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Guide to the procurement of mine action equipment

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Contents

Foreword

International standards for humanitarian demining programmes were first proposed by working groups at an international technical conference in Denmark, in July 1996. Criteria were prescribed for all aspects of demining, standards were recommended and a new universal definition of 'clearance' was agreed. In late 1996, the principles proposed in Denmark were developed by a UN-led working group and the International Standards for Humanitarian Mine Clearance Operations were developed. A first edition was issued by the UN Mine Action Service (UNMAS) in March 1997.

The scope of these original standards has since been expanded to include the other components of mine action and to reflect changes to operational procedures, practices and norms. The standards were re-developed and renamed as International Mine Action Standards (IMAS) with the first edition produced in October 2001.

The United Nations has a general responsibility for enabling and encouraging the effective management of mine action programmes, including the development and maintenance of standards. UNMAS, therefore, is the office within the United Nations responsible for the development and maintenance of IMAS. IMAS are produced with the assistance of the Geneva International Centre for Humanitarian Demining.

The work of preparing, reviewing and revising IMAS is conducted by technical committees, with the support of international, governmental and non-governmental organisations. The latest version of each standard, together with information on the work of the technical committees, can be found at http://www.mineactionstandards.org/. Individual IMAS are reviewed at least every three years to reflect developing mine action norms and practices and to incorporate changes to international regulations and requirements.

Introduction

Mine action programmes have traditionally relied on manual practices, procedures and drills, which are slow, deliberate and labour intensive. In many situations, a manual approach may be the most appropriate and effective means of detecting and rendering safe Mines and Explosive Remnants of War (ERW) including unexploded sub-munitions. However there is a growing consensus that a more universal application of technology may enable ground preparation and mine and ERW clearance (and other elements of mine action) to be conducted more effectively, cheaply and quickly, and with less risk.

Until now the procurement of mine action equipment has often been conducted in an *ad hoc* and uncoordinated manner. Invariably, there have been few formal statements of User need, few trials or evaluation, a limited investment appraisal, minimal logistic support planning, no formal acceptance or approval, and limited coordinated monitoring of in-use effectiveness.

The purpose of the '03 Series' of standards is to promote a common international approach to the procurement of mine action equipment, and to provide guidelines on procurement procedures and practices. The adoption of a common approach could enhance international cooperation and coordination, which should assist the procurement of better, safer and more affordable equipment.

Only by adopting this common approach will it be possible to achieve the significant improvements in international cooperation and coordination that could provide considerable benefits to the mine action community. Such an approach does not imply the centralisation of procurement. Indeed, a theme, which is consistent throughout the '03 Series' of standards, is the need to encourage a decentralised approach. Any step in the procurement process that does not add significant value to the end product should be eliminated; this IMAS identifies all of the processes to enable valued judgement to be used.

'Procurement' in this standard refers to the process of research, development, production and purchase which leads to an item of equipment being accepted as suitable for use in mine action programmes, and continues with the provision of spares and post-design services throughout the life of the equipment.

Guide to the procurement of mine action equipment

1. Scope

This standard establishes principles and provides background and introductory guidance on the requirements of the application of technology and the procurement of equipment for mine and ERW, including unexploded sub-munitions clearance tasks and processes.

More detailed information on the procurement process, test and evaluation is contained within the complementary '03 Series' of IMAS.

2. References

A list of normative references is given in Annex A. Normative references are important documents to which reference is made in this standard and which form part of the provisions of this standard.

3. Terms, definitions and abbreviations

A complete glossary of all the terms, definitions and abbreviations used in the IMAS series of standards is given in IMAS 04.10.

In the IMAS series of standards, the words 'shall', 'should' and 'may' are used to indicate the intended degree of compliance. This use is consistent with the language used in ISO standards and guidelines:

a) 'shall' is used to indicate requirements, methods or specifications that are to be applied in order to conform to the standard;

b) 'should' is used to indicate the preferred requirements, methods or specifications; and

c) 'may' is used to indicate a possible method or course of action.

The term 'National Mine Action Authority (NMAA)' refers to the government entity, often an inter-ministerial committee, in a mine-affected country charged with the responsibility for the regulation, management and coordination of mine action.

Note: In the absence of a NMAA, it may be necessary and appropriate for the UN, or some other recognised international body, to assume some or all of the responsibilities, and fulfil some or all the functions, of a MAC or, less frequently, an NMAA..

4. The aim of procurement

The aim of the procurement process is to deliver effective, appropriate and cost-effective equipment to the User.

5. Technology categories

Three general categories of technology are defined and addressed in this standard. Examples of these three categories of technology are given at Annex B.

5.1. Category A

Equipment, assemblies and sub-assemblies that have been fully developed and evaluated, and can be procured off-the-shelf (OTS) without significant modification or changes.

5.2. Category B

Those technologies that have been proven in concept demonstrator programmes, but require further development prior to production.

5.3. Category C

Those technologies, which may have an application to mine action, but have yet to mature and have not yet been formally demonstrated.

6. Factors influencing procurement

6.1. The nature of mine action

Contamination by mines and ERW including unexploded sub-munitions form just part of the amalgam of challenges which confront a country at war and during the period of post-conflict recovery. The nature of mine action and other categories of humanitarian and developmental assistance will be dependent on the circumstances existing at the time: the security situation, the authority of government, political will and the resources available.

The procurement of appropriate and affordable equipment requires an understanding of the *form* and extent of mine action during the different *states* of post-conflict. For example, mine and ERW clearance equipment, which may be suitable for use in humanitarian emergencies, may be inappropriate or too expensive for use in large scale developmental demining programmes. Some equipment may have wide utility; others may be optimised for a particular task in a particular mine action programme.

6.2. Technological advance

Consumer demand requires the continuous improvement of products through refinements in design and manufacturing, incremental improvements in technology, or the 're-packaging' of technology in a different form. This has not been the case for mine and ERW clearance, where technology has failed to provide any major improvements in capability.

Breakthroughs in technology require much investment in research and development (R&D). This tends to favour equipment and products with a large consumer market and with the potential for significant profits. Major investments may also be required for reasons of national security.

Thus any major breakthroughs in technology which will benefit future mine and ERW clearance equipment may come from other areas of research, including the military R&D community. Mine action equipment procurement must be creative and apply new and perhaps unconventional technologies to achieve a paradigm shift in capability.

6.3. User requirements

While scientific and technological advances are likely to remain a key influence, procurement policy and decisions will tend to be driven primarily by User needs, refined by field experience and through progressive improvements in design, materials and manufacturing.

User requirements will be generated by acknowledgement and identification of inadequate or obsolescent current equipment. They will also come from new mine action programmes, new or modified concepts of operation, improved procedures and the continuing need to implement programmes more cost-effectively and more quickly, without any compromise to safety.

6.4. Funding (the mobilisation of resources)

Many promising technologies have not been exploited due to the lack of available funding. Although resources may exist, there has hitherto been no formal mechanism to link sources of funding to technology opportunities, and *vice versa.* Donors will expect new technologies to demonstrate measurable improvements over existing methods.

The funding of ambitious mine action equipment programmes poses a particular problem. The life-cycle costs of major equipment (R&D, design, manufacture, testing and evaluation, deployment and redeployment, training and operational use, maintenance, repair and system upgrades) may involve significant financial commitment and exposure to risk which cannot be made by many NGOs and demining contractors. Furthermore, investment in technology requires a long-term commitment, and traditional methods of mobilising resources do not provide such a commitment from donors. There is thus a need to identify novel arrangements, which satisfy the requirements of industry, the User community and the donors.

Technology is a resource and, together with other resources (such as information, human skills and time), the use of equipment in mine action programmes will depend on its cost effectiveness. Cost effectiveness is an assessment of the balance between the equipment's operational performance relative to its total life-cycle cost. It can also be expressed as a measure of the operational capability added by a system compared to its and competing systems life-cycle costs. The mine affected state and donor community must bear the costs of such technology and will expect the full costs to be exposed at an early stage.

A common approach to procurement within the mine action community could lead to the following benefits:

a) the adoption of common, agreed levels of performance and safety;

b) the collection, exchange and archiving of information on operational procedures, trials and evaluation;

c) through cooperation, the reduction of development costs and risk; and

d) through collaboration, the reduction of unit production costs.

There are, however, a number of obstacles to the universal acceptance of technology standards. These include:

e) a real, or perceived, difference in national and local needs and priorities;

f) an inability to meet new standards;

g) a reluctance to change procedures to conform to externally imposed standards;

h) additional resources may be required to establish an international organization or agency with the mandate and capability to develop monitor and, if necessary, to amend standards;

i) the transfer/exchange of information which has national security or major commercial implications; and

j) for collaborative projects, the allocation of work share, potential profits and exposure to risk between partners.

A willingness to develop and subsequently adopt technology standards requires stakeholders to believe that the overall benefits outweigh the obstacles, local disadvantages and organizational challenges. There must be a common purpose and acceptance that standardization provides better, safe and more cost-effective mine action.

7. Procurement stakeholders

7.1. The user community

The *User* community includes all those individuals, organizations, agencies and private companies who will subsequently use equipment in mine action programmes. Currently there is no single professional body, which articulates a common position of the User community. Instead, the views are fragmented and diverse, and tend to reflect the personal opinion of organisations based on experiences gained from specific programmes and geographical scenarios. Furthermore, the views of users are often dominated by current issues and problems, which require immediate (and sometimes expedient) solutions. Such a perspective militates against longer-term solutions, including the exploitation of new and emerging technologies.

The approach to equipment procurement proposed in this standard could help produce a common and harmonised view of the problem. The User community should be involved in drafting the formal statement of operational need (SON) and the subsequent statement of requirement (SOR) for the proposed equipment solution.

7.2. Donors

Technology is a resource, and the use of equipment in mine action will depend on its cost effectiveness.[1] The donor community ultimately must bear the cost of such technology. They will expect the full costs to be exposed at an early stage and monitored throughout the equipment's life cycle using standard cost accounting procedures.

The views of donors will be particularly important for equipment programmes that involve high risk R&D. In circumstances where costs are uncertain, donors would expect a full and formal risk assessment to be produced. The approach to equipment procurement proposed in this standard should involve donors at the earliest opportunity in equipment projects, and should provide them with the necessary information to make informed decisions.

7.3. Research organisations and industry

Research organizations and industry have become more involved in mine action as a consequence of the greater public awareness generated by the Anti-personnel Mine Ban Convention and through effective advocacy programmes. The motives and objectives within industry and academia may vary, but most individuals share a common vision and purpose: to make greater use of technology to improve performance, affordability and safety. The process proposed in this standard aims to engage industry and academia from the outset of a project, encourage focused R&D, leading to more cost effective equipment with wider utility.

7.4. The military

Military forces conducting peace enforcement and peacekeeping duties have the potential to contribute significantly to many aspects of mine action. Military support need not be restricted to mine and ERW clearance, but can involve Mine Risk Education (MRE) training, medical support, transport, logistics, supervision, monitoring and audit. Indeed, the strategic goals of the military peacekeeping forces and humanitarian communities are complementary, and the two communities have a joint responsibility to ensure that their equipment, procedures, processes and standards are consistent and holistic.

1. Cost effectiveness is an assessment of the balance between the equipment's operational performance relative to its total life-cycle cost.

The military has substantial resources for R&D, and for conducting equipment trials and evaluation. Military-sponsored work is underway in a number of countries with the aim of identifying dual-use technologies which have the potential to deliver benefits both to the humanitarian and military mine action communities. The results of this work are frequently being made available to the United Nations. The military community is a major stakeholder in mine action, and judicious use should be made of its considerable resources to assist mine action equipment programmes.

7.5. United Nations

The 52nd session of the General Assembly on *Assistance to Mine Clearance* emphasised "....*the important role of the United Nations in the effective coordination of technological developments*." The United Nations' policy paper on mine action technology clarified the organization's role and responsibilities; which includes an obligation and the mandate to provide effective coordination of technological developments. This coordination involves the issue of policy, (which should include the priorities and principles for investment in technology), a summary of international technical standards and legal requirements, a 'clearing house' (for the management (preparation, coordination, circulation, dissemination, analysis etc.) of equipment requirements, technical feasibility studies, and equipment trials and evaluations) and a portfolio of technology opportunities.

7.6. Sponsor

Each equipment project should have a Sponsor. The Sponsor shall nominate a representative who has overall responsibility for articulating the operational need and for coordinating the subsequent activities, including formal 'Acceptance' of the preferred equipment. For equipment requirements with limited local application, the Sponsor's representative is likely to be the local project manager. For equipment with national application, the Sponsor's representative is likely to be the programme manager of the national MAC, or his/her technical adviser. For equipment with universal application, the Sponsor's representative is likely to be a technology adviser from UNMAS, or an agency working in coordination with UNMAS.

Equipment may start with a local application and subsequently have national or even international application. In such cases the Sponsor's responsibilities will also change from local to national to international.

7.7. Steering committee

Major equipment projects require much coordination. This coordination should be provided principally by a Steering Committee that should meet at regular intervals. The Sponsor should normally provide the Chairperson and all interested parties should be represented. The Committee should have formal proceedings, and may be assisted by working groups and panels dealing with specific issues of the project such as standardisation, risk, documentation and training.

The Steering Committee can be established within a mine action organisation for the procurement of equipment solely within that organisation, or it could consist of representatives from a number of stakeholders in collaborative ventures.

8. Priorities and principles

The purpose of the procurement process is to deliver effective, appropriate, cost-effective and safe equipment to mine action programmes. The outcome of the process will depend on three key factors: the User's needs, the availability of technology and the availability of funding. A reconciliation of these three factors will normally be made by conducting a formal investment appraisal. The outcome from such an investment appraisal will depend on the selection criteria and the relative importance (or weighting) of the criteria. The United Nations' policy paper on mine action technology recommends that the weighting of criteria should acknowledge the following generic principles and priorities.

8.1. Functionality

Potential technologies shall meet the 'essential' equipment requirements as defined in the SOR. The implications of failing to meet one or more 'essential' requirements shall be fully assessed and agreed by the User community and the equipment Sponsor.

8.2. Cost-effectiveness (Benefit Cost)

The cost-effectiveness of candidate technologies shall be fully assessed, and compared against existing equipment and manual methods. Standard cost analysis methods of calculating life-cycle costs should be adopted. The use of all relevant cost estimating tools should be considered to determine the implications of committing finite resources amongst competing equipment programme requirements.

~~Note:~~ Ensuring that technologies are appropriate for both sexes may add to the initial costs because of the need to invest in facilities, personal equipment and training for female deminers but this will have great social consequences which, in the longer term, may make them cost-effective.

8.3. Reliability

The reliability, maintainability and durability of candidate technologies and the availability of replacement sub-systems shall be determined. Ruggedness and reparability are essential criteria for most mine action technologies.

8.4. Utility

Ideally, equipment should have a broad utility. Equipment that is of use in a large number of mine action programmes will benefit from 'economies of scale', lower unit costs, availability, familiarity, ease of training and user confidence.

8.5. Ease of use

Complex technologies will impose a significant training burden unless they are to be operated by specialists, such as military peacekeeping forces. Ergonomics and the man-machine interface are to be given high priority.

8.6. Pre-Planned Product Improvement (P3I)

The humanitarian needs of mine action programmes will encourage the early deployment of new equipment. Such equipment should rely primarily on existing technologies, but wherever possible they should be designed for pre-planned system upgrades to exploit fully the potential of emerging technologies. A P3I approach has the potential to extend the life (and cost-effectiveness) of equipment, and to delay the onset of obsolescence. P3I is particularly appropriate for software developments.

8.7. Technology maturity

Use should be made of systems and sub-systems that are based on mature technologies. Ideally these technologies should have wider application including other military, humanitarian and developmental mine action activities.

9. Responsibilities

9.1. United Nations

The United Nations shall be responsible, within available resources, for:

a) the development of strategic policy for the development of mine action technology;

b) the coordination between donors, users, sponsors and developers;

c) the development of UN priorities and principles for investment in mine action technology; and

d) the management of technical feasibility studies.

9.2. National Mine Action Authority (NMAA)

The NMAA shall be responsible for:

a) establishing and maintaining national standards, regulations and procedures for the procurement of mine action equipment. These procedures should be consistent with IMAS, and other relevant national and international standards, regulations and requirements; and

b) the selection and accreditation of the appropriate mine action technology specific to their national conditions and requirements.

9.3. Mine action organizations / the Users

Mine action organisations (the Users) should:

a) establish SOPs which enable mine action procurement projects to be conducted effectively and efficiently;

b) participate in the development of statements of operational need (SON) and statements of operational requirement (SOR); and

c) cooperate with other Users to ensure that relevant information on the use of particular technology is available to all stakeholders.

9.4. Donors

Donors should:

a) ensure that research and development activities in mine action technology that they support are in accordance with the principles and priorities established by the United Nations;

b) ensure that full and formal risk assessments are developed prior to investment in research and development activities; and

c) ensure that the minimum duplication of effort exists between competing research and development programmes.

9.5. Research and development organisations and industry

The mine action technology research and development organisations and related industry should:

a) liaise with research and development programmes in similar technology areas, (within the bounds of commercial confidentiality); and

b) try and establish complementary and focused, rather than competing, areas of research.

Annex A
(Normative)
References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of the standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of the standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid ISO or EN:

a) IMAS 04.10 Glossary of mine action terms and definitions;

b) IMAS 03.20 The procurement process;

c) IMAS 03.30 Guide to research of mine action technology; and

d) IMAS 03.40 Test and evaluation of mine action equipment.

The latest version/edition of these references should be used. GICHD hold copies of all references used in this standard. A register of the latest version/edition of the IMAS standards, guides and references is maintained by GICHD, and can be read on the IMAS website (http://www.mineactionstandards.org/). NMAA, employers and other interested bodies and organisations should obtain copies before commencing mine action programmes.

Annex B
(Informative)
Technology for mine action

SER	GENERIC AREA	CATEGORY 'A'	CATEGORY 'B'	CATEGORY 'C'
		Equipment, systems and subsystems that have been full, developed and can be procured OTS without significant modifications or changes	Technologies that have been proven in concept demonstrator programmes but require further development prior to production.	Technologies that may have an application to mine action but have yet to mature and have not yet been formally demonstrated.
(a)	(b)	(c)	(d)	(e)
1	Mine and ERW detection (close In)	Mine prodders Metal detectors Hand tools Video camera	Vibrating prodders GPR (Ground Penetrating Radar) Minimal-metal detectors FLIR (Forward Looking Infra Red) Sensor-processing software Multi-sensor system	NQR (nuclear quadrupole resonance) Trace chemical (IMS) Hyperspectral camera Data fusion software Vehicle mounted Multi-sensor system.
2	Mine and ERW neutralisation or render safe	Plastic explosive Shaped charges Chemical foam Thermitic (Powder) Attack Thermal (Industrial Gas) Attack) Signature duplicators Explosively Formed Projectile (EFP) Ballistic Disc Attack	Metal projectile disruption Liquid projectile disruption Laser initiated burning Freezing techniques Local mechanical aggression Seismic vibration	Non-nuclear EMP Electric arc High power microwaves Biological degradation Chemical degradation Charged particle beam Ultrasonics Sonic shock waves
3	Mechanical ground 'processing' systems	Deep-cutting heavy flails Light flail systems Rollers Ploughs Harrows Excavators (with various buckets)	Horizontal flails Ground sifters Ground milling systems Modified turf cutters Modified peat harvesters Open-cast mining technology	Robotic farming technology Robotic open-cast mining technology
4	Vegetation clearance	Defoliant spray Hand tools Mini flails MPV mounted mowers Heavy duty line trimmer Excavator (with flail)	Automated defoliant spreader	
5	Hazardous area marking	Global positioning systems Geographic information systems Locally available materials Pickets	Soil paints Soil pigments 'Irremovable' Pickets/Poles	Intruder warning systems and alarms
6	Technical survey		GIS IMSMA	Air- and space borne system for identification of mine fields and provision of precise boundaries

SER	GENERIC AREA	CATEGORY 'A'	CATEGORY 'B'	CATEGORY 'C'
		Equipment, systems and subsystems that have been full, developed and can be procured OTS without significant modifications or changes	Technologies that have been proven in concept demonstrator programmes but require further development prior to production.	Technologies that may have an application to mine action but have yet to mature and have not yet been formally demonstrated.
(a)	(b)	(c)	(d)	(e)
7	Personal protection and armouring	Universal visors Military type helmet & visors Military type body armour Safety glasses Mine-protected vehicles	Second generation mine protected vehicles Lightweight body armour Improved safety glasses	

Amendment record

Management of IMAS amendments

The IMAS series of standards are subject to formal review on a three-yearly basis, however this does not preclude amendments being made within these three-year periods for reasons of operational safety and efficiency or for editorial purposes.

As amendments are made to this IMAS they will be given a number, and the date and general details of the amendment shown in the table below. The amendment will also be shown on the cover page of the IMAS by the inclusion under the edition date of the phrase *'incorporating amendment number(s) 1 etc.'*

As the formal reviews of each IMAS are completed new editions may be issued. Amendments up to the date of the new edition will be incorporated into the new edition and the amendment record table cleared. Recording of amendments will then start again until a further review is carried out.

The most recently amended IMAS will be the versions that are posted on the IMAS website at www.mineactionstandards.org.

Number	Date	Amendment Details
1	1 Dec 2004	1. Formatting changes. 2. Minor text editing changes. 3. Changes to terms, definitions and abbreviations where necessary to ensure that this IMAS is consistent with IMAS 04.10.
2	23 Jul 2005	1. Annex B, change to the definition of 'acceptance' to be consistent with IMAS 04.10.
3	1 Aug 2006	1. Minor changes/additions to the first and second paragraph of the foreword. 2. Inclusion of the term 'mines **and ERW**'. 3. Clause 6.1, changes to the first sentence removing the term 'threat'. 4. Clause 7.5 and 9.1 d), replacement of the term 'staffed'. 5. Annex C, minor text changes to column (b).
4	1 Mar 2010	1. Updating UNMAS address 2. Updating NMAA definition. 3. Removal Annex B and renaming Annex C to B. Also reference to Annexes updated. 4. Minor changes to ensure land release, gender and cluster munitions issues.
5	01 Aug 2012	1. Amendments to Clause 7.3 APMBC for Ottawa Treaty. Reference to ITEP removed. 2. Addition of thermal (industrial gas) attack to current technology. 3. Reviewed for impact of IATG development. 4. Minor typographical amendments.