
G8 Initiative

2012 Status: www.iarp-robotics.org

AIM: FOSTER INTERNATIONAL COOPERATION in the development of ADVANCED ROBOTICS SYSTEMS able to dispense with human exposure to difficult activities in harsh, demanding or dangerous conditions or environments

US-UK-FRA-CDN-JPN-CHINA-SKOREA-RUSSIA-HUN-POL-BEL-NZEEL-AUSTRIA-ITA-SPAIN-GER-EUR COM

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# One JCF per year – WARSAW in 2012
# Objectives of the Joint Committee Forum:

- to get an updated information on the member's programmes in Advanced Robotics
- to get an updated information on the yearly activities of the mandated working groups
- to plan IARP workshops on topics proposed by the Members
- to inform the European commission on the above mentioned programmes and get information on the EC planning in Robotics and related technologies

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# Working Groups

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|---|---|---|
| SSRR | Security, Safety, Rescue Robotics | Coord: USA …JPN |
| HUDEM | Robotics for Humanitarian De-mining | Coord: BEL (Y.Baudoin) |
| DEPEND | Dependability of Robotics Systems | Coord: FRA |
| RISE | Robotics for Risky Interventions and Surveillance of the Environment | Coord: BEL-GER (Y.Baudoin – R.Dillman) |
| ASSIST | Assisted Living Quality of Life | Coord: UK, USA |
| ULTRA | Medical Robotics and UltraOperations | Coord: USA |

# WG Tasks

- Define a Technical Activity Program (TAP)
- Yearly report on existing Programs/projects and related funds/IARP country
- Yearly formulate according recommendations towards National and International Funding Authorities (updated related roadmap)
- Periodically inform the official members of the IARP on progresses, projects, relevant events, proposal-calls, etc
- Yearly organise a dedicated IARP Workshop
- Inform on and update the list of the members of the WG
- Update a page on the Website http://iarp.isir.upmc.fr

# WG HUDEM

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| Working Group | HUDEM |
| Title: | Robotics for humanitarian de-mining |
| Description: | Establishment of detailed minimal requirements, design concepts, standards and procedures for the implementation of robotics systems for humanitarian de-mining |
| Aim: | Organization of a (bi-) yearly workshop |
| Request: | IARP |
| Category: | Robotics Assistance, Multi-robotics, Sensor Systems (detection) |
| Type: | R&D results exchange of information<br>*R&D results sent to the ITEP (International Testing Evaluation Programme) www.itep.ws (now GICHD)* |
| Equipment: | N/A |
| Development: | N/A |
| Time Frame: | 1998-2012 |
| Coordination Place: | Belgium, Royal Military Academy (RMA) |
| Lead Nation(s) | Belgium |
| Partners: | IARP , EURON, CLAWAR Association, , a.o. |
| Point of contact: | Yvan Baudoin |
| E-mail: | Yvan.baudoin@rma.ac.be |
| Status: | Ongoing |
| Web site: | ww w.itep.ws (now GICHD) – http://mecatron.rma.ac.be |
| Comments: | •Ten IARP workshops have been organized to date: six scientific workshops (Toulouse 98, Vienna 02, Brusse 04, Tokyo 05, Cairo 08, Sousse 10) and two on-site workshops (Zimbabwe/Mozambique 00, Prishtina 02). Proceedings of the Workshops are available at the above-mentioned website.<br>•Actualised Repertory of current projects available on request POC |

# WG HUDEM

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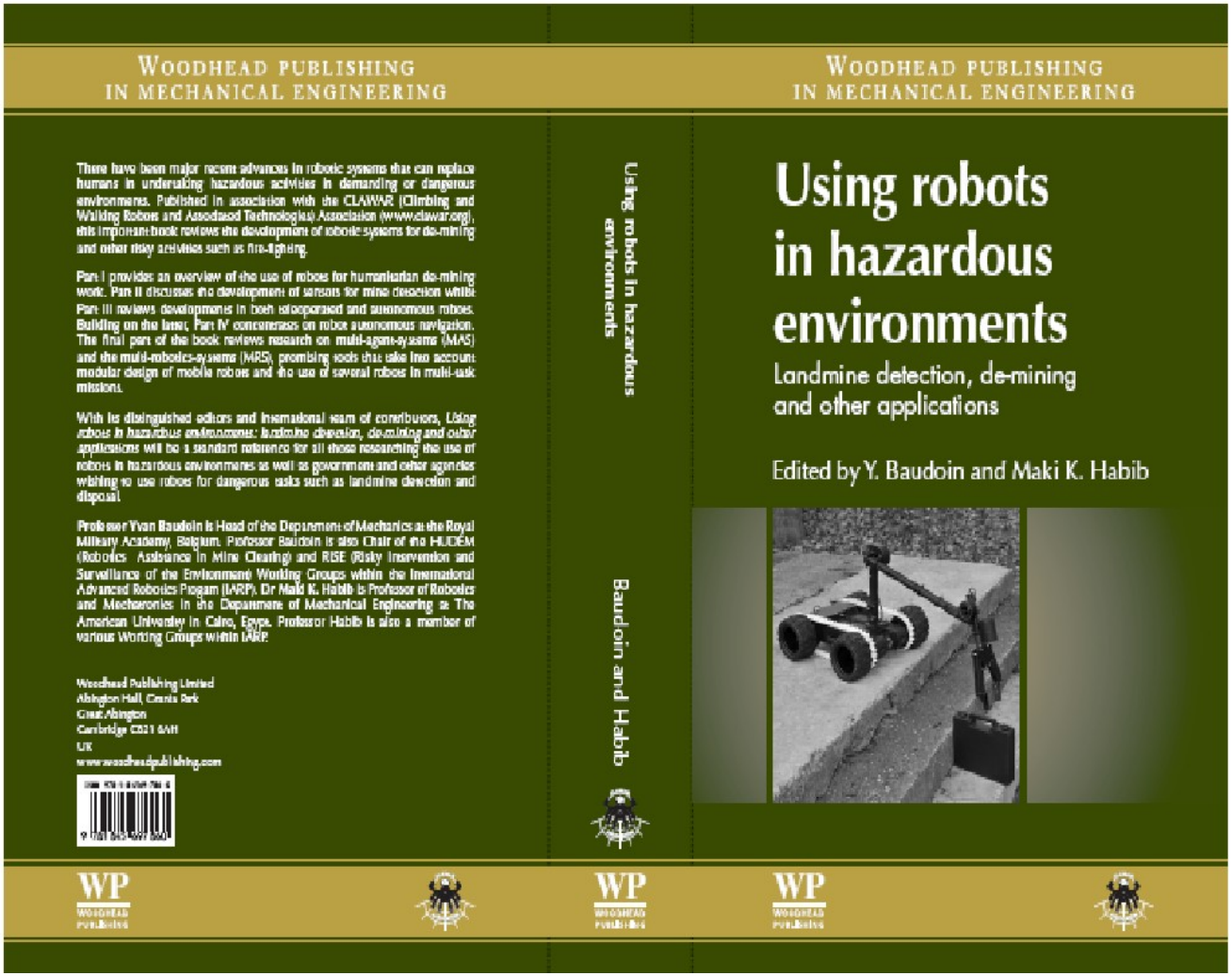
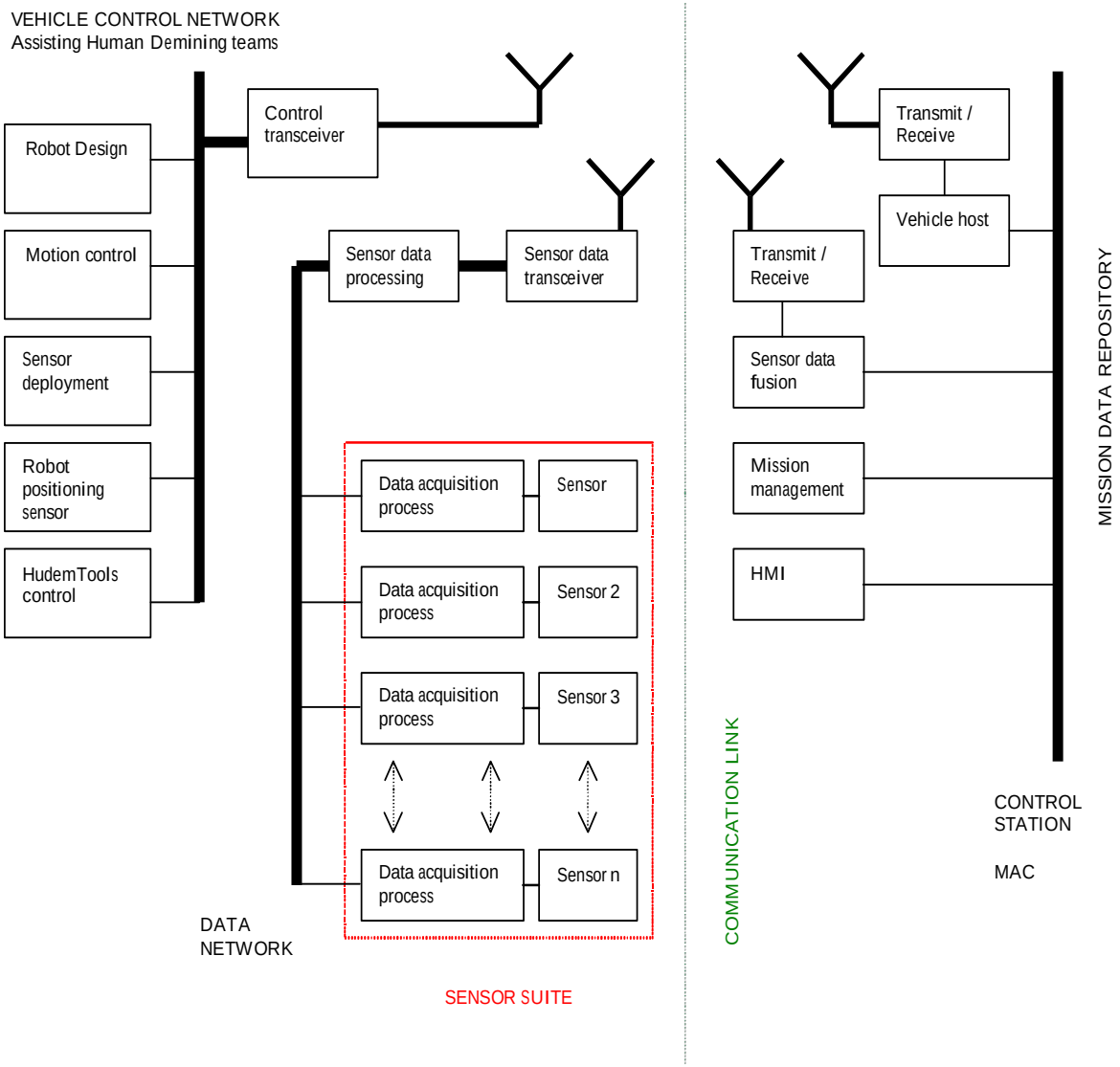
|---|---|
| Roadmap | 1.Collect the End-users Requirements (Ottawa, Oslo, Field)<br>2.Define the System Requirements (IARP Workshops)<br>3.Define the Platform requirements<br>4.Define the Testing procedures (RTO, (ELROB) a.o.)<br>5.Build or negotiate Test facilities (DOVO, Belgium)<br>6.Edit first repertory of UGV for Close-in detection<br>7.Edit a handbook on robotics and sensor technologies<br>8.Disseminate the Handbook (cooperation CLAWAR)<br>9.Introduce proposals through FP7-SEC topics<br>10.introduce other projects through Eureka, bilateral contacts, etc |
| Next action: | Although robots are promising systems some detection tasks, only prototypes were and ar currently in development and partial on-site tests (described in the proceedings of the IAR WS and on the ITEP Site) have been done.<br>This application, extended to the sub-munitions (OSLO Convention) remains interesting ar will be pursued through<br>- FP7-SEC proposals (TIRAMISU)<br>-Actualized Handbooks and workshops (11th in Sibenic April 2013) |

# First Handbook (2011)



# 1st and 2nd WS (Zimbabwe, Toulouse) : Definition of the modules to develop by RS



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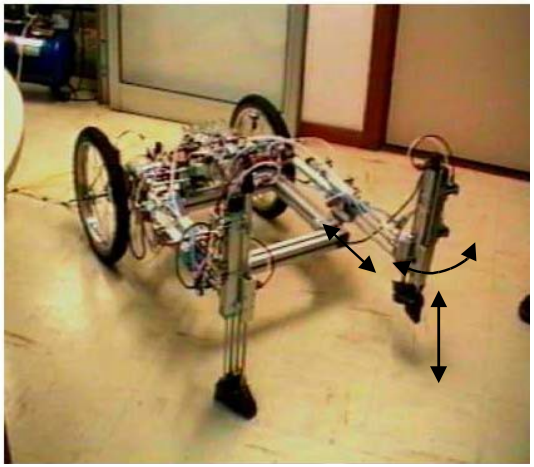
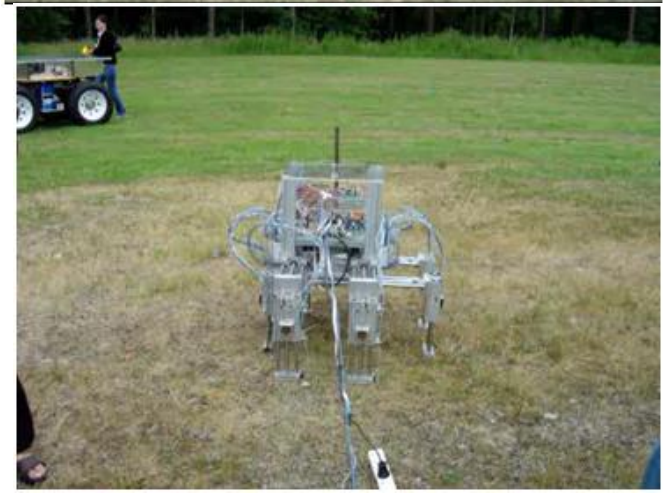
# 3-4-5th IARP WS HUDEM (Vienna-Pristhina-Brussels) – Description of first prototypes

## (support: European CLAWAR Network – multi-legged robots)(EOD robots)



- **High Mechanical Reliability**: robust material and electronics to support high humidity, high temperature, dust, sand, rain, etc.
- Good resistance to accidental explosions: a protection shield could be a solution.
- **Easy to use**: A simple man-machine interface must be provided in order to allow a non-robotic expert operator to control the robot.
- Easy to repair: A modular construction can help to repair the robot easily and efficiently. Legs/feet, as the devices more in danger on an accidental explosion should be simple and modular and able to be re-constructed with simple materials.
- **Low cost**: In general all the parts should be based in systems spread all over the world. Mechanical parts could be based on very simple designs

  (simple rods, etc). Electronics and computers based in PC technologies, etc.
- **Autonomy**: At least half a day of autonomy is required. In electrical robots this can also be accomplished using petrol engine onboard or using tethers for supplying the power from outside the robot. The handle of the tether can be a great problem to be solved



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## 3-4-5th WS Vienna, Kosovo - Usefulness

- Improvement of the safety in very dense minefields or fields containing a high percentage of iron ( 1/3 of the areas treated in Cambodia, for instance): a precise scanning, according to well- drilled motion-procedures, could allow the mapping (terrain modelling AND mine localisation) of unstructured areas with the same (or better) effectiveness (than this one of the Human deminers) and improved safety.
- Improvement of the 'productivity' of Human Deminers
- Progressive implementation of High-Level/Low-Level Scanning procedures (unmanned aerial/ground vehicles cooperation)
- Multi-Tooling of a mobile robot
- Quality Assurance (post-demining inspection)
- Dual-Use:

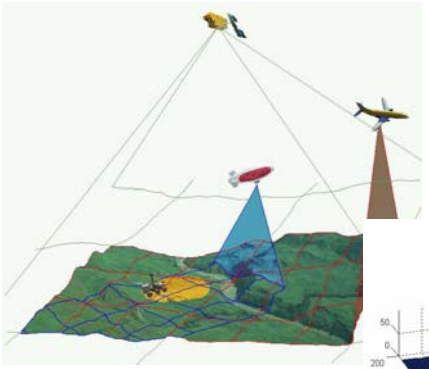
- Systematic inspection of dangerous areas after earthquakes

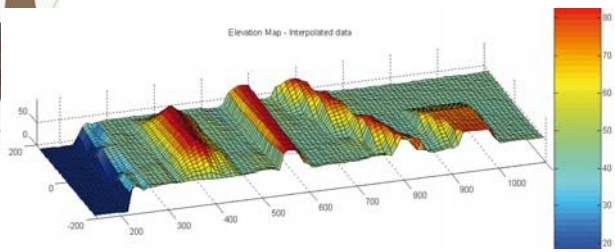
- Systematic inspection of dangerous areas after Nuclear/Chemical accidents

- Space applications (March Rover…)

-Survey of forests and prevention of Fires

-Military Robotics (including the Mine-clearing Ops during Peace-keeping/maintaining missions





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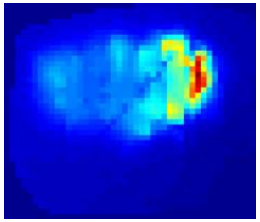
## 6-7-8thh IARP WS HUDEM (Tokyo-Cairo-Sousse))

## Improvement and testing of Robots/Sensors



HUNTER – RMA (MD, UWB and HOPE)

DYLEMA- CSIC (MD-GPR)

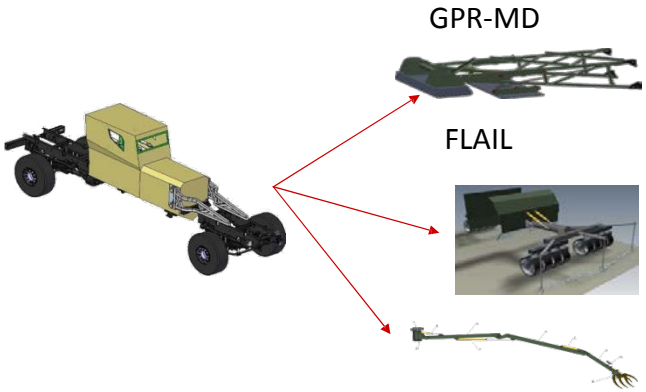
GRYPHON Prof Ishikawa Tokyo JPN

SCARA ALYS, Prof Nonami Shigeo JPN

COMET III, Prof Nonami Shigeo JPN

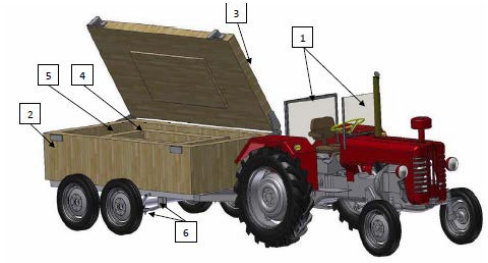
**2011: LOCOSTRA Test in Jordan**
**(SNAIL-AID, PIERRE)**

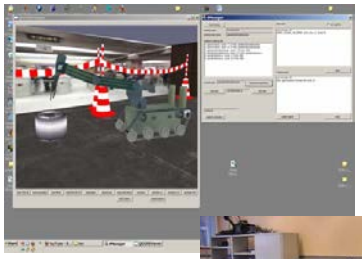
**2012: A robust, simple, low-cost autonomy enhancement module for LOCOSTRA, a remotely controlled demining machine: Michal Przybylko, Emanuela Elisa Cepolina, Gianni Polentes[1] and Matteo Zoppi[2] (DIMEC, PIERRE)**

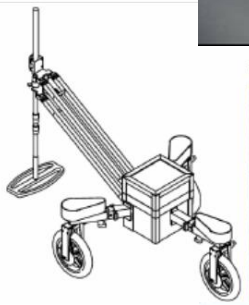



**2011: Concept, MILITARY INSTITUTE OF ENGINEER TECHNOLOGY**

**2012: Proposal for construction of demining machines and trailers for the transport of dangerous goods carried out within the project TIRAMISU: Marcin SZCZEPANIAK, PhD, Wiesław Jasiński, (WITI)**







**2011: Training with Robots**

**2012: Identification and classification of tools and missions needing e-training of Humanitarian Demining staff with use of computer simulation: Andrzej Kaczmarczyk, Marek Kacprzak, Andrzej Masłowski (IMM)**

**2012: Qualitative Spatio-temporal Representation and Reasoning Framework for Risky Intervention mobile robot's operator training Design:Janusz Będkowski[1], Paweł Musialik[1], Andrzej Masłowski[1], Yvan Baudoin[2] (IMM, RMA)**

**2011: ROBUDEM, BBN of RC Sensor carrier (RMA)**

**2012: TRIDEM, project of teleoperated dog-like post-scanner for QA: Y.Baudoin, I.Doroftei (RMA-TUI)**

**2012: State of the art review on Mobile Robots and Manipulators for humanitarian demining:L. Marques[1], A. T. de Almeida[1], M. Armada[2], R. Fernández[2], H. Montes[2] , Y.Baudoin[3] (ISR-UC, CSIC-CAR, RMA)**

**2012: Robot mapping of sites contaminated by landmines and unexploded ordnance. Kjeld Jensen, Leon B. Larsen, Kent S. Olsen, Jens Hansen, Rasmus N. Jørgensen (*University of Southern Denmark Campusvej*)**

ISR-UC S-O ground detection (L.Marques)

**2012: Sensors for close-in detection of explosive devices – current status and future prospects: Lino Marques[1], Giovanni Muscato[2], Yann Yvinec[3],Salvo (ISR-UC, UNICT, RMA,VALLON, USTAN)**

**2012: Bio-inspiration and Mine Detection: M.K.Habib, UN CAIRO**

Efforts were focusing to determine whether trained foraging bees can reliably and inexpensively search wide areas for the presence of landmine chemical signatures, such as TNT, at very low concentration, and possibly other explosive materials in bombs and landmines, as well as other chemicals of interest,

including drugs and even decomposing bodies.

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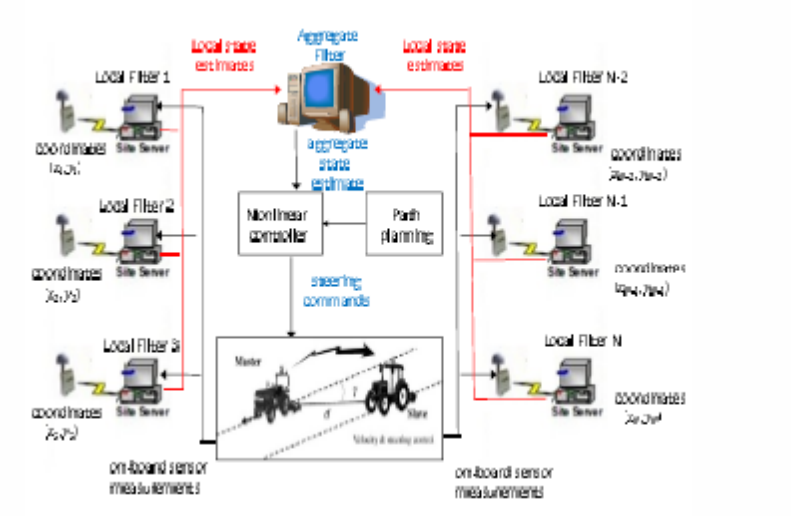
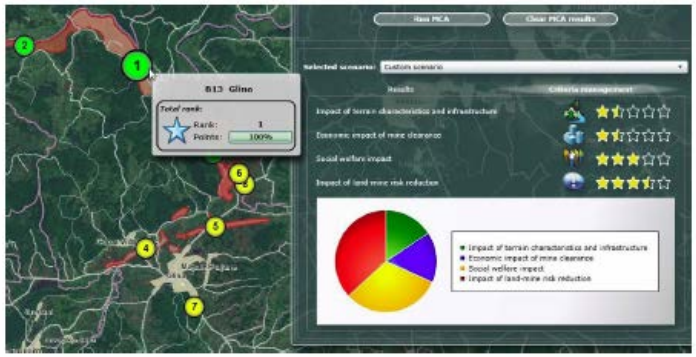
**9-10th IARP WS SIBENIC**




**2012: Extended Information Filtering and nonlinear control for cooperating robot harvesters (G.C. Rigatos)**

**2012: Complete coverage path planning of mobile robots for humanitarian demining: Marija Đakulović and Ivan Petrović University of Zagreb, Croatia**

**2012: Airborne wide area general assessment of the environment pollution due to the exploded ammunition storages: Milan Bajic, Croatia**



**2012: An overview of GIS-based Multi-Criteria Analysis of priority selection in humanitarian demining : Nenad Mladineo, Snjezana Knezic, Marko Mladineo**

a

b

Figure 1. The ammunition storage Padjene: a) before the explosion, shown on the satellite IKONOS image 29.03.2006 (Google Earth Pro); b) one month after the explosion shown on the aerial photography 13.10.2011.

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| COORDINATOR | |
|---|---|
| Royal Military Academy of Belgium | |
| **PARTNERS** | |
| DLR- National Research Center for Aeronautics and Space (Germany) | Spinator Ab (Sweden) |
| Institute for Systems and Robotics (Portugal) | Protime Gmbh (Germany) |
| CSIC- Agencia Estatal Consejo Superior De Investigaciones (Spain) | Spacetec Partners Sprl (Belgium) |
| University of Catania (Italy) | European Union Satellite Centre (Spain) |
| University of Genoa (Italy) | Vallon Gmbh (Germany) |
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| University of Zagreb (Croatia) | European Committee for Standardization (Belgium) |
| Institute of Mathematical Machines (Poland) | Noveltis Sa (France) |
| Croatian Mine Action Centre (Croatia) | Dialogis Ug (Germany) |
| Military Institute of Engineering (Poland) | |

# TIRAMISU

**Toolbox Implementation for Removal of Anti-personnel Mines, Submunitions and Uxo**

**Towards a Network of End Users: contact** Yann Yvinec@rma.ac.be


- **We thank Nikola Pavkovic, Milan Bajic, Sanja Vakula and their colleagues for having hosted the 10th IARP WS HUDEM**
- **We thank CTDT, FGUNIZ, CROMAC, ITF for their active support by the preparation of the TIRAMISU proposal, hoping we may further cooperate to reach the objectives of the OTTAWA and OSLO threaties**
- **We thank GICHD for his support through our Project Advisory Board and the Belgian DOVO for the sharing of his large experience over the world**

**We thank all of you, and particularly the IARP WS attendees for your kind company**