7th Framework Programme

FP7-SEC-2012.4.3-1

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

Capability Project

The Proceedings of the Workshop in Month 42

Deliverable No.	D9.5		
Workpackage No.	WP9	**Workpackage Title**	Dissemination Activities
Author(s)	S. Camarinopoulos (RISA); E. Sdongos (ICCS)		
Status	Final		
Version No.	V1.00		
File Name	'RECONASS_D9.5_The_Proceedings_of_the_Workshop_in_Month_42_V1.00'		
Delivery Date	May 31, 2017		
Project First Start and Duration	Dec. 1, 2013; 42 months		

DOCUMENT CONTROL PAGE

Title		
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Format	Text-MS Word	
Language	en-UK	
Work Package	WP9	
Deliverable Number	D9.5	
Due Date of Delivery	31/05/2017	
Actual Date of Delivery	1/06/2017	
Dissemination Level	PU	
Rights	RECONASS Consortium	
Audience	☒ public ☐ restricted ☐ internal	
Revision	(none)	
Edited by		
Status	☐ draft ☒ Consortium reviewed ☒ WP leader accepted ☒ Project coordinator accepted	

REVISION LOG

Version	Date	Reason	Name and Company
V 0.01	3/5/17	Initiation	S. Camarinopoulos (RISA)
V 0.02	16/5/17	Review and Modification/extension	E. Sdongos (ICCS)
V 0.03	30/5/17	Final review and respective modifications	A. Tsertou (ICCS)
V1.0	1/6/2017	Final version by RISA	S. Camarinopoulos (RISA)

LIST OF FIGURES

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ABBREVIATIONS AND ACRONYMS

ABBREVIATION	DESCRIPTION
DBA	D. Bairaktaris & Associates Structural Design Office LTD
EC	European Commission
FOI	Swedish Defense Research Agency
GIS	Geographic Information Systems
GS	GeoSIG AG Switzerland
ICCS	Institute of Communications and Computer Systems
INACHUS	Technological and Methodological Solutions for Integrated Wide Area Situation Awareness & Survivor Localisation to Support Search and Rescue Teams
ISCRAM	(Information Systems for Crisis Response and Management
ITC	University of Twente, Department of Earth Systems Analysis, Faculty of Geo-Information Science and Earth Observation
RISA	RISA Sicherheitsanalysen GmbH/RISA Safety Analysis Ltd
TECNIC	Techniche e Consulenze Nell' Ingegneria Civile SPA - Consulting Engineers S.p.A
THW	Federal Agency for Technical Relief
TUD	Technical University of Dresden

EXECUTIVE SUMMARY

The partners decided to organise the final RECONASS Workshop in conjunction with an international event of the disaster management community in order to reach a wider audience and enhance the impact of the results.
To this end RECONASS (together with the project INACHUS) have been accepted to chair a track and organise a Workshop on 'Post-Crisis Damage and Needs Assessment of Buildings for Response, Reconstruction and Recovery Planning' under ISCRAM 2017 (https://iscram2017.mines-albi.fr/).
The INACHUS (Technological and Methodological Solutions for Integrated Wide Area Situation Awareness & Survivor Localisation to Support Search and Rescue Teams) project (www.INACHUS.eu) is a 7th FP IP project that aims to achieve a significant time reduction in the Urban Search and Rescue phase providing wide-area situation awareness and simulation tools for predicting structural failures. INACHUS, thus, complements RECONASS in some research areas and operational aspects, while the two projects share the same coordinating partner and two additional partners.
ISCRAM (Information Systems for Crisis Response and Management) is an international community of researchers, practitioners and policy makers involved in or concerned with the design, development, deployment, use and evaluation of information systems for crisis response and management. The ISCRAM conferences have been held annually since 2004.
The workshop was a success including 19 people outside the RECONASS consortium that came from civil protection, disaster risk management, situation monitoring, red cross, fire brigades, research groups, industries and users. The participants commented that it is very useful that the RECONASS system is interoperable and that it provides the capability of integration with first responders' applications.

1. INTRODUCTION

Buildings are often among the main facilities damaged in either a natural or manmade disaster. In the unfortunate events of an earthquake or an explosion, 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 original 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 buildings, such as, for instance, buildings necessary for the disaster planning and management (e.g., the Ministry of the Interior or civil protection agencies) or buildings that serve the affected population, such as hospitals, police and fire stations, schools, etc.

1.1 Objectives of the Workshop on 'Post-Crisis Damage and Needs Assessment of Buildings for Response, Reconstruction and Recovery Planning'

The objective of this Workshop is to discuss the importance and trends in structural and non-structural assessment techniques and methods (structural health monitoring systems) applied in buildings as a means to assess the damage and safety of the building and avoid, if possible, partial or total collapses when disaster strikes (e.g., earthquakes, explosions, etc.). Such assessments include - but are not limited to - the deployment of novel monitoring sensor networks (in-building, environmental and aerial sensors) in conjunction with additional information and disaster management systems that provide the stakeholders rapidly with an evaluation of the magnitude of the disaster. Additionally, the assessment reports generated drive response, reconstruction and recovery planning efforts towards saving lives, restoring functionalities and rebuilding better buildings.

1.2 Workshop Topics

- Structural and non-structural engineering
- Emergency management and planning
- Training and simulations
- Collaboration and integration
- Response and health monitoring of structures
- Lessons learned from recent earthquakes and explosions
- Case studies
- Economic implications of seismic/terrorist attacks, risk and resilience
- Damage avoidance design

1.3 Workshop Organizers

The workshop is driven by the following projects:
1. RECONASS - Reconstruction and REcovery Planning: Rapid and Continuously Updated COnstruction Damage and Related Needs ASSessment -

Project's Goal: The work provides a monitoring system for constructed facilities that produces 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 both early and full recovery planning. The above 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 provides the required input for prioritization of the repair.

Consortium: The RECONASS consortium comprises 10 partners (4 SMEs, 1 Civil Protection Agency and 5 research/academic partners) from 7 EU countries. The project also features a wide end user group of more than 50 members, including civil protection agencies, insurance companies, damage map and monitoring system providers and assessment experts.

2. INACHUS - Technological and Methodological Solutions for Integrated Wide Area Situation Awareness & Survivor Localisation to Support Search and Rescue Teams -

Project's Goal: INACHUS aims to achieve a significant time reduction related to Urban Search and Rescue (USaR) phase by providing wide-area situation awareness solutions for improved detection and localisation ofthe trapped victims assisted by simulation tools for predicting structural failures and a holistic decision support mechanism incorporating operational procedures and resources of relevant actors.

Consortium: INACHUS partnership has been carefully selected to form a balanced consortium regarding all aspects, including R&D (8 partners), public entities (3), large companies (3) and SMEs (6) from 9 EU member states and 2 associated countries.

1.4 Agenda, Sunday, May 21, 2017

The workshop was structured as follows:

Workshop on
"***Post-Crisis Damage and Needs Assessment of Buildings for Response, Reconstruction and Recovery Planning***"

organised by,

RECONASS

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

&

INACHUS

Technological and Methodological Solutions for Integrated Wide Area Situation Awareness and Survivor Localization

Workshop Venue:
École des Mines d'Albi, Allée des sciences Campus Jarlard - Route de Teillet 81013 ALBI CT 09, Tél : 05 63 49 30 99
Room 0F03
GPS coordinates: Lat.: 43.922441 Long.: 2.178785

Workshop Chairs:
Dr. Angelos Amditis, Research Director – ICCS (A.Amditis@iccs.gr)
Mr. Evangelos Sdongos, Project Manager – ICCS (esdongos@iccs.gr)
Dr. George Athanasiou, Project Manager – ICCS (george.athanasiou@iccs.gr)

08:00 – 09:00	**Registration**
09:00-09:10	"Welcome & Introduction to the Workshop" (Dr. Angelos Amditis, Research Director – ICCS, INACHUS and RECONASS Project Coordinator, Workshop Chair)
09:10-09:30	"JRC+IFB Field Reporting Tool applied to Middle Italy earthquake event", Daniele Alberto Galliano, Scientific Project Officer, European Commission Joint Research Centre – JRC.E.1, Disaster Risk Management Unit Mr. Daniele A. Galliano, is an electronic engineer and works for the EC since 2007 as a developer of IT solutions for Crisis Management. This role includes the design and the implementation of facilities like Crisis Room (notably the one of the Department of Civil Protection of Haitian Republic in Port-au-Prince) and the technical responsibility of the European Crisis Management Laboratory.
09:30-09:50	"Using technology and the power of the crowd to improve emergency response", Mr. Tomer Kaplan, Senior Disaster Management Officer, Magen David Adom in Israel Mr. Tomer Kaplan is a senior disaster management officer at MDA since 2007. Mr. Kaplan teaches in Ben-Gurion University in the department of emergency medicine and he acts as Medical Supervisor of the southern region in Israel. Mr. Kaplan was deployed to Nepal following the earthquake in 2015 as a public health delegate for the Norwegian Red Cross.
09:50-10:10	'Civil Protection Operations-Gaps and Future Trends' Michael Markus, Building Monitoring Team - Safety and Security Officer, Federal Agency for Technical Relief - Technisches Hilfswerk (THW) Michael Markus holds a diploma in Aerospace Engineering (University of Stuttgart) and was responsible for different research projects about disaster response and urban search and rescue at the Karlsruhe Institute of Technology/University of Karlsruhe (I - LOV, CPC 461 'strong earthquakes'). He is a member of the German Agency for Technical Relief THW, where he is responsible for a building monitoring team for search and rescue operations and as safety and security officer. He is a member of the THW FP7 RECONASS research team. His research interest includes building collapse classification, collapse modeling and user requirements.
10:10-10:30	"Earthquake Nepal, 2015 – A structural assessment: Examples & lessons learnt towards resilient buildings" Åke Solfeldt, Structural Engineer – Project Manager, WSP & Swedish Civil Contingencies Agency - Swedish International Fast Response Team, Urban Search And Rescue Mr. Åke Solfeldt is a Civil Engineer with 27 years of experience in the field of a structural engineering. He has worked for WSP since 2001. During 2008-2009, period of 18 months, he was stationed in Shanghai as an interface engineer for steel structures. During 2010-2013 he was the team leader and responsible engineer for the complete precast structure of Tele2 Arena in Stockholm. Since 1990 most of his projects have been buildings of different kinds. Since 2014 he is a volunteer for the MSB´s SWIFT USAR team. His position is as the structural engineer of the team (Swedish Civil Contingencies Agency - Swedish International Fast Response Team, Urban Search And Rescue). In 2015 his USAR team deployed to Nepal directly upon/after the earthquake 7.8. In Nepal he performed rapid visual assessments of earthquake affected buildings such as hospitals.
10:30-11:00	Break

11:00-11:20	"RECONASS Monitoring System & the Damage Assessment Platform" , Evangelos Sdongos, RECONASS Project Manager, Institute of Communication & Computer Systems (ICCS) The CV of the presenter is referred to in the section presenting the workshop chairs found below.
11:20-11:40	"HOT - Crowd-sourced area based damage assessments and comparative damage rankings", Melanie Eckle, Research Assistant HeiGIT - Disaster Mapping and Management, GIScience Research Group, Department of Geography, Heidelberg University. Ms. Melanie Eckle is a research assistant at the disaster mapping and management department of the Heidelberg Institute for Geoinformation Technology (HeiGIT) at Heidelberg University. She moreover is an active member of the Humanitarian OpenStreetMap Team (HOT) which she aldo supports as part of the Board of Directors. Therefore, her main work and research focus is on the use of crowdsourcing and user-generated geodata for disaster management and humanitarian purposes. In the scope of the workshop she will be introducing one of her current projects with HOT, the Stanford Urban Resilience Initiative (SURI), the World Bank's Global Facility for Disaster Reduction and Recovery (GFDRR), the University of Colorado and Heidelberg University on crowdsourced area based damage assessment.
11:40 – 12:00	"The INACHUS System for Buildings Assessment and SAR Operations" , Dr. Angelos Amditis, Research Director – ICCS, INACHUS and RECONASS Project Coordinator, Workshop Chair The CV of the presenter is referred to in the section presenting the workshop chairs found below.
12:00 – 12:20	"3D laser imaging techniques to improve USaR operations for wide-area surveillance and monitoring of collapsed buildings" Nicolas Riviere, ONERA – The French Aerospace Lab, F31055 Toulouse, France Abstract[1]: 3D laser imaging systems operate at night in all ambient illuminations and weather conditions. These techniques can perform the strategic surveillance of the environment for various worldwide operations (up to long ranges). ONERA, the French aerospace lab, develops and models new active imaging concepts based on new sensor technologies. The knowledge of the relevant physical phenomena impacting on the performances of such 3D-lidar techniques is essential to face the new scientific challenges. This presentation will be illustrated by applications such as the ones of the European project INACHUS. INACHUS will improve the detection and localization of trapped victims. It aims to achieve a significant time reduction related to Urban Search and Rescue (USaR) phase by providing wide-area situation awareness solutions.
12:20-14:00	Lunch
14:00 – 14:20	"A Common Operational Picture for wide-area situational awareness and emergency response planning", Anita Schilling, 3D-R&D Software Engineer, DIGINEXT Abstract: This presentation will demonstrate how a Common Operational Picture can aid wide-area situational awareness by presenting on-going developments on situation and environment monitoring from

[1] While the former were key note speakers of the workshop, the current and the following presentation were on the basis of a concept paper submitted to the workshop.

	the ZONeSEC European project and emergency response management from the INACHUS European project.
14:20-15:20	Panel Session – RECONASS Evaluation Civil Protection community needs for resilient buildings (part A) Moderators: Michael Markus (THW), Evangelos Sdongos (ICCS)
15:20-16:00	Break
16:00-17:00	Panel Session – RECONASS Evaluation Civil Protection community needs for resilient buildings (part B) Moderators: Michael Markus (THW), Evangelos Sdongos (ICCS)
17:00-17:15	Meeting Closure - Conclusions

1.5. Workshop Committee

The Workshop Committee was structured as follows:

Organising Chairs

- Angelos Amditis, Institute of Communication and Computer Systems (ICCS) and National Technical University of Athens (NTUA), A.Amditis@iccs.gr
- Evangelos Sdongos, Institute of Communication and Computer Systems (ICCS) and National Technical University of Athens (NTUA), esdongos@iccs.gr
- George Athanasiou, Institute of Communication and Computer Systems (ICCS) and National Technical University of Athens (NTUA), george.athanasiou@iccs.gr

Publicity Chair

Stefanos Camarinopoulos, RISA Sicherheitsanalysen GmbH, s.camarinopoulos@risa.de

Technical Programme Committee

- Konstantinos Loupos, Institute of Communication and Computer Systems, Greece
- Lazaros Karagiannidis, Institute of Communication and Computer Systems, Greece
- Athanasia Tsertou, Institute of Communication and Computer Systems, Greece
- Frank Ellinger, Technical University of Dresden, Germany
- Niko Joram, Technical University of Dresden, Germany
- Rickard Forsen, Swedish Defense Research Agency, Sweden
- Dimitris Bairaktaris, DBA Ltd., Greece
- Reza Ghadim, GeoSIG, Switzerland
- Norman Kerle, University of Twente, Department of Earth Systems Analysis, Faculty of Geo-Information Science and Earth Observation, The Netherlands
- Francesco Nex, University of Twente, Department of Earth Systems Analysis, Faculty of Geo-Information Science and Earth Observation, The Netherlands
- Corrado Sanna, TECNIC Consulting Engineers, Italy
- Vassilis Kallidromitis, TECNIC Consulting Engineers, Italy
- Hassan Sgivari, Anglia Ruskin University, UK
- Annika Mitschke, Federal Agency for Technical Relief, Germany
- Klaus-Dieter Buttgen, Federal Agency for Technical Relief, Germany
- Arjen Boin, Crisisplan, The Netherlands

- Nicola Riviere, ONERA, France
- Frederique Giroud, CEREN/ENTENTE, France
- Giancarlo Marafioti, SINTEF, Norway
- Gustav Tolt, Swedish Defense Research Agency, Sweden
- Werner Riedel, Fraunhofer EMI, Germany

Workshop Chair and Co-Chairs

Angelos Amditis (A.Amditis@iccs.gr), Institute of Communications and Computer Systems

He is Research Director at the Institute of Communications and computer Systems (ICCS) and member of its Board of Directors. He is the founder and the Head of the I-SENSE Group (http://i-sense.iccs.gr). Dr Amditis received his MSc in Electrical and Computer Engineering in 1992 and his Ph.D. in Electrical and Computer Engineering (Telecommunications) in 1997 from the National Technical University of Athens (NTUA) and has been teaching in various courses (communication and computer networks, communication theory) of the Electrical and Computer Engineering Department of NTUA, of ICCS and of the Hellenic Naval Academy. He acted as an EU evaluation expert and as reviewer in a number of scientific journals. He is the writer of several peer reviewed journal articles, book chapters and many conference papers. He has participated in more than 60 projects in the last 10 years and he is currently the coordinator of the following projects: SAFERtec, NeMo, AutoNet2030, FABRIC, SENSKIN, RECONASS and INACHUS.

Evangelos Sdongos (esdongos@iccs.gr), Institute of Communication and Computer Systems

He holds a MSc in Telecommunications and Information Technology from the ECE Dept. of Patras University and has extensive experience in the design, implementation and integration of mobile communication networks, embedded systems and sensors, security and emergency communication systems. Moreover, his recent research activities include automation capabilities of complex sensor networks for security applications. He has worked in several industrial projects and is actively participating in several FP7 and H2020 projects, such as PPDR-TC, eVACUATE, NEXES, PASSME and RECONASS as project technical and quality manager. He has obtained an MBA from the Hellenic Open University (2016) and is currently a Ph.D. candidate at the National Technical University of Athens. Ha has published several articles in conference proceedings and journals.

George Athanasiou (george.athanasiou@iccs.gr), Institute of Communication and Computer Systems

He received the diploma in Electrical and computer Engineering from the University of Thessaly in 2005. In 2010 he obtained his Ph.D. degree in Electrical and Computer Engineering from the same University. He spent several years working as a researcher in Academia (KTH Royal Institute of Technology in Sweden, Information Technologies Institute at the Centre for Research and Technology Hellas, Electrical Engineering School at the Polytechnic Institute of New York University and University of Piraeus Research Centre) and Industry (Telefonica Research and Intracom Telecom). He was also co-founder and Chief Technology Officer of Aukoti AB, a Swedish start-up on sensor networking and building automation. He has authored more than 50 publications in international journals and refereed conferences. Since September 2014 he is with the ICCS/I-SENSE group working as a Technical Manager in EU research projects.

2. WORKSHOP PRESENTATIONS

In what follows, the presentation slides from all presenters are shown in the order followed by the agenda. Highlights and conclusions from the interesting discussions triggered by the presentations are briefly summarised in Section 4.

Welcome Address

ISCRAM '17 - "POST-CRISIS DAMAGE AND NEEDS ASSESSMENT OF BUILDINGS FOR RESPONSE, RECONSTRUCTION AND RECOVERY PLANNING – WORKSHOP"

DR. ANGELOS AMDITIS
RESEARCH DIRECTOR, ICCS

May 21 - 24, 2017

14th International Conference on
Information Systems for
Crisis Response And Management
Albi, Occitanie Pyrénées-Méditerranée, Fra...

RECONASS

INACHUS

Programme funded by the EUROPEAN UNION

Scope of the Workshop

Buildings, both critical and conventional ones, are often among **the main facilities damaged in either a natural or a manmade disaster**. In such unfortunate 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.

<u>The scope of this workshop is to discuss :</u>

1) **the importance and trends of structural and non-structural assessment techniques and methods** (civil structural health monitoring) applied in critical or conventional buildings as a means to avoid partial and total collapses when disastrous incidents take place (e.g. earthquakes, explosions, etc.);
2) **New tools (platforms & applications) and methodologies at the services of civil protection agencies and relevant stakeholders applied to** response, reconstruction and recovery planning efforts towards saving lives, restoring functionalities and building back better;
3) **RECONASS' final evaluation**

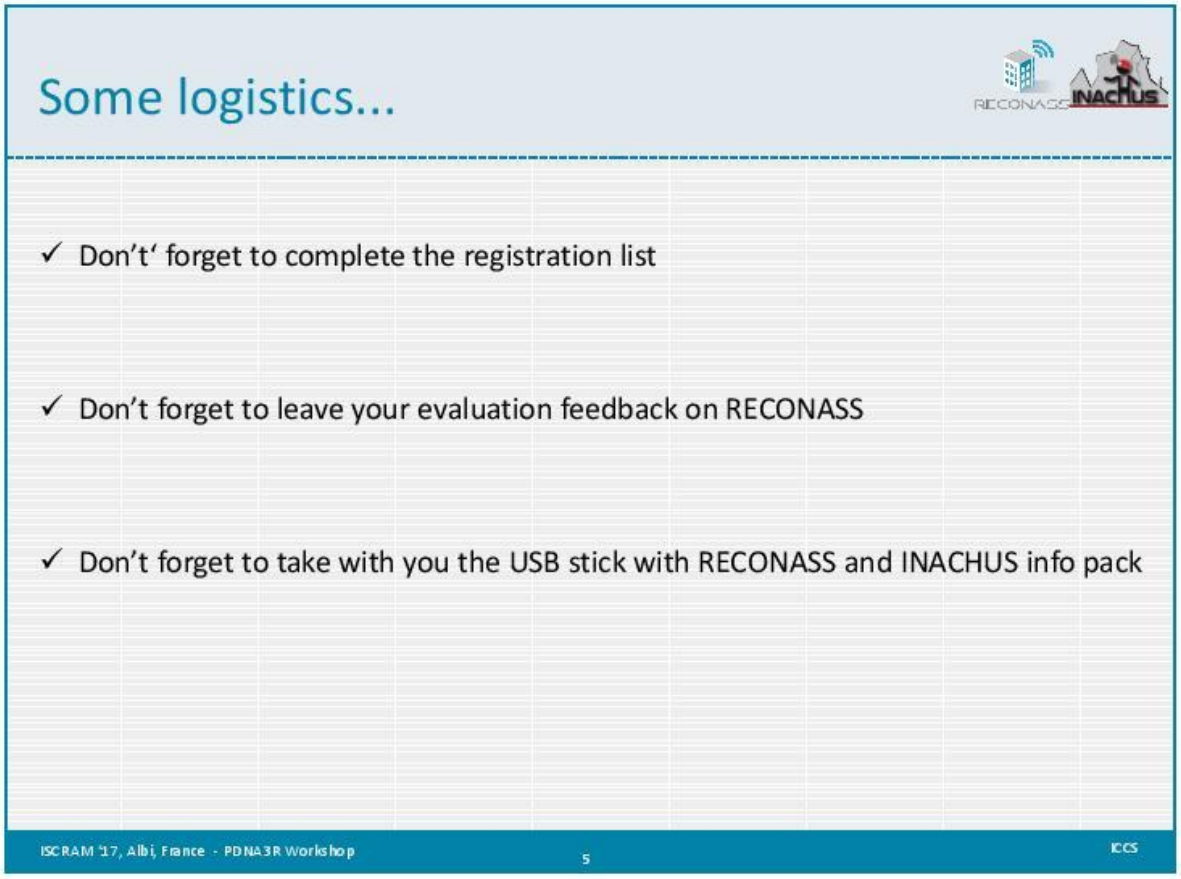
Workshop agenda at a glance

08:00 – 09:00	**Registration**
09:00-09:10	**"Welcome & Introduction to the Workshop"** (Dr. Angelos Amditis, Research Director – ICCS, INACHUS and RECONASS Project Coordinator, Workshop Chair)
09:10-09:30	**"JRC+IFB Field Reporting Tool applied to Middle Italy earthquake event",** Mr. Daniele Alberto Galliano, Scientific Project Officer, European Commission Joint Research Centre – JRC.E.1, Disaster Risk Management Unit
09:30-09:50	**"Using technology and the power of the crowd to improve emergency response",** Mr. Tomer Kaplan, Senior Disaster Management Officer, Magen David Adom in Israel
09:50-10:10	**"Civil Protection Operations - Gaps and Future Trends",** Mr. Michael Markus, Safety and Security Officer, Federal Agency for Technical Relief - Technisches Hilfswerk (THW)
10:10-10:30	**"Earthquake Nepal, 2015 – A structural assessment: Examples & lessons learnt towards resilient buildings"** Mr. Åke Solfeldt, Structural Engineer – Project Manager, WSP & Swedish Civil Contingencies Agency - Swedish International Fast Response Team, Urban Search And Rescue
10:30-11:00	**Break**
11:00-11:20	**"RECONASS Monitoring System & the Damage Assessment Platform" ,** Mr. Evangelos Sdongos, RECONASS Project Manager, Institute of Communication & Computer Systems (ICCS)
11:20-12:20	**Panel Session – RECONASS Evaluation** Civil Protection community needs for resilient buildings (part A) Moderators: Michael Markus (THW), Evangelos Sdongos (ICCS)

Workshop agenda at a glance

12:20 – 14:00	**Lunch**
14:00 – 14:20	**Panel Session – RECONASS Evaluation** Civil Protection community needs for resilient buildings (part B) Moderators: Michael Markus (THW), Evangelos Sdongos (ICCS)
14:20 – 14:40	**"HOT - Crowd-sourced area based damage assessments and comparative damage rankings",** Ms. Melanie Eckle, Research Assistant HeiGIT - Disaster Mapping and Management, GIScience Research Group, Department of Geography, Heidelberg University
14:40 – 15:00	"The INACHUS System for Buildings Assessment and SAR Operations" , Dr. Angelos Amditis, Research Director – ICCS, INACHUS and RECONASS Project Coordinator, Workshop Chair
15:00 – 15:20	**"3D laser imaging techniques to improve USaR operations for wide-area surveillance and monitoring of collapsed buildings"** Mr. Nicolas Riviere, ONERA – The French Aerospace Lab, F31055 Toulouse, France
15:20-16:00	**Break**
16:00 – 16:20	**"A Common Operational Picture for wide-area situational awareness and emergency response planning",** Ms. Anita Schilling, 3D-R&D Software Engineer, DIGINEXT
16:20-16:30	**Meeting Closure - Conclusions**

ISCRAM '17, Albi, France - PDNA3R Workshop 4 ICCS


Some logistics...
RECONASS
INACHUS
✓ Don't' forget to complete the registration list
✓ Don't forget to leave your evaluation feedback on RECONASS
✓ Don't forget to take with you the USB stick with RECONASS and INACHUS info pack
ISCRAM '17, Albi, France - PDNA3R Workshop
5
ICCS


Thank you!
I hope you all enjoy the workshop!
Any questions?
DR. ANGELOS AMDITIS(ICCS)
A.AMDITIS@ICCS.GR
I-SENSE GROUP
ICCS
May 21 - 24, 2017
14th International Conference on
Information Systems for
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Albi, Occitanie Pyrénées-Méditerranée, France
RECONASS
INACHUS
Programme funded by the
EUROPEAN UNION
ISCRAM '17, Albi, France - PDNA3R Workshop

The European Commission's science and knowledge service

Joint Research Centre

JRC+IFB Field Reporting Tool applied to Middle Italy earthquake event

D. A. Galliano, A. Annunziato, M. Marzoli

European Commission

DRM Unit

The whole information flow related to the Crisis Management is studied

Sensors Models Analysis Practitioners

Decision making

2

European Commission

IFB - National Fire Academy

The National Fire Academy (Istituto Superiore Antincendi - ISA), is the school for officers and managers of the National Fire Service (CNVVF).

The institutional scope of the ISA is to provide training and lifelong learning for the officers and the managers of the Department of Firefighters, Public Rescue and Civile Defense.
The Institute provides also any other activity aimed at spreading the culture in the specific fields of fire safety, technical rescue and civil protection.

The Institute hosted the first training course the end of 1994.

3 European Commission

Collaboration Agreement - Objectives

- To obtain the **scientific data** needed to understand better the process involving the management of the crisis information from the first notification to the first-hand observation and then to the resolution.
- To improve the **co-ordination and effectiveness** of co-operation efforts between operational bodies in the field of the **Civil Protection** and the JRC in the field of Crisis Management.
- To promote mutual interest and **co-operation** in understanding and resolving issues about the user experience and the effectiveness of User-Machine Interfaces.

4 European Commission

Collaboration Agreement - Actions

- Joint **development of innovative and cost-effective approaches** to improve the activity dispatching and management of a Control Room. The Italian Fire Brigade will make this development **available to** the JRC to promote its adoption by the **Member States**.
- **Exchange appropriate scientific and technological information,** throughout the on-the-field testing of developed software solutions, at least three exercise to evaluate the software provided by JRC. This activity includes the study of the Mobile Crisis Room paradigm (present and future implementations)
- **Harmonise information representation and exchange** and promote related methods to end-users internationally.

5

European Commission

6

European Commission

7

European Commission

First joint experience

28th-30th September

- With Civil Protection and Italian Fire Brigade, search and rescue simulation in Fossato di Vico
- With the first responders of the Italian Fire Brigade, survey of the places hit by the 24th August earthquake

8

European Commission

Search and rescue simulation

- Comparison with the presently used technology
- Test of the technology (deployment, chosen hardware, ...)
- Feedback of untrained users (quite no formation required)

9

European Commission

Earthquake area survey

On September, 29th JRC and IFB visited:

- Capodacqua
  IFB operators replayed the initial surveys using FRT-Universal
- Arquata del Tronto
  Meeting with the JRC mission validating the Copernicus data
- Amatrice
  Extensive use of FRT-Universal to assess all the features
- Castelluccio di Norcia
  IFB operators showed the issues about present version

10

European Commission

Capodacqua

- Combined visualization of new information and a reference (Copernicus data)
- Real-like survey stepping into destroyed houses
- Comparison of remotely performed assessment with the real situation

11

European Commission

Arquata del Tronto

- The tool was also demonstrated to Italian Civil Protection
- Joint comparision of remotely performed assessment with the real situation

12

European Commission

Amatrice

- Lengthy survey campaign to test reliability
- Use of all the features
- Roleplaying by IFB to widen the use to other activities

13

European Commission

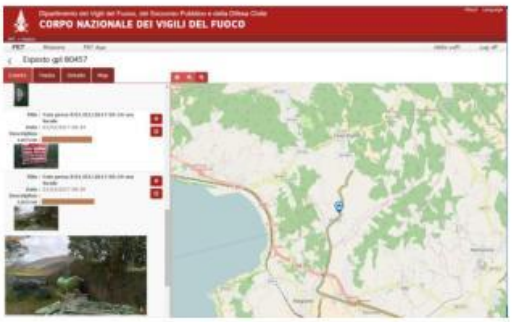
Follow-up activities

- Two province commands are presently testing the tool in daily activities (Perugia and Cuneo)
- Technical improvements: the tool was refined and translated in Italian, French, Spanish, Polish, Romanian, Greek, German, Portuguese.
- The web site was deployed in the IFB ICT infrastructure and presently the integration is being performed
- The adoption of the tool is foreseen in 2017

14

European Commission

Daily activities



i.e. Identification of Fire Fighters related issues and related prove images

15

European Commission

Expression of interests

- On February, 14th the tool was demonstrated to SDIS04 and enthusiastically requested to be used asap (a cross-border exercise will be held on June, 22nd)
- The Main School of Fire Service, a Polish equivalent of ISA, provided the Polish translation and would also test the tool
- German THW is also interested in observing the joint exercise
- Portuguese Civil Protection stated that it is exactly the tool that is missing
- The NYFD is comparing the tool with the one they use

16

European Commission

Technical details

- Windows 10 Universal application (runs on all W10 devices)
- No additional libraries (JRC developed libraries only both on application and website) apart from .Net framework
- 12 weeks from scratch to trial on the field (not full time developer)

- Entry level smartphone (Microsoft Lumia 550) up to the needs
- 10' from unpacking to readiness

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European Commission

The European Commission's science and knowledge service

Joint Research Centre

JRC+IFB Field Reporting Tool applied to Middle Italy earthquake event

D. A. Galliano, A. Annunziato, M. Marzoli

European Commission

Using technology and the power of the crowd to improve emergency response

Tomer Kaplan B.ems,MPH
DM / EU projects officer
Medical Supervisor
tomerk@mda.org.il

MDA – Magen David Adom

National blood service

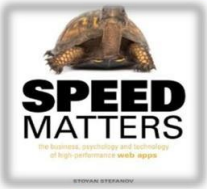
National EMS (Emergency Medical Service)

National Red Cross society

Auxiliary arm to the IDF medical corps
in war times, part of civil protection mechanism


Operational Activity - 2016
MAGEN DAVID ADOM IN ISRAEL
מגן דוד אדום בישראל
זה עניין של חיים
2,000,000 Emergency calls
679,082 Dispatches
1 every 16sec
1 every 46sec
500+ Medicycles
~1,000 Ambulances
2 Helicopters
Average response time
MAGEN DAVID ADOM IN ISRAEL
מגן דוד אדום בישראל
זה עניין של חיים
Call answering
Telephony FA + Data collection
Dispatching
Scene arrival
3.42 sec
1:30 min
Medicycle – up to 5 min
Ambulance – up to 10min
3.08
Shift average call answering time

Challenges



1. Shorter "Time to Patient".
2. Faster Identification of Life threatening conditions and OHCA.
3. Shorter Time to Initiation of CPR in OHCA.
4. Shorter "Call to PCI" time.
5. Shorter "Call to TPA" time.
6. Precise localization of casualties / patients / medical personnel.
7. Crowd Sourcing / risk communication
8. Better Operational Picture /Situational awareness tools.

What do we Know (1)

MAGEN DAVID ADOM IN ISRAEL
מגן דוד אדום בישראל
זה עניין של חיים

- "Early cardiopulmonary resuscitation (CPR) by bystanders has been shown to be associated with increased survival after OHCA. " Herlitz J, et al. Resuscitation 2005
- "Survival was 2.2% among those who received no bystander CPR, 4.9% among those who received bystander CPR from lay people and 9.2% among those who received bystander CPR from professionals." Herlitz J, et al. Resuscitation 2005

Wh

DISPATCHER-ASSISTED CPR:
WHAT YOU NEED TO KNOW

Each year, EMS providers assess more than 380,000 Americans with sudden cardiac arrest (SCA). Yet just 11% of those who experience SCA outside of hospitals survive it.

Bystanders who witness an SCA victim collapse can play a vital role in increasing the likelihood that patient survives. By helping callers recognize the cardiac arrest in progress, 9-1-1 dispatchers can provide instructions for compression-only CPR when indicated, thus improving the chances of survival.

MAGEN DAVID ADOM IN ISRAEL מגן דוד אדום בישראל
זה עניין של חיים

"The provision of instruction for virtually all cardiac arrests is a standard of care. Meeting this standard requires early identification, ongoing training, and continuous improvement.
Meeting this standard saves lives.
Not meeting this standard results in deaths that are preventable". AHA guidelines 2015

Stop Stroke© Acute Care Coordination Medical Application: A Brief Report on Postimplementation Performance at a Primary Stroke Center

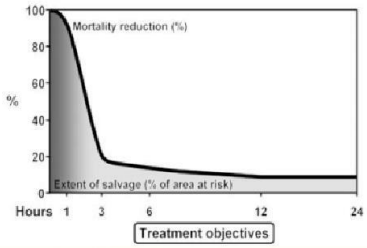
Robert L. Dickson, MD, FAAEM, FACEP, FACEM,* Dineth Sumathipala, MBBS,† and Jennifer Reeves, RN-MSN‡

- Communicating vital signs and medical history of suspected stroke patients using the App shortened DTN time in ~60min.

Impact of call-to-balloon time on 30-day mortality

Richard W Varcoe1, Tim C Clayton2, Huon H Gray3, Mark A de Belder4, Peter F Ludman5
on behalf of the British Cardiovascular Intervention Society (BCIS) and the National Institute for Cardiovascular Outcomes Research (NICOR)

- "An S-T segment elevation myocardial infarction (STEMI) is a severe heart attack that kills heart muscle every minute it is left untreated".



What has been done?

Decision Support Tools

MAGEN DAVID ADOM IN ISRAEL
מגן דוד אדום בישראל
זה עניין של חיים

Data gathering tools / instruction modules

- Call
- SMS, whatsApp.
- GPS
- "My MDA"
- Vehicle mounted cameras.
- Medical emergencies instruction modules
- MCI module

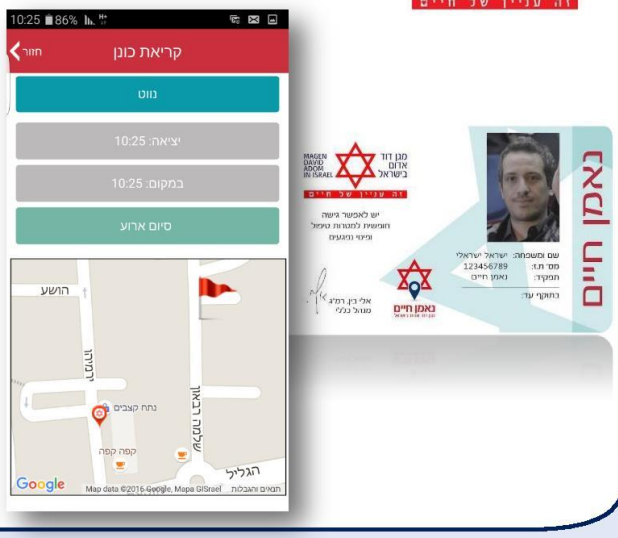
Automated Resources Identification & Allocation

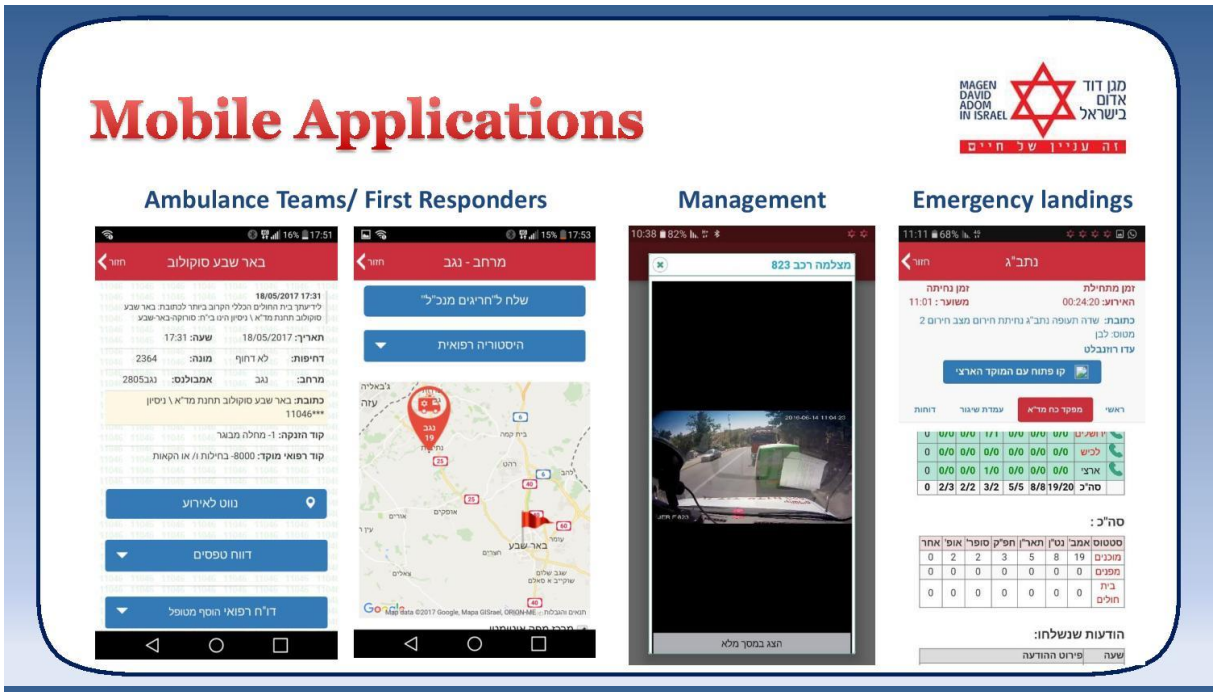
Supervision / online support

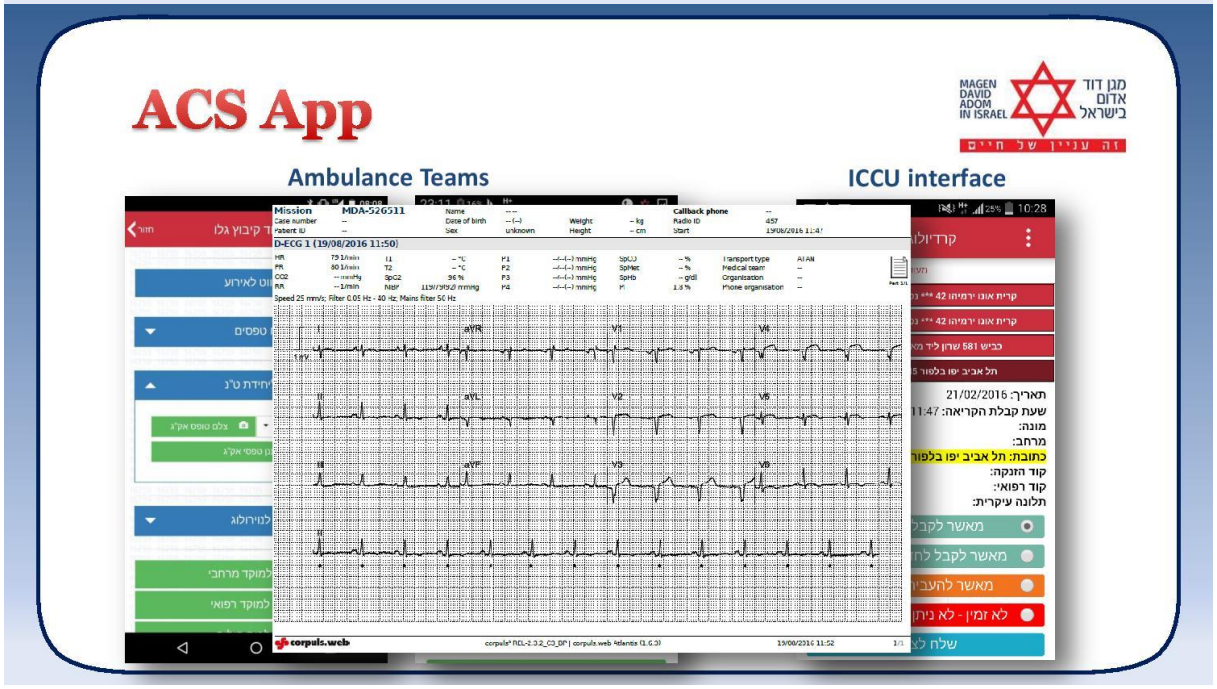
Life Guardians

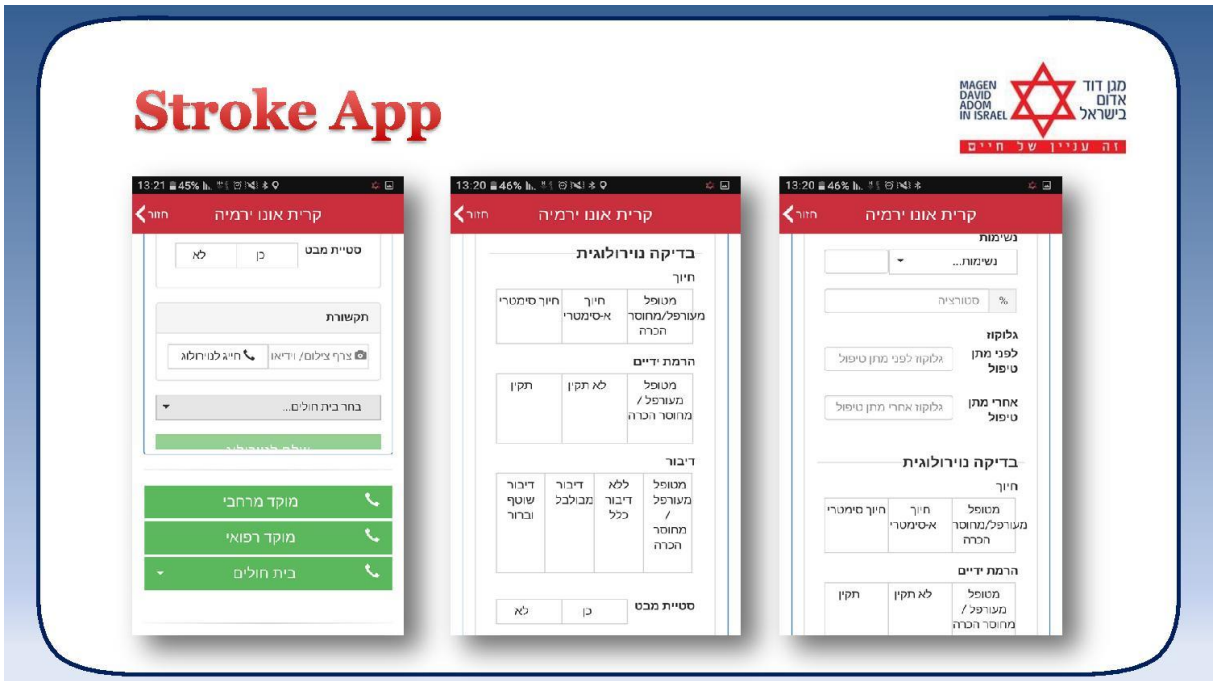
MAGEN DAVID ADOM IN ISRAEL
מגן דוד אדום בישראל
זה עניין של חיים

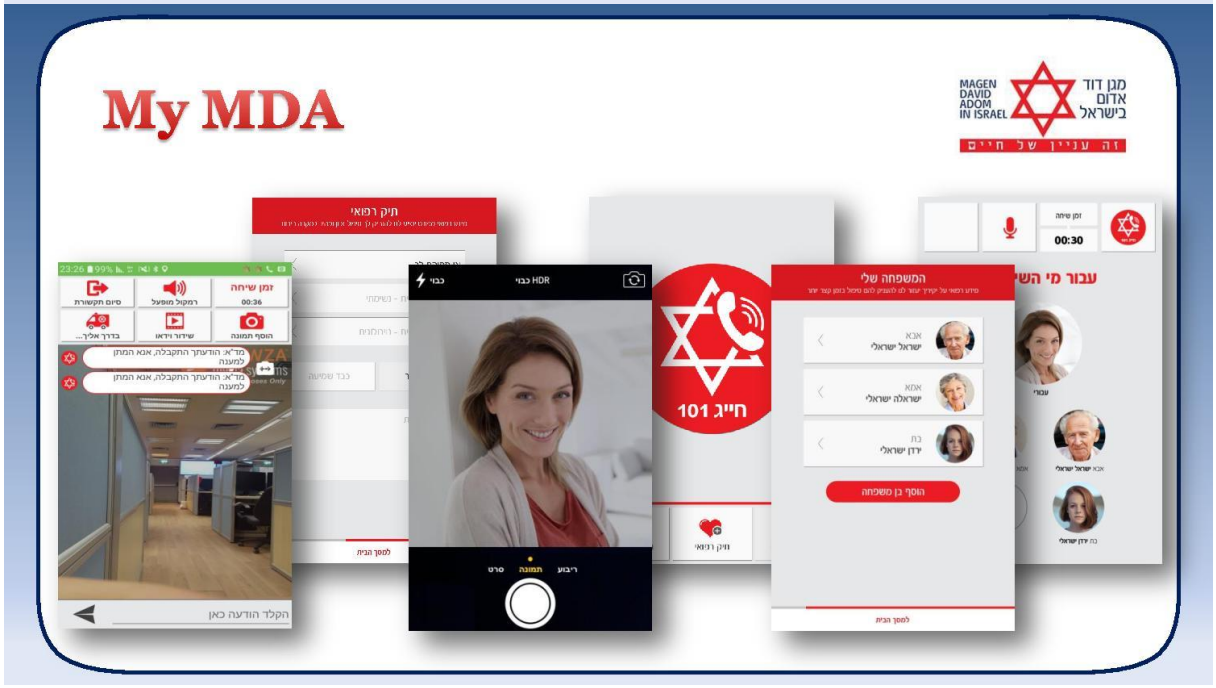
- Doctors
- Nurses
- Paramedics
- Medics
- FA providers
- Automatic dispatch via smartphone app



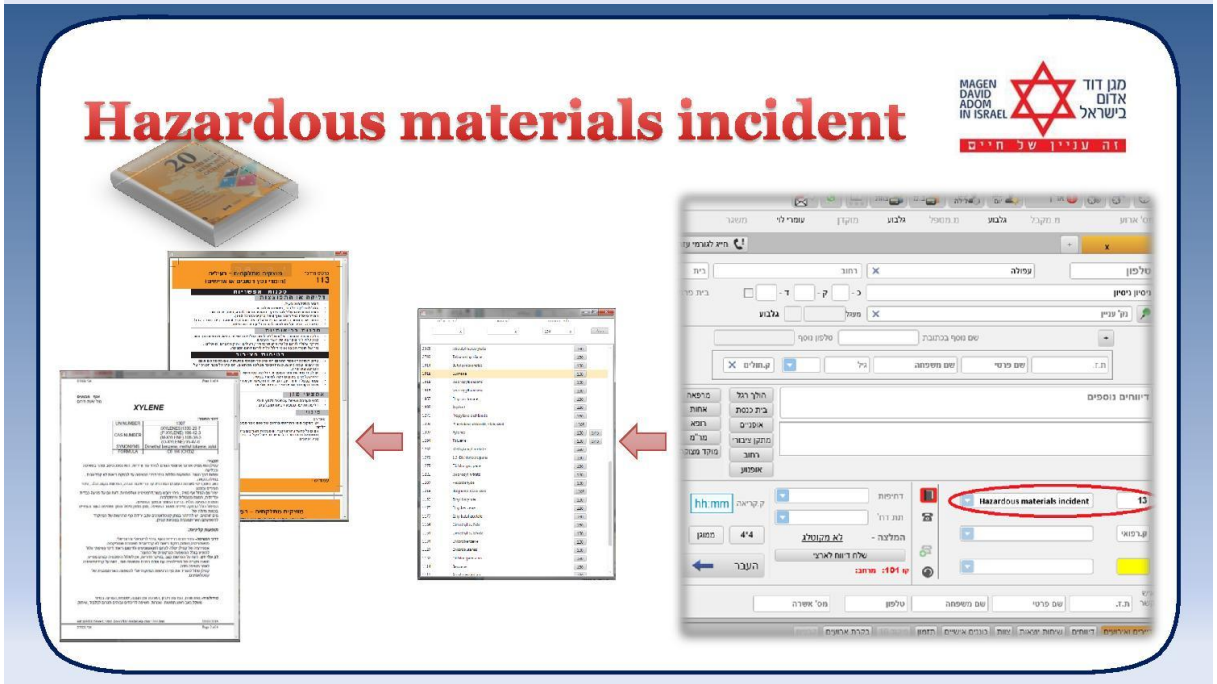

Mobile Applications
מגן דוד אדום בישראל
MAGEN DAVID ADOM IN ISRAEL
Ambulance Teams/ First Responders
Management
Emergency landings


ACS App
מגן דוד אדום בישראל
MAGEN DAVID ADOM IN ISRAEL
Ambulance Teams
ICCU interface


Stroke App
MAGEN DAVID ADOM IN ISRAEL
מגן דוד אדום בישראל
זה עניין של חיים
קרית אונו ירמיה
חזור
סטיית מבט
כן
לא
תקשורת
צרף צילום/ וידאו
חייג לנוירולוג
בחר בית חולים...
מוקד מרחבי
מוקד רפואי
בית חולים
בדיקה נוירולוגית
חיוך
מטופל מעורפל/מחוסר הכרה
חיוך א-סימטרי
הרמת ידיים
מטופל מעורפל / מחוסר הכרה
לא תקין
תקין
דיבור
מטופל מעורפל / מחוסר הכרה
ללא דיבור כלל
דיבור מבולבל
דיבור שוטף וברור
נשימות
סטוראציה
גלוקוז
גלוקוז לפני מתן טיפול
אחרי מתן טיפול
גלוקוז אחרי מתן טיפול


My MDA
MAGEN DAVID ADOM IN ISRAEL
מגן דוד אדום בישראל
זה עניין של חיים
חייג 101
המשפחה שלי
הוסף בן משפחה
00:30


Mobile Applications - vehicles
MAGEN DAVID ADOM IN ISRAEL
מגן דוד אדום בישראל
זה עניין של חיים
MOBILE INTENSIVE CARE UNIT
4X-BDW


Hazardous materials incident
MAGEN DAVID ADOM IN ISRAEL
מגן דוד אדום בישראל
זה עניין של חיים
XYLENE
Hazardous materials incident


MAGEN DAVID ADOM IN ISRAEL
מגן דוד אדום בישראל
זה עניין של חיים
?
Tomer Kaplan B. ems, MPH
DM / EU projects officer
Medical Supervisor
tomerk@mda.org.il

Technisches Hilfswerk

THW: The Federal Agency for Technical Relief

Civil Protection Operations – Gaps and Future Trends
Instrumentation-based Disaster Response and Damage Assessment - Michael Markus

www.thw.de

Technisches Hilfswerk

Agenda

- Short Presentation of the THW
- Damage assessment and monitoring
- Mission examples
- Further development

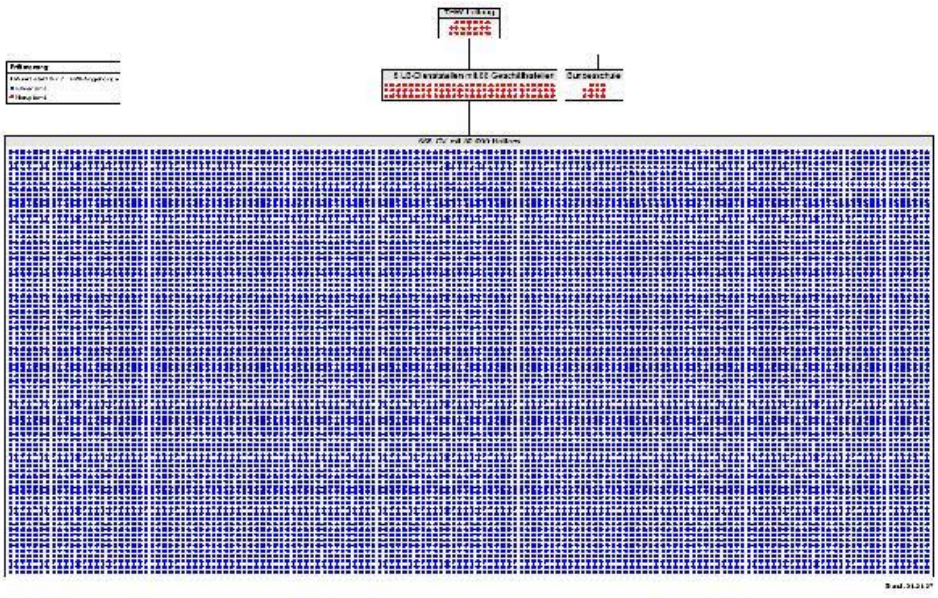
Technisches Hilfswerk

THW

- Founded in 1950 as a federal agency belonging to the Federal Ministry of the Interior
- 80,000 Volunteers
- 800 full time only
- Annual budget of 180 million EUR

Technisches Hilfswerk

THW: Volunteers & Employees



Technisches Hilfswerk

THW abilities


Locate


Clean


Vacate


Coordinate


Repair


Pump


Catering


Illuminate


Wire


Blast


Re-build


Purify

Technisches Hilfswerk

Agenda

- Short Presentation of the THW
- **Damage assessment and monitoring**
- Mission examples
- Further development

Technisches Hilfswerk

Risk Assessment- Mobile Flood Gauge

www.thw-backnang.de

Technisches Hilfswerk

Mobile Flood Gauge

christian.praegitzer@thw-backnang.de

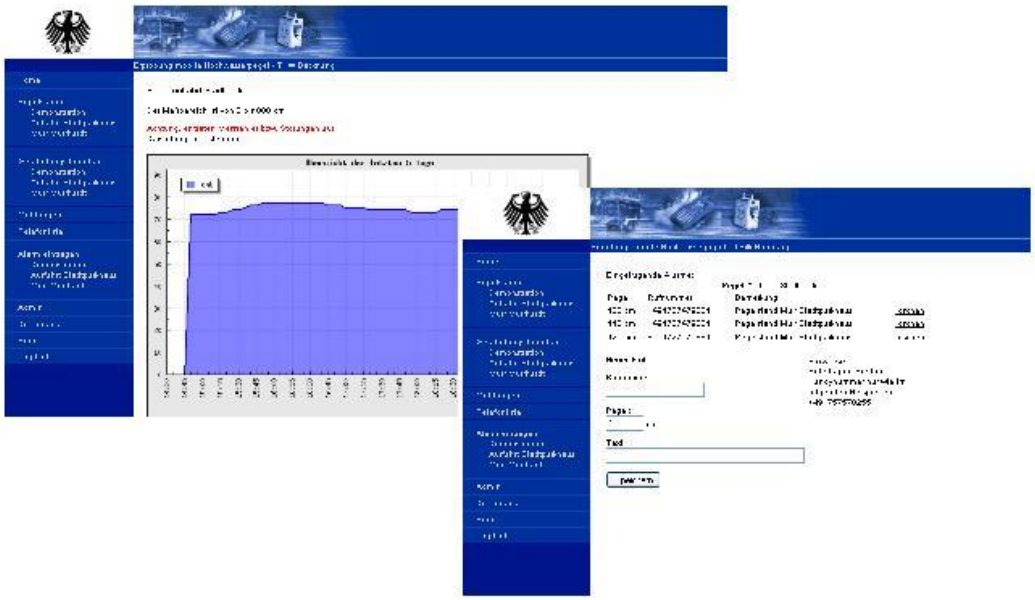
steffen.hoffmann@thw-backnang.de

www.thw-backnang.de

Technisches Hilfswerk

Mobile Flood Gauge

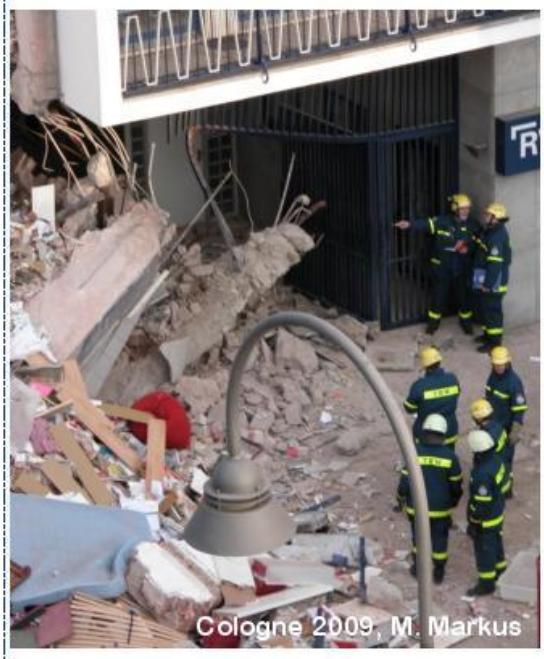
- Websurface



www.thw-backnang.de

Technisches Hilfswerk

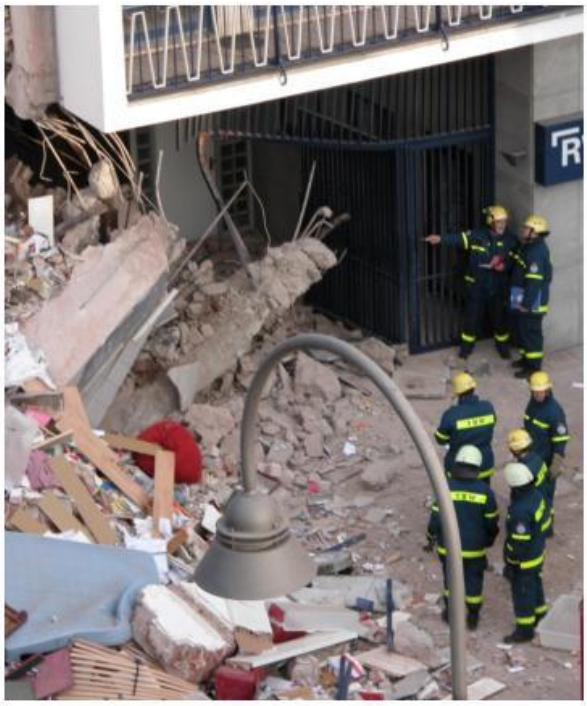
Structural Specialist/Safety and Security Officer



Supports head of operations with advice:

- Hazards from damaged or collapsed structures
- Hazards during further operations
- Securing measures, e.g. shoring, monitoring
- Possible positions of victims under the debris
- Possibilities to advance to victims
- Rescue techniques

Technisches Hilfswerk



Technisches Hilfswerk

Baufachberater 2013 –
Gebäudeüberwachung

Technisches Hilfswerk

Monitoring of partly damaged structures

Damaged buildings and the risk of further collapse endanger

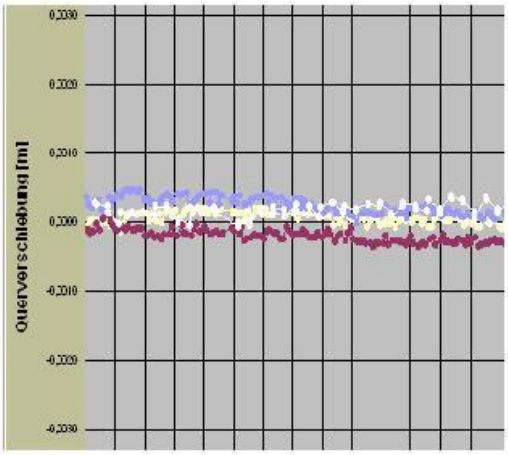
- Fire fighters working in or near damaged structures
- Urban search and rescue missions saving trapped victims
- Technical teams reinforcing damaged buildings
- .. and victims under the rubble.



Technisches Hilfswerk

Monitoring of partly damaged structures

- THW uses a Leica monitoring system
  - A total station automatically measures the 3D position of different specified points
  - Slightest movements can be detected (less than 0,1 mm resolution)

Technisches Hilfswerk

Monitoring System

OVe Bechtesgadener Land & Remscheid

Technisches Hilfswerk

Agenda

- Short Presentation of the THW
- Damage assessment and monitoring
- **Mission examples**
- Further development


Example 1: Konstanz, 23.12.2010
vodafone


vodafone


vodafone


vodafone
N24


odafone


odafone


dafone


dafone

Example 1: Konstanz, 23.12.2010

Technisches Hilfswerk

Attachment of prism reflectors

Gas actuated fastening tool

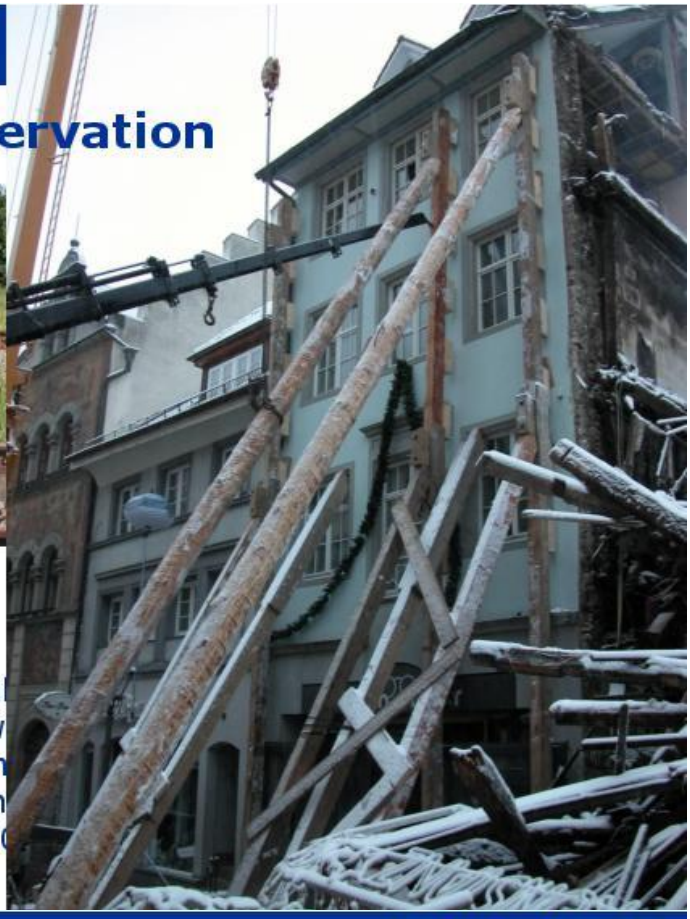
Magnetic mounting device with prism reflector on a metal sheet

Technisches Hilfswerk

Attachment of the metal sheet

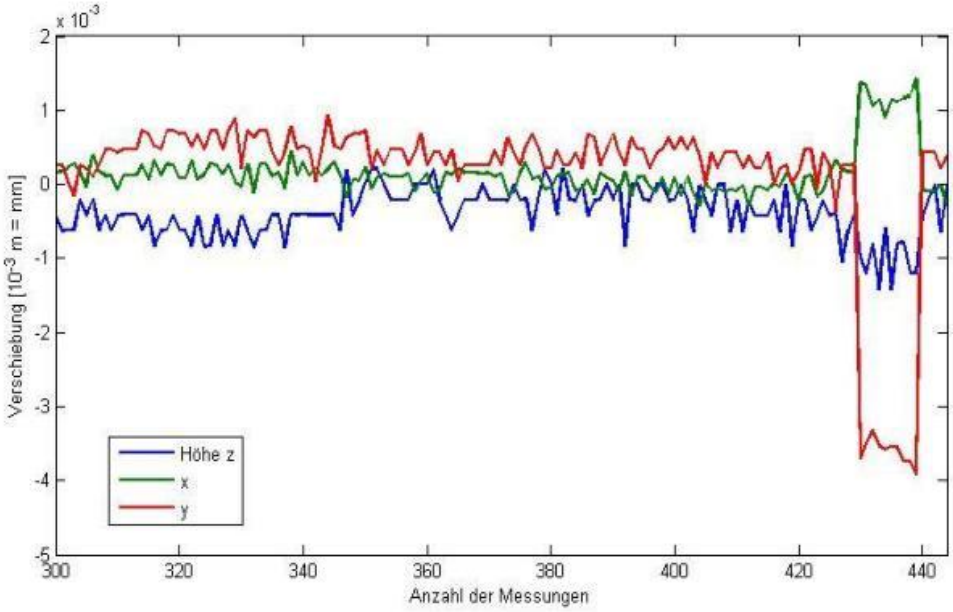
Konstanz
2010,
M.Markus

Single point observation



Technisches Hilfswerk

Konstanz, measured event



Technisches Hilfswerk

Example 2:
Landslide in Mössingen near Stuttgart

condition

Technisches Hilfswerk

Example 2: Landslide in Mössingen near Stuttgart

Technisches Hilfswerk

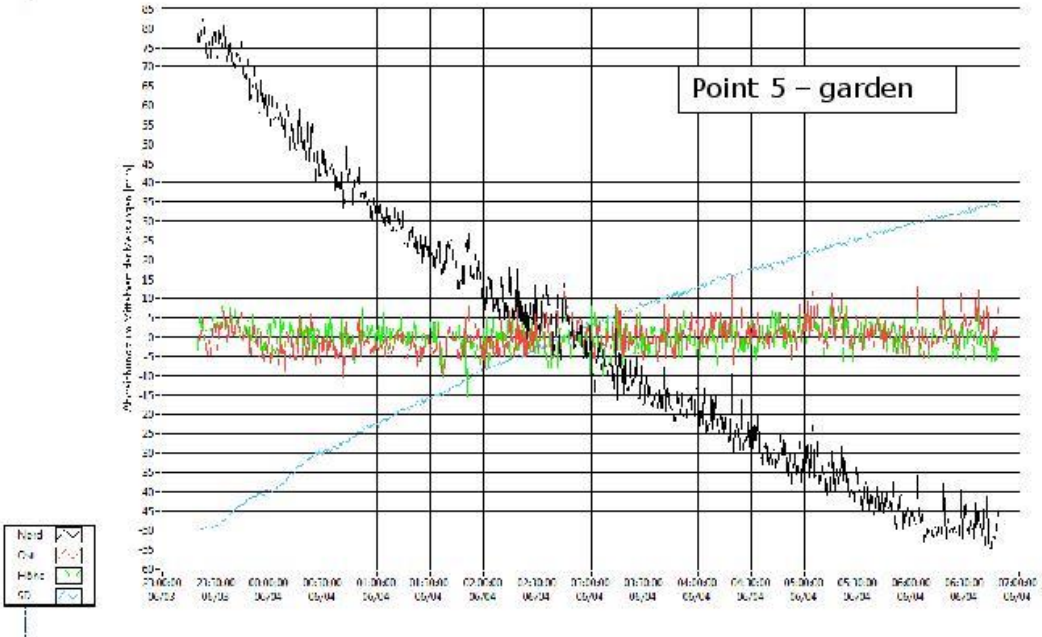
Example 2:
Landslide in Mössingen near Stuttgart

Technisches Hilfswerk

Example 2:
Landslide in Mössingen near Stuttgart

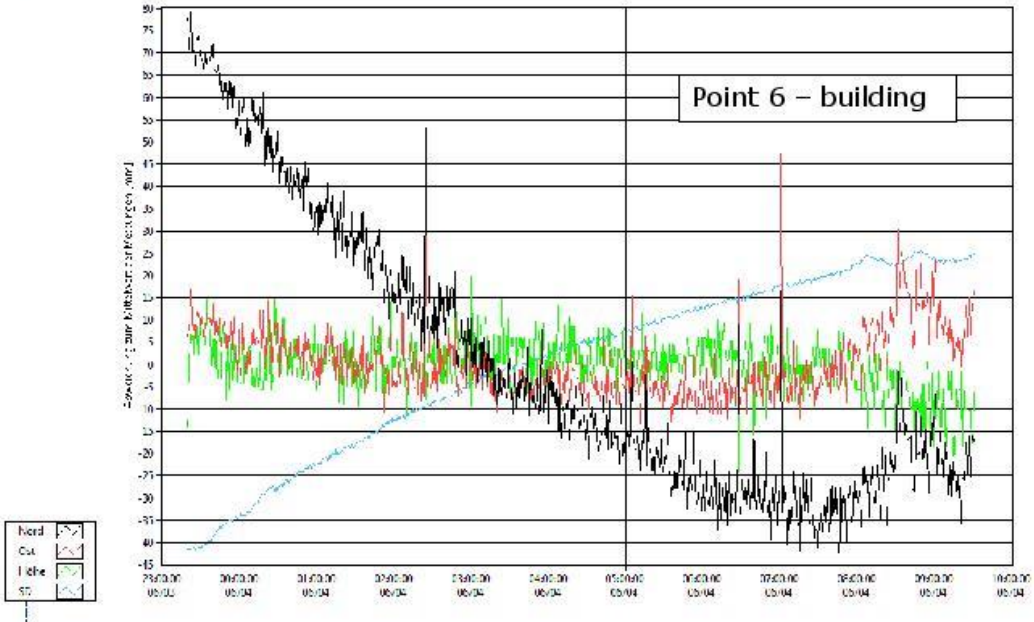
Technisches Hilfswerk

Example 2:
Landslide in Mössingen near Stuttgart



Technisches Hilfswerk

Example 2:
Landslide in Mössingen near Stuttgart



Technisches Hilfswerk

What we need (in this field)

- To look into the buildings/structures, visually and structural conditions
- To detect changes fast in a large observed area
- Detect living persons under the debris
- Reliable information

Technisches Hilfswerk

Agenda

- Short Presentation of the THW
- Damage assessment and monitoring
- Mission examples
- **Further development**

Technisches Hilfswerk

THW Consortium Coordinator in two H2020 projects:

- **SAY-SO (SEC-02-DRS)** – Situational awareness systems to support civil protection preparation and operational decision making
- **DAREnet (SEC-21b-GM)** – Practitioners (end-users) from different disciplines and concerned with current or future security or disaster risk and crisis management issues in the Danube River Basin

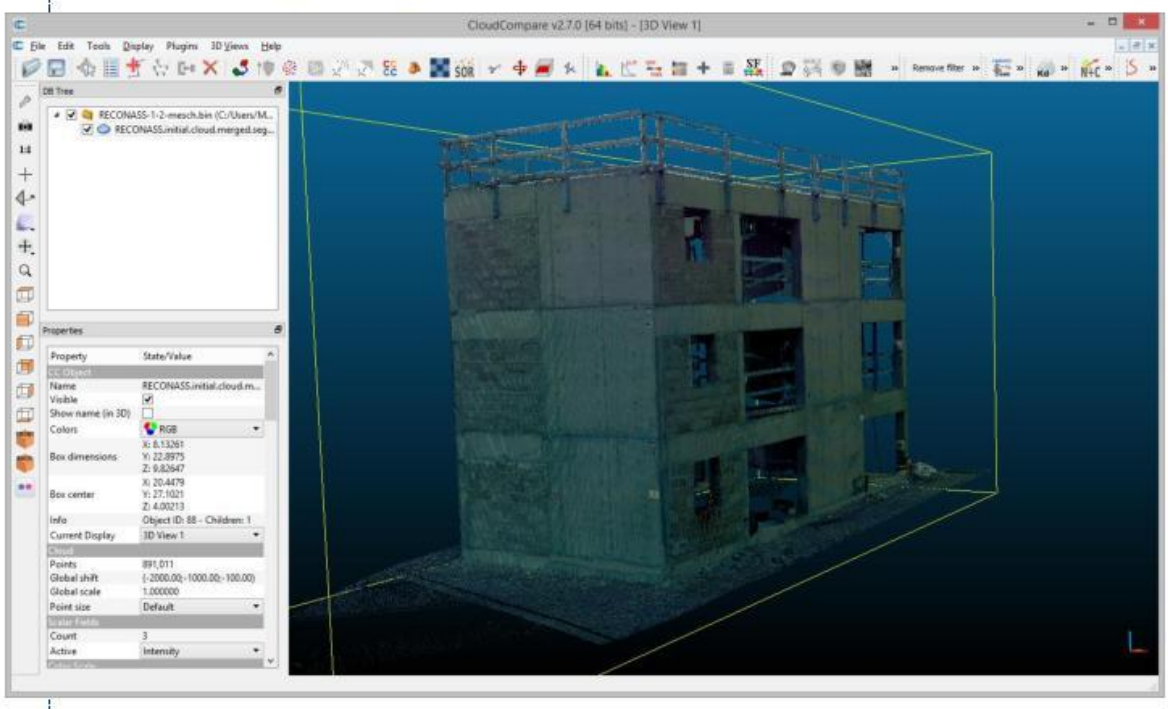
Technisches Hilfswerk

HW Consortium Partner in 1 H2020 and 2 FP7 projects

- **FireIn (SEC**-21-GM) – Practitioners (end-users) from different disciplines and interested in improving national and European Fire and Rescue capabilities
- **DRIVER** (EU FP7) – monitoring and assessing innovative technologies supposed to assist civil protection entities
- **RECONASS** (EU FP7) – remote detection and assessment of structural damages to buildings

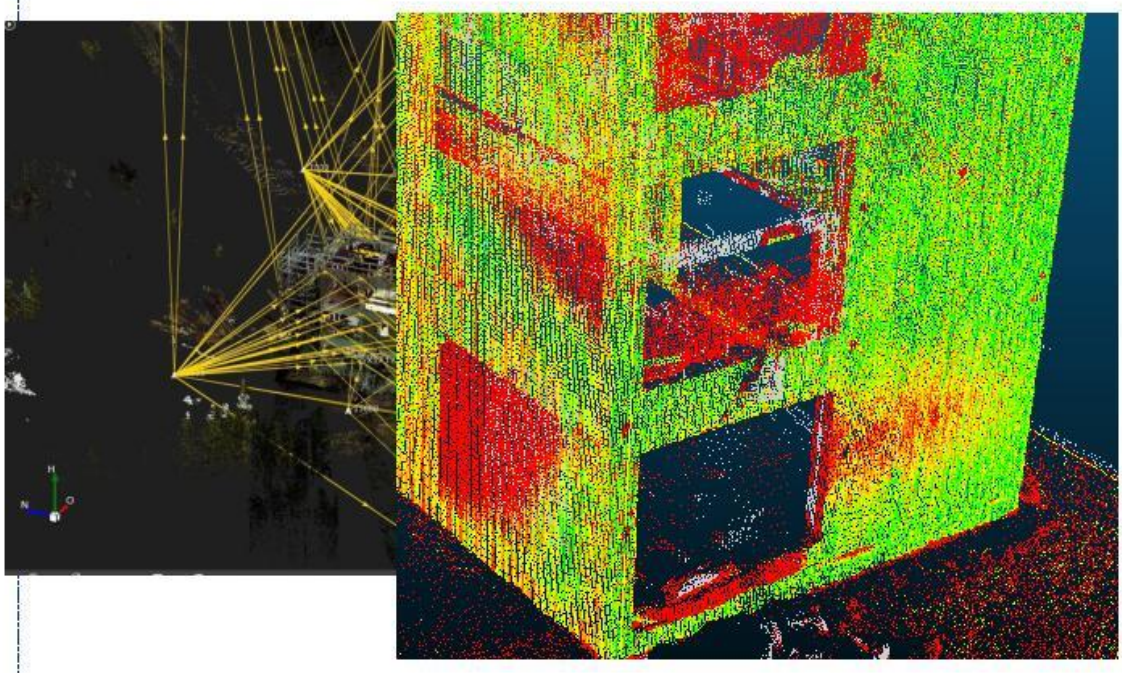
Technisches Hilfswerk

Example:
3D scanning using a Leica total station



Technisches Hilfswerk

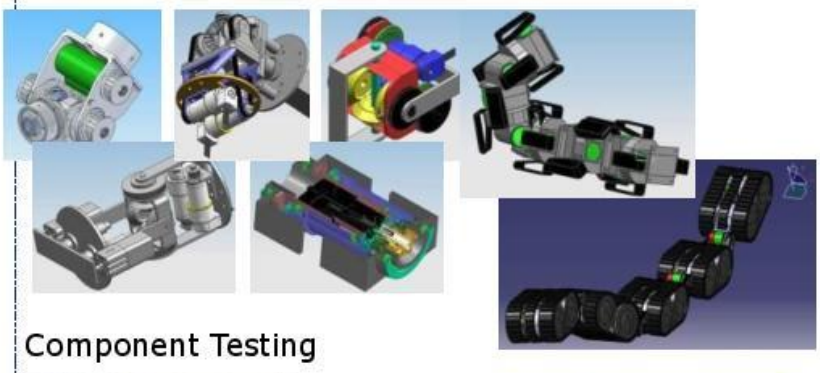
Example:
3D scanning using for deformation detection



Technisches Hilfswerk

Example:
Reconnaissance Robotics

Constructive Implementation



- installation space
- weight
- space utilization
- complexity
- manufacturability
- ...
- roadworthiness
- maneuverability
- all-terrain capability
- ...

Component Testing

- capability
- reliability
- ...
- mobility (traction)
- stability
- ...

Technisches Hilfswerk

Example:
RAWIS mimo RADAR monitoring system

Earthquake Nepal, 2015

personal reflections from the perspective of a Structural Engineer

Åke Solfeldt
+46 705 77 64 66
ake.solfeldt@wspgroup.se

Project Manager at WSP and Structural Engineer at SWIFT USAR

Youtube: Solfeldt Nepal

Swedish Civil Contingencies Agency

1 (136)

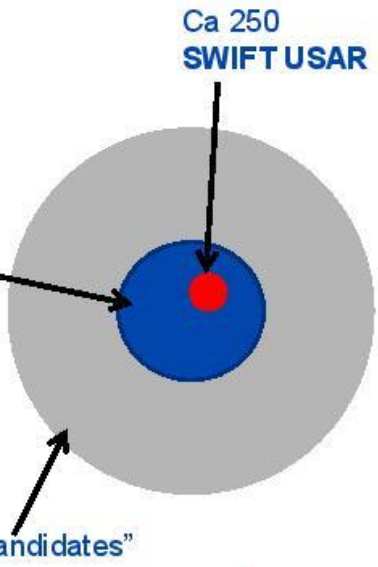
Staff 36 000

2 (136)

MSB – **Swedish Civil Contingencies Agency**

MSB recruits personnel within a wide range of competences.
MSB aims to secure the quality of their educated personnel within following areas:

- Administration
- Construction and support
- Disaster management
- Environment
- Water, sanitation and hygiene
- Humanitarian assistance
- Information and communications technology
- Information
- Logistics
- Medical
- Mine action
- Emergency response
- Security



Swedish Civil Contingencies Agency

3 (☺)

SWIFT USAR

Swedish **I**nternational **F**ast **R**esponse **T**eam - **U**rban **S**earch **A**nd **R**escue

- **SWIFT USAR** is an advanced search- and rescue team. Possibe to activate when national or international crisis occur if collapsed structures. Crises caused by natural disasters like eartquakes, or accidents or intentional damage.
- **SWIFT USAR** consists of 76 personnel and 12 search dogs, self-contained for 10 days.
  - Management; including command and command support
  - Operational; Rescue groups
  - Logistics; Technician, camp
- **SWIFT USAR** is a classified heavy team accordingly to UN INSARAG guide lines. (www.insarag.org)

INSARAG
Preparedness - Response

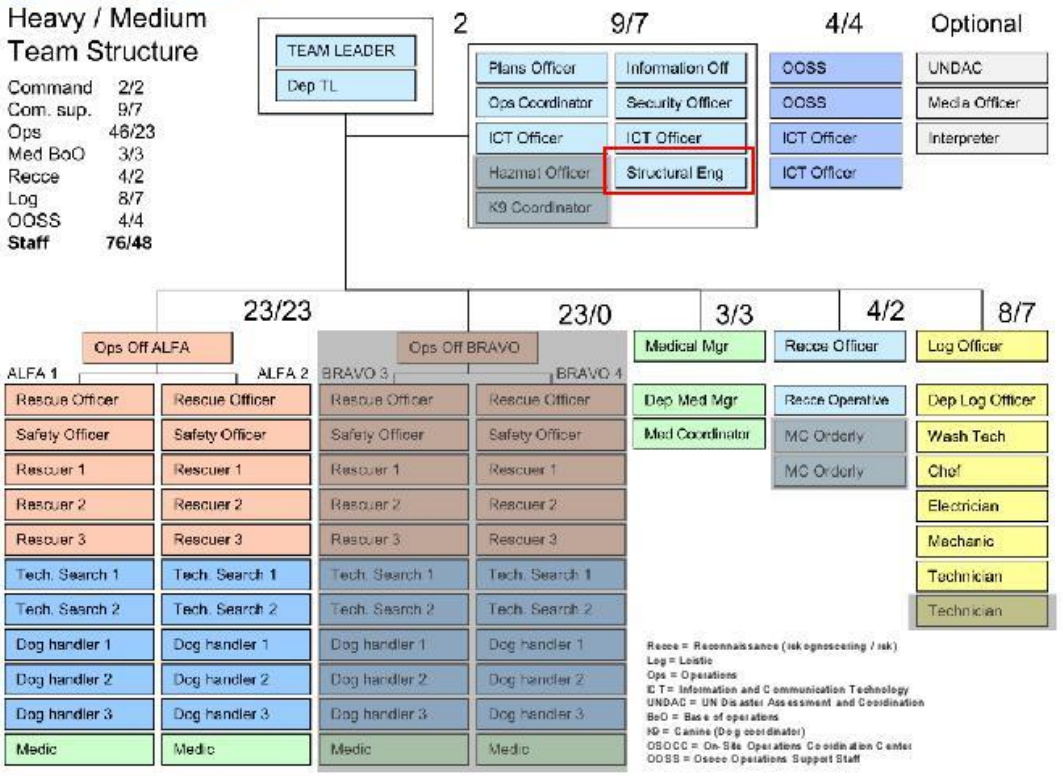
4

SWIFT USAR

2012-08-27

Heavy / Medium Team Structure

Command	2/2
Com. sup.	9/7
Ops	46/23
Med BoO	3/3
Recce	4/2
Log	8/7
OOSS	4/4
Staff	**76/48**



5

NEPAL 2015

Re-organization SWIFT USAR -> Early Support and Recovery Team (~76 -> ~35)

6

NEPAL 2015

7

NEPAL 2015

- 25 April (Sat) 11:56 AM 7.8 in magnitude;
- Epicentre around Barpak, Gorkha District;
  - The tremor was felt all over Nepal, and in Tibet, Sikkim, Bihar, Utter Pradesh and Delhi also.
- Aftershocks:
  - 6.6 RS at 12:30 hrs in the same day,
  - 6.8 RS on 12 May and
  - More than 400 shocks > 4
- Impact: The Kathmandu Valley and other more than 30 districts.

8

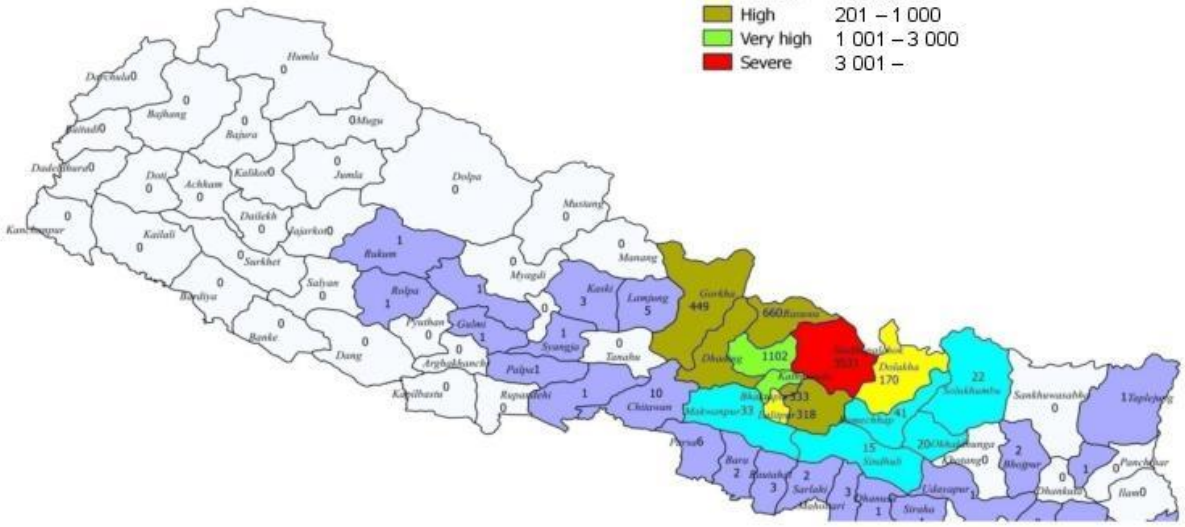
International Search and Rescue (ISAR) Teams

- Total 4,521 SAR personals from **34 countries** and 141 canines were mobilized.
  - Only 6 countries responded within 48 hours and 3 countries arrived within 72 hours.
- ISAR team rescued 19 lives and recovered many dead bodies with National Security Forces.
- **34 countries:** Algeria, Australia, Belgium, Bangladesh, Canada, China, France, German, Hungary, India, Indonesia, Israel, Japan, Jordon, Malaysia, Mexico, Netherland, Norway, Oman, Philippines, Poland, Pakistan, Russia, South Korea, Sri Lanka, Singapore, Spain, Sweden, Switzerland, Thailand, Turkey, UAE, UK, USA

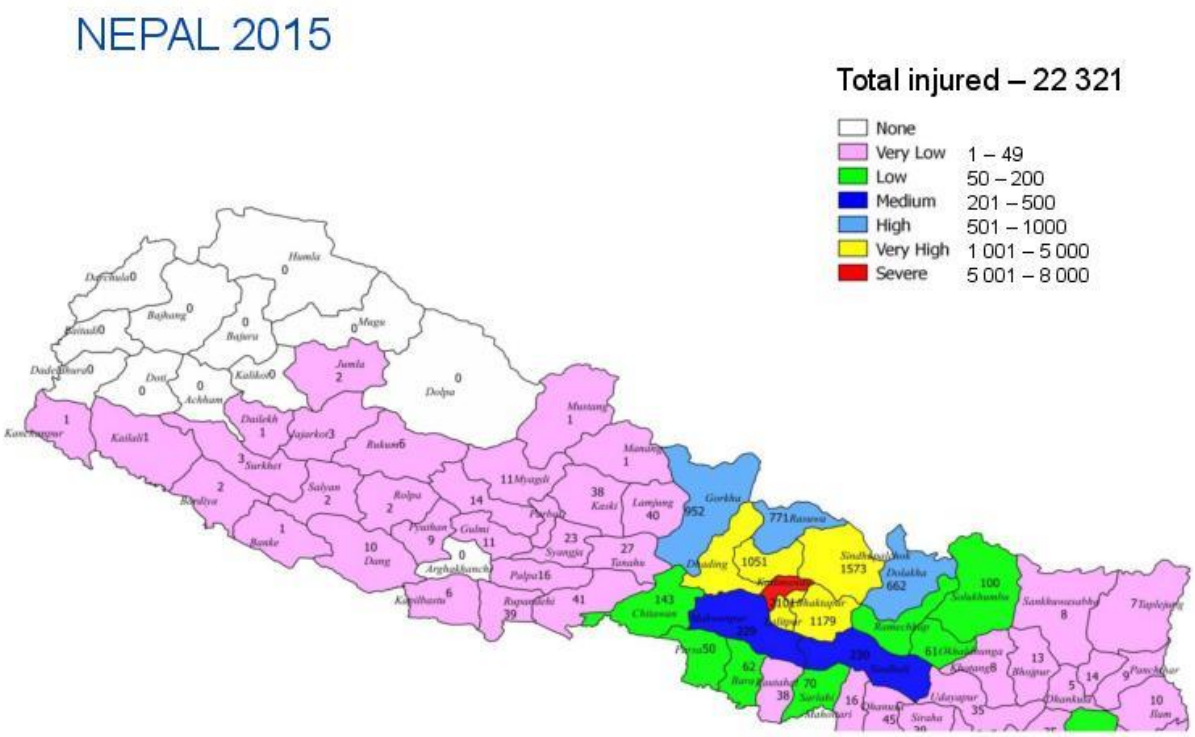
Rescued child after 22 hour in Bhaktapur

NEPAL 2015

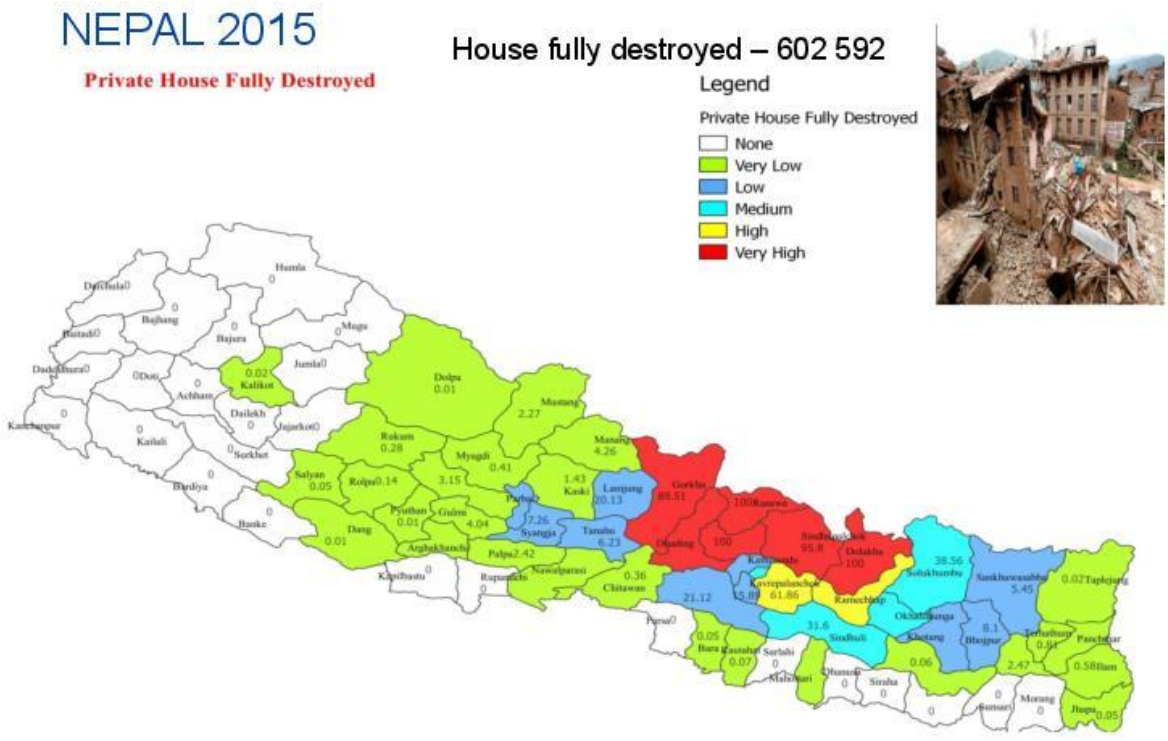
Total death – 8 969



10

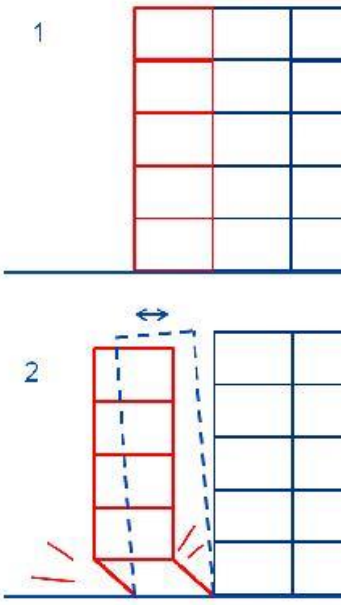

NEPAL 2015
Total injured – 22 321
None
Very Low 1 – 49
Low 50 – 200
Medium 201 – 500
High 501 – 1000
Very High 1 001 – 5 000
Severe 5 001 – 8 000

11


NEPAL 2015
Private House Fully Destroyed
House fully destroyed – 602 592
Legend
Private House Fully Destroyed
None
Very Low
Low
Medium
High
Very High

12

NEPAL 2015



13

NEPAL 2015

Instabil masonry structures
Temporary shored

14

NEPAL 2015

15

NEPAL 2015

16

17

18

19

Reflections

On site:
Drones
"hands on" inspections
K9

Distance/back home:
Networking
Proactive studies and courses
Sharing experiences and facts
Workshops like this

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"RECONASS Monitoring System & the Damage Assessment Platform"

EVANGELOS SDONGOS
ICCS – PROJECT MANAGER

RECONASS

Programme funded by the EUROPEAN UNION

Presentation Overview

RECONASS

Project Concept
- RECONASS facts & figures
- The RECONASS Concept

RECONASS Modules
- The Sensing System
- The Structural Assessment
- The Remote Sensing Assessment
- The PCCDN

The Pilot Test
- Instrumentation and Testing
- Visualisation of results

RECONASS

RECONASS Facts & Figures

- RECONASS is a **Collaborative project (STREP)** funded under FP7 - SEC
- Theme:

Next generation damage and post-crisis needs assessment tool for reconstruction and recovery planning

- Project Full Title:

Reconstruction and **RE**covery Planning: Rapid and Continuously Updated **CO**nstruction Damage and Related **N**eeds **ASS**essment

- Project Facts :

10 partners, 7 countries, 42 months, 4,260,240.00 requested EU contribution

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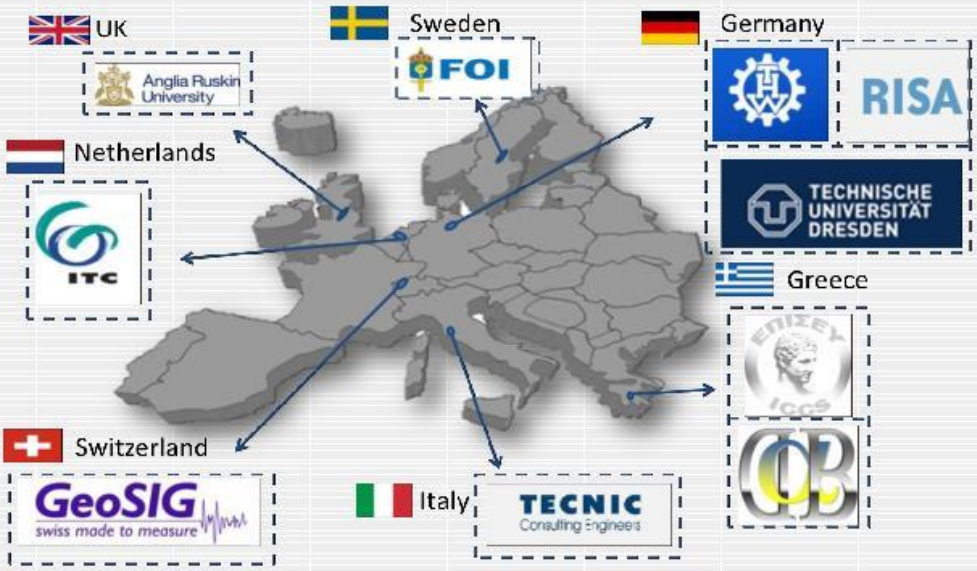
Consortium Synthesis



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The Problem

RECONASS

Current needs for **structural damage and post-crisis awareness assessment tools** with enhanced capabilities in:

- **required time**
- **updating processes**
- **post-crisis reconstruction** & **recovery planning**
- **international interoperability**
- **collaborative work** including mobile assets and integration of earth observation data

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The RECONASS Concept at a glance

RECONASS

The RECONASS Monitoring and Assessment System

1. The Local Positioning System
2. Strain, Acceleration and Temperature sensors
3. The Communication Module
4. Air and Space-borne Remote Sensing
5. Post Crisis Needs Assessment Tool in regards to Construction Damage and Related Needs (PCCDN)
6. Structural and Economic Loss and Needs Assessment Modules

"**RECONASS** will provide the stakeholders with near-real time and updated assessment of **damage**, **loss** and **needs**"

Local positioning tags
Strain sensors
Accelerometers
Temperature sensors
Data hubs
Gateway module

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The Sensing System (in-building & UAV)

RECONASS

GATEWAY

PCCDN TOOL

Security and tunneling layer

- IPSEC or SSL/TLS, tunnel authentication and user authorization, private key support, etc.

Smart routing layer

- Customized and adaptive routing protocols for the best utilization of WAN interfaces

Data management layer

- Local collection, validation and storage of sensor networks data (measurements, events, configurations etc.)

Sensor Management

- Queries, status update, abnormal behavior alert, etc.

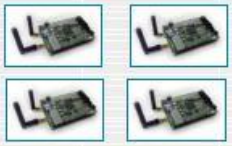
WSN (Waspmotes)

DATA HUBS

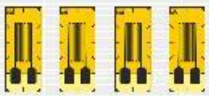
ACCELEROMETERS

LPS COORDINATOR

LPS TAGS



STRAIN SENSORS



TEMPERATURE SENSORS

The Sensing System (in-building & UAV)

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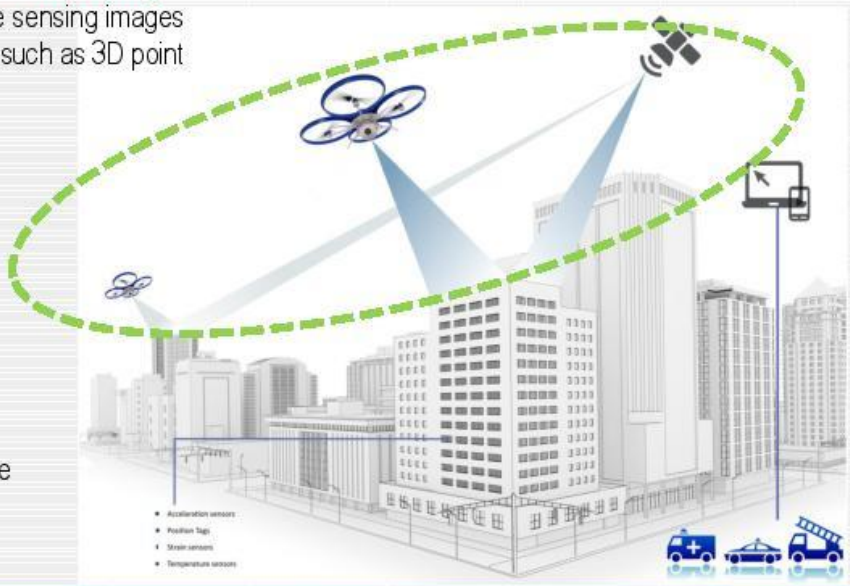
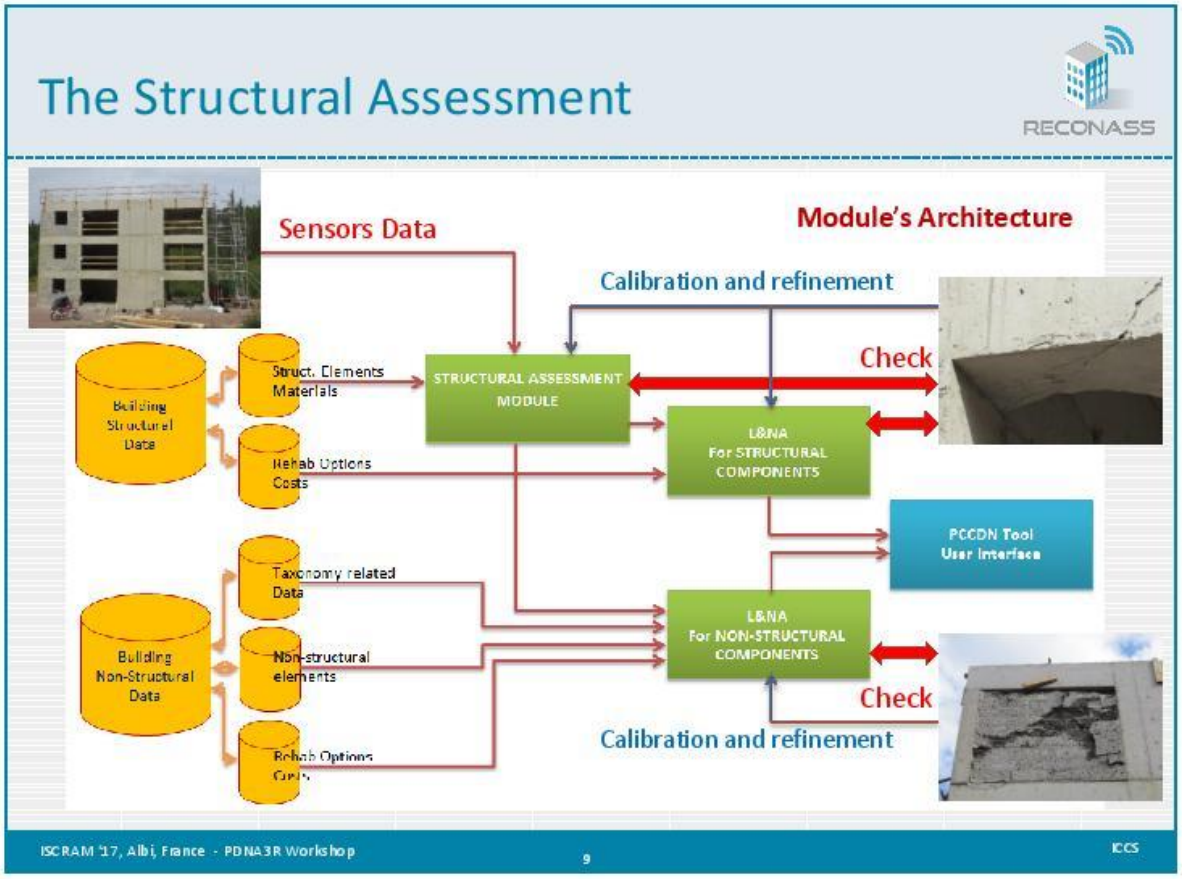
Damage mapping of exterior building elements using remote sensing images and derived products, such as 3D point clouds

Macro-perspective



Information integration to improve assessment level


The Structural Assessment
RECONASS
Sensors Data
Module's Architecture
Calibration and refinement
Check
Building Structural Data
Struct. Elements Materials
Rehab Options Costs
STRUCTURAL ASSESSMENT MODULE
L&NA For STRUCTURAL COMPONENTS
PCCDN Tool User Interface
Taxonomy related Data
Building Non-Structural Data
Non-structural elements
Rehab Options Costs
L&NA For NON-STRUCTURAL COMPONENTS
Check
Calibration and refinement
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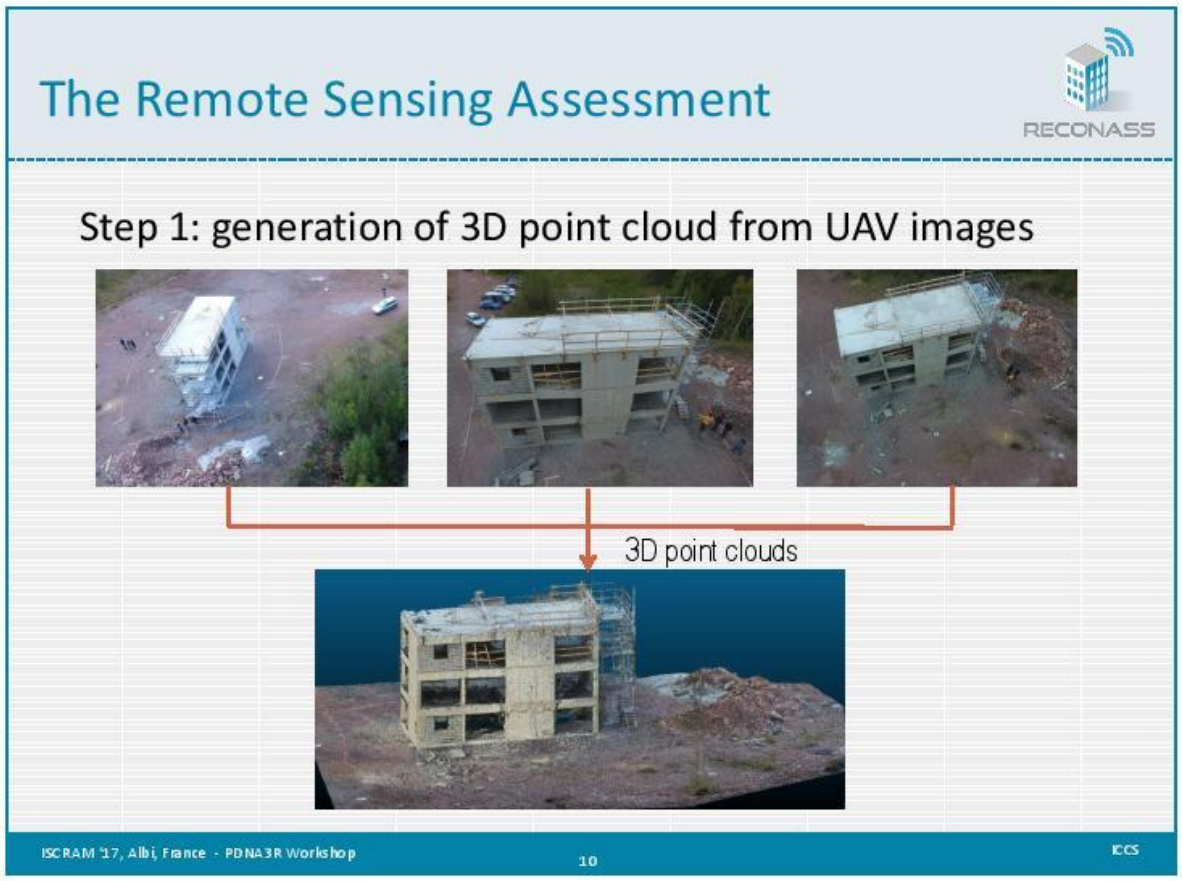
The Remote Sensing Assessment
RECONASS
Step 1: generation of 3D point cloud from UAV images
3D point clouds
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The Remote Sensing Assessment

RECONASS

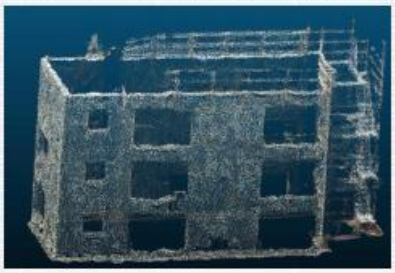
Step 2: Automated building detection

3D point cloud of the scene

Detection of roof segments of individual buildings

Delineated building

Detection of below roof elements



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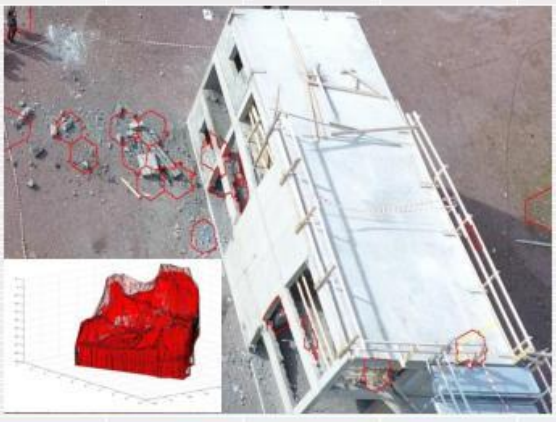
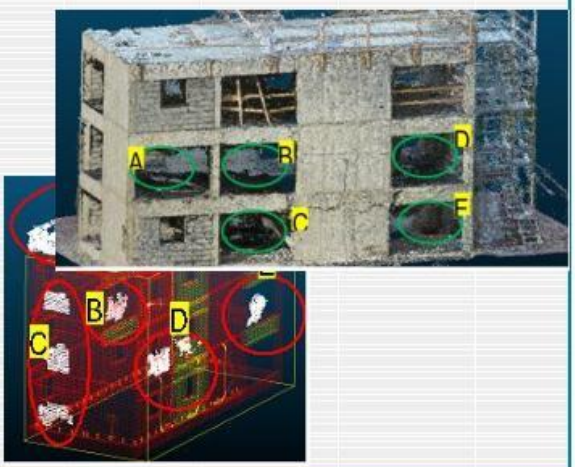
The Remote Sensing Assessment

RECONASS

Step 3: Spalling and debris detection and quantification using machine learning-based classification



Step 4: Broken element detection based on post-event data alone:



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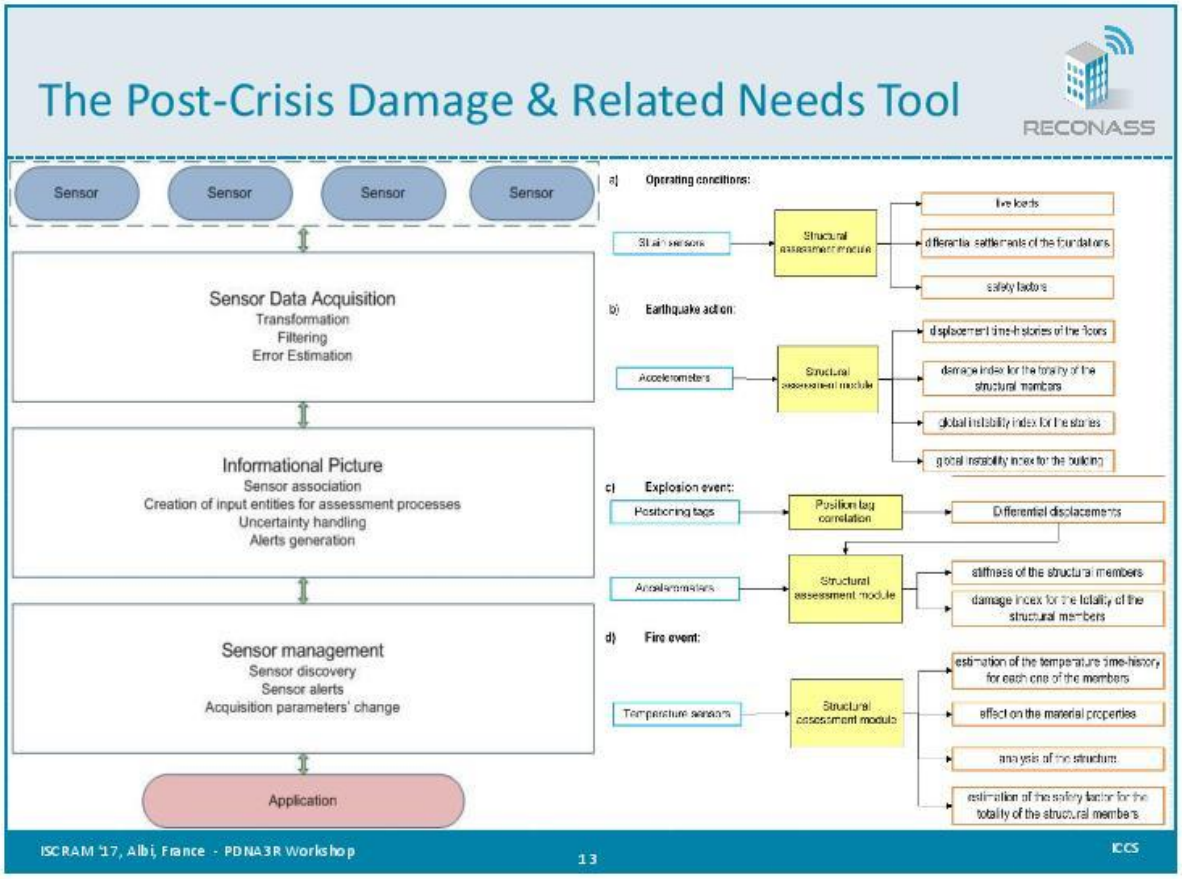
The Post-Crisis Damage & Related Needs Tool
RECONASS
Sensor
Sensor
Sensor
Sensor
Sensor Data Acquisition
Transformation
Filtering
Error Estimation
Informational Picture
Sensor association
Creation of input entities for assessment processes
Uncertainty handling
Alerts generation
Sensor management
Sensor discovery
Sensor alerts
Acquisition parameters' change
Application
a) Operating conditions:
Strain sensors
Structural assessment module
live loads
differential settlements of the foundations
safety factors
b) Earthquake action:
Accelerometers
Structural assessment module
displacement time-histories of the floors
damage index for the totality of the structural members
global instability index for the stories
global instability index for the building
c) Explosion event:
Positioning tags
Position tag correlation
Differential displacements
Accelerometers
Structural assessment module
stiffness of the structural members
damage index for the totality of the structural members
d) Fire event:
Temperature sensors
Structural assessment module
estimation of the temperature time-history for each one of the members
effect on the material properties
analysis of the structure
estimation of the safety factor for the totality of the structural members
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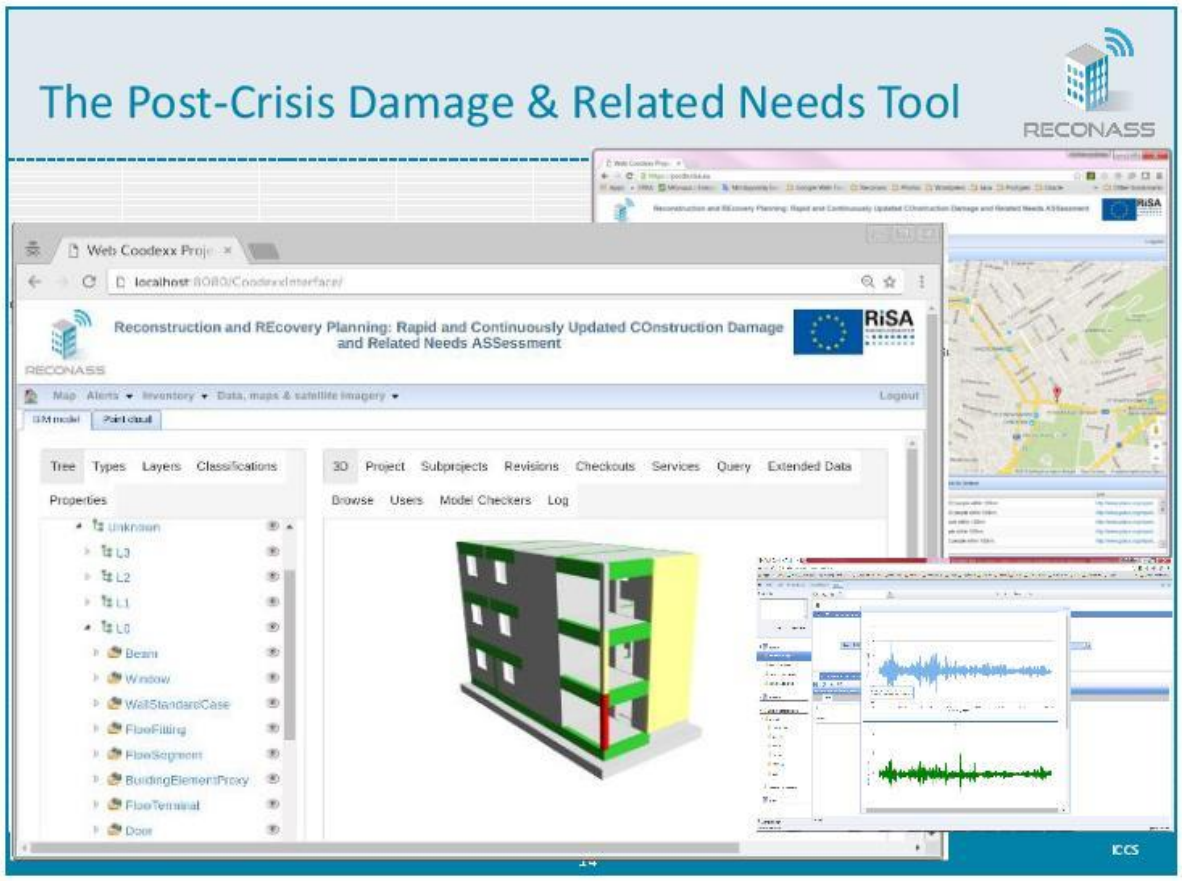

The Post-Crisis Damage & Related Needs Tool
RECONASS
Web Coodexx Proje
localhost:8080/CoodexxInterface/
Reconstruction and REcovery Planning: Rapid and Continuously Updated COnstruction Damage and Related Needs ASSessment
RiSA
RECONASS
Map Alerts Inventory Data, maps & satellite imagery
Logout
BIM model
Point cloud
Tree Types Layers Classifications
Properties
3D Project Subprojects Revisions Checkouts Services Query Extended Data
Browse Users Model Checkers Log
Unknown
L3
L2
L1
L0
Beam
Window
WallStandardCase
FlowFitting
FlowSegment
BuildingElementProxy
FlowTerminal
Door
ICCS

The RECONASS Pilot – Test Building

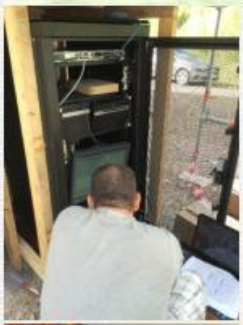
- ✓ Building construction
- ✓ Strain Instrumentation
- ✓ Full building instrumentation

25th of August 2016

Pilot Tests Detonations:

1. exterior 26th of August
2. interior 31th of August

The RECONASS Pilot – Test Building



The RECONASS Pilot – Test Building

- RECONASS Pilot Test External
- RECONASS Internal Explosion - GoPro camera
- RECONASS Internal Blast - Aerial view

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The RECONASS Pilot – Test Building

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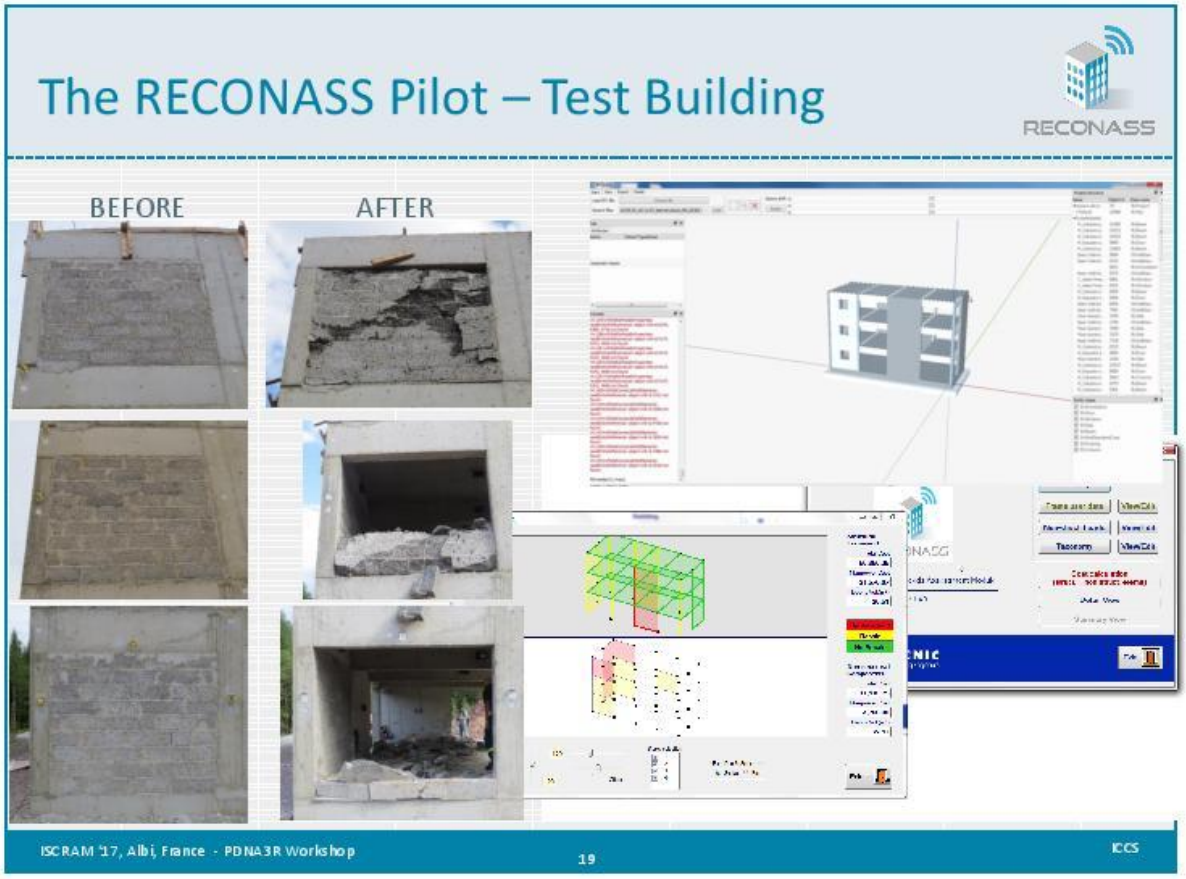
The RECONASS Pilot – Test Building
RECONASS
BEFORE
AFTER
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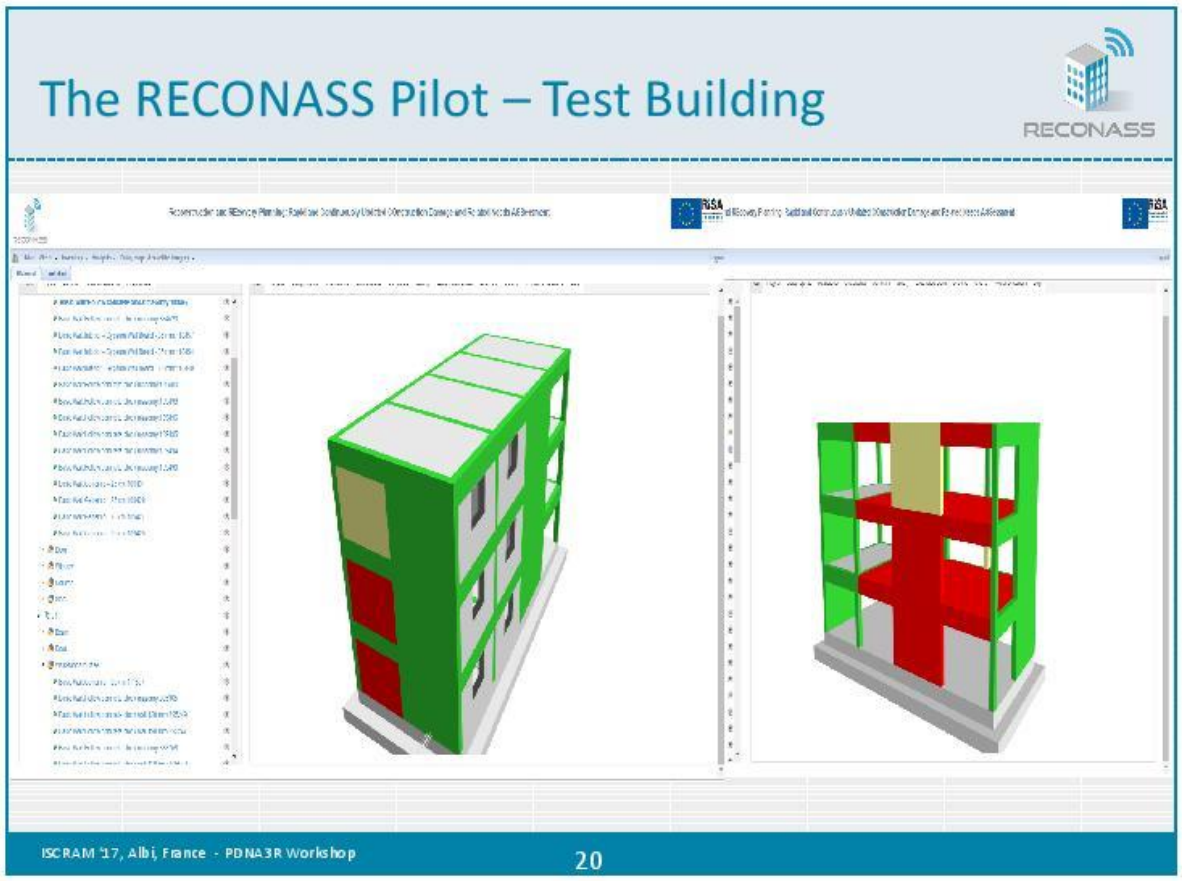
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Expected Results and their Applicability at EU level

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EU enhancement in Civil Protection and Disaster Management

Prevention → Preparedness → Response → Recovery

1. Relief organizations can **begin funding restoration efforts at a much earlier date.**
2. ER crews will receive **critical information promptly to pinpoint danger** respond in precision
3. **Disaster cost will be reduced** by preventing monitored structures from collapsing
4. Knowing **functionality of CIs** immediately after the disaster enhances asset utilisation
5. All **major recovery stakeholders** will acquire **a common picture of the situation.**
6. **Training operations** can be enhanced
7. Early, effective handling of the **reconstruction and recovery process** will have long term financial repercussions.

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RECONASS End-User Group

NGOs/Governmental Emergency Services, Building Owners and Operators, Damage Evaluators, Insurance companies

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Follow us on social media and learn more about SHOX

RECONASS

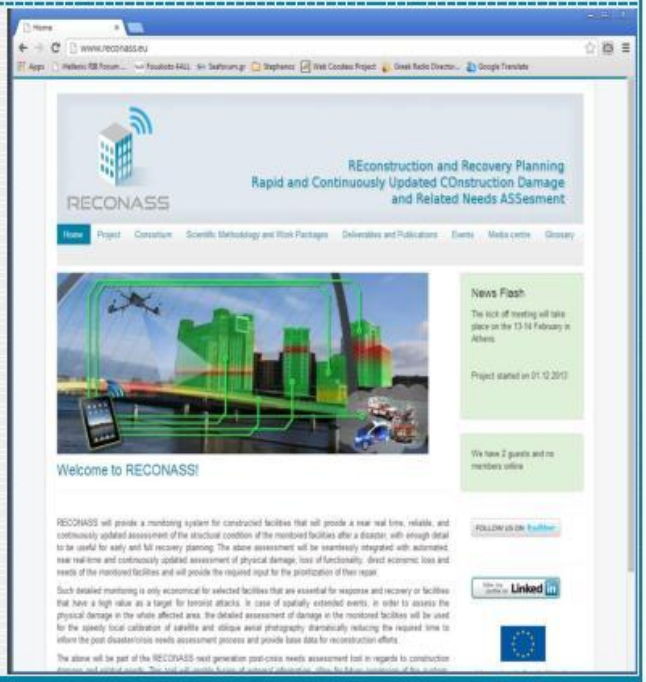
www.reconass.eu

- twitter.com/reconass

- Group "RECONASS"

http://www.shoxsolutions.com/

SHOX – Structural Health Monitoring in a Box



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Thank you!
Any questions?
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HOT - Crowdsourced area based damage assessments and comparative damage rankings

David Lallement, Robert Soden, Cristiano Giovando, Blake Girardot, **Melanie Eckle**, Benjamin Herfort, Gitanjali Bhattacharjee, Karen Barns, Sabine Loos

Eckle@uni-heidelberg.de

Humanitarian OpenStreetMap Team
STANFORD URBAN RESILIENCE INITIATIVE
GFDRR Global Facility for Disaster Reduction and Recovery
HeiGIT
NSF

Agenda

- Background
- Objective
- Approach
- Current state
- Outlook

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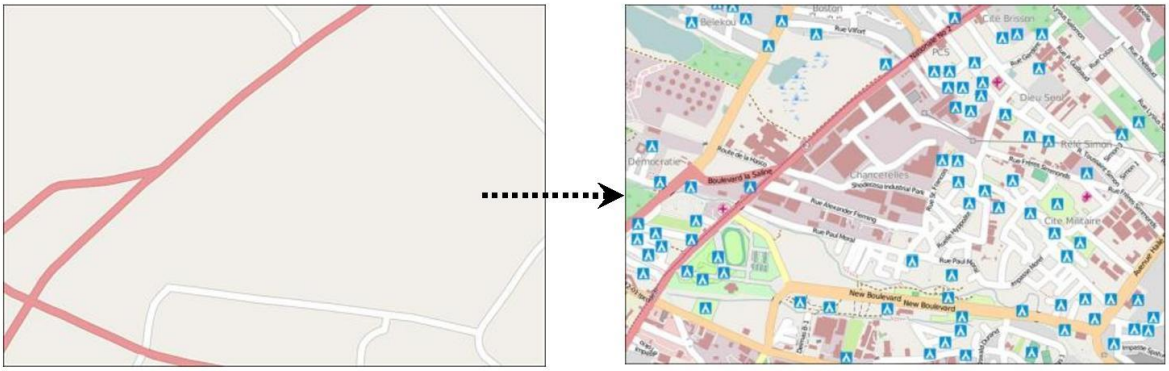

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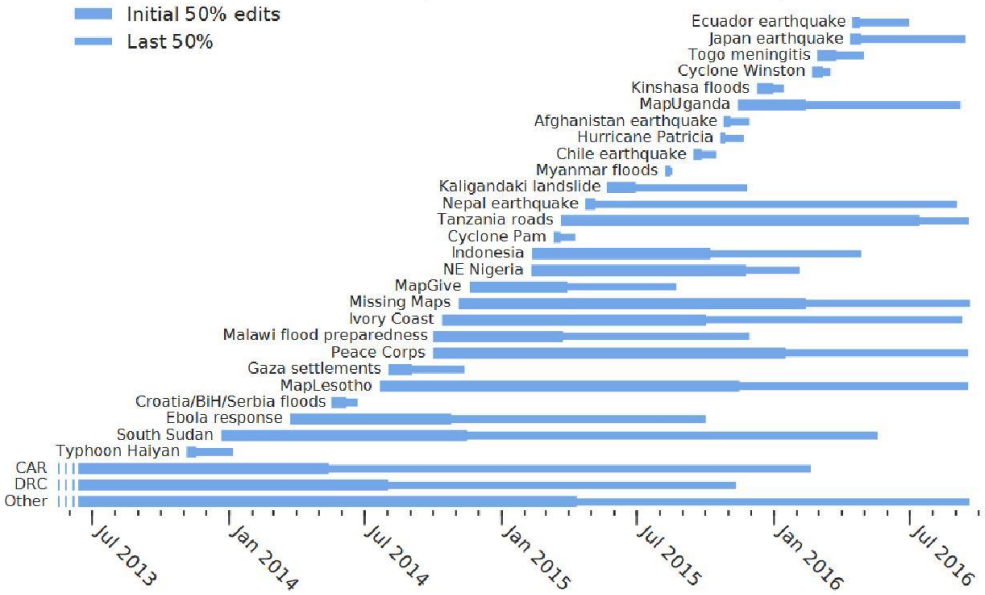

Dittus, SotM 2016

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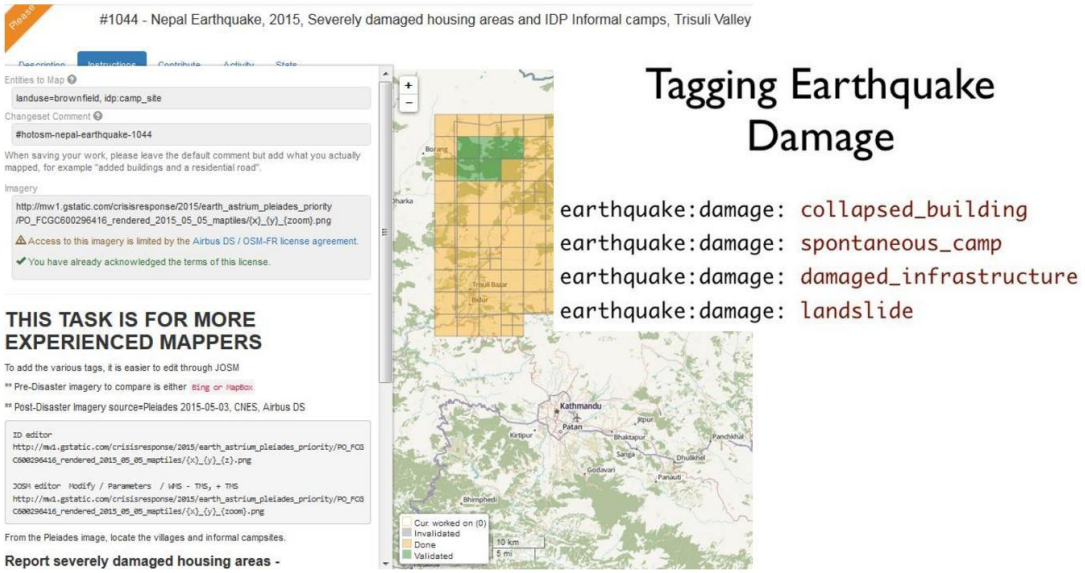
Crowdsourced damage mapping



http://tasks.hotosm.org/

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Crowdsourced damage mapping

"[…] **image-based damage assessment** can be considered **more challenging than base data mapping** […].
Damage mapping requires that **a single ordinal scale label is given to a structure in a complex state** […]. That essentially makes **"damage" a concept rather than a physical state**."

(Kerle 2013, p. 127f.)

"OSM contributors did a reasonably good job of identifying affected buildings but **overestimated the number of buildings completely destroyed** by the typhoon and **underestimated the number of buildings that were majorly damaged**.[…]"

(ARC 2014)

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Objective

Examine further opportunities for crowdsourcing of damage assessment information following major disasters.

Approach

- *Demand Survey*

  -Post Disaster Needs Assessment requirements

Approach

- *Area based assessment*
  - Rather than rating the level of damage to individual buildings, testing scoring the amount of damage in a given area

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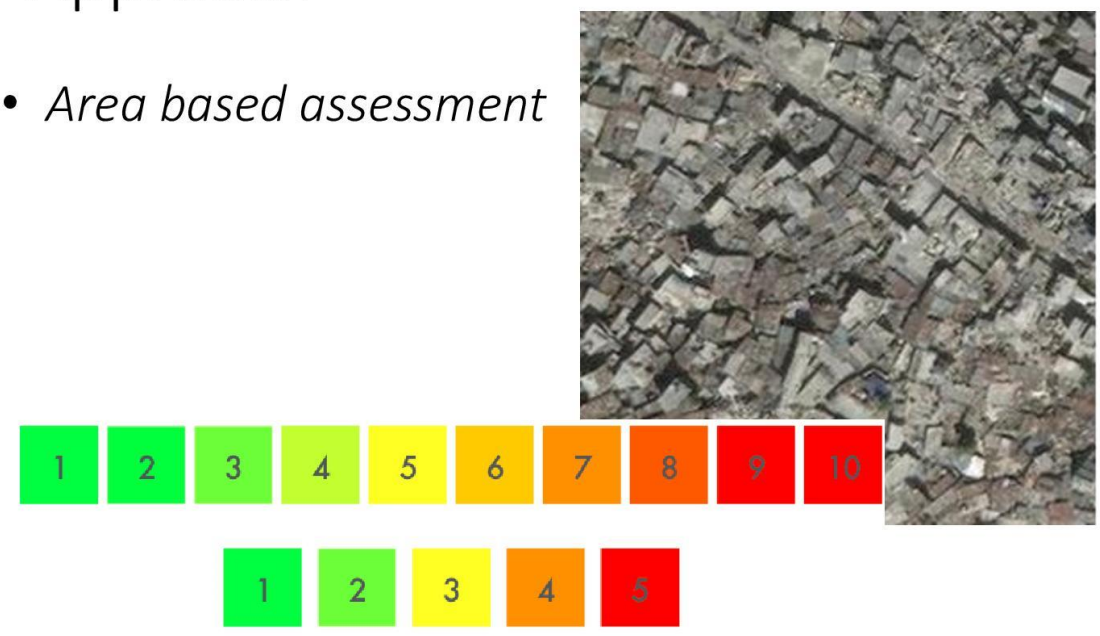
Approach

- *Area based assessment*



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Approach

- *Comparative damage rankings*
  - Rather than rating each building/ area individually, testing method by which participants are asked to compare two separate areas.

Approach

- *Comparative damage rankings*

Approach

- *Statistical methods of aggregation*
  - rather than testing accuracy of individual building marking, aggregating results to ward or district levels
  - including multiple passes and weighting user

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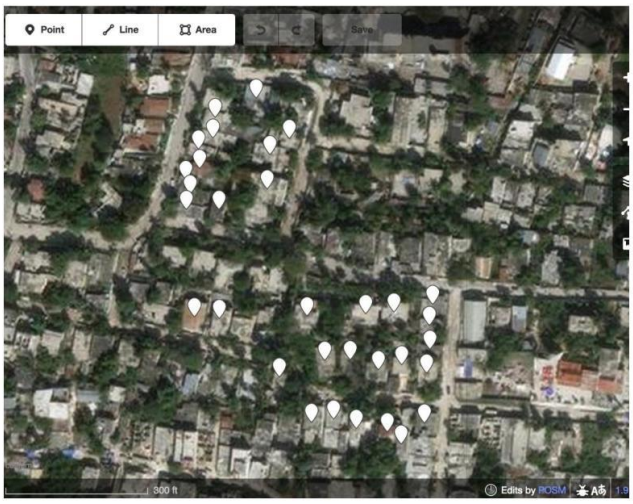
Approach

- OSM damage mapping



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Approach

- Training material

„Creating **generic and disaster-specific damage assessment guidance** materials for remote mappers would **improve the accuracy of results** and **reduce the number of potentially inaccurate judgment calls** contributors are asked to make. […]

Tailored materials featuring disaster-specific imagery could help to better identify damage patterns common to **local construction types** […]." (ARC 2014)

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Approach

- Training material

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Current state

- Pre-experiment ✓
- Think alouds ✓
- Internal review ✓

Next steps

- Finalize experiment setup
- Run experiment with OSM, HOT and Stanford community
- Presentation of experiments and results at HOT Summit and further conferences and discuss results with practitioners

Thank you for your attention!

Questions? Comments?

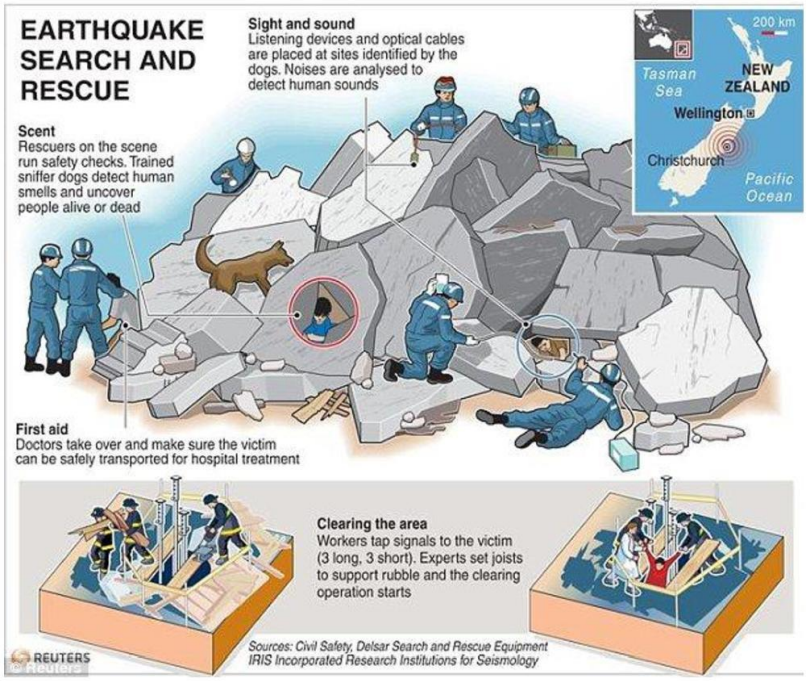
Eckle@uni-heidelberg.de

The INACHUS System for Buildings Assessment and SAR Operations

Dr. Angelos Amditis,
Research Director - ICCS

ISCRAM Workshop, 21 May 2017,
Albi, France

Urban Search and Rescue



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Urban Search and Rescue Issues

- Natural or man-made disasters often result to **chaotic and difficult working conditions** for Urban Search and Rescue (USaR) crews
- USaR crews must make **quick decisions under stress**
- **Limited situation awareness** and **inefficient localization** of trapped victims
- Statistics show that an efficient USaR system can significantly **reduce accident losses**, compared with situations without emergency system

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INACHUS

INACHUS - Project Info

Title: **Technological and Methodological Solutions for Integrated Wide Area Situation Awareness and Survivor Localization to Support Search and Rescue Teams**

Topic: SEC-2013.4.2-1, Fast rescue of disaster surviving victims: Simulation of and situation awareness during structural collapses including detection of survivors and survival spaces

Type: Large-scale Integrating Project (IP)

Consortium: 20 partners from 10 EU countries

Budget: ~10M € (EU contribution)

Starting date - Duration: 1/1/2015 – 48 months

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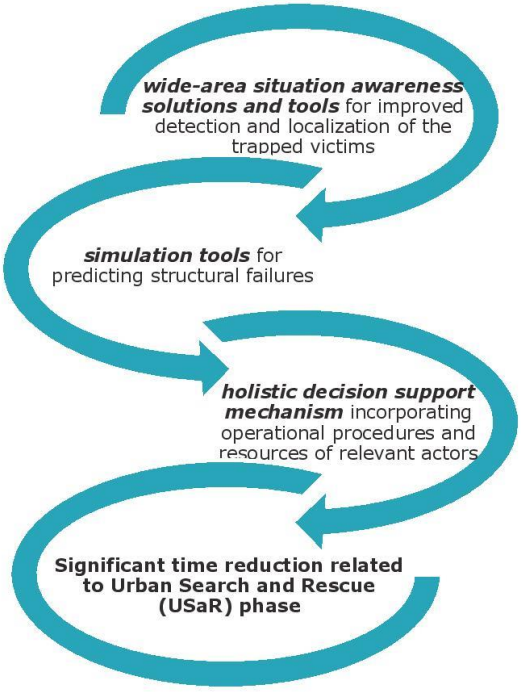
INACHUS

INACHUS Main Objectives



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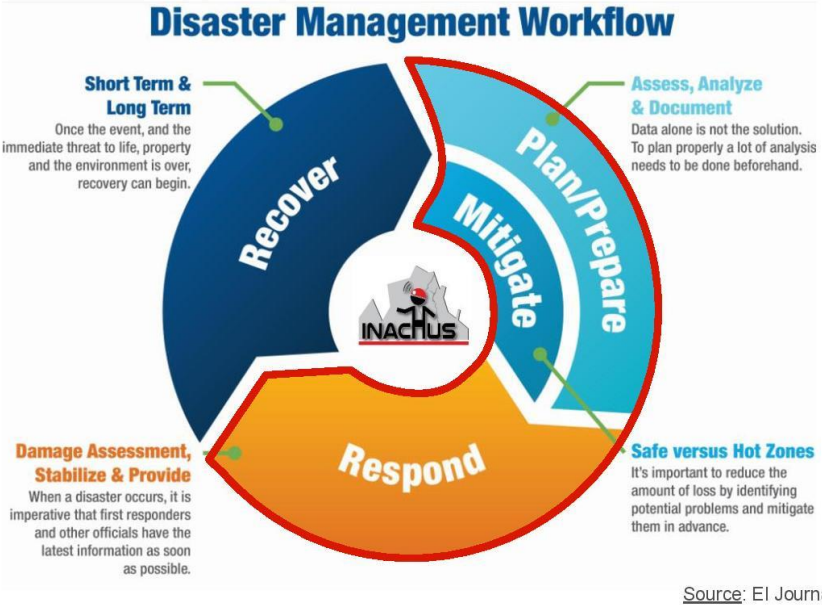
Disaster Phases



Source: El Journal

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INACHUS Approach

1. Increased effectiveness with the same number of human resources
2. Effective/safe tactics and uninterrupted flow of information and decision making through different levels of commandment and logistics organization
3. End user-driven approach
   - Operational organizations from Day-Number 1
   - Heavily involved in determining the specifications
   - Provide feedback so that INACHUS system is constantly improved and complies with the established USaR procedures
   - Proactively identify potential target audiences for the project exploitation

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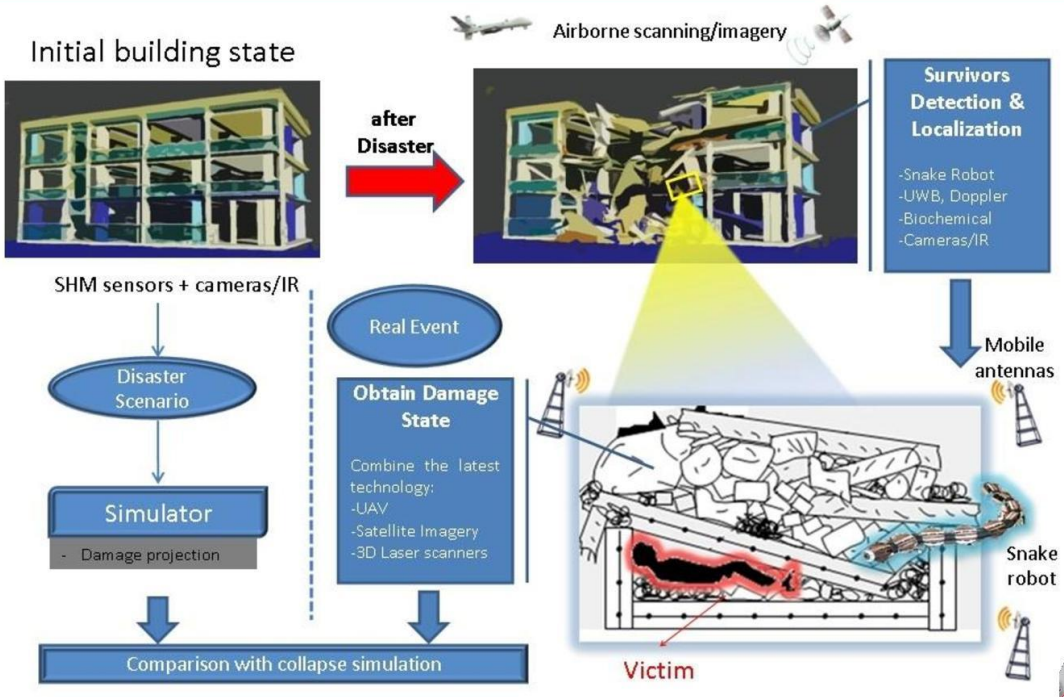
INACHUS Concept



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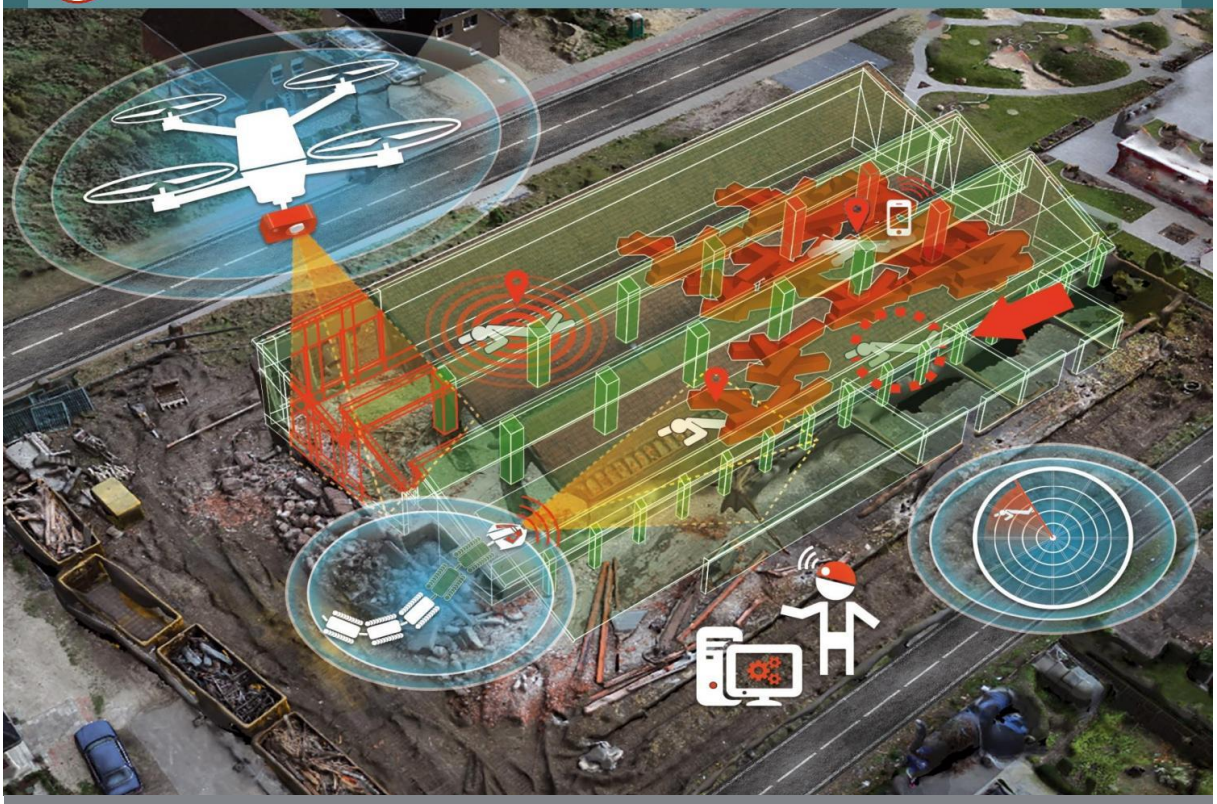
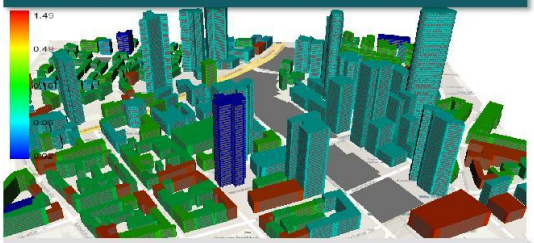
INACHUS Solution



Structural Damage Analysis and Casualty Estimation

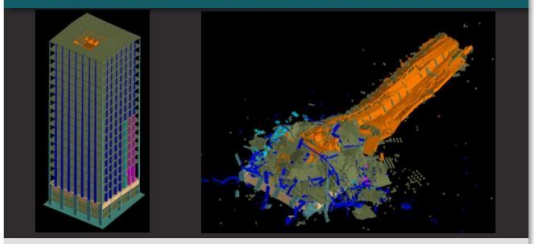
city quarter assessment



Mapping tool
assessment of damage hot spots and rescue paths in urban areas

→ *where should USaR teams start?*

single building assessment



Detailed collapse simulation
of single buildings with DEM/AEM/FEM

→ *where might USaR teams find people in a debris heap? How to get them out safely?*

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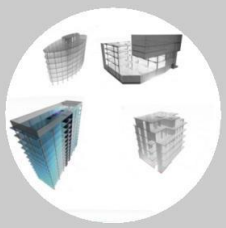
INACHUS

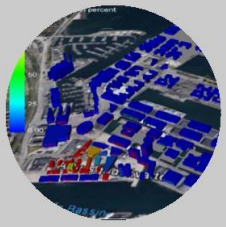
Structural Damage Analysis and Casualty Estimation



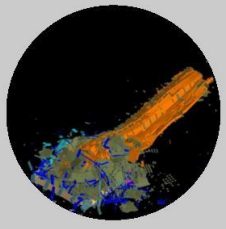
Library of predefined (typical European) buildings

Templates for …

Selected buildings



city quarter **assessment**



single building **assessment**

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INACHUS

Wide-Area Surveillance Tools

3D surface models

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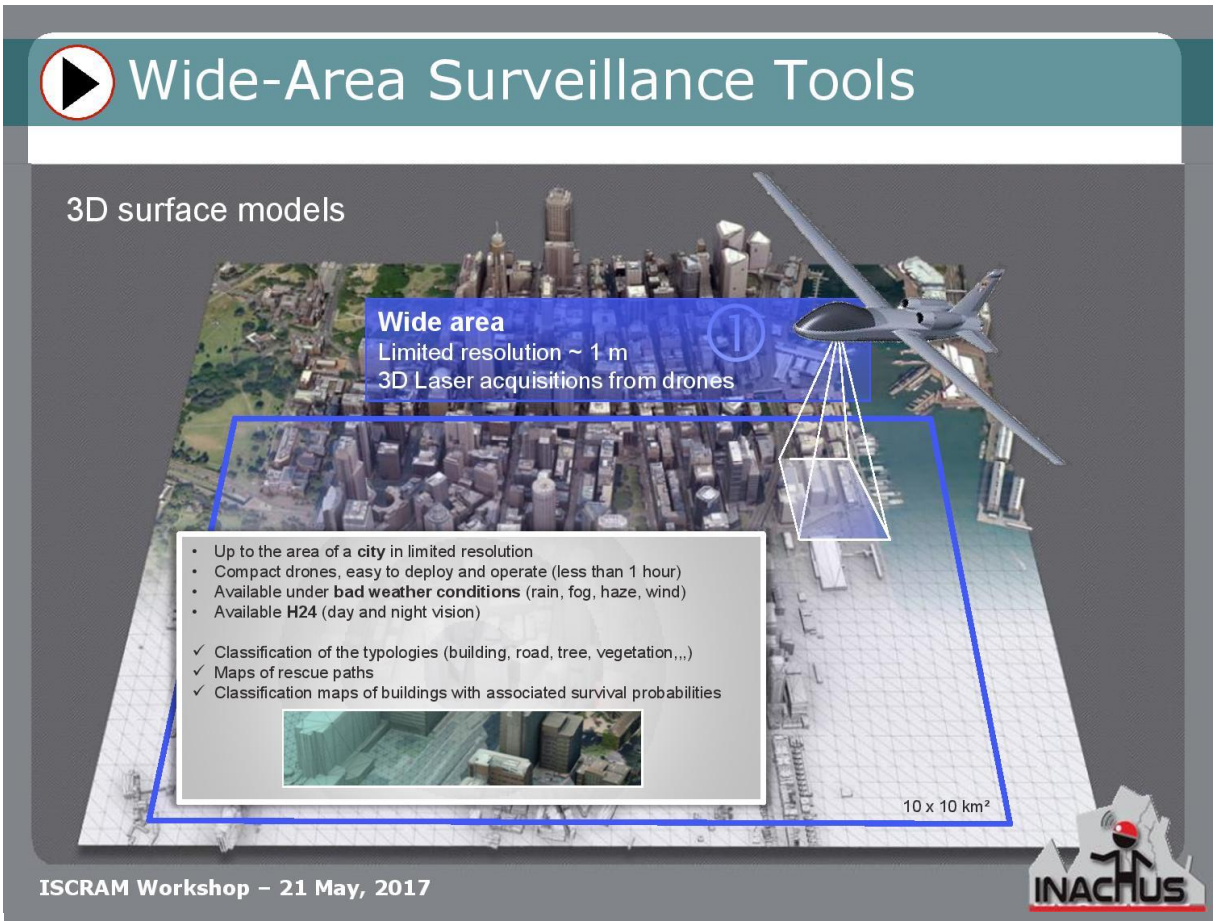
Wide-Area Surveillance Tools
3D surface models
Wide area
Limited resolution ~ 1 m
3D Laser acquisitions from drones
1
• Up to the area of a city in limited resolution
• Compact drones, easy to deploy and operate (less than 1 hour)
• Available under bad weather conditions (rain, fog, haze, wind)
• Available H24 (day and night vision)
✓ Classification of the typologies (building, road, tree, vegetation,,,)
✓ Maps of rescue paths
✓ Classification maps of buildings with associated survival probabilities
10 x 10 km²
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INACHUS


Wide-Area Surveillance Tools
3D surface models
• From Quarter to Building levels in high resolution
• Autonomous outdoor flight (light-weight drones <5kg)
• Data fusion from Terrestrial and Airborne measurements
✓ Precise 3D reconstruction for visual analysis of buildings by SaR Teams
✓ Increasing operator interpretation by 3D / visible data fusion (damage evaluation)
Small scale
High resolution < 10 cm
3D Laser acquisitions from ground and drones
Visible camera on drones
2
100 x 100 m²
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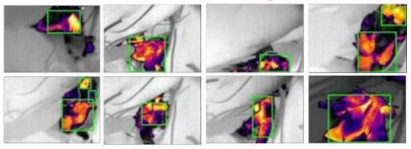
Victim Localization

Infrared sensors



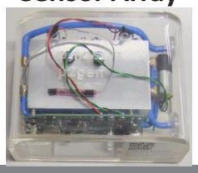
Surface radar (UWB radar)

Robot radar
(CW radar)

Mobile phone
detector

Distributed Seismic sensors

Electronic Nose
Sensor Array



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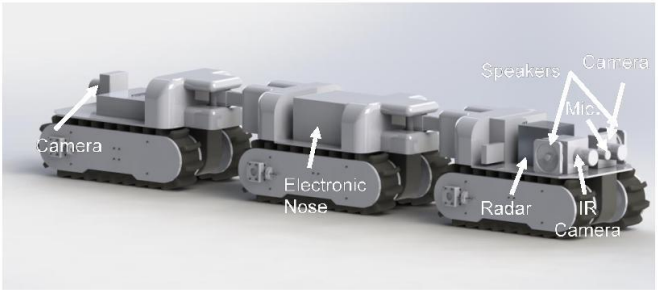
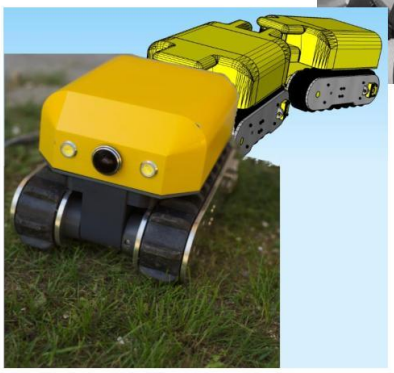
INACHUS

INACHUS Robot

Robots go where humans can't!



Sensors located inside the robot



Obstacle-aided locomotion

High maneuverability

High robustness

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INACHUS

INACHUS Robot

Vision of the final prototype – simulated environment

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Work Structure

WP No.	Title
WP1	Scenarios Definition, User/System Requirements and Specifications
WP2	Framework Design and Interoperability Issues
WP3	Simulation Tool for Structural Damage Analysis and Casualty Estimation
WP4	Wide-Area Surveillance Tools for monitoring of Collapsed buildings
WP5	Victim Localization Solutions
WP6	INACHUS Emergency Support System (SaR-ESS)
WP7	Secure Communications and Positioning Issues
WP8	System Integration
WP9	Pilot Implementation and Validation of INACHUS platform
WP10	Dissemination, Exploitation and Training Activities
WP11	Evaluation and Consideration of Societal Impacts, Legal/Ethical Issues and Standardization
WP12	Project Management, Quality Assurance and Reporting

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INACHUS Validation

Pilot 2: Small scale catastrophe for performance assessment mainly of wide-area surveillance tools for monitoring of collapsed buildings and simulation tools for structural damage analysis and casualty estimation

Pilot 1: Small scale catastrophe for performance assessment of integrated sensors

Pilot 4: Cross-border earthquake scenario - Final Demonstration of the Integrated INACHUS system

Pilot 3: Explosion in industrial installation due to terrorist attack scenario - First Demonstration of the integrated INACHUS system

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Expected Impact

Saving more lives during disasters!

- Improving situational awareness, reducing uncertainties and strengthening coordination
- Strongly reducing time for planning and intervention and increasing effectiveness
- Providing more advanced tools for USaR operations
- Reduced disaster costs
  - *Limitation of disaster impact*
  - *Reduction in medical costs*
- New technologies for an emerging market

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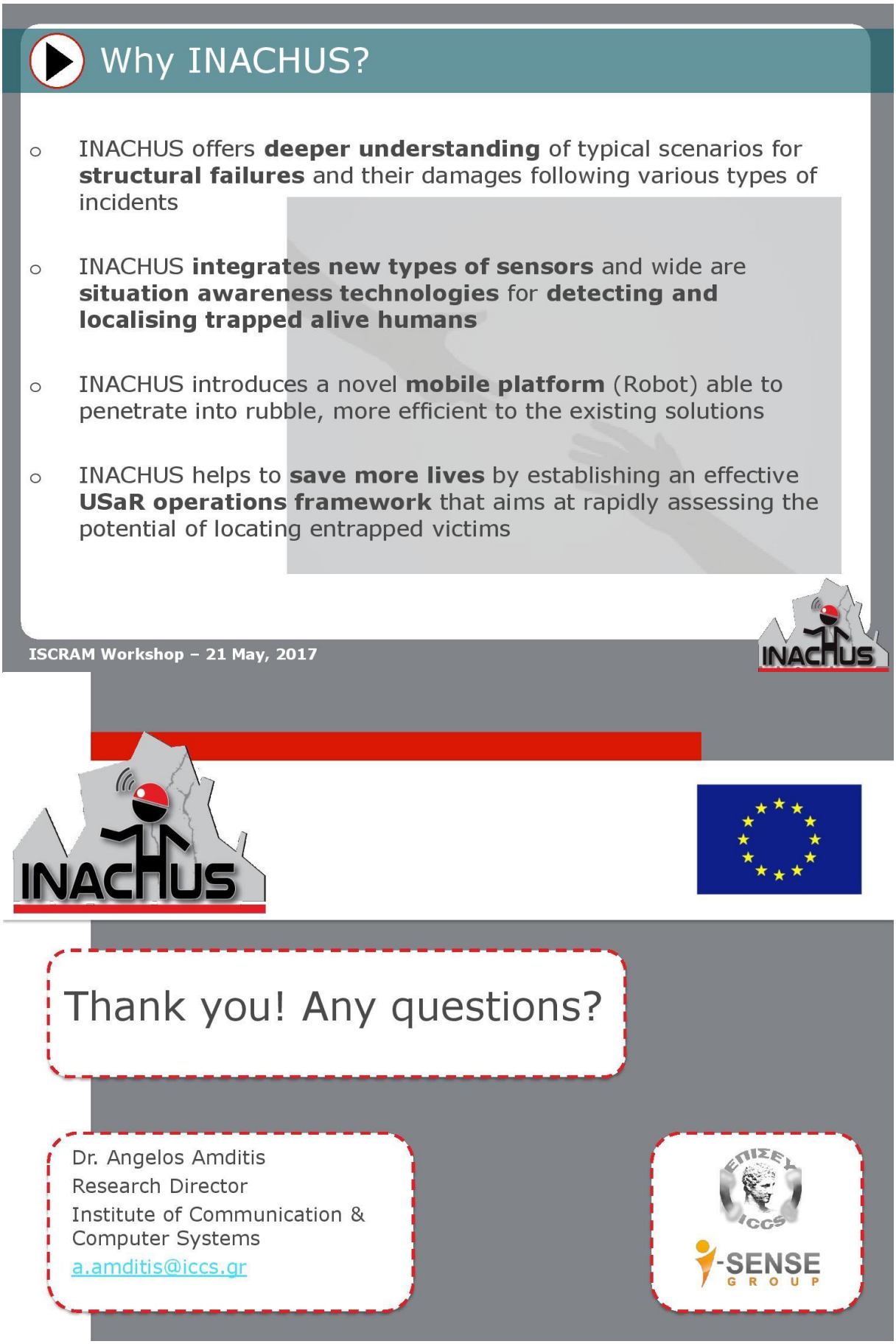
Why INACHUS?
INACHUS offers deeper understanding of typical scenarios for structural failures and their damages following various types of incidents
INACHUS integrates new types of sensors and wide are situation awareness technologies for detecting and localising trapped alive humans
INACHUS introduces a novel mobile platform (Robot) able to penetrate into rubble, more efficient to the existing solutions
INACHUS helps to save more lives by establishing an effective USaR operations framework that aims at rapidly assessing the potential of locating entrapped victims
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INACHUS
INACHUS
Thank you! Any questions?
Dr. Angelos Amditis
Research Director
Institute of Communication & Computer Systems
a.amditis@iccs.gr
ICCS
i-SENSE GROUP

ISCRAM 2017 | 3D Laser Imaging | 20170521

3D laser imaging techniques to improve USaR operations for wide-area surveillance and monitoring of collapsed buildings

Angelos Amditis, Alexandre Amiez, George Athanasiou, Jimmy Berggren, Alexandre Boulch, Nathalie Bozabalian, Diogo Duarte, Paul-Edouard Dupouy, Pierre Escalas, Markus Gerke, Frédérique Giroud, Christophe Grand, Laurent Hespel, Norman Kerle, Yoann Lambert, Francesco Nex, Bertrand Le Saux, Nicolas Riviere, Anita Schilling, Gustav Told

ONERA
THE FRENCH AEROSPACE LAB

Nicolas RIVIERE
ONERA – Optronics Department
Light Matter Interaction, Imaging and Detection Laser Systems Unit
2 av Edouard Belin – F31055 Toulouse – France

Phone : +33 (0) 562 252 624
E.mail : riviere@onera.fr

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General context

Our business, expertise in the field and facilities

- **ONERA, The French Aerospace Lab**

1st French actor of research on aeronautics, space and defense

2,100 persons

70 ans 2016

EPIC State-controlled entities of an industrial or commercial nature

15% of PhD students

8 Sites

- **Missions**

☒ Anticipate technological breakthroughs

☒ Promote the technology transfer to industry

☒ Realization and implementation of simulation and experimental facilities (1st European wind tunnels…)

☒ Expertise to government and industries

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General context

Our business, expertise in the field and facilities

- **How can we improve the vision for situational awareness?**

☒ To perform the **strategic surveillance** of the environment for various worldwide operations

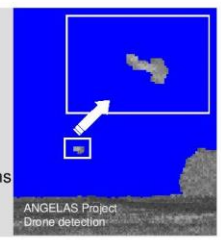
☒ To perform the **enhanced navigation** of an aircraft, a drone or a ground vehicle

⇨ Imaging systems must operate **at night** in all ambient illuminations and **weather** conditions
Active / Passive Imaging systems for **security and defense applications**

- **Performance Analysis of Sensors at ONERA**

☒ ONERA develops **new systems** and **models** for **remote sensing applications** based on laser sources (imaging or not)

☒ Challenges
To evaluate **original / complementary** imaging techniques *vs* conventional imaging systems
To identify **new concepts** (3D, hyperspectral…) using new sensors



What about Laser Imaging Techniques ?

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Laser Imaging

① 2D Flash Laser Systems

Burst illumination imaging system combines active laser illumination with time gating
Long range aerial / terrestrial applications: Defense, Security and Survey
Targeting, camouflage, observation, up to identification

② 3D Laser Scanner Systems

Range estimation using pulsed laser and scanner ⇨ 3D point clouds restoring the shape of the target
Time Of Flight (TOF) + Full Wave Form imaging technique
Applications to camouflage, detection, up to identification

③ 3D Focal Plane Array (FPA) Systems

Multi-pixel 3D arrays (*eg.* photon counting avalanche photodiodes) provide a 3D laser image with one single large laser beam, thanks to the temporal independence of each pixel on the matrix
3D Geiger-mode Avalanche PhotoDiode (GmAPD) array offers single photon detection capability

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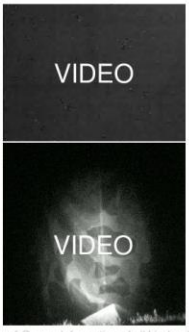
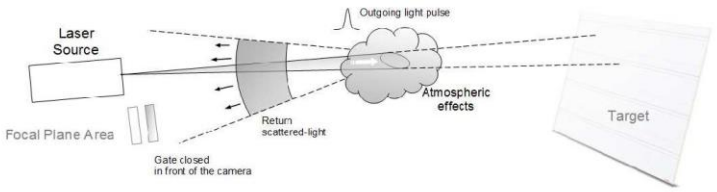
Laser Imaging

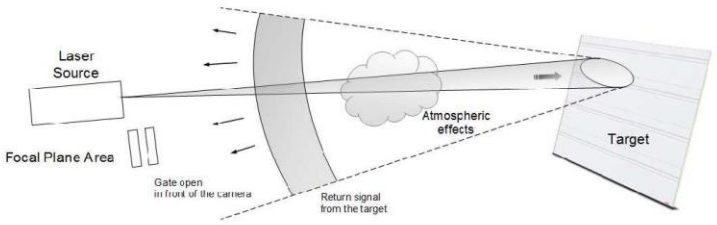
① 2D Flash Laser Systems

Burst illumination imaging system combines active laser illumination with time gating
Long range aerial / terrestrial applications: Defense, Security and Survey
Targeting, camouflage, observation, up to identification

- ✓ Observation at long range
- ✓ 2D video mode
- ✓ Identification
- × Resolution and SWaP ?







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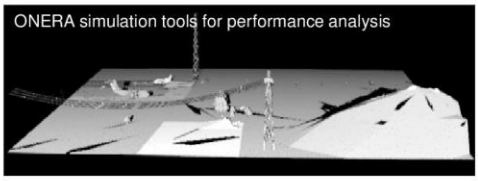
Laser Imaging

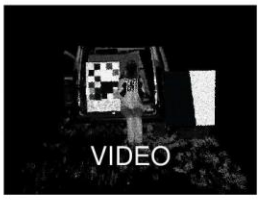
② 3D Laser Scanner Systems

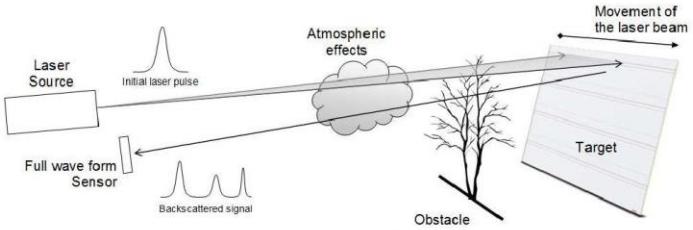
Range estimation using pulsed laser and scanner ⇨ 3D point clouds restoring the shape of the target
Time Of Flight (TOF) + Full Wave Form imaging technique
Applications to camouflage, detection, up to identification

- ✓ Observation at short / medium range
- ✓ Recognition
- ✓ Full wave form information, not only first or last echoes
- × Single image

ONERA simulation tools for performance analysis







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Laser Imaging

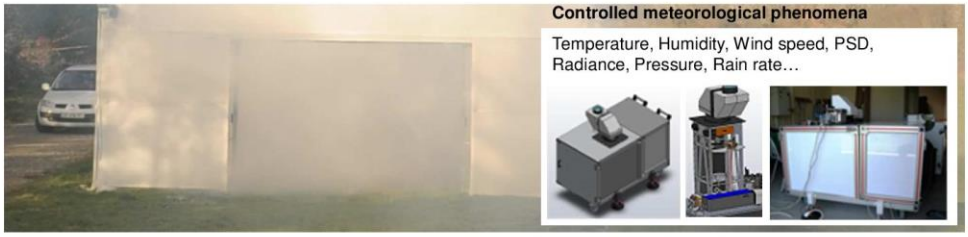
② 3D Laser Scanner Systems

Range estimation using pulsed laser and scanner ⇨ 3D point clouds restoring the shape of the target
Time Of Flight (TOF) + Full Wave Form imaging technique
Applications to camouflage, detection, up to identification

Enhanced vision in all weather conditions
Natural / controlled bad weather conditions

Cloud chamber

A facility to create controlled fog and rain at ONERA



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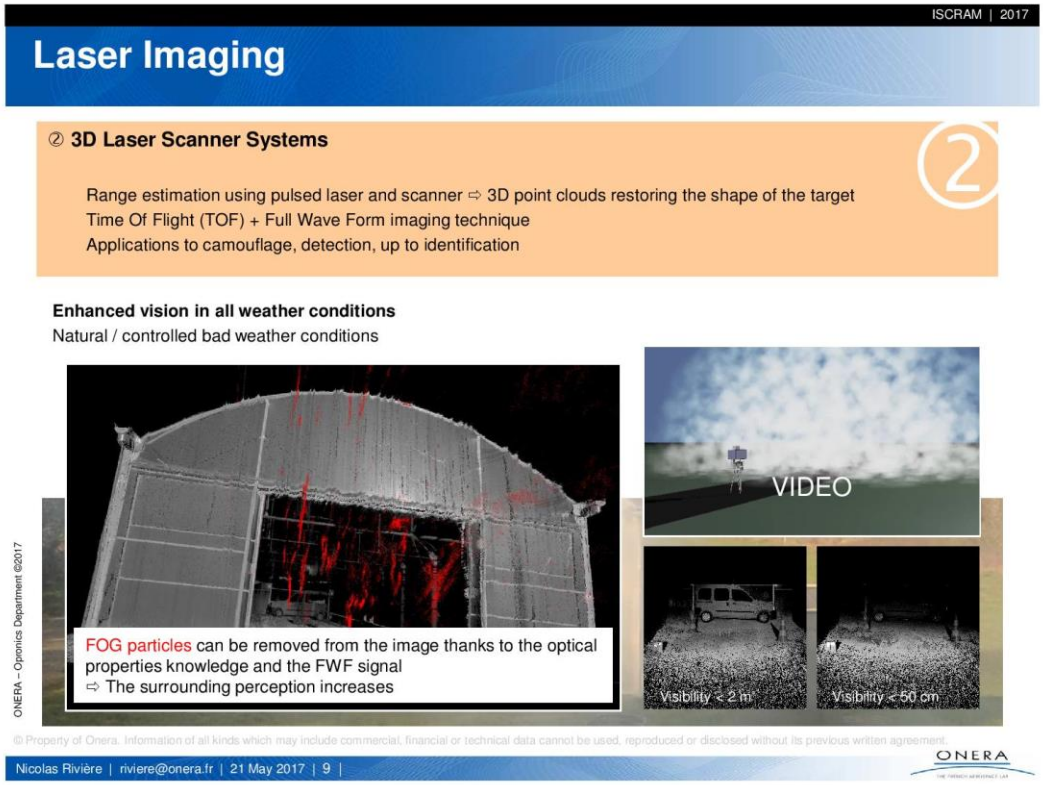
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Laser Imaging
② 3D Laser Scanner Systems
Range estimation using pulsed laser and scanner ⇨ 3D point clouds restoring the shape of the target
Time Of Flight (TOF) + Full Wave Form imaging technique
Applications to camouflage, detection, up to identification
Enhanced vision in all weather conditions
Natural / controlled bad weather conditions
FOG particles can be removed from the image thanks to the optical properties knowledge and the FWF signal
⇨ The surrounding perception increases
VIDEO
Visibility < 2 m
Visibility < 50 cm
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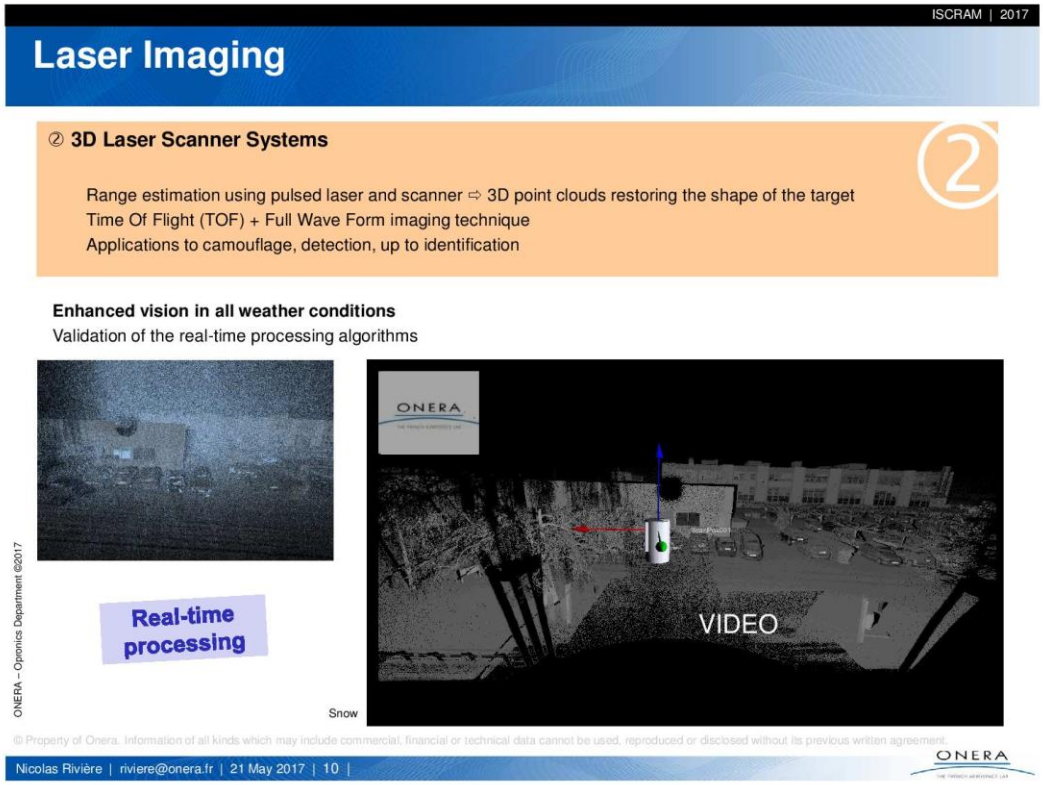
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Laser Imaging
② 3D Laser Scanner Systems
Range estimation using pulsed laser and scanner ⇨ 3D point clouds restoring the shape of the target
Time Of Flight (TOF) + Full Wave Form imaging technique
Applications to camouflage, detection, up to identification
Enhanced vision in all weather conditions
Validation of the real-time processing algorithms
Real-time processing
ONERA
VIDEO
Snow
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Laser Imaging

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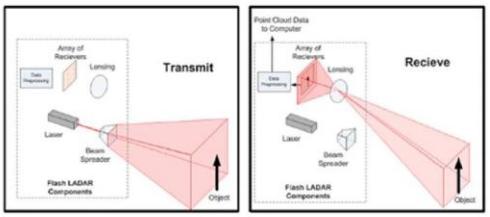
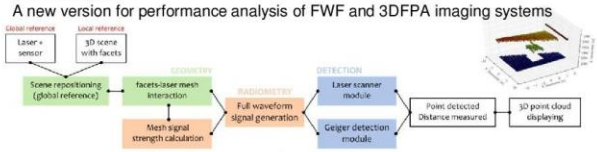
Multi-pixel 3D arrays (*eg.* photon counting avalanche photodiodes) provide a 3D laser image with one single large laser beam, thanks to the temporal independence of each pixel on the matrix
3D Geiger-mode Avalanche PhotoDiode (GmAPD) array offers single photon detection capability

- ✓ Observation at very long range (a pencil at 7km)
- ✓ 3D video mode
- ✓ Object detection and surveillance applications
- ✓ Real-time accurate DSM generation
- × Small matrix size (128x32pxl)
- × Big data storage



Research and first concepts : TRL 3-4

MATLIS code:
A new version for performance analysis of FWF and 3DFPA imaging systems



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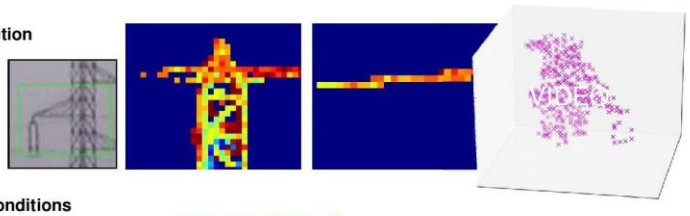
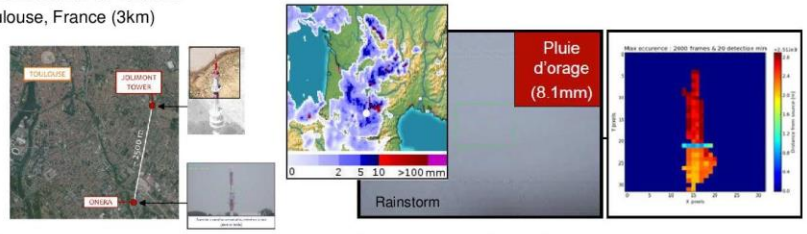
3D Geiger-mode Avalanche PhotoDiode (GmAPD) array offers single photon detection capability

Obstacle detection in high resolution
Cables at several kilometers
Day and night vision



Enhanced vision in all weather conditions
Jolimont Tower in Toulouse, France (3km)



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3D laser imaging and USaR operations
INACHUS
INACHUS Project
Objectives and approaches
To achieve a significant time reduction related to Urban Search and Rescue phase
To provide wide area situation awareness solutions for improved detection and localization of the trapped victims
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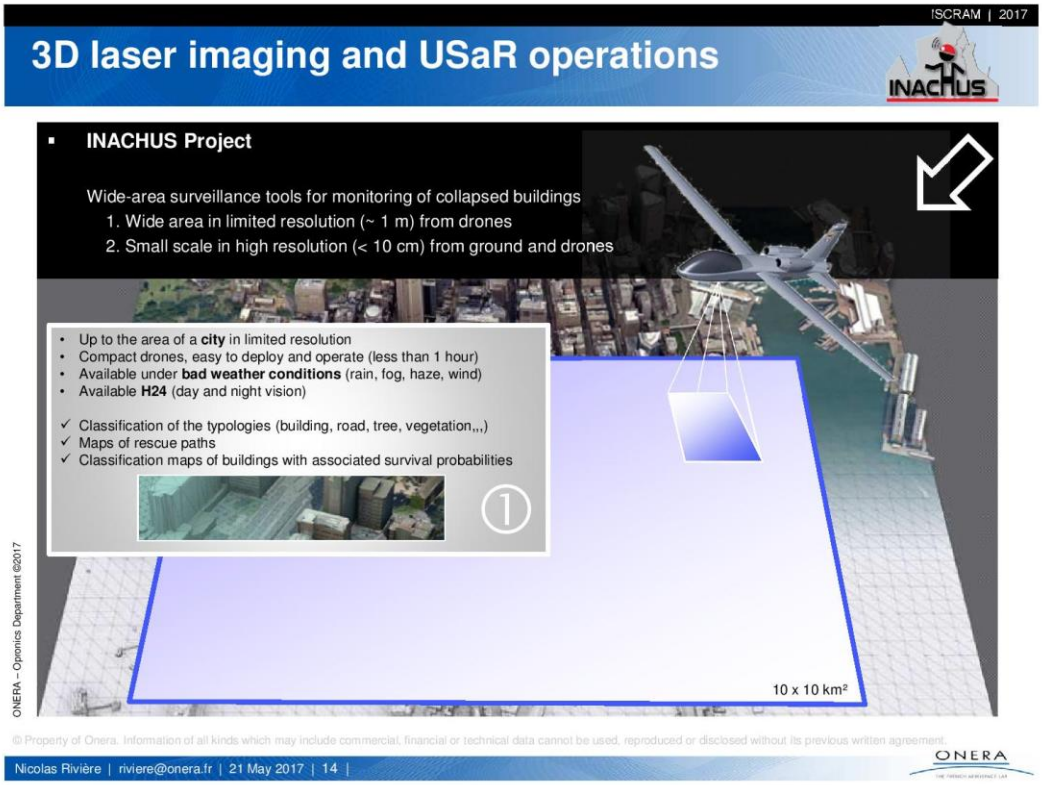
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3D laser imaging and USaR operations
INACHUS
INACHUS Project
Wide-area surveillance tools for monitoring of collapsed buildings
1. Wide area in limited resolution (~ 1 m) from drones
2. Small scale in high resolution (< 10 cm) from ground and drones
Up to the area of a city in limited resolution
Compact drones, easy to deploy and operate (less than 1 hour)
Available under bad weather conditions (rain, fog, haze, wind)
Available H24 (day and night vision)
✓ Classification of the typologies (building, road, tree, vegetation,,,)
✓ Maps of rescue paths
✓ Classification maps of buildings with associated survival probabilities
10 x 10 km²
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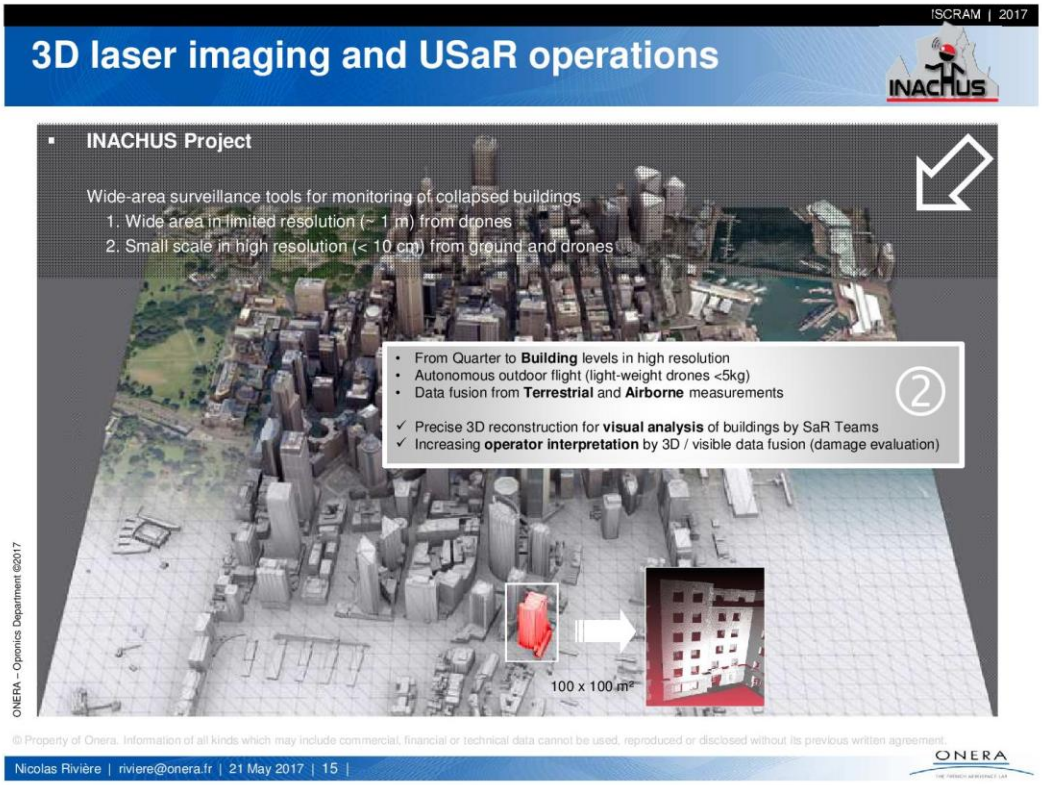
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3D laser imaging and USaR operations
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1. Wide area in limited resolution (~ 1 m) from drones
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From Quarter to Building levels in high resolution
Autonomous outdoor flight (light-weight drones <5kg)
Data fusion from Terrestrial and Airborne measurements
Precise 3D reconstruction for visual analysis of buildings by SaR Teams
Increasing operator interpretation by 3D / visible data fusion (damage evaluation)
2
100 x 100 m²
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3D laser imaging and USaR operations
INACHUS
INACHUS Project
Experiments to collect 3D data with aerial / ground-based systems ⇨ Dense high-accuracy data
3D laser cameras (3D TOF) integrated on helicopter UAV and gyrocopter
50-100kg, 2-3m rotor span, payload 5-10kg
3D measurements in Ågesta, Toulouse… Scenarios shared with ALL partners + End-Users
Gyrocopter experiments
VIDEO
Ground laser scanner
Experiments in Toulouse, France
March 2016
GYRO ALL GYRO taxi GYRO Flight
3D point cloud (FWF) on wide area from gyrocopter platform
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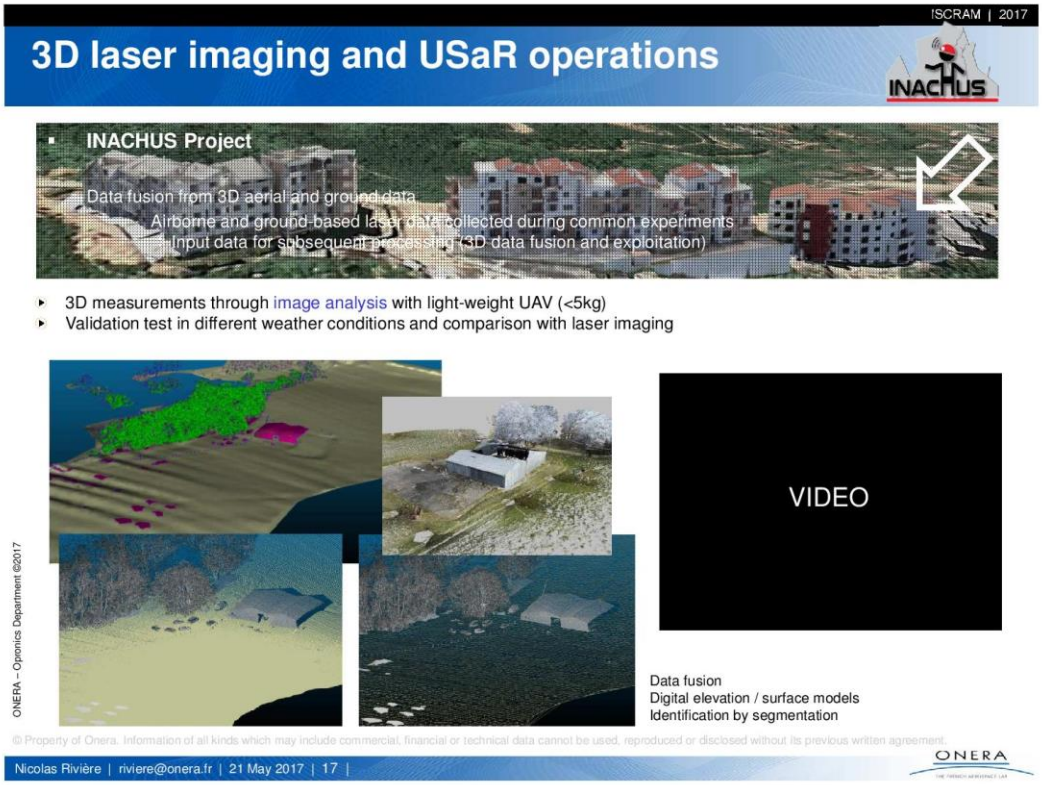
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3D laser imaging and USaR operations
INACHUS
INACHUS Project
Data fusion from 3D aerial and ground data
Airborne and ground-based laser data collected during common experiments
Input data for subsequent processing (3D data fusion and exploitation)
3D measurements through image analysis with light-weight UAV (<5kg)
Validation test in different weather conditions and comparison with laser imaging
VIDEO
Data fusion
Digital elevation / surface models
Identification by segmentation
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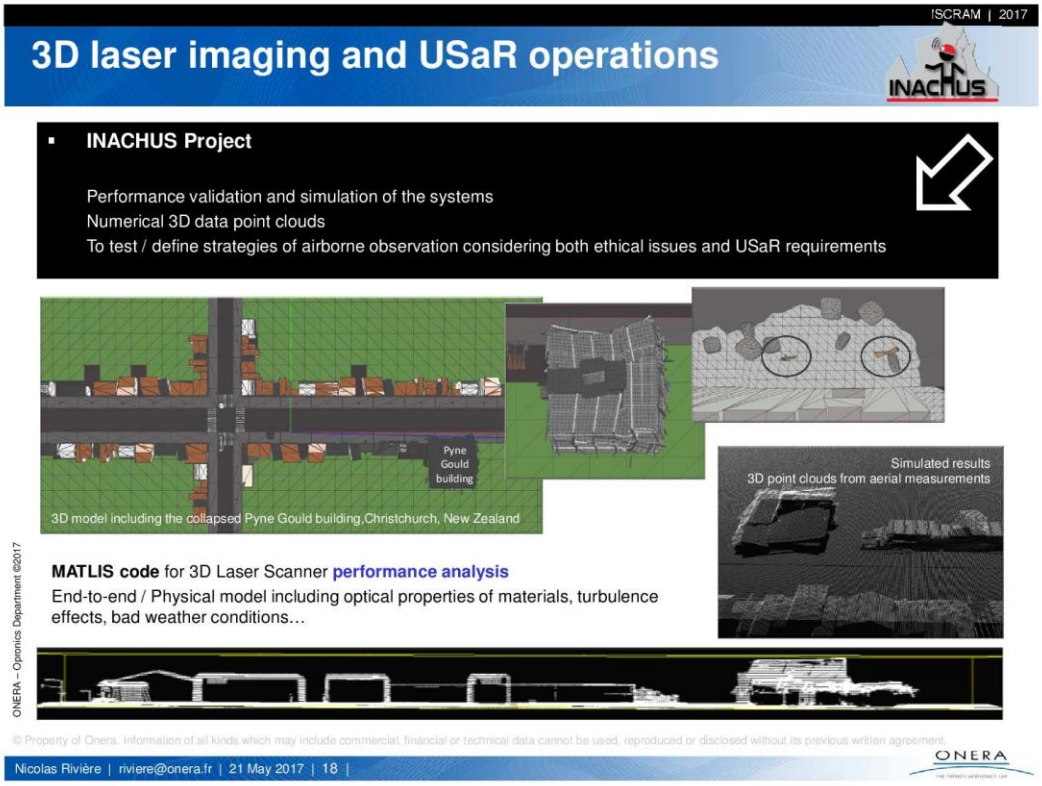
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3D laser imaging and USaR operations
INACHUS
INACHUS Project
Performance validation and simulation of the systems
Numerical 3D data point clouds
To test / define strategies of airborne observation considering both ethical issues and USaR requirements
Pyne Gould building
3D model including the collapsed Pyne Gould building,Christchurch, New Zealand
Simulated results
3D point clouds from aerial measurements
MATLIS code for 3D Laser Scanner performance analysis
End-to-end / Physical model including optical properties of materials, turbulence effects, bad weather conditions…
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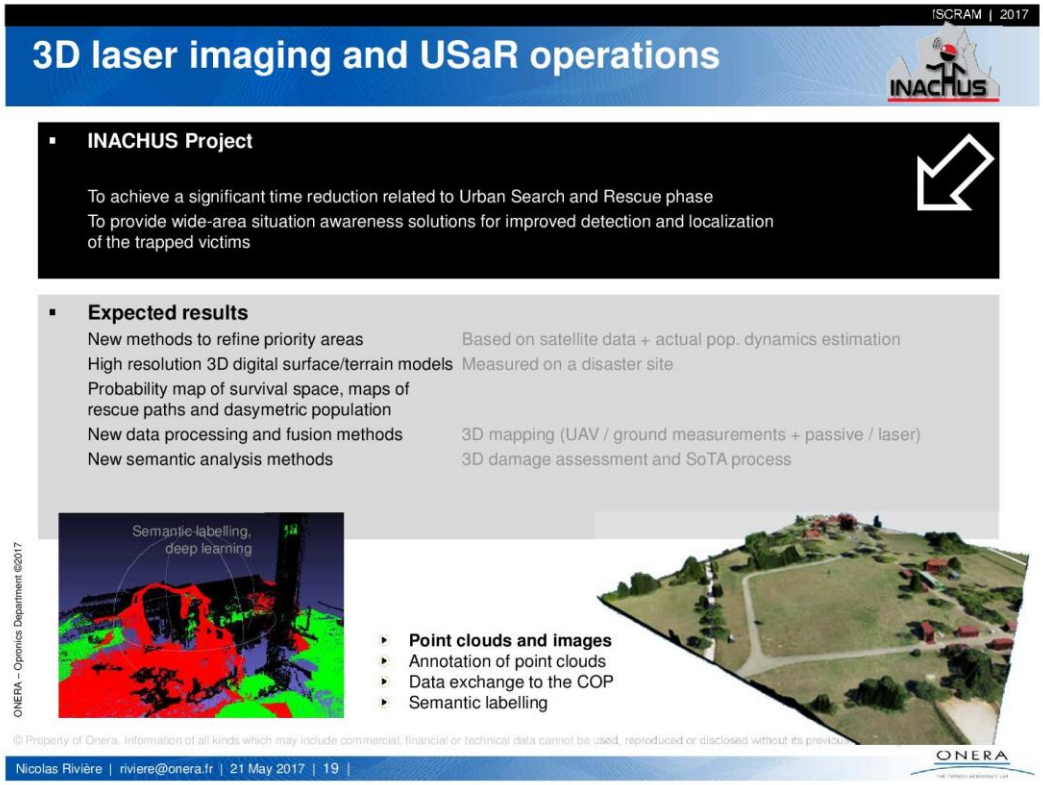
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3D laser imaging and USaR operations
INACHUS
INACHUS Project
To achieve a significant time reduction related to Urban Search and Rescue phase
To provide wide-area situation awareness solutions for improved detection and localization of the trapped victims
Expected results
New methods to refine priority areas
Based on satellite data + actual pop. dynamics estimation
High resolution 3D digital surface/terrain models
Measured on a disaster site
Probability map of survival space, maps of rescue paths and dasymetric population
New data processing and fusion methods
3D mapping (UAV / ground measurements + passive / laser)
New semantic analysis methods
3D damage assessment and SoTA process
Semantic labelling, deep learning
ONERA – Optronics Department ©2017
Point clouds and images
Annotation of point clouds
Data exchange to the COP
Semantic labelling
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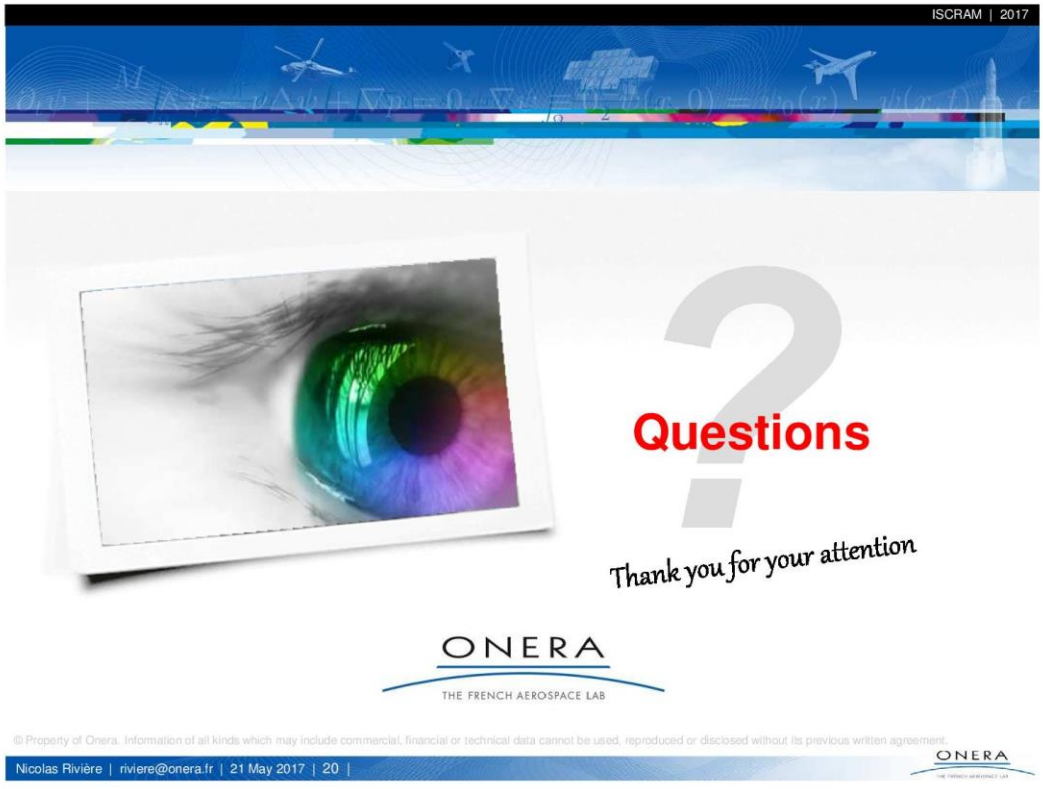
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A Common Operational Picture for wide-area situational awareness and emergency response planning

21 May 2017

Anita Schilling, PhD
Project Leader
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Context – Crisis management

- In a state of crisis
  - Authority flows down the hierarchy
  - Information needs to come back
- Collection, analysis and immediate sharing of critical information is of paramount importance.
  - Taking decisions founded on all relevant information

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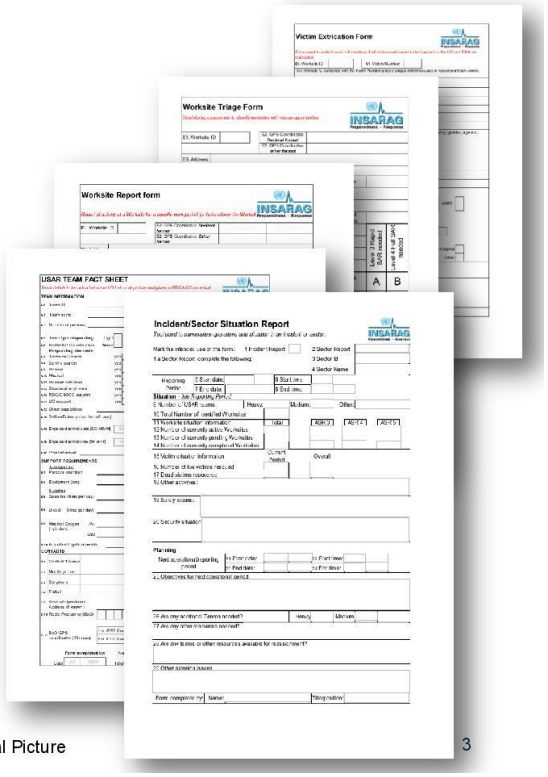
The Common Operational Picture 2

Context – INSARAG guidelines

- International Search and Rescue Advisory Group
- INSARAG guidelines for preparation, and operation of emergency response
  - Emergency response as structured and orderly process
  - Progress and traceability by report forms



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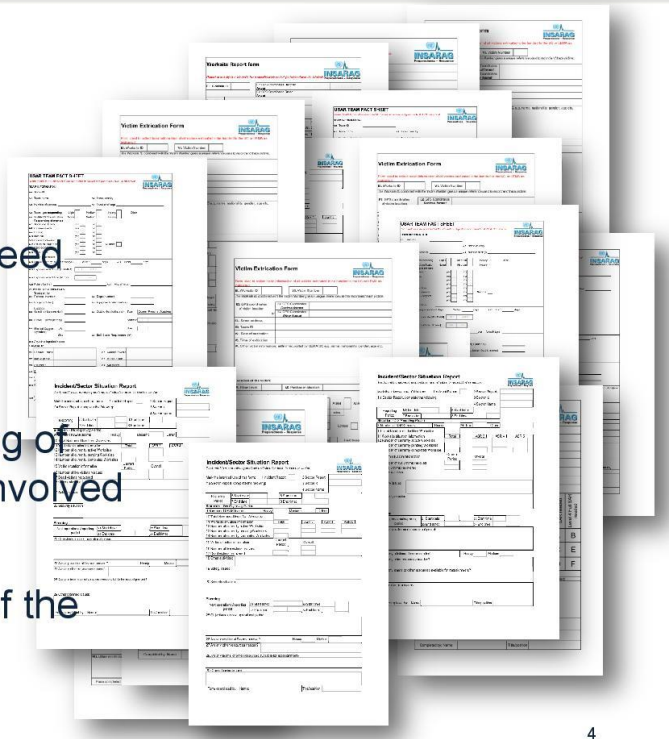
The Common Operational Picture

3

Context – Flow of Information

- Structured...
  - Pen & Paper
  - Low transmission speed
- ... But limited
  - No immediate sharing of information with all involved parties
  - No visual overview of the situation



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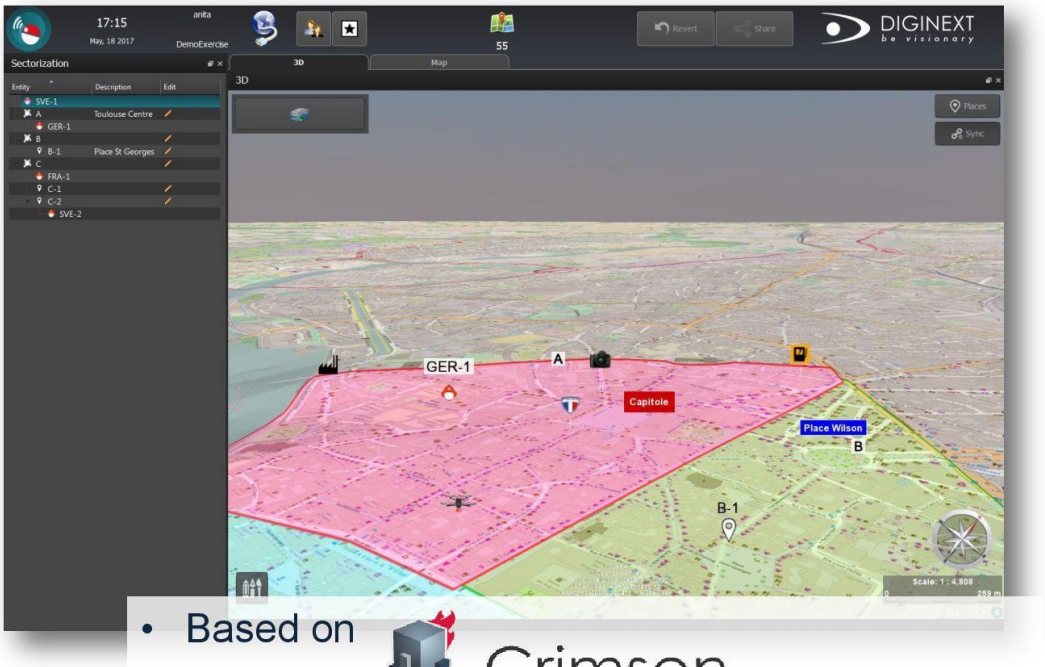
The Common Operational Picture

4

The Shared Common Operational Picture



- Based on Crimson
  Crisis Management Solutions

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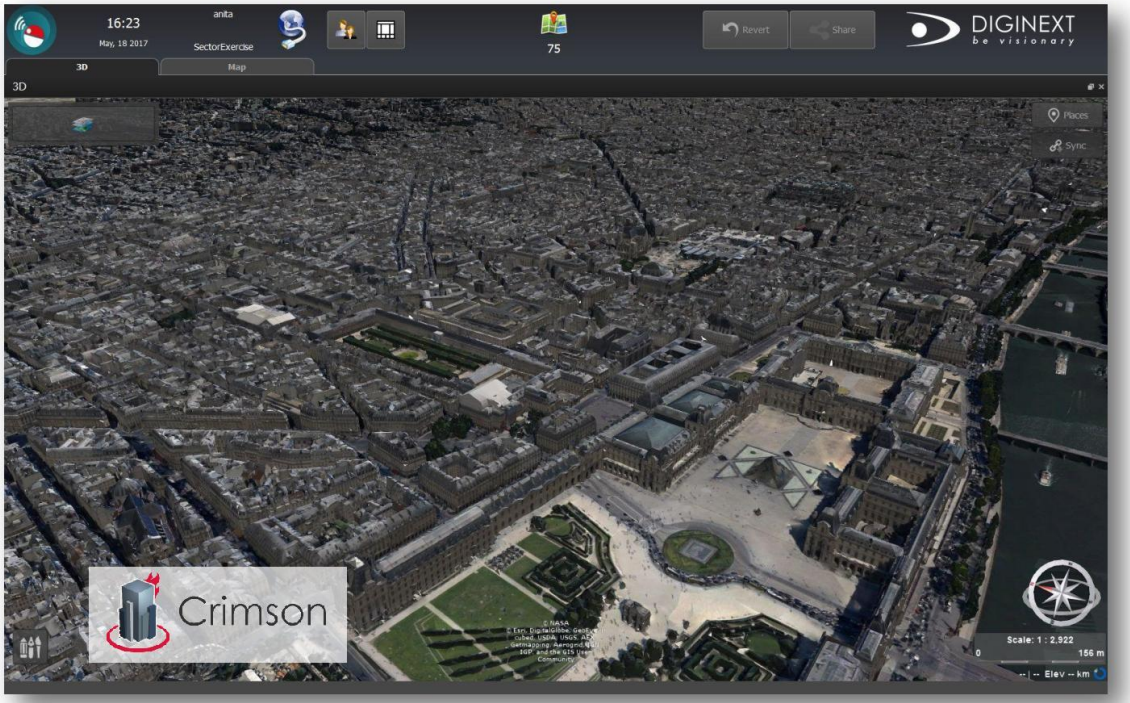
The Shared Common Operational Picture

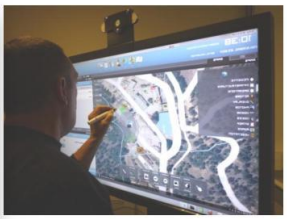
- 2D and 3D views of the tactical situation with the optimal information required
- Focused on both strategic and tactical visions
- Powered by VirtualGeo

The Shared Common Operational Picture



The Shared Common Operational Picture

- Multi-sites system
- Real-time information sharing between levels of command and organisations
- Every kind of data collection: geo-location, voice, messaging, maps, images, videos, social media, etc.



The Common Operation Picture in Action

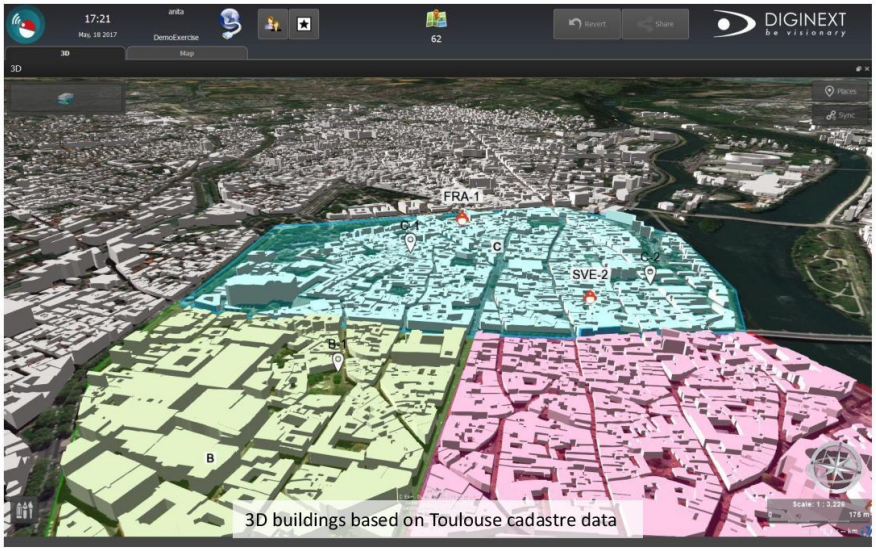
INACHUS
Technological and Methodological Solutions for Integrated Wide Area Situation Awareness and Survivor Localisation to Support Search and Rescue Teams

ZONeSEC
Towards a EU framework for the security of Widezones

The projects have received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 607522 (Inachus) and n° 607292 (ZONeSEC).

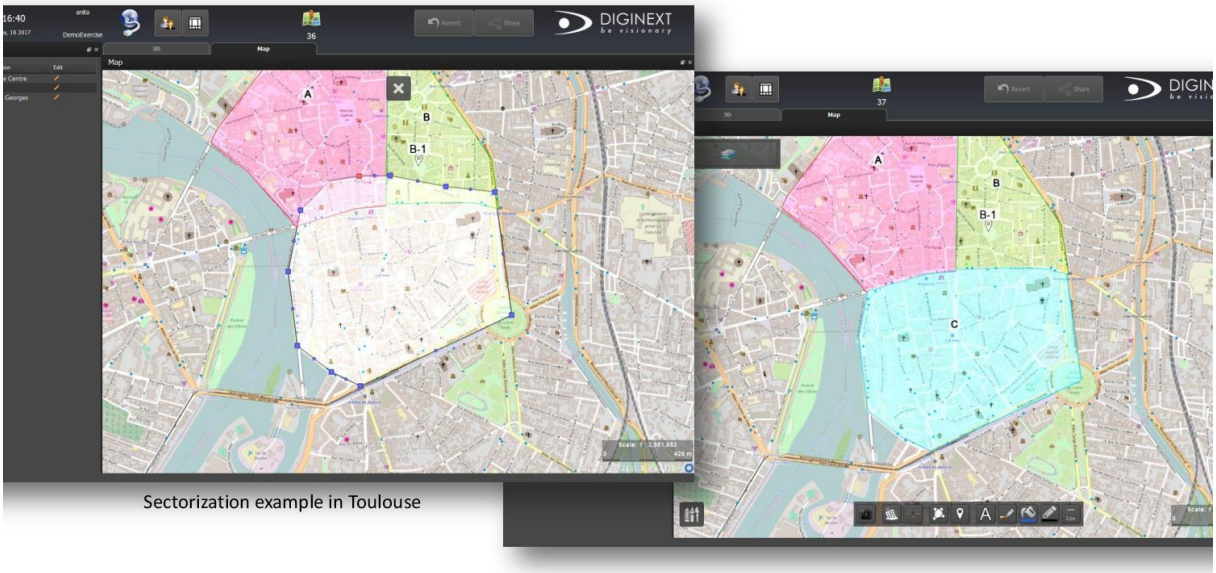
The Common Operation Picture in Action

- COP targeting USaR emergency response
- Supports the INSARAG guidelines



The Common Operation Picture in Action

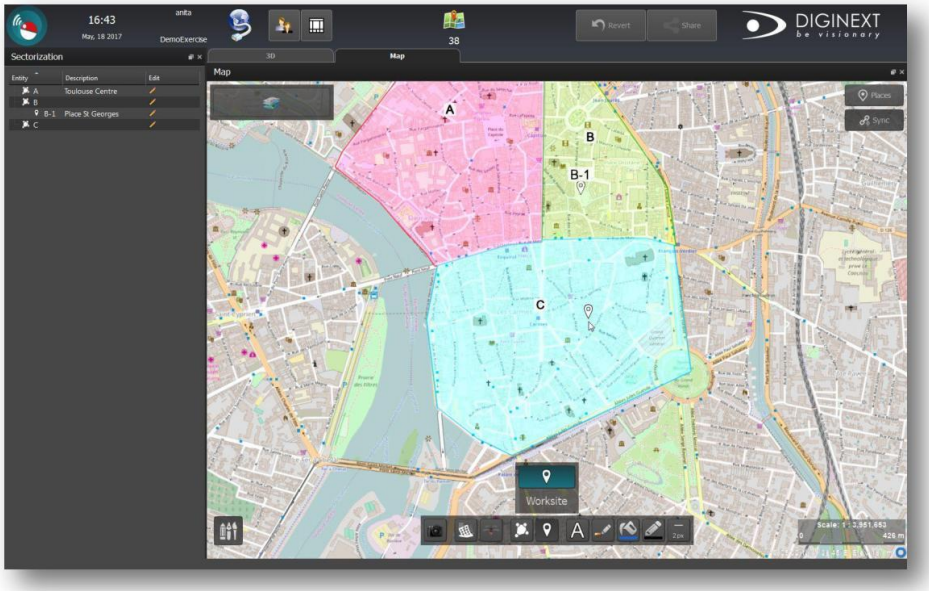
- Easy but precise edition via manipulation of control points
- Automatic clipping of new sectors



Sectorization example in Toulouse

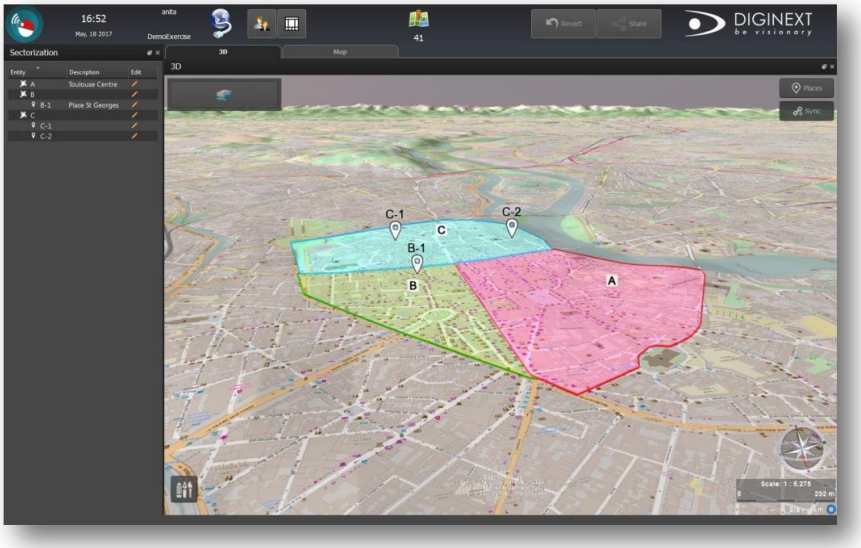
The Common Operation Picture in Action

- Creation of worksites in the sectorization by drag&drop



The Common Operation Picture in Action

- Automatic INSARAG-compliant naming by synchronisation with the Inachus emergency-support backend



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The Common Operational Picture

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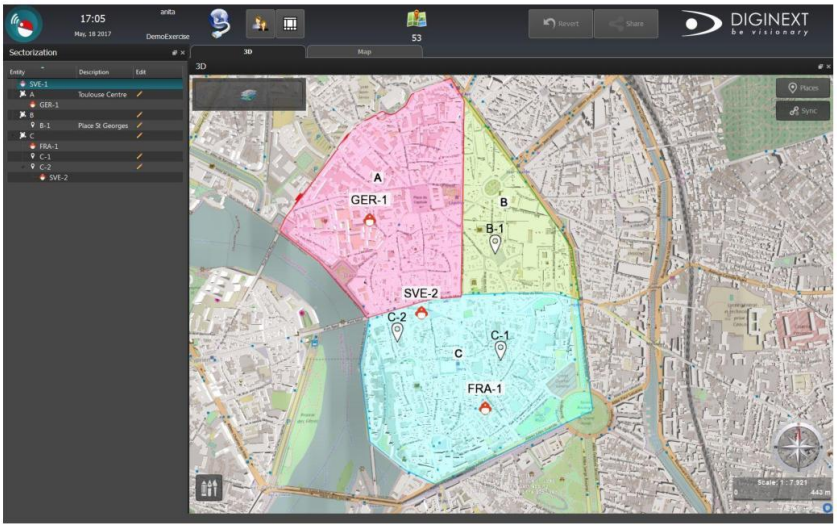
The Common Operation Picture in Action

- Team assignments managed directly in the map view
- Synchronisation of incoming and assigned teams with the Inachus emergency-support backend



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The Common Operational Picture

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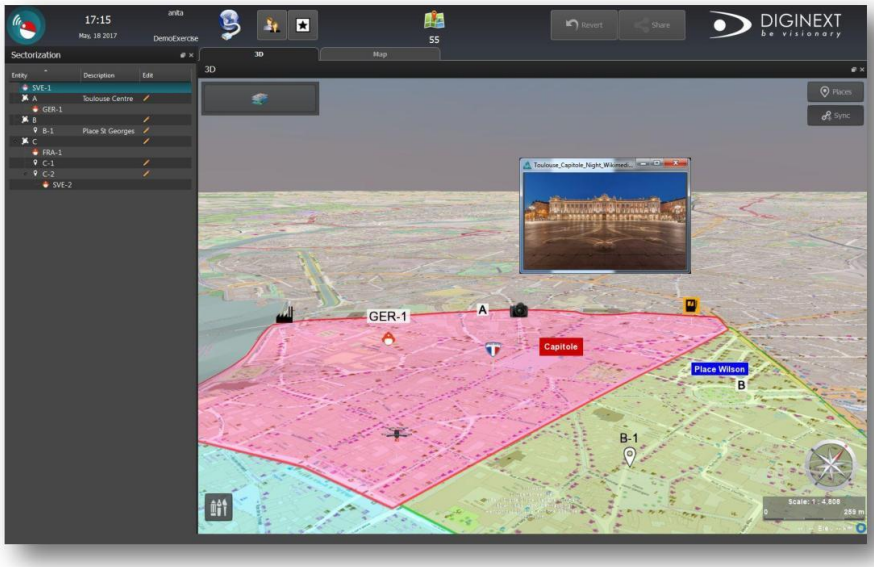
The Common Operation Picture in Action

- Various types of annotations to the map to create a comprehensive overview of the crisis scene



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The Common Operational Picture

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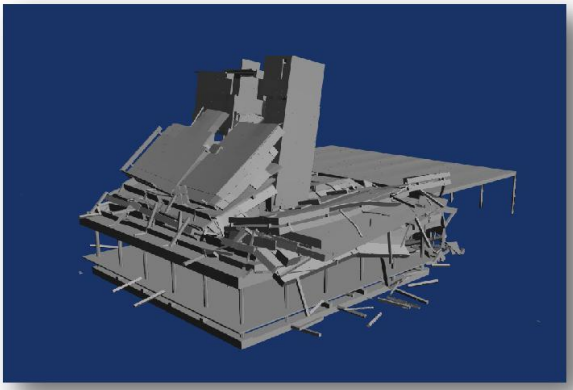
The Common Operation Picture in Action

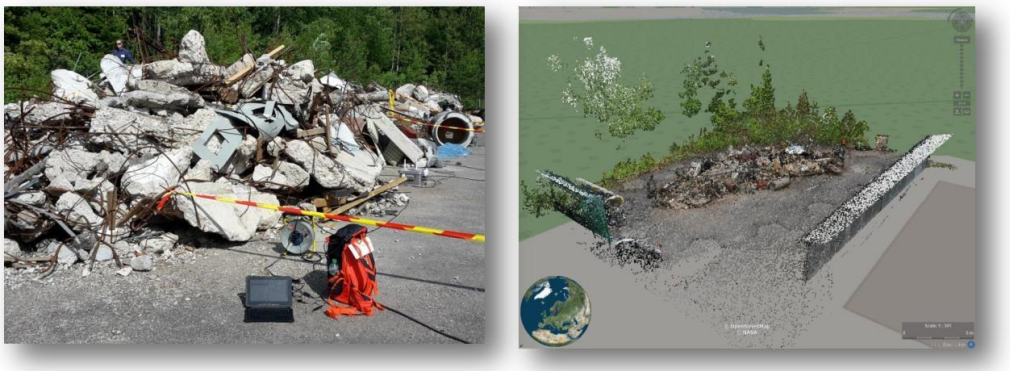
- Visualization of 3D models
  - Simulation results of collapsing buildings



Pyne Gould building, Christchurch
Collapse simulation by LUAS, ASI, Fraunhofer EMI

The Common Operation Picture in Action

- Visualization of point cloud data
  - Scan data from UAVs or LiDAR of the intact and destroyed sites



The rubble pile at the Ågesta training site, near Stockholm, that was used for the first INACHUS pilot demonstration

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The Common Operational Picture

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ZONeSEC

Towards a EU framework for the security of Widezones

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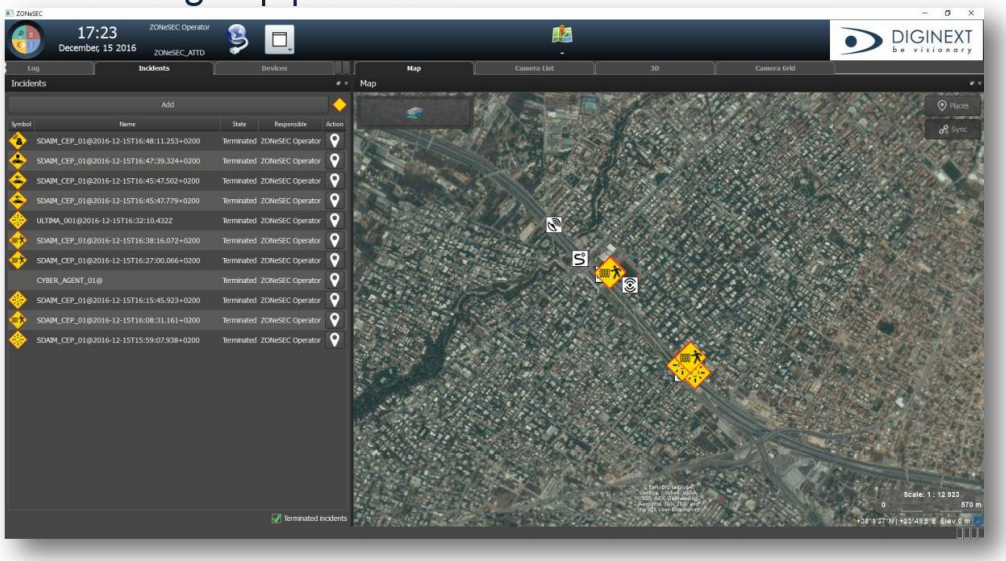
The Common Operation Picture in Action

ZONeSEC

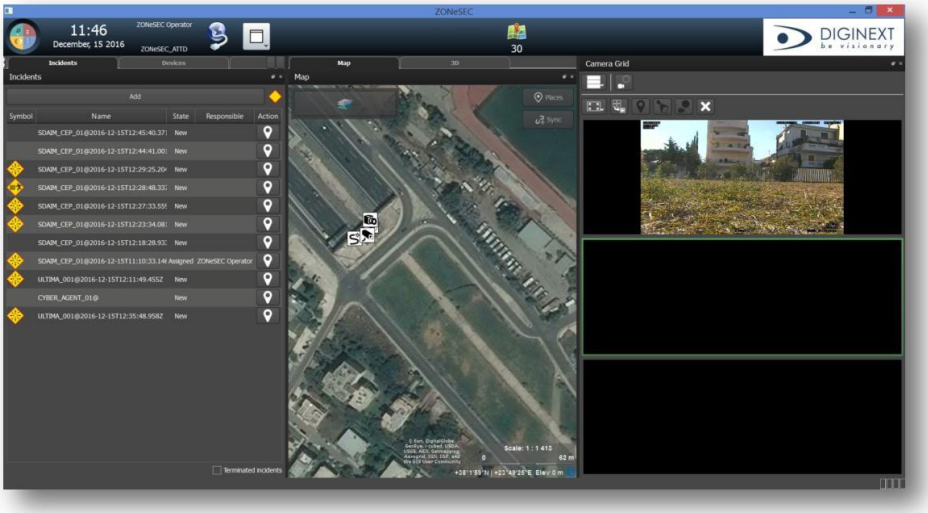
- For area situational awareness
- To monitor critical infrastructures e.g. Highways, water and gas pipelines…



ZONeSEC

ZONeSEC

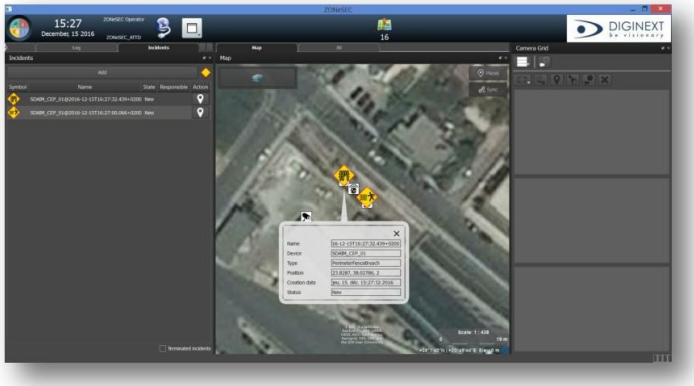
- Deployed intelligent sensor network and legacy systems
  - Devices are geo-localized and updated in real-time



The Common Operation Picture in Action

ZONeSEC

- Geo-localized alerts from sub-systems

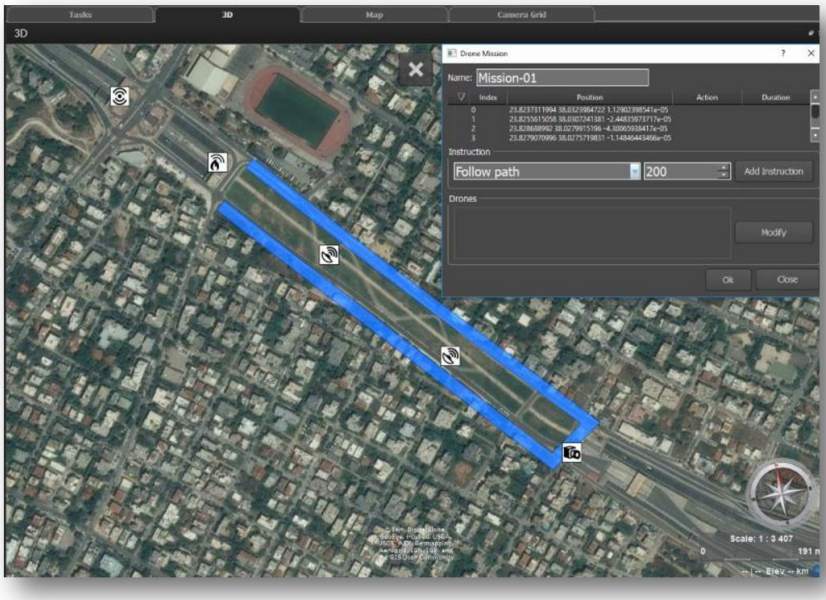


- … and from operators
  - Drag & drop of new alert on the map
  - Add details and share them

The Common Operation Picture in Action

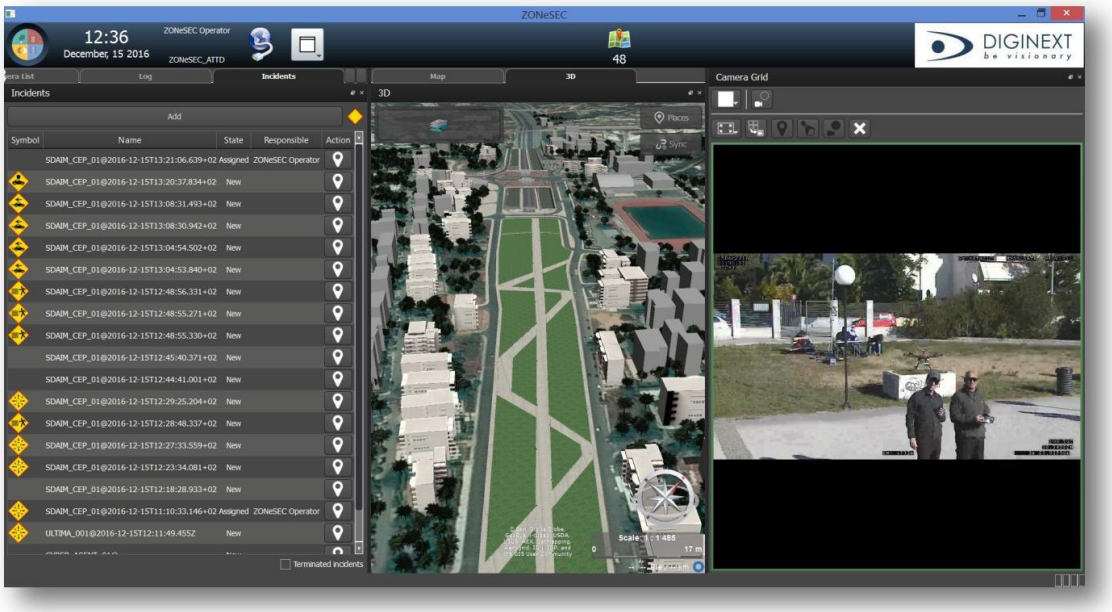
ZONeSEC

- Real-time interactions with UAV
- Mission planning



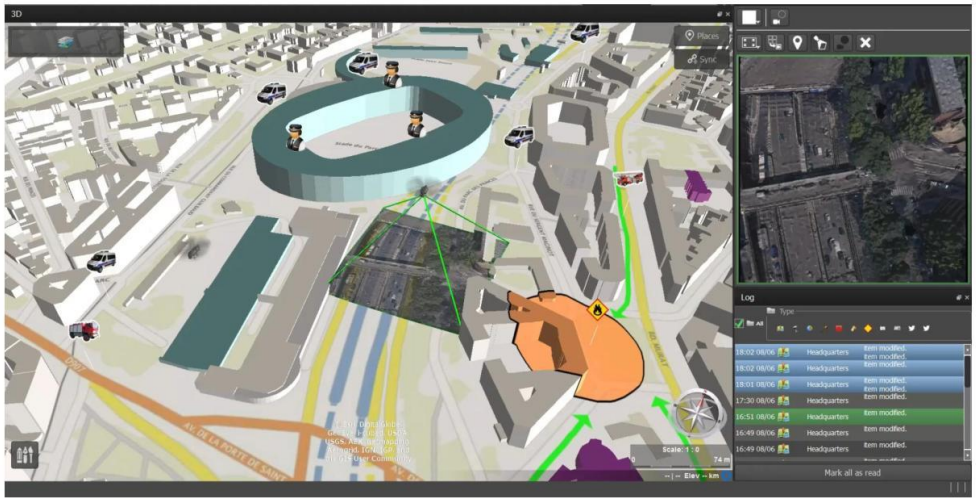
The Common Operation Picture in Action

- Real-time video and information from UAV



The Common Operation Picture in Action

- On-ground projection of video stream from UAV
  - Into the 3D environment



The Common Operation Picture in Action

ZONeSEC

- ZONeSEC aims to address the needs of Wide zone surveillance from detection to alert

- The COP will help to achieve this goal by providing operators and crisis manager with
  - An **holistic view** of the wide-zone enriched with **real-time 2D and 3D** shared information coming from **multi source sensors**

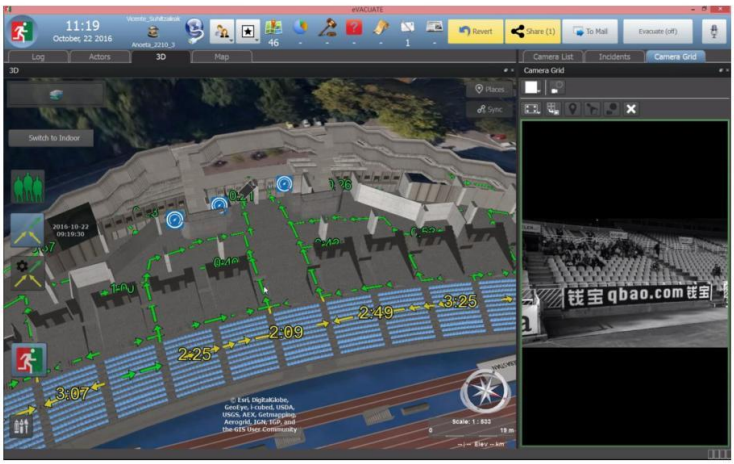
  - **Interactive tools** to shorten the detection alert response time
    - By sending **direct orders** to sub-systems (like UAV) to gather specific data
    - By providing operator with means to raise alert, either from the control centre or from the field with a COP mobile version.

The Common Operation Picture in Action

eVACUATE

eVacuate:

A holistic scenario-independent, situation-awareness and guidance system for sustaining the active evacuation route for large crowds

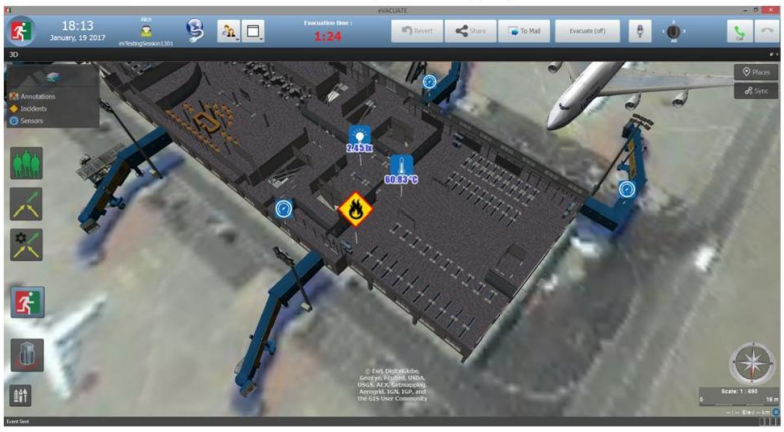


This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 313161.

The Common Operation Picture in Action

eVACUATE

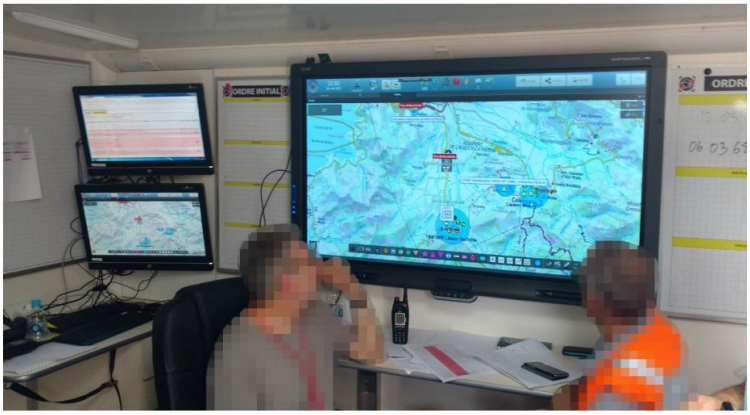
- 4 pilots with end-users
  - The Anoeta football stadium, San Sebastian, Spain
  - Athens international airport, Athens, Greece
  - STX Shipyard, St-Nazaire, France
  - San Mames metro station, Bilbao, Spain



The Common Operation Picture in Action

Crimson

- Crimson is used for training by ENSOSP –
  National Superior School of Fire Brigade Officers, Paris



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3. WORKSHOP PARTICIPANTS

List of Participants

Daniele Alberto Galliano, JRC, Disaster Risk Management

Tomer Kaplan, Disaster Management, Magen David Adom, Israel's national medical disaster. ambulance and blood bank service

Michael Markus, Building Monitoring Team, Safety and Security, Federal Agency for Technical Relief, Germany

Ake Solfeldt, Swedish Civil Contingencies Agency, Fast Response Team, Urban Search and Rescue

Melanie Eckle, Disaster Mapping and Management, GIScience Research Group, Department of Geography, Heidelberg University

Nicolas Riviere, ONERA, French Aerospace Lab, Toulouse, France

Anita Schilling, DIGINEXT

Angelos Amditis, ICCS, RECONASS coordinator

Theodora Karali, ERRA, Greece

Vink Lunh, Vulnerable Road Users, Safety Region of Utrecht

Beatrice Linot, LORIA/INRIA/UNIV.

Simon Sehleiner, Koln Technical University

Evangelos Sdongos, ICCS, RECONASS project manager

Nicky Von Gorscht, NETAGE

Hassan Shivani, Anglia Ruskin University

Dysathish Nammi, Anglia Ruskin University

Van Den Homberg Red Cross

Evangelia Latsa, ICCS

Timothy Clark, 510 Global, Personalised Humanitarian Aid through Big Data

Patric Lieser, Technical University Darmstadt

Stefanos Camarinopoulos, RISA

Zhao Xlujuan, Beijing University

Zhang Xiaoyan, Purham University

Ronald Cheistiagns, Polika Academy, The Netherlands

Barry Van Padje, Fire Brigade, Amsterdam.

The participants included people from disaster management covering medical disaster services, the red cross, fire brigades and civil protection services units, first responders, including search and rescue, university groups in the areas of OpenStreetMap, search and rescue and post-crisis damage assessment, and high tech industry in technologies for situation awareness and search and rescue.

Figure 1: T. Kaplan describing MDA, Israel's National Medical Disaster, Ambulance and Blood Bank Service.

Figure 2: E. Sdongos presenting RECONASS project

Figure 3: M. Markus presenting THW and their role in RECONASS

4. RESULTS & DISCUSSION

D. Galliano in 'JRC-IFB Field Reporting Tool Applied to Middle Italy Earthquake Event' described a Joint Research Centre (JRC) and National Fire Academy (IFB) field reporting Tool that is based on sensors in the field, models, analyses and information from practitioners in the field and supports first responders on decision making after an earthquake. The results of this Tool have been compared with a reference (Copernicus data) and with results from real surveys stepping into destroyed houses and passed all tests. Following this, the adoption of this tool is foreseen in 2017.

T. Kaplan in 'Using Technology and the Power of the Crowd to Improve Emergency Response,' described Magen David Adom, Israel's national medical disaster, ambulance and blood bank service, including their decision support tools that include data gathering (from calls, GPS, vehicle mounted cameras, etc.), automated resources identification and allocation and supervision and online support. Specific applications include mobile applications for ambulance/first responders and stroke applications.

M. Markus in 'THW: The Federal Agency for Technical Relief' focused on the civil protection operations of the German THW, including instrumentation-based disaster response and damage assessment. The goal of this unit is to locate severely damaged structures and to clean, vacate, repair, demolish and re-build these structures. For the above, they have structural specialists that advise on possible hazards from damaged or collapsed structures, shoring, monitoring and rescue operations. Additionally, this unit has a monitoring system that includes measuring devices (prism reflectors) and a robotic total station.

A. Solfeldt in 'Earthquake Nepal 2015,' gave an overview of the Swedish Civil Contingency Agency, the Swedish International Fast Response Team-Urban Search and Rescue unit and the Nepal earthquake of 2015. This earthquake attracted 4,521 search and rescue professionals from 34 countries. Only 6 countries responded within 48 hours and 3 countries arrived within 72 hours. They recued 19 lives and recovered many dead bodies. 602,592 houses were fully destroyed. On site they used drones and 'hands on' inspections.

E. Sdongos in 'RECONASS Monitoring System and the Damage Assessment Platform,' described the RECONASS concept, modules and pilot test. He also described the current needs in structural damage and post-crisis awareness assessment tools that RECONASS fulfils, including speed, updating capability, ability for post-crisis reconstruction and recovery planning, international interoperability and ability for collaborative work.

M. Eckle in 'HOT-Crowd Sourced Area Based Damage Assessments and Comparative Damage Rankings,' described the work of the humanitarian OpenStreetMap Team at Heidelberg University in Germany in order to assess damage based on participants contributing field information. Several approaches are being investigated in order to process the above information. At this point, the approach is pre-experimental and undergoing an internal review.

A. Amditis in 'The INACHUS System for Buildings Assessment and SAR Operations,' gave an overview of project INACHUS that provides wide-area situation awareness solutions and tools, simulation tools for predicting structural failures and decision-support incorporating operational procedures and resources for relevant actors. The above results to a significant time reduction related to the Urban Search and Rescue Phase.

N. Riviere in '3D Laser Imaging Techniques to Improve USaR Operations for Wide-Area Surveillance and Monitoring of Collapsed Buildings,' described laser imaging for situation awareness to help search and rescue. The expected results include new methods to refine priority areas, 3D digital surface/terrain models, probabilistic maps of survival space, maps of rescue paths and dasymetric population, new data processing and fusion methods and new semantic analysis methods.

A.Schilling in 'A Common Operational Picture for Wide-Area Situation Awareness and Emergency Response Planning,' proposed a Common Operational Picture after a disaster, shared by stakeholders in the various levels of command and organisations, that includes 2D and 3D views of the tactical situation and focuses on both strategic and tactical visions. It includes multi-sites, real-time information and several kinds of data collection: geo-location, voice, messaging, maps, images, videos, social media, etc. and supports emergency response. It can be used for wide area situation awareness, for survivor localisation to support search and rescue teams and for monitoring critical infrastructures.

Regarding the panel sessions on the RECONASS system evaluation, these were moderated by M. Markus from THW and E. Sdongos from ICCS and were conceptualised by a round-table discussion among the workshop participants, comprising external stakeholders and consortium partners. In particular, a set of questionnaires as well as discussion topics have been circulated to the external participants in order to provide their views concerning the current status of the RECONASS monitoring tool and its modules as well as provide recommendations for extensions and refinements that will make it more tailored and appealling to them. The session lasted approximately 2 hours; it was an interactive session of questions and answers and the results are presented in D7.3. The questionnaire distributed to the end-users is provided in Annex I.

The workshop fulfilled its goals to discuss trends in structural assessment of damaged structures after a disaster, which in conjunction with additional information and disaster management systems can provide the stakeholders with updated decision support on search and rescue, response, reconstruction and recovery planning. Moreover, one can conclude from the above that there is a great need for a quick assessment of structural damage after a disaster, which is fulfilled in a most reliable way by the RECONASS System that, in addition, has the unique capability to update this assessment as a function of time. This is essential in cases where subsequent events, say aftershocks after the main earthquake event, further deteriorate the structural capacity of the building.

Nineteen participants were external to the RECONASS consortium. There was a lively discussion and some of these participants commented that it is very useful that the RECONASS system is interoperable and that it provides the capability of integration with first responders' applications. Regarding future developments and recommendations, there was a suggestion to combine the RECONASS system with conventional monitoring systems in order to reduce the cost, a suggestion to standardize the layouts of the user interface making it also configurable according to the end-user profile and needs and to deduce the details on the structural condition of the various structural members as first responders need less details.

5. CONCLUSIONS

The RECONASS final workshop fulfilled its goal to discuss and disseminate the RECONASS results to potential users and have the participants assess the developed system. The participants were what the consortium had hoped for them to be, including civil protection agencies, the red cross, fire brigade, first responders. Moreover, the RECONASS partners were pleased to hear that the interoperability features of the system were well appreciated by the stakeholders; so was the fact that RECONASS system can be integrated with existing applications for first responders. Regarding future developments it was useful to hear that first responders need less than the provided details on the structural condition of the various structural members and that it would be desirable to standardize the layouts of the interfaces.

ANNEX I RECONASS QUESTIONNAIRE FOR END USER EVALUATION

RECONASS

Reconstruction and REcovery Planning:

Rapid and Continuously Updated COnstruction Damage and Related Needs ASSessment

Instructions

Please fill in the questionnaire during the discussions with **your** assessment of the presented RECONASS system and its sub systems. Give it then to us at the end of the workshop.

THANK YOU for supporting RECONASS!

Questions

1. Your background

1.1	How would you describe your background? Further details such as fire department, insurance company	A. **Governmental** Emergency / **Disaster Response** Organizations B. **Non-Governmental** Emergency / **Disaster Response** Organizations C. **Public Operators** of Critical **Buildings** D. **Private Operators** of Critical **Buildings** E. **Organizations** involved in the **development** of remote sensing based **damage maps** F. Organizations involved in synoptic **damage prediction** based on acceleration measurements, **insurance companies**, **etc.** Further details:_____ _____
1.2	In which country are you working?	

2. Please rank

2.1	Functional suitability How useful are the information generated by the PCCDN tool	**0 1 2 3 4 5 6 7 8 9 10** **0 not useful, 10 Fits all your needs**

	Remarks	
2.2	Usability Ease of use	**0 1 2 3 4 5 6 7 8 9 10**
	Remarks	
2.3	Costs	**0 1 2 3 4 5 6 7 8 9 10** **0 not affordable at all, 10 very low-cost solution**
	Remarks	
2.4	Reliability	**0 1 2 3 4 5 6 7 8 9 10**
	Remarks	
2.5	How likely is the implementation of RECONASS in your country, state, municipality?	**0 1 2 3 4 5 6 7 8 9 10**
	Remarks	

3.1	Which parts of the RECONASS system would you use?	
3.2	What additional functions do you need?	

4.	Your comments and personal assessment about the discussed questions (See below) You can use the back side of this sheet as well.	

Questions

Response phase

1. How can the RECONASS system support operations in the first response phase? How do you assess the components damage assessment, observations (UAV) and monitoring? Consider earthquake, fire and other scenarios.
2. Is the user interface and access to data sufficient? What level of detail is necessary? What should be improved?
3. Will the RECONASS system measurements, observations and damage assessment at an equipped building enhance the damage assessment for larger areas?
4. What are your experiences with other tools and what should be goals for further developments.

Recovery phase

5. Do you think, the time to continue/restart to operate and use the building after an event would be shortened significantly by using the RECONASS system.
6. Who would use the results of the economic loss and needs assessment module?
7. In which case would there be a need for such a system? Consider buildings of critical infrastructure, computing centres, factory buildings and situations with lack of experts to assess the stability and restoration needs.
8. Do you think that residential buildings should be equipped with RECONASS systems?
9. What would be the revenue to speed up the time to use the building again.
10. What proportion of building costs (construction phase and during use) would be spent on such a system?

Mitigation and preparedness and general considerations

11. How can the RECONASS system help to prepare for such damaging events?
12. How can the system help during the operational phase of the building (Before a damaging event occurs)? Should there be interfaces to other systems?
13. Your assessment of the RECONASS system properties and compared to the state of the art. Especially time needed to generate and provide assessment results, structural and non-structural assessment, calculation of damage and restoration costs.
14. How can the implementation of such systems be supported? Should there be governmental rules to include such systems and for which usage types? Should there be standards on national or EU level?
15. Further comments and personal assessment.

THANK YOU!

4.	Further comments	

THANK YOU!