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International Conference Sheds Light on Mine Action Trends and Concerns

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Introduction

During the "International Conference on Requirements and Technologies for the Detection, Removal and Neutralization of Landmines and UXO" held in Brussels September 15–18, 2003, many global viewpoints and models emerged from the discussions. Some of the ideas triggered strong emotional reactions during the conference. Several of the new ideas might have a short lifetime; others have the potential of forcing breakthroughs; and all of them are subject to further debate.

The EUDEM2-SCOT 2003 conference was an open forum for discussing state-of-the art humanitarian demining technology research and development (R&D) and practice. New technology developments and demining systems and scenarios were confronted with viewpoints from daily practice in demining on the field.

Strong Interest of Policy Makers

P. Busquin, a member of the European Commission, has acknowledged the advances made in information management tools, integration of geographic information systems (GIS), and incremental improvement of sensors, area reduction and international standards, but mentioned also that "delivery of new tools and equipment to improve the search for individual mines has not met early expectations."[1] He pointed to the complexity of the problem, the mismatch between research ideas and application requirements in the field and the significant non-technological problems in finding the resources to turn prototypes into fully tested commercial products ready to use in the field.

Closing the Gap Between Humanitarian and Military Demining R&D

Although different goals are pursued and different practices are used in military and humanitarian demining, there is a large potential for technology sharing (Petersberg Tasks).[2] P. Busquin emphasized that even financial support will gradually be opened by the European Union for joint technology developments in the context of (civil) security. This may certainly help bridge the chasm between research results and deployment.

Demining: A Military Point of View

James L. Jones, General and Supreme Allied Commander Europe for the North Atlantic Treaty Organization (NATO), has put the mine problem in a broad historical perspective. The notion of military necessity makes the case that inadvertent harm to civilians and

civilian objects, though regrettable, is acceptable if a significant military gain results and there is no other way to proceed. The Ottawa Convention[3] (which bans the use, the stockpiling, the production and transport of AP mines) and the diminishing threat of warfare with massed armies (hence the decreasing "military necessity") are the two main reasons for optimism in the future evolution of the worldwide mine problem. However, "non-state actors see the landmine and its horrifying, indiscriminate nature as being a very useful weapon if the objective is to psychologically terrorize and influence populations and government."[4]

Reinterpreting Controlled Testing and Evaluation

Amazingly low probabilities of detection were presented for two standard demining tools, namely prodders and metal detectors, in three conference presentations,[5] even in controlled test conditions. C. Mueller et al. reported success rates with metal detectors beginning at about 50 percent and rarely reaching above 80 percent;[5] R. Fjellanger et al. reported detection performance down to approximately 70 percent based on the vapour-sensing capabilities of dogs; and J. Trevelyan described success rates with prodders down to 50 percent. It is certainly true that, in practice, locally adapted operational procedures, based on the contextual *a priori* knowledge, reduces the risks and increases the probability of detection. Nevertheless, the three papers on retrospective scientific analysis of well-adopted sensors remain extremely valuable—if their results are being confirmed—because they describe the objective intrinsic behaviour and limitations of sensors when operated independently of an operational procedure based on human expertise in controlled conditions for a variety of soils and foreign objects.

The evidence that little is understood about why current successful demining works (dogs, prodding, metal detectors and machines) triggers the following questions:

- What is the baseline to which new technology has to be compared?
- In the presence of urgency, is it not appropriate to be less reluctant towards fast uptake of new technology at an earlier stage in current practice?
- User requirements have not been updated in 10 years and technology has evolved substantially. Isn't it the right time to bridge this newly developing gap, so that we can move forward and introduce some of the new technologies by associating them in the operations even if they are not 100-percent effective?

Producing these kinds of figures for an experimental new sensor probe resulting from an R&D project would probably be and has often been interpreted as unsuccessful. Nevertheless, the end-user community has adopted prodders and metal detectors as workable instruments a long time ago. This leads to the conclusion that deployment of new technologies in the field should occur at an earlier stage, and time should be explicitly provided for developing appropriate procedures and contextual scenarios to complement the toolbox of instrumentation so that more and more specific situations can be covered.

Bridging the Chasm Between Prototypes and Fieldable Equipment: The Need for New Funding Structures

The major impediment to adoption of new technology in the field is the absence of support for bridging the gap between R&D results and fieldable systems. For a small government and a financially unattractive market (with no explosive market increase), such support is a prerequisite for achieving a breakthrough. Dual use developments within civil applications, common military/civilian technology development and incorporation in the broader field of security are encouraged to solve that problem but

take away some of the needed focus on specific technology to solve the mine problem. A debate concerning the European Commission (EC) co-funded research and technical development (RTD) projects leads to the conclusion that no structure for support exists at this time in Europe for carrying the results of EC-funded R&D projects towards fieldable systems. The crude question is raised: Why fund research, since it is well-known that "research only generates new research," if the results are not exploited?

Bottlenecks hampering the structural funding of the transition activities between R&D results and fieldable systems in Europe include the partitioning of Directorate General (DG) responsibilities, the strict interpretation of laws on falsification of competition and the limited interest of donors in this area due to high budget requirements. To get rid of this situation, urgent political action on the decision level is required.

> The reluctance of donors and their limited interest to participate in technology transfer can be explained by the high budget requirements in this area. Grossly, J. Trevelyan stated that for every Euro spend in supporting research, 10 Euros are required for development, while an investment of 100 Euros is needed for turning these developments into successfully marketed products. Moreover, as stated earlier, in humanitarian demining technology, we are confronted with modest market perspectives and markets created by government decisions.[7]

The U.S. Army's "Market Culture"

The overview of the Canadian landmine detection R&D program,[5] presented by J. McFee, and the overview of the current U.S. Army basic research on landmine and UXO detection, presented by R.S. Harmon, illustrate the North American structural approach for the continuous cross-fertilisation of laboratory research towards applications in practice: the U.S. Army research office has as a mission to invest in fundamental research at universities, and a parallel structure within the Army for applied research is picking up the results of the fundamental research. An equivalent approach does not exist in the European Union (EU) at this moment.

David Daniels raised the point of Europe lagging far behind commercially. If Europe does not start up a voluntary action in picking up the R&D results and turning them into commercial products, U.S. government-funded technology will monopolise the market. It is in the interest of everybody that second and third source suppliers exist.

Technological Progress

Progress has been made in many domains and this was covered by the conference contributions.[5] Nevertheless, P. Blagden made the statement that, except for ground penetrating radar (GPR), none of the technologies appeared near being ready to be taken into the field for close-in detection. The general opinion at the conference is that close-in detection of individual mines and area reduction are the priority domains for demonstrating progress.

Unimpressive Advances in Data Fusion

In the area of multisensor platforms and data fusion, the following three ideas are essential:

- **Sharing:** Information exchange certainly occurs now within the humanitarian demining community.
- **(Demonstrated) promise:** We are on the way, but have not yet arrived, e.g., good results on learning sets are not sufficiently convincing.
- **Real time:** Appropriate processing architectures are being conceived to go from simulation towards practice.

The Shift of Airborne Survey From Experimental Towards "Production Survey"

From the work presented, a coherent framework emerges with opportunities for improvement, both on sensors (e.g., chemical detection) and on software (e.g., integrated GIS environments, image interpretation methods). It involves the total usage and integration of all available information over the area from small-scale to large-scale, past and present—aerial and satellite multimodal data, ground surveys, interviews and local knowledge about culture and land usage. The means to obtain all of this information are generally known; the integration and structuring schemes are emerging and being validated.

Significant Decision Support and Information System Contributions From the Non-Demining Information Communication Technology (ICT) Community

> "Everything would have been easier if we had the JMU [James Madison University] clearinghouse at the start."[5] This statement heard from D. Radmore, a professional deminer, illustrates how initially hostile attitudes towards a technology coming from another scientific community outside the humanitarian demining field can gradually gain acceptance when developed in collaboration with end users.

Information systems are now being equipped with extra communication means and decision support systems. The primary question raised is how to harmonise them around the Information Management System for Mine Action (IMSMA). It is generally acknowledged that IMSMA has brought standardisation in the field and enforces correct documentation and reporting of mine actions. Therefore, there is a tendency to encourage add-on developments that are compatible with IMSMA, which has gained wide acceptance within the demining community.[6]

It was suggested that a structured knowledge base on "lessons learned from field experience" would be useful, particularly for bringing back the results and experience gained with new technologies on the field towards researchers and developers.

Test and Evaluation Standardisation in a Shrinking Market

The European Committee for Standardization (CEN) Workshop[7] activities on standardisation are deemed useful and necessary, certainly for manufacturers, but the timeliness of the activities is questioned in the presence of a shrinking market.[8] Standards should gain acceptance also by the end-users and manufacturers before getting maximal utility. Practical questions of end users should be taken into account, e.g., the appropriate footprint size at a specified depth (Vernon Joint) in relation to full area coverage. Standardisation in general could be useful as one of the elements in procurement decisions of existing tools.

End-User Needs vs. Technology Development: Scientific Approaches Have Yet to Mature

Initial steps towards a scientific approach to economic modelling of cost-effectiveness of demining technologies were proposed by R. Keeley as an alternative or complement to the ad hoc analyses of today.[5] The main challenge will be the acceptance of the models and their ability to be tuned to local circumstances. One of the main identified bottlenecks is the availability and the certainty of the input information. The latter problem is related to the previously raised question: How does one ensure adequate and exchangeable reporting from mine actions? Solving this question is an essential prerequisite for further development of economic models, ICT decision support systems, information systems and socio-economic impact studies that can identify priority and less useful areas for demining operations.

Research, Development and Deployment: Shifting Towards Community Restoration and Evidence-Based Risk Management

The thinking behind the following three observed evolutions converges towards a similar way to move forward, and it calls for the investigation of a paradigm shift in research, development, deployment and donor attitude from humanitarian demining towards restoring local communities and evidence-based risk management.

1. At the organizational level in EC-FP6, R&D on humanitarian demining is part of "Improvement of Risk Management." The text of the "Call for Proposals" is technically oriented towards (open) system development and should be interpreted as a transcription of the global objective to achieve high-level society benefits.[9]
2. At the level of field actions, in practice, mine action centres (MACs) are adapting their priorities to those of the locals. Avoiding famine by food supply, medical assistance and agricultural activities or restoration of water sources might come first before the removal of mines. S. Grainger presented a case study in Lebanon in which urban restoration of the infrastructure started before the contracted demining organisation had the opportunity of fully removing the mine threat.[5] In certain situations, the risk of famine or socio-economic failure might either subjectively be perceived or objectively be higher than the mine threat, influencing the priority of action. Ranking of risks is implicitly made.
3. At the level of designing models and R&D, J. Trevelyan presented a possible model of agricultural exploitation in the presence of AP mine risk.[5] The model is an initial proposal and includes mine-resistant agricultural machinery development and new agricultural practice. The idea is certainly not mature yet but deserves to be taken up further.

The fundamental question was raised of whether or not this viewpoint is compatible with the Ottawa Convention.[3] In our opinion, it is: "the fencing of minefields that have little impact on the socio-economic life rather than their removal" and "prioritising a solution to the threat of famine by cultivating the land rather than to clear it" can be seen as interim solutions to solve urgent local problems causing immediate and high risk, taken up before the actual mine clearance.

The emerging new paradigm also triggered a lot of organisational questions. New views are required on the quality of results and liability defined in terms of achieving acceptable risks, which should be adopted by the donors in their contracts. Probably due to the presence of representatives from several demining companies, the difficulty of the statement of work in the contracts was raised at several occasions: e.g., the specification of quality assurance and the definition of failure. The UN requirement for humanitarian mine clearance efficiency of 99.6 percent is in contradiction to the term "acceptable risk," which primarily depends on the end use of the cleared land.[10]

Conclusions and Discussion

The EUDEM2-SCOT 2003 conference has brought together subsets of all players in the field of humanitarian demining. The presentations and discussions were characterised by an increasing maturity, transparency and honesty about the achievements. Views were exchanged frankly between different parts of the community, including analyses of where we have gone wrong.

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Endnotes

1. P. Busquin discussion: http://www.eudem.vub.ac.be/eudem2-scot/open_speech/busquin.pdf.

2. See http://www.ejil.org/journal/Vol9/No4/art5-03.html.
3. Ottawa Convention: http://www.mines.gc.ca/VII/VII_AA-en.asp.

4. James L. Jones discussion: http://www.eudem.vub.ac.be/eudem2-scot/open_speech/jones.pdf

5. H. Sahli, A. M. Bottoms, J. Cornelis (Editors). EUDEM2-SCOT-2003, "International Conference on Requirements and Technologies for the Detection, Removal and Neutralization of Landmines and UXO," Volumes 1&2, pp. 3–26, 32–40, 56–63, 78–81, 93–98, 162–165, 233–248; September 2003. VUB, Brussels, Belgium, ISBN 9080826111.
6. J. Cornelis, A. Craib, R. Voles. "Strategic Study of the Humanitarian Demining Prospects, the Role of RT&D Analysed as a Europe-Wide Issue: Proposal to Stimulate Commitment of European Industry in the Development of Improved Systems for Humanitarian Demining;" DG INFSO-IST; November 15, 2000. http://www.eudem.vub.ac.be/publications/Files/StrategicStudy.pdf.
7. IMSMA: http://www.imsma.ethz.ch/.
8. CEN Workshop 7: http://humanitarian-security.jrc.it/demining/cw07/.
9. IST FP6 Call "Improving Risk Management," http://www.cordis.lu/ist/so/risk-management/home.html.
10. Ottawa Convention Intersessional Work: Standing Committee of Experts on Mine Clearance: http://www.gichd.ch/docs/minebantreaty/clearance/1st_SCE99/mineclearancedraftreportSept99.htm.

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