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Press Release

Reconstruction and REcovery Planning: Rapid and Continuously Updated COnstruction Damage, and Related Needs ASSessment (RECONASS)

Terrorist actions often strike building and civil critical infrastructures of strategic interest, such as government buildings, airports, harbors, bridges, head offices of large corporations. The same buildings and critical infrastructure are often among the facilities damaged in a natural disaster. During such events the above facilities may exceed their functional or structural limits and this can be visible. On the other hand, they can also suffer enormous damage to their capacity without producing any apparent visible signs. Such damage, for instance, in the case of an earthquake, can render the facility incapable of surviving consecutive aftershocks. These aftershocks take place within few hours of the earthquake and can have an intensity of up to 90% of the earthquake intensity.

The post-crisis damage assessment process for constructed facilities is based mainly on on-site inspection by experienced engineers. When the visible signs of damage are not of the kind that points to a definitive damage or non damage state, further analysis is necessary. The problem is compounded by the shortage of experienced inspectors and the inevitable time delay caused by an in-depth structural analysis during which time a conservative position has to be taken and the facility stays closed. This is extremely painful in the case of critical facilities, such as, for instance, buildings necessary for the planning and management of early and full recovery (e.g., the Ministry of the Interior, or civil protection agencies), or hospitals, police and fire stations, bridges and tunnels essential for the passage of emergency vehicles.

In case of large scale events (e.g., an earthquake or regional conflict), recent advances in Information and Communication Technologies, including Earth Observation, can shorten the time for an initial inspection to identify damaged constructed facilities. Still, this is information that is based exclusively on what can be seen from outside the facility and can replace a first, rapid inspection, to quickly screen out the obviously safe and the obviously unsafe facilities, that usually takes some days, but it cannot replace the detailed inspection that follows to provide a more reliable estimate of the structural condition of the facility that takes some weeks.

Recent advances in accurate positioning inside constructed facilities, in smaller, less expensive, lower power wireless sensors and in computation, present the opportunity to combine these developments into the capability to estimate automatically, reliably, in near real-time, the structural condition and damage of monitored building and civil infrastructure following a hazardous event.

For immediate release or For release <time>, <Day>, <Date dd/mm/yyyy>

In this frame RECONASS aims to provide a monitoring system for constructed facilities that will provide a near real time, reliable, and continuously updated assessment of the structural condition of the monitored facilities after a natural or manmade disaster (e.g., an earthquake or explosive devices), with enough detail to be useful for early and full recovery planning. The above assessment will be seamlessly integrated with automated, near real-time and continuously updated assessment of physical damage, loss of functionality, direct economic loss and needs of the monitored facilities and will provide the required input for the prioritization of their repair.

Still another aim of RECONASS is to provide seamless interoperability among heterogeneous networks to secure that the required information from the monitored facility can reach, in near real-time, the base station even after difficult conditions, such as post-crisis situations (e.g., in a post-earthquake situation).

The detailed monitoring provided in RECONASS is only economical for selected facilities that are essential for response and recovery or facilities that have a high value as a target for terrorist attacks. In case of spatially extended events, in order to assess the physical damage in the whole affected area, the detailed assessment of damage in the monitored facilities will be used for the speedy local calibration of satellite and oblique aerial photography dramatically reducing the required time to inform the post disaster/crisis needs assessment process and provide base data for reconstruction efforts.

All of the above will be part of the RECONASS next generation post-crisis needs assessment tool in regards to construction damage and related needs. This tool will enable fusion of external information, provide international interoperability between the involved units for reconstruction and recovery planning and support the collaborative work between these actors.

RECONASS will have significant social and economic consequences that include:

- Relief organizations, insurers and banks can begin funding restoration efforts at a much earlier date
- Reconstruction activities will start earlier
- It will be easier to obtain international financing soon after the disaster when the disaster is still in the news.
- Emergency response crews will be provided with critical and timely information on damage in monitored facilities so that danger can be pinpointed and emergency response directed with precision.
- Disaster cost will be reduced by preventing monitored structures from collapsing to limit damage to adjacent structures and additional loss of life when explosive devices impact highly populated urban centers.
- Disaster costs will also be reduced when providing shoring to weakened monitored buildings to protect them from the aftershock sequence.
- Safety will be promoted when dangerous monitored buildings or portions thereof will be demolished.
- Knowledge of the structural condition of monitored buildings will reduce likely building-closure durations and consequently business interruption costs.
- Identification of the safe monitored buildings for immediate use will help the government find the physical infrastructure needed to provide essential services.
- Knowing the functionality of hospitals immediately after the disaster will help the government direct injured victims to available hospital capacity.

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- RECONASS information to all major recovery stakeholders (in the form that they need it) will help them acquire a common picture of the situation.
- Use of the RECONASS system will provide better situational awareness in case of any disastrous event helping to save lives, environment and culture
- Communication in case of disaster, such as guaranteed by the proposed communication gateway, in addition to helping the recovery efforts, can save lives.
- Early, effective handling of the reconstruction and recovery process will have long term financial repercussions

RECONASS is a project co-funded by the European Commission under FP7 that launched its activities in December 2013.

Apart from the dissemination of the project in the general public, as well as the exchange of information with other projects and organizations the same field work, ICCS is also responsible for the design and realization of the telecommunication solutions that will associate the control system and the data imputation with the central processing and visualizing station. This solution will include innovation of the interoperability of the means and the required resources for realization, providing at the same time a high level of credibility.

The reliable and continuous recording of construction failures through the specific control system, according to the ICCS scientists, can form an effective solution for the confrontation of many problems and to offer significant results, so much for the society as for the economy, as summarized below:

- Repairing activities in case of disasters will start much earlier.
- The emergency crews will have available important information about the condition of the disasters in the facilities.
- The cost of the disasters is expected to decrease, as the collapsing of inclined infrastructure will be avoided on time. In this way the nearby structures will be protected and the security of the citizens in densely populated occasions will be preserved.
- The demolition of facilities will become known faster.
- The knowledge of the normal state of the infrastructures will reduce the time that the buildings will not function as well as the economic loss from the pause of their use.

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- There will be immediate evaluation of the situation of critical infrastructures and public buildings (e.g. hospitals, ministries, etc) to be placed faster in the disposal of the authorities when facing crises.

- The use of the RECONASS system will provide improved operational knowledge in case of a disaster.

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Project Fact Sheet:

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Total cost: 5,479,161 €

EC contribution: 4,260,240 €

Coordinator: Institute of Communication and Computer Systems (ICCS)

Partners:

- Institute of Communications and Computer Systems, Greece
- Technical University of Dresden
- Swedish Defence Research Agency
- RISA GmbH
- TECNIC S.p.A.
- D. Bairaktaris and Associates Ltd
- GeoSIG Ltd.
- University of Twente, Dept. of Earth Systems Analysis, Faculty of Geo-Information Science and Earth Observation
- Federal Agency for Technical Relief

website: http://www.reconass.eu (to be available by the end of March 2014)

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