if investments on risk reduction and mitigation strategies might reduce the amount of damages and so restoration costs in the aftermath. It is not possible now to know whether the Italian State will introduce compulsory flood insurance for buildings, but it is important to enable citizens to act for their safety through the knowledge of the territory they live in. For this reason, the increase in public awareness concerning flood risk might be considered a priority in the public agenda: the spread of information to the population living in flood prone areas might encourage citizens themselves to adopt protection measure, in the same way that lower prices for insurance policy could do (Boer et al, 2013). In the "Google era", when interaction with geographic data became user friendly, new channels for the communication of risk information opened up. Often we state that data produced at different level might be open and accessible, but we should start to consider that the meaning of the word "accessibility" is twofold: from a technical point of view accessibility concerns data availability and interoperability, and spatial information describing hazards should be easily retrieved and structured in a standard format, allowing a universal comprehension of information produced by different authorities (Messner and Meyer, 2005); from a social point of view accessibility concern the possibility to access knowledge and get a complete comprehension of events citizens and assets might be exposed to before these events take place, even without being a flood risk specialist. If, on the one hand, it is correct that risk reduction and mitigation become a public concerns that include not only public administrator but also the citizens, on the other hand the provision of clear and understandable information aimed to increase public awareness is due (Manfré et al, 2012).

The role of geographic information in this cultural shift

As mentioned in the project described, the restoration to spatial information led to a cultural shift in the management of an insurance portfolio. In the same way, and as recognized by the technical community, geographic information management systems allow an efficient and integrated territorial government: unfortunately, this is far from being a common practice and even the datasets integration is still an open issue (Tóth et al, 2012). If we think about built assets, information describing different aspects of buildings are stored in many databases: building ownership is registered in the land registry; its geometrical features are described both in technical cartography and cadastral maps and documents, with different level of detail and update, with no positional or semantical connection; the related address recorded in the civil registry and in use by the municipal administrator do not necessarily correspond with the one recorded in the land registry; it is possible to determine whether this building fall within a flood area only identifying its position in a specific hazard map. What is missing is a common framework that allow the interconnection among different datasets related to one specific object: the building.
One simple solution that could be adopted to overcome this problem is the indication of the coordinate pair, unique in the world and not subjected to changes, identifying the building that data are referred to.
Also, the ongoing cadastral reformation process represent the occasion to create a qualitative informative hub where to collect all information concerning buildings, making cadaster a tool that provides not only support for fiscal purposes, but that concentrate knowledge for an integrated territorial management and the provision of innovative services to the citizenry.
Year 2014 was a period when, due to the high number of flood events that took place on our country, the theme of the impact of natural hazard on society gained a lot of attention and the current awareness on the topic has to be exploited before that people lose interest on it: now is the right time for a cultural shift toward a collective commitment in risk reduction that may start from an increased awareness supported by the widespread of information, enabling all stakeholders to contribute in disaster reduction.

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KEYWORDS

FLOOD RISK; FLOOD INSURANCE; RISK GIS.

ABSTRACT

During year 2014 the ABC department of Politecnico di Milano, with the technical support of R3 GIS company, undertook a research project with a major insurance company for the development of a management system aimed to support the underwriting process of flood insurance policies in the consumer market. The scope of the project was the creation of a GIS-based system that allow, on the one hand, to evaluate potential damages related to flood risks assumption and, on the other hand, to support commercial and price strategies in order to balance refund costs and guarantee financial solvency.

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

Video surveillance and satellite imagery for the territory monitoring

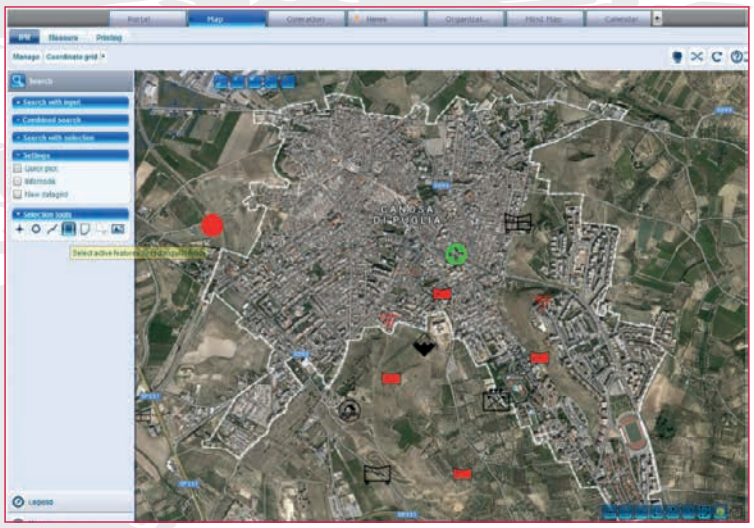
by Massimo Zotti

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.

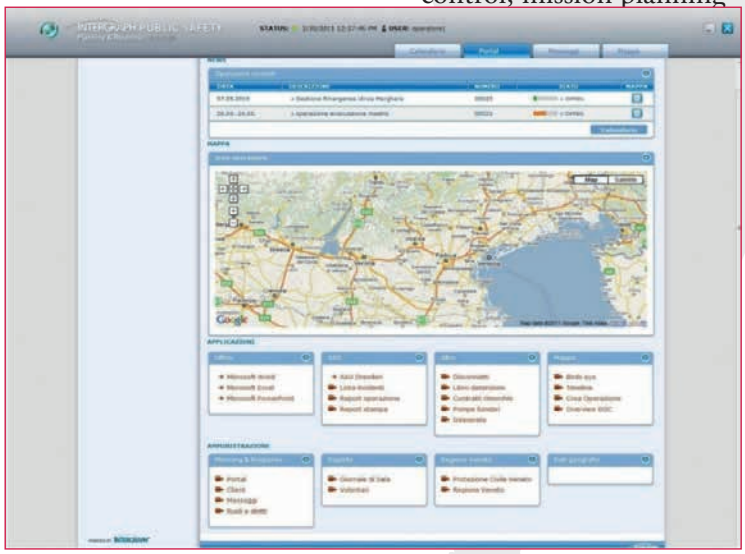
The SIMP system, Integrated System for Monitoring and Prevention of environmental crime, adopted by the Municipality of Canosa di Puglia is a component of the municipal Urban Control Center, dedicated to the activities of monitoring and prevention of urban environmental crimes, as well as to the analysis 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 geolocation. 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 infrastructure and high scalability (using specific vertical modules or, where necessary, customized 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 active 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, accessible to potentially unlimited users. Providing web tools to develop efficient and customizable 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 resolution 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.

MORE INFORMATION

• Overview and updates about the project on the Planetek Italia website

http://www.planetek.it/eng/simp_canosa

KEYWORDS

SIMP; Video surveillance; satellite imagery; territory monitoring

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.

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Dronitaly the event for Unmanned Vehicle System in Milan

by Fabrizio De Fabritiis

Dronitaly is the event dedicated to all Unmanned Vehicle Systems (aerial, aquatic or land) that unites the leading names in professional remotely piloted systems market: producers, distributors, aeronautical operators, service providers, flying schools, universities, institutions, regulatory authorities, associations and the media.

Dronitaly (25-26 September, Congress Center Atahotel Expo Fiera, Milan, Italy) is a solid business platform, where companies can showcase products, services, solutions and meet final users, big customers, investors, representatives from institutions and the public administration.
After the success of the first edition (October 2014), which attracted 2,300 professional visitors, 50 companies, 80 journalists and delivered an impressive, high-profile conference programme, Dronitaly has become a reference event for the professional drone market.
Dronitaly 2015 will be held on 25-26 September in a modern and functional venue: the Atahotel Expo Fiera Conference Centre, Milan. The venue is very close to the Universal Exhibition Expo 2015, a not-to-be-missed event that will attract thousands of tourists but also professional operators from all over the world.
Engineers, surveyors, architects, managers, investors, public administration officials dealing with agriculture, remote sensing, videoing or technical inspection, will attend Dronitaly 2015 to find the most suitable solutions for their business quickly and easily.
This year visitors are expected from abroad thanks to the intensive ongoing relationships with the main European UAS associations and the foreign chambers of commerce.
Dronitaly is also an opportunity to be brought up to date thanks to the huge program of conferences that will again this year see collaboration with professional bodies, universities, institutions and associations and will give a deep insight of many topics such as drone rules & regulations, precision agriculture, technical inspections by

drones, remote sensing and topography, marine drones, disaster management, FPV piloting and BVLOS.
Dronitaly is also realizing the first research on the Italian market together with the market research company Doxa Marketing Advice.
Involving companies from all areas of the industry (drone manufacturers, software vendors, producers of parts, flying schools, insurance providers among others), the research will put particular attention on business strategy and marketing. It will also provide operators, the public and the media with a valuable instrument for learning about and enhancing the drone market.

The results of this first market research will be presented on 25 September during the opening conference. And will provide operators and the market with a first snapshot of the drone industry in Italy. Plenty of space will be also given for workshops presented by exhibitors, an important opportunity to show the public how new technology and new operating applications function, in addition to providing a showcase for the latest professional drone models.
At Dronitaly both visitors and exhibitors have the chance to comprehend trends and evolutions on the horizon, get a unique, detailed picture of products, services and application and gain an overview of the sector that no other event can guarantee.

Dronitaly The event for civil UVS 25-26 SEPTEMBER 2015 MILAN-ITALY

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Efficient laser scanning – how the new Z+F IMAGER® 5010X profoundly changes the workflow

by Daniel Blersch, Christoph Held, Philipp Kresser

Img. 1 - The Z+F IMAGER® 5010X used head first high above the church's ground floor.

What do you really need regarding new laser scanning hardware to become more efficient? A faster system? Longer Range? Higher Resolution? The engineers at Zoller+Fröhlich (Z+F) think differently and redesigned the so-far general scanning workflow instead.

Scanning nowadays is a matter of a few minutes. A typical scan can be taken within one to three minutes. With colour another four minutes are needed, at least even with the best instruments out there. So instead of saving seconds here and there, the question is rather, how to make use of down-time of the staff while waiting for the next scan? And more importantly, how to reduce scan positions altogether? The more complex a site is the more people tend to over-scan the site, as they lose track of what has already been scanned. Have I covered all important details? Are the targets o.k., or is there enough overlap for the registration to work? Hence, instead of minimizing the amount of scans, one rather adds another couple of scans, just to be sure not to have forgotten any important detail or to have too little overlap.

After the scanning procedure in the field, the scans need to be registered together. As time on-site is usually more expensive, this so-called registration process happens back at the office. There are a couple of very good automatic solutions for cloud-to-cloud based registration, however, they do need a lot of overlap compared to a target approach. In many cases, especially because of symmetries, these algorithms also need adjustments by the user, so generally speaking, it takes another couple of hours or even days to finish the dataset, depending on the complexity of the project. Time which cannot be spent on other tasks. And what if something is missing? Going back? In some cases, revisiting a site might be too complicated or simply not possible.

The "Blue" Workflow

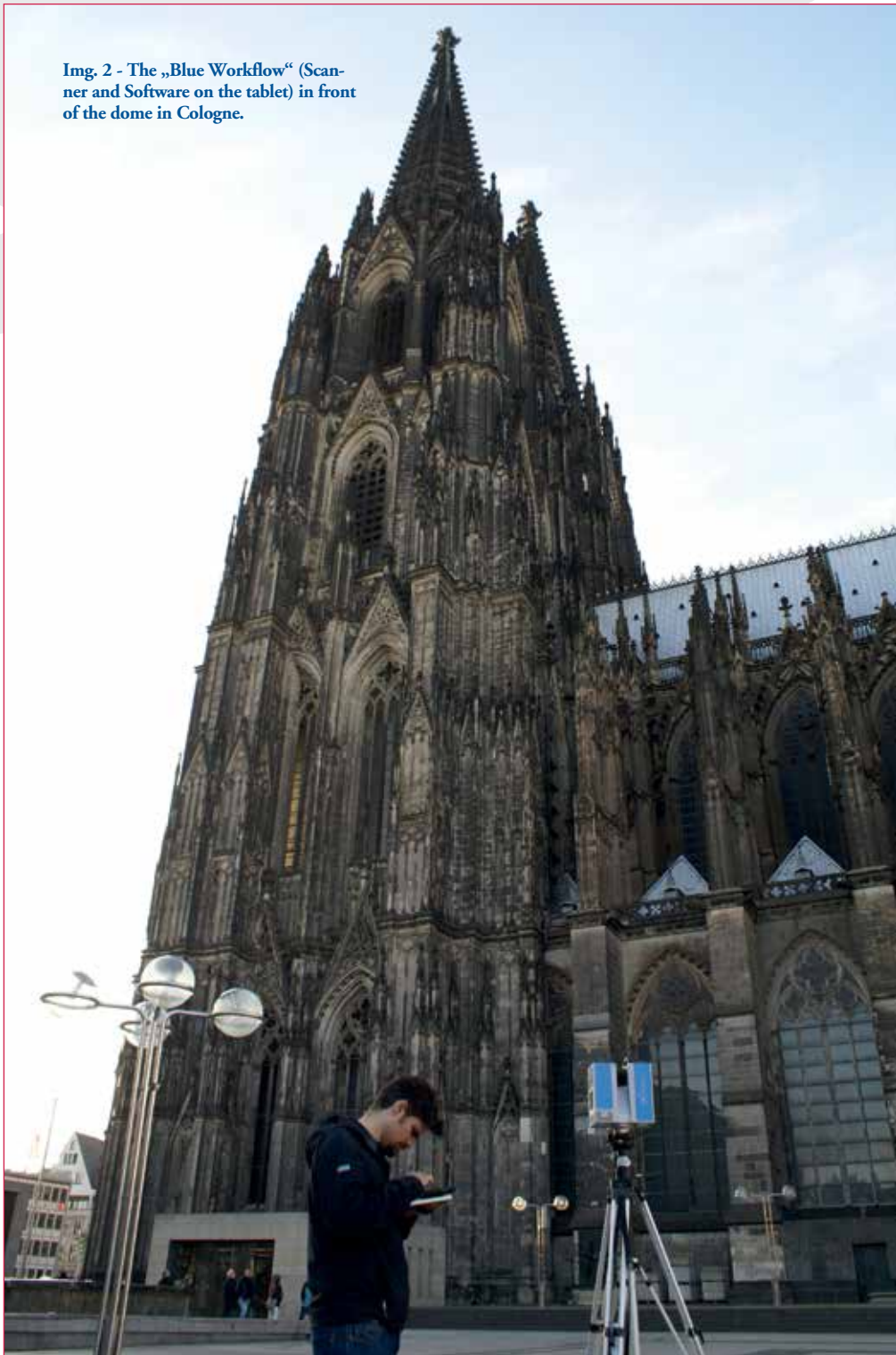
Z+F, known for innovations, has introduced a new, so-called "blue" workflow, where all scans are registered automatically, right on the spot, right on

site. After each scan, the data is quickly streamed to a tablet and it is automatically registered to any prior scan position. The user can also open the scan and inspect it live on site, to make sure all details are covered in high enough resolution. The download and registration process is completed within a few seconds, and finished long before one has to move the scanner to another position. Therefore the entire scanning procedure will not be held up or slowed down.
This solution is realized with new hardware and software. Current cloud-to-cloud registration algorithms require a rough initial alignment of two scans. The algorithm will then take this preliminary registration to refine it. There are solutions to automatically guess this initial alignment, however, on complex sites this is a very difficult task and the user needs to intervene often. To get a rough placement, Z+F has now integrated additional navigation sensors into the Z+F IMAGER® 5010X scanner to estimate the users current position. While carrying the scanner from one position to the next one, the current track is recorded and a position estimate can be shown at any point. This solution works not only outdoors via GPS but also – as an industry first – indoors with internal sensors.
The scan, together with the rough position estimate, is then transferred to a tablet computer, where the registration is automatically refined and finalized. To make sure the data transfer is running fast and smoothly even over longer distances, the scanner is equipped with large dual band antennas and operating with the 802.11n Wifi Standard.

Z+F LaserControl® Scout

Regarding the tablet, Z+F designed a tablet optimized software which allows to quickly check data as well as registration. Should there be any problem, e.g. there was not enough overlap, simply take an additional scan. There is no need to over-scan a site anymore or the risk of forgetting something. With this immediate feedback you can scan only what is really necessary and save a great amount of time.

Z+F provides easy adjustment tools to deal with various situations which could come up while working in the field. For example, one can group scans together for a better overview of the project when working on different building levels. It also easily allows to create new subprojects. Let's assume you have finished scanning a passage and need to continue somewhere else in the building, the new scan cannot be registered to



Img. 2 - The „Blue Workflow" (Scanner and Software on the tablet) in front of the dome in Cologne.

the previous passage, as there is no overlap yet. Scout allows putting the next scan aside and treating it like a sub-project. Once there is overlap between the two sub-projects, they can easily be merged again.

Synchronization

The solution is thought through from the beginning to the end. What happens if the tablet runs out of battery? Simply take a new one. Scout always synchronizes the current registration with the scanner. If a new tablet needs to be used, the scanner will stream all data, including the most recent registration onto the new tablet and you can continue from where you left off.

Targets

Because of the advancement of feature-based registration algorithms, targets are used less and less, however, in many projects they still have to be used. Z+F LaserControl® Scout can automatically detect all targets in scans and provide a 3D feedback for the user to verify the target center was acquired correctly. It can also register the project immediately, in order to be able to quickly check. If a target was moved or wasn't scanned in proper resolution, one will notice immediately. This is probably the strongest argument for the new scanning bundle Z+F IMAGER® 5010X and Z+F LaserControl® Scout. You can check your data right on the spot and make sure you have covered everything. You are enabled to identify issues on site, where you can still intervene, and make use of the time waiting for the next scan to finish or to resolve more important things in the scanning workflow. You will become more productive and return with a relaxed feeling, knowing you have everything you need. Combined with the integrated HDR technology for perfect

Img. 3 - Z+F's newest laser scanner used during the important scanning project at the dome of Cologne.

RGB data even in scenes with strong contrasts and the proven Z+F IMAGER® 5010 technology, the Z+F IMAGER® 5010X is the most efficient and versatile tool to be used in all major applications.
The new solution was tested on several interesting projects, industrial and cultural heritage. The most prominent project so far was the scanning of the cathedral in cologne.

Zoller + Fröhlich supports the student project "3Dom" of the Fresenius College in Cologne

The student project's objective is to document the Dome in Cologne three dimensionally in order to preserve it for generations to come. The idea of digitally conserving monuments, which may also be part of UNESCO world heritage sites, is not new and is already being exercised by various organizations – such as the Zamani Project.
Head of Department Christopher Wickenden (Fresenius College) followed up on this idea for his faculty 3D Mind & Media and started the project 3Dom with his colleague Douglas Pritchard, who works for Heriot-Watt-University and has a lot of experience in the field of 3D documentation. The project is being supported by the city of Cologne, cathedral works and Zoller + Fröhlich GmbH – a leading manufacturer of 2D and 3D laser measurement technology.
"The special challenges in this project are the size and the complexity of the object", says project manager Douglas Pritchard, who has already documented monuments such as Mount Rushmore in 3D. Many adorned pillars, ornaments, towers and statues require a very detailed measuring device, many measuring points and many scan positions. In addition, the factor "time" plays a very important role when it comes to funding such a project. In order to face these challenges, the Zoller + Fröhlich's Z+F IMAGER® 5010X was used in addition to the Z+F IMAGER® 5010C. This laser scanner, equipped with state-of-the-art technology, measures more than one million points per second up to a maximum distance of 187 m (approx. 617 ft.). The accuracy is in sub millimeter range. A strong advantage of this unique laser scanner is the determination of its own position using internal sensors and transfers the measured points of each position to the scanner software Z+F LaserControl® Scout. The software puts each scanner position together automatically and generates a three-dimensional image of the entire object, based on the transferred data of the scanner. All is performed automatically.

Another advantage of this system is that it allows the user to check the progress of scans or to detect potential gaps. In case there are any gaps, the Z+F IMAGER® 5010X can simply be put to the missing scanning positions in order to complete the data set with additional scans.
The project 3Dom of the Hochschule Fresenius is divided in two phases. The first phase included the documentation of the entire Dome in Cologne and was carried out successfully. This illustrated the possibilities of high-precision three-dimensional measurements for archiving and restoration purposes.
In the second phase, which will start in this year's August, the Dome will be documented in detail.

Please visit www.zf-laser.com for more information.

KEYWORDS

LASER SCANNING; 3D LASER SCANNING; 3D LASER SCANNER; AUTOMATIC REGISTRATION; EFFICIENT WORKFLOW; BLUE WORKFLOW

ABSTRACT

Laser measurement technology is developing at a fast pace. Laser scanners become faster, more accurate, more reliable and deliver additional information to the scan data – such as color. Yet not only data acquisition is important in the workflow, but also registration and pre-processing. Zoller + Fröhlich (Z+F) has recognized this aspect and has recently introduced a new scanner, which – in combination with a new software – changes the workflow profoundly and results in a higher efficiency.

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