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Next Generation Damage and Post-Crisis Needs Assessment Tool for Reconstruction and Recovery Planning
Capability Project

Brochure & CD Demo for the Monitoring System and the PCCDN Tool

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Authors	**Name**	**Partner**
	Wayne Kimberlin	GS
	Reza Ghadim	GS
Contributors	**Name**	**Partner**
	Evangelos Sdongos	ICCS
Peer Reviewers	**Name**	**Partner**
	Corrado Sanna	TECNIC
	Roger Berglund	FOI
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EXECUTIVE SUMMARY

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. 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.

This deliverable D8.4 represents the fourth deliverable in WP8. The specifics covered in this deliverable are the Brochure & CD Demo for the Monitoring System and the PCCDN Tool.

Our approach with the brochure has been to keep the message short and simple and to the point in line with the exploitation approach and the product website www.shoxsolutions.com. The brochure can be seen in this report.

For the CD Demo for Monitoring System and PCCDN Tool we have already demonstrated this software working at the demonstration in August 2016. In this report we have discussed the different methods we may use to deploy a demonstration version of the CD Demo for Monitoring System and PCCDN Tool software and how we plan to achieve it.

INTRODUCTION

1.1 General Project Overview

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 or days 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.

Figure 1 - RECONASS Response & Recorvery

RECONASS has provided a proof of concept demonstrator monitoring system for constructed facilities that will provides a near real time, reliable, and continuously updated assessment of the structural condition of the monitored facilities after a disaster, with enough detail to be useful for early and full recovery planning. The assessment is 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. This was demonstrated at the RECONASS pilot demonstration in August 2016. This can be seen illustrated in Figure 2 and Figure 3 below.
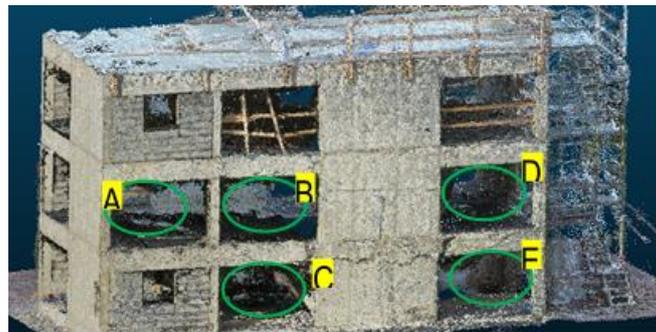
Figure 2 - RECONASS Pilot Building

Figure 3 - RECONASS Post simulated distaer data capture
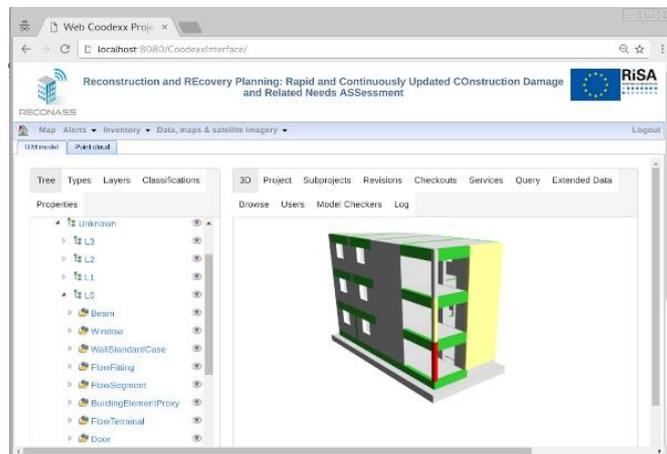

Figure 4 - RECONASS PCCDN Tool

1.2   Deliverable Overview

This deliverable is the 4th deliverable from work package 8 and has the specific description from the description of work.

> *D8.4) Brochure and CD demo for the monitoring system and the PCCDN Tool: This deliverable will include the production of a brochure and a CD demo for the PCCDN and the monitoring system. They will both be used towards wider dissemination of the project results*

This deliverable specifically relates to the following task

Task 8.5: Production of Support Products (Task Leader: GS). Such products will include documentation in a form that is easy to understand and accepted by potential users. They will also include a brochure and a CD Demo for the PCCDN Tool and the Monitoring System that will be used to present the results to major users. A printable version of this brochure will be available on the web site. Partners' Roles: GS, the task leader, will be in charge of the production of support products, produce a brochure and CD demo for the proposed monitoring system and PCCDN Tool and present the project results to major potential end-users.

The production of this support material is described in section 2 and 3 of this report.

2   BROCHURE

Our initial approach taken in with the brochure delivered D8.2 was to keep the message short and simple and to the point in line with the exploitation approach and the product website www.shoxsolutions.com. After some thought and feedback we decided to stay with this approach for this deliverable, which is an updated version of the brochure developed for D8.2.

So the basic aim of the brochure remains to be able to generate interest from the specific end user groups identified in the previous work packages. We have led on the Phrase 'Structural Health Monitoring in a Box', in order to quickly explain what the RECONASS system is. This approach is based upon GeoSIG's successful experience within this market place.

We circulated the brochure internally and within parts of the consortium. On the basis of the feedback we received from this circulation we have made a number of amendments. These amendments are mainly cosmetic and include the following
- Use of higher resolution images where possible.
- Recreation of title, so that it appears in higher resolution.

As before, the brochure can be seen Figure 5 and Figure 6. The brochure is designed in a foldable A5 format.

Although this is the final issue for the use of the project, GeoSIG will continue to develop the brochure artwork and adapt it as the technology develops. GeoSIG will continue to use it at events and as they meet potential end users to stimulate the market interest.

Temperature

At elevated temperatures the very materials used to construct the building can be begin to degrade. For this reason temperature sensors are embedded into the structure of the building.

Image

The UAV performs a detailed damage assessment along exterior elements of the building using remote sensing images. Remote sensing-based damage maps are provided, using both air- and space-borne imagery. Near real-time construction damage data from the monitored buildings are used in order to effectively calibrate and evaluate these maps.

Structure Assessment

The PCCDN tool takes all sensor and UAV information that has been stored in the cloud by the gateway tool and combines it with other information to determine the structural damage and deduce the post crisis needs.
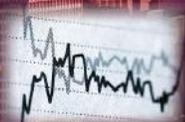
Loss Assessment

The PCCDN Tool provides the recovery stakeholders with near real-time, detailed and reliable data and information on the construction damage and loss.

Web

Sensors' observations are inserted/retrieved in/from the PCCDN database with the use of OGC compliant Sensor Observation Services. Special procedures are followed to store and retrieve info from each of the calculation modules. Wireless network interfaces and Ethernet wires complete the SHOX system set-up.

We are making a special introductory offer to the first 10 installations of SHOX. Please visit:
http://www.shoxsolutions.com/contact for details.

SHOX
Structural Health Monitoring in a Box

Your Building's Nervous System

Imagine if your building had the ability to make an accurate assessment of damage. When the human body is harmed, the nervous system senses and reports damage. If a building could do the same, damage assessment would be easier, faster and more reliable. So that, your building is able to have its functionality restored and generate income again — in a much shorter timescale. The need for better damage assessment has been recognised and SHOX addresses this need.

SHOX is a brand new, state-of-the-art structural health monitoring system. It is a modular and configurable system that uses state-of-the-art ground and aerial sensor technology to remotely monitor any building.

www.shoxsolutions.com

"SHOX development has been supported by EC funding via the RECONASS Project"

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Figure 5 - Brochure Page 1 & Page 4

FEATURES

- Modular based system adaptable for many applications
- Retrofittable – SHOX can be retro-fitted to any building or structure
- High resolution 'state-of-the-art' sensors
- Remote access to monitoring data stored in cloud

BENEFITS

- Faster disaster response used in operations and resulting in large economic savings
- Accurate recovery and reconstruction planning
- Near real time monitoring
- Rapid structural and loss assessment

Modules include:

Position

SHOX has developed small, inexpensive, wireless, local positioning tags embedded in the structural elements of the monitored buildings to report their position to the base station. The wireless local positioning tags measure the displacement of structural elements using radio frequency signals.

Acceleration

Accelerometers are embedded within the system to assess the magnitude and direction of movement caused by an event. Accelerometers measure the acceleration at the various parts of the building or structure subjected during an event. The acceleration magnitude is passed to the data hubs.

Gateway — The Communication Gateway is a core module as it collects information from all of the sensors, manages the networks, and is responsible for interface and alerts.

Strain

During a collapse event structural members of the building may be subject to excessive loads. To monitor these loads during and after such an event, the building is equipped with embedded strain gauge sensors. These strain gauges will indicate the changes in strain to which the structural members have been subjected.

HOW SHOX WORKS

SHOX acts like an aircraft 'black box' or nervous system for a building or structure. It provides a monitoring system for the building or structure in a near real time, reliable manner. It uses sensors to continuously update an assessment of the operational loadings and structural condition of the building, during normal operation and should a disaster occur. In the event of a disaster, it has enough detail to be useful for early and full recovery planning.

It uses state-of-the-art sensors to provide detailed information about movement and stress and temperature conditions within the building structure. Additionally it collects satellite and aerial (UAV) imaging data for the monitored structure. All of this data is transmitted to a central 'cloud based' monitoring hub. Through computer analysis, SHOX reports the structural health of the building. 3D models allow damage to be visualised and animated — suitable for engineers, rescue workers and building owners. This creates an accessible pool of information which can be accessed remotely.

A realistic pilot test was successful and validated the developed SHOX system.

Figure 6 -Brochure Page 2 & Page 3

3   CD DEMO FOR THE MONITORING SYSTEM AND THE PCCDN TOOL

At the time of writing the original RECONASS proposal, one of the most common methods for software deployment was the use of a CD ROM. Some 5 years later the CD ROM method of software deployment is now much less common. Instead software developers choose to deploy software online via downloads or a server based application, sometimes referred to as the cloud.

At the time of writing the first CD demo report in D8.2, we had a choice of deploying the 'DEMO FOR THE MONITORING SYSTEM AND THE PCCDN TOOL'. These choices were:

- CD ROM
- DVD
- Online down load and install
- Online Server based demo

Discussions regarding these choices took place around the following points of consideration.

CD ROM:
This technology is a little outdated. Many PC's do not have CD ROM drives fitted now. Also we would need to write different software applications for PC and Apple MAC based systems.

DVD:
Again it is common that PC's do not have DVD drives fitted as standard now. Also we would need to write different software applications for PC and Apple MAC based systems.

Online download and installation:
This method would enable easy deployment and also the ability to capture contact information about the user requesting a download. Again, we would need to write different software applications for PC and Apple MAC based systems.

Online Server based web demo:
This method would enable us to capture user contact information at the time the user requests login credentials. Also it would enable the future possibility of the user interacting with live data. Finally this method is hardware platform independent.

In conclusion then, at this time the preferred method is an online web demo version. To deploy this version will require a significant investment in the development of a public accessible interface which complies to the required web security and accessibility standards.

At this time the partner placed to develop and deploy such a web demo log in is RISA, as they developed the PCCDN tool. RISA are now able to offer a web login access to the system and we are in the process of making this available on the www.shoxsolutions.com website.

Below we present the steps an interested stakeholder should follow for scheduling a web demo of the RECONASS PCCDN tool:

1. To contact Mr. Evangelos Sdongos (evsdongos@iccs.gr) and Mr. Stephanos Camarinopoulos (s.camarinopoulos@risa.de) for scheduling an appointment to hold the web demo by using in the e-mail title "RECONASS-PCCDN Web DEMO Request"
The PCCDN Web DEMO is expected to last approx. 90 minutes and it will include a 45 minute presentation of the PCCDN tool's capabilities and configuration parameters and a 45 minute

demonstration where the interested user may navigate within the tool and create various scenarios by changing the tool's operational parameters.

2. The interested stakeholder will receive an information package about the PCCDN tool as well as three different date options for scheduling the web demo (at least 1 week time).

3. After scheduling the demo date and time the user will receive unique credentials and the web-links* for accessing the tool. In parallel with the demo a video-conference session will be realised for the RECONASS personnel to inform, orientate and assist the user during the demo session.

*The web-links for accessing the PCCDN tool will be of the below format. Please follow below links to have a glimpse of the tool's user interface prior to the demo. The building visualised is the pilot building where the RECONASS monitoring system has been tested (http://reconass.eu/index.php/media-centre/reconass-pilot-test-external-explosion)

- BIM Viewer: https://bim.risa.eu/?page=Project&poid=131073&tab=3dview
- Blast1 pointcloud: https://pointcloudview.risa.eu/blast01/portal.html
- Blast1 pointcloud: https://pointcloudview.risa.eu/blast02/portal.html