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Mine Action Technologies: Problems and Recommendations

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Mine Action Technologies: Problems and Recommendations

Mine action research and development (R&D) is an ongoing process that has yielded many insightful and invaluable technologies. Future mine action R&D will require the collaboration of end-users, donors and technologists in order to develop equipment and tools based on real needs rather than assumed needs.

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Introduction

In 1997, at the workshop that accompanied the signing of the Ottawa Convention, concern was expressed at the lack of international coordination and cooperation in mine action technology. It was noted that there were no universal standards for technology, no common view on where resources should be directed; additionally, inadequate dialogue and understanding existed both within the R&D community as well as with the other actors in mine action.

Even if there is still a lack of international coordination and cooperation in mine action technologies, especially among the end-users, the donors and the R&D communities, a lot of work has been done and some success stories can be reported. Significant progress has been made in the following areas (see the appendix for more details):

- Metal detector and handheld dual sensor performance, which combines metal detectors with ground penetrating radar (GPR)
- Mechanical device use and development
- Development of applications based on information technologies, such as the Information Management System for Mine Action (IMSMA)
- Personal protective equipment (PPE) and prosthetic limb development
- Training of rodents to detect landmines
- PPE suitability and cost

Thanks to the International Test and Evaluation Programme (ITEP), much work has been undertaken to test and evaluate equipment, systems and methods against agreed standards.[1] Nevertheless, efforts must continue, especially to initiate and increase the coordination and cooperation among users, donors and technologists in order to develop and bring to the field equipment and tools based on real needs rather than assumed needs.

Mine Action Technologies: A Very Difficult Problem

A lot of factors are slowing down real progress in technology and the fielding of new equipment. The most important among them are the following:

- The lack of a procurement path makes fielding a technology very difficult. Consequently, developers are faced with a dead-end even when R&D, prototyping and testing and evaluation (T&E)/validation (if any) are successfully accomplished!
- Mine action solutions are not universal and are often country/region-specific (soil type, climate, vegetation, socio-cultural environment, etc.). A "systems approach" needs to be used.
- Mine action technologies are diverse (e.g., ITEP recognizes six different categories: survey, detection, mechanical assistance, manual tools, personal protection and neutralisation).
- Requirements for technologies are not easily defined, nor easily satisfied.
- Some major advances have not been well appreciated; for example, the significant improvements in metal detectors, PPE and information technology support tools.

Mine Action solutions are not simple, and a "silver bullet" universal solution is not avaliable; Finding all the mines in the ground without a false alarm is a challenge comparable to sending a man to the moon but with much less money.

- The market for mine action equipment is not large enough by itself to support the cost of bringing products to market.
- Both donors and demining organizations are naturally conservative especially regarding safety.
- Donors do not insist on the use of new and more efficient technologies.
- Deminers do not change successful clearance methods (even if they are not efficient) as long as donors accept them.
- Some of the problems of new mine action technologies are not technical (e.g., computer staff in field offices leaving once they are trained).

Donor Responsibilities

Clearly, donors have a key role to play, especially in supporting the introduction of new technologies that offer potential long-term cost savings to the field. This introduction of new technologies must be based on faster operations, saving lives and saving money. Technologists need donor support to establish a sound procurement process for fielding new technologies in order to have more cost-effective mine action.

Donors need to be responsible for the following points:

- Donors must now consider investing in new technology to get future gains in efficiency (thus saving money).
- Donors need to insist on steady improvements in efficiency from demining organisations.
- Donors need to insist that clearance contracts include, where appropriate, participation by demining organisations in testing new technologies (costs re-paid by the donor).
- In order to solve the problem of the absence of a large enough market for humanitarian demining equipment, donors should envisage:
  - Dual-use technologies
  - The "leverage" of military technologies
  - The incremental improvement of existing tools
- The most likely vendors of new technologies are probably existing manufacturers of demining equipment (e.g., metal detector manufacturers). Therefore, a technology funding package needs to include a staff education package that takes into account the socio-cultural environment, as well as a long-term training package for the maintenance and repair of equipment.
- Donors need to understand users' real needs. Appropriate technology must correspond to appropriate needs. Mine action funding is not necessarily just a platform for selling the donor country's products.
- Donors must realise that clearing mined areas more quickly and efficiently may be seen as leading to unemployment for local deminers, who may therefore reject new technologies. Support for improved clearance technologies must be complemented by assistance to local deminers to help them re-integrate into the local productive economy when clearance is complete.
- Contact and understanding must be improved between donors and technologists.

End-users need to have a pro-active role and to be understanding and open regarding the process of introducing new technologies in the field. New technologies could save human lives and increase mine action efficiency.

Recommendations to End-Users

- Demining organisations (or Mine Action Centers [MACs]) need to analyse which are the best technologies for their geographic, social, cultural and UXO situation. The "bottlenecks" can then be addressed (and the areas where problems do not exist should be left alone, e.g., better detectors do not help in areas with UXO in heavy vegetation).
- End-users should make use of the opportunities offered by the ITEP members for asking specific questions on technology performance and for receiving information about "tried and tested tools."[2]
- End-users should help technologists to understand the real needs of deminers, e.g., by inviting them to go to the field ("Nothing is more important than understanding the working environment").

Recommendations to Technologists

Technologists must keep in mind that nothing is more important than understanding the working environment. In order to better serve the end-users:

- Technologists need to spend time and effort to understand the real end-users' needs.
- Technologists must go to the field.
- Technologists must be aware that field users will only accept sophisticated technology if it is simple to use and affordable.
- ITEP needs to be open to end-users' questions and has a key role in providing information about "tried and tested tools" with clear information about where, why and when they are useful.
- Technologists need to understand that detection is not the only important task, but there is also a need for improved technologies for:
  - Area reduction (to know where the mines are not)
  - Strategic planning using information technology tools
  - Programme management
  - Other key areas of mine action

Conclusion

The Convention states that "each State Party undertakes to facilitate and shall have the right to participate in the fullest possible exchange of equipment, material and scientific and technological information concerning the implementation of [the] Convention." This implies that such an exchange is an important underpinning to assisting States Parties in the fulfilment of their obligations. It is in the spirit of this provision of the Convention that all actors are urged to apply the recommendations in this document. Donors need to understand that technologists need their support to establish a sound procurement process for fielding appropriate technologies in order to have a more cost-effective mine action programme. For their part, end-users need to be pro-active, understanding and open to the process of introducing new technologies in the field, as well as to making use of existing tools. End-users need to understand that appropriate technologies could save human lives and increase mine action efficiency.[3] Furthermore, technologists must accept that nothing is more important than understanding the working environment.

Finally, it is recommended to mandate an informal expert group, meeting on the margins of the Standing Committee and including end-users, donors and technologists. Primarily, this will help to define a coherent roadmap to field effective mine action technologies as soon as possible, taking into account real needs of end-users, and priorities of donors and mine-affected countries, as well as the state of maturity of technologies. Secondly, the group should identify the means to establish a sound procurement process for fielding the appropriate technologies in order to make mine action more cost effective. Lastly, the group would be responsible for investigating the means to encourage and organise a close dialogue among mine action actors.

Appendix

Some examples of advances in technology are as follows:

1. Metal detectors: In recent years, manufacturers and scientists have significantly enhanced the capabilities of current metal detectors (including much better sensitivity and

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resolution, much better behaviour in magnetic soils (power storage and return), much lower lifetime, low maintenance costs and better cosmetic features.

soils, etc.). Not all soils are suitable for metal detectors; there are dangerous cases where it is impossible to detect metallic objects because of the soil characteristics. In order to solve this safety problem, an analysis of the soil characteristics is to be undertaken under the umbrella of ITEP.

2. Handheld dual sensor mine detectors (a metal detector plus GPR): In 2002, dual sensor mine detectors were successfully tested in Bosnia and in Lebanon. In 2003, operational tests will be performed with 24 mine detectors in four different mine-affected countries. The lessons learned will be collected and enhancements will be made, if needed. The benefits include enhanced detection and reduced false alarm rate.

3. Information technology: the Information Management System for Mine Action (IMSMA) is still evolving. It now includes standard reporting facilities (reporting obligation of Article 7) and can exchange information with Geographical Information Systems (GIS), which allows the use of digitised map and satellite images. Satellite images with appropriate information overlays can be used as maps. Management tools have been developed or are under development (e.g., to assist with the planning of demining campaigns, cost-benefit analysis regarding the introduction of specific equipment, and the definition of a mine clearance strategy at the country/region level).

4. PPE: A test methodology has been developed based on the in-depth analysis of the physics of mine-blast damage mechanisms (Canadian Center for Mine Action Technology [CCMAT-US]) and standards will be developed for PPE under the umbrella of ITEP.

5. Prosthetic feet (CCMAT): These prosthetic feet provide greater comfort for the

6. Educated Rodents (APOPO): In 2002, rats were successfully tested in Tanzania and proved to be reliable at mine detection. In 2003, operational tests are foreseen in six different mine-affected countries.

7. ITEP: ITEP is an international programme favouring collaboration among the participating countries to avoid duplication of efforts. ITEP is dedicated to the test and evaluation of all forms of equipment, systems and methods for use in humanitarian demining. Test and evaluation against agreed standards are very important for safety and operational effectiveness, as it can be dangerous to rely entirely on manufacturers' data for equipment selection and assessment. For these reasons, the two main activities of ITEP are test and evaluation and the development of standards (which is an ongoing process).

Agreed standards for metal detector testing were published at the beginning of July 2003. The process of developing standards for GPRs was launched in 2002. ITEP has also elaborated a work plan for test and evaluation activities, including six technical programmes: survey, detection, mechanical assistance, manual tools, personal protection and neutralisation.

This document is a compilation of two expert hearings in mine action technologies that took place at the Geneva International Center for Humanitarian Demining (GICHD) during the Standing Committees on Mine Clearance, Mine Risk Education and Mine Action Technologies in February and May 2003. The following experts participated in the discussions, chaired by Marc Acheroy (RMA): M. Acheroy (RMA), A. Antanasiotis (EC /DG-RELEX), D. Barlow (JMU), S. Brigot (ICBL), B. Briot (BE MoD / STRAT), J.Dirscherl (GICHD), R. Gasser (EC / DG-INFSO), D. Lewis (ITEP), A. McAslan (CMA), A. Sieber (EC / JRC), S. Sekkenes (ICBL), R. Suart (CCMAT), and C. Weickert (CCMAT).

References

1. The European Committee for Standardization (CEN) Workshop Agreement: CWA 14747:2003 "Humanitarian Mine Action—Test and Evaluation—Metal Detectors," published by the CEN in July 2003

2. The audience of the CEN Workshop Agreement (CWA07) on "Humanitarian Mine Action—Test and Evaluation—Metal Detectors" requested the European Commission's Joint Research Centre (JRC) to act as a warehouse for test targets.

3. E.g., ITEP for T&E or for information exchange on lessons learned when applying technologies through the Demining Technical Information Forum (DTIF).

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