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IMSMA V3.0: Experiences From the ”IMSMA Diaspora”

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The Information Management System for Mine Action (IMSMA) V3.0 was released June 2003, and early experience with the system has been positive. Sellent features are summarized, including geographic information system (GIS) capabilities based on ArcView GIS.

Recommendations include operations-oriented training focusing on reporting information from IMSMA. The following article describes the new version and discusses local customization. The authors also describe upgrading to IMSMA V3.0 based on experience as IMSMA administrators and trainers within their organizations.

by Mohammed Qasim, MACA and John Walker, Former trainer, U.S. DoD HDTC

Introduction

Information technology (IT) is a support function within the bigger world of humanitarian mine action. IT managers struggle to turn data into information and information into knowledge so we can find better mine action solutions. This expedites the following:

- Safe demining
- Impact, technical and completion surveys
- Mine risk education (MRE)
- Reliable, secure communications
- Training

Mine action is always evolving, which the terms reflect. Humanitarian demining firms focused on the physical removal of mines; worldwide, good programs are now in place doing this. As managers shift attention to education and efficiency, information system people have a bigger job to do. The first job of a management information system (MIS) is to support Operations (Ops)—not create “data processing” capability, resulting in the well-known problem of “a lot of data but no information.” The IT team should also support headquarters administration, donor reports and interagency liaison as well as give 24/7 support to decision makers through timely and accurate information and analysis. So they need a good information system.

Information systems for mine action must be simple, economic, secure and stable. The system must be locally maintainable while following international norms and focus on the “leading edge”—not the “bleeding edge”—of technology. GIS and data export-import capabilities are essential. The system should support local languages and share information in UN languages, with full acceptance by the international mine action diaspora. Moreover, software should be easy to use and able to run on standard computers.

The system meeting these criteria is IMSMA, developed at the Swiss Federal Institute of Technology in Zurich (ETHZ) with leadership by the Geneva International Center for Humanitarian Demining (GICHD). No mine action center (MAC) should operate without IMSMA.

IMSMA Background

The Swiss Mine Defense, through the Center for Security Studies and Conflict Research at ETHZ, sponsored IMSMA development as part of Switzerland's commitment to humanitarian demining. The software development team engineered IMSMA as a highly customized Microsoft Access database; any group using small-office PCs could use the system. In 1999, the UN Mine Action Service (UNMAS) declared IMSMA its standard mine information database. The GICHD, founded in 1998, began training and implementation as a partner with ETHZ. Using ArcView software, ETHZ developed IMSMA GIS, a custom version of ArcView optimized for mine action. GIS allowed presentation and analysis of mine action information (vector data) on maps and imagery (raster data).

UNMAS and the U.S. government began encouraging use of IMSMA: IMSMA V2, developed and distributed from 2000 to 2002, added a tank tool and improved the GIS engine. ETHZ's development team was recognized by the Environmental Systems Research Institute (ESRI) for their GIS work.

Use of IMSMA by MACs accelerated. The U.S. Department of State and Department of Defense accepted it as their mine action standard, and a team of experts crafted the expensive Demining Support System (DSS). ESRI worked with the GICHD to provide ArcView 3.2a to mine action programs, giving many lesser-developed countries their first GIS. Nicaragua and Afghanistan pioneered IMSMA use. During 2002 and 2003, with at least 28 mine action programs using IMSMA, the GICHD assumed responsibility for training and implementation support. ETHZ developers began work on the IMSMA V3.0, introducing the GIS markup language (SQL) technology. This will be an exciting and positive development.

ArcView and IMSMA GIS

ArcView, developed by ESRI in Redlands, California, is a well-known desktop GIS tool worldwide by planning agencies, universities, corporations and anyone needing accurate geographic data. It has powerful tools for querying spatial data.

ArcView GIS does not require specific skills for basic use, although it does require training to become proficient. People experienced with geographic software (e.g.,

Table 1: D-2 Technical Data.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length without attachment</td>
<td>3.500 m</td>
</tr>
<tr>
<td>Vehicle width</td>
<td>1.360 m</td>
</tr>
<tr>
<td>Width with attachment</td>
<td>1.600 m</td>
</tr>
<tr>
<td>Working width</td>
<td>1.600 m</td>
</tr>
<tr>
<td>Overall height</td>
<td>1.640 m</td>
</tr>
<tr>
<td>Max weight with attachment</td>
<td>3.500 kg</td>
</tr>
<tr>
<td>Speed range</td>
<td>0–10 km/h</td>
</tr>
<tr>
<td>Engine</td>
<td>3.300 cubic cm Kubota diesel (69 hp net)</td>
</tr>
</tbody>
</table>

Logistics and Infrastructure

International transportation can be easily accomplished in a 20-f container, which can also be optionally equipped as a field workshop. In small dimensions and weight allow the D-2 to be carried by a small track or a trailer. DIGGER DTR can provide the specific recovery equipment necessary to pull the D-2 out of a minefield in case of serious damage.

Selling Strategy

The D-2 will be available for sale in 2005. As a humanitarian and non-profit organization, DIGGER DTR's goal is to make the D-2 affordable to as many demining organizations as possible, so that the safety of the deminers can be improved and global mine clearance productivity can be increased. Due to the D-2 selling price being fixed to the costs, as well as the significant voluntary development work involved, DIGGER DTR is able to sell this vehicle at a very attractive price (165,000 CHF).

*All graphics courtesy of the author.*

References


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"IMSMA V3.0: Experiences From the "IMSMA Diaspora""
Adobe Photoshop) or mapping programs such as FalconView learn quickly since they understand "layers" of data (themes) in ArcView. Quantitative skills are useful, and a skilled SysAdmin may add functionality through custom ArcView extensions.

**IMSMA V3.0**

ETHZ developed IMSMA V3.0 between 2002 and 2003 and the GICHD released it in June 2003. This is a complete, well-organized and full-featured information system. Advances include the following:

- MRE management
- Contacts and organization tables
- Data quality explorer
- IMSMA V3.0 strengthens structure, functionality, platform, security and performance. Proper chain-of-action and business rules must be followed when updating information; for example, a clearance operation cannot begin until a technical survey is completed. Structured Query Language (SQL), the International Organization for Standardization (ISO)-approved coding used in Oracle and other powerful database systems, is now used. The Microsoft SQL Server back-end is more powerful, more secure and easier to back up and more secure than older Microsoft Access versions. But IMSMA V3.0 retains the familiar Access front-end.

The SQL Server dismantles IMSMA with its restriction of few concurrent users. An unlimited number of users can access the system with no performance degradation. Smaller mine action programs may run compact (and free) Microsoft Desktop Engine (MSDE), allowing five concurrent users but in practice supporting more. MSDE easily runs SQL on desktop or notebook PCs. Humanitarian Demining Training Camp's (HDTC's) uses MSDE with good results while the much larger Mine Action Center Afghanistan (MACA) runs the full SQL Server. SQL gives us the following:

- Data export-import with native SQL files (NAT files)—small and fast to transmit—as well as good performance, even slow dial-up connections.
- Easy protection of information using IMSMA sensor tools and public key encryption. This should expedite two-way sharing of information.
- Multi-layer security on the domain-based network authentication bypass login name and password (trusted connection), IMSMA login authentication and password, and IMSMA login security and policy make the system secure and reliable.
- New status control features, improved task management and process tools and revised GIS themes for SysAdmin and "Ops." IMSMA V3.0.

**New Functionality and Decentralized Data Entry**

Gaining past technical improvements, IMSMA V3.0 has more everyday functionality. This functionality includes the following points:

- New MRE module for the tracking and analysis of educational and outreach activities.
- Contacts and organizations tables for complete information on key individuals and organizations.
- More than 70 summary and statistical reports in tabular and chart formats.

IMSMA template reports enable MACs to move IMSMA's reporting tools according to local requirements. Older versions provided fewer reports, and non-technical managers often called IMSMA a "black-box"—put a lot of data in the system, retrieve it from the database. Hurry criticism now resolved!

Decentralized data entry works nicely at MACA. Geographical areas of responsibility for data entry streamlines synchronization with headquarters in Kabul. MACA's large AMACs correspond to the regional mine action centers (RMACs) of smaller programs.

**Upgrading**

Enhancements clearly justify upgrading to IMSMA V3.0. Afghanistan (MACA), Lebanon (the UN Mine Action Coordination Cell [UNMACC]) and the United States (HDTC and Survey Action Center in Washington) upgraded as soon as it was available with good results. The Non-Human National Agency for Mine Action (ANAMA) customized IMSMA V2.2 to meet its needs and is now considering upgrading with help from the GICHD. Others will follow.

Training for IMSMA V3.0 was needed. SysAdmins attended GICHD-ETHZ "Train-the-Trainer" (T2T) in Geneva during April 2003. The actual upgrade is straightforward.

**Software Requirements**

ETHZ's development team recommends Windows 2000 Professional or XP Professional. IMSMA V3.0 will run on Windows NT, although this is not recommended. HDTC installed IMSMA V3.0 on older NT machines, which worked but did not seem "happy." NT machines are now upgraded to Windows 2000. Additionally, IMSMA V2.2 must be present, so an earlier version is installed, upgrade to 2.2 first. Microsoft Office 2000 Professional, not Office XP is required. Finally, ArcView 3.2a, the same version used by IMSMA V2.2, is used.

**Hardware Requirements**

The SQL Server back-end may want a better home than the old Access database. HDTC runs IMSMA V3.0 and MSDE on newer mid-range PCs (Windows XP Professional, Pentium 4 1.8 GHz, 256 MB RAM, 40 GB hard disk) with good results, but the database is small. UNMACA runs the full SQL Server on a Pentium 4 with 512 MB RAM and a 5GB-G hard disk. Client workstations are similar to HDTC's server: 256 MB RAM and 40-G hard disk.

**Running the Upgrade**

First, make the usual backups. Be aware of the following:

1. Any customization on the IMSMA V2.2 needs to be configured after upgrading. The best practice would be to review and update documentation for all customization—forms, reports, queries, etc.—before the upgrade process.
2. IMSMA's upgrade utility will take you to the Data Cleaning Tool. All tables in the IMSMA V2.2 dataspool containing the "Organization" field need to be standardized and cleaned up because of the new "Organization" in IMSMA V3.0 will be formed from "Organization" fields of the tables.
3. If you are running IMSMA V2.2 as Server/Client solution, upgrade the server first, then run client installations.
4. After upgrading, the status for all processes and status for areas must

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be corrected by IMSMA V3.0 Data Quality Explorer tool.

HDTC and MACA found IMSMA V3.0's powerful data-cleaning tools effective in cleaning mine data entry errors such as misspellings or different spelling of organization names. The upgrade easily impacted names into the new contacts table. HDTC students can pull IMSMA V3.0 and MSIDE installations on different PCs, which went well. Sometimes there would be a little "IMSMA bug"—this is not to suggest that IMSMA is not customized fine commercial software. SysAdmin should report these to the development team but not worry. Installations always ended up running fine.5

Consult with the Swiss support team if you are uncertain about upgrading. Read the manual—it's a good one!

**IMSSA in the MAC**

**Training Issues**

Great tools are of little use without adequate training. One week of local training will work for sharp data entry people familiar with IMSMA V2.2. However, managers are sometimes annoyed with the lack of customization of the training. The data entry fields mean some tasks will take longer. SysAdmin, quality assurance and trainers should attend the Geneva T-C-T. They should be fully competent with IMSMA V2.2 and ArcView, understand relational database theory and here experience and SQL queries. The GICHID runs successful Partnership for Peace seminars in cooperation with the North Atlantic Treaty Organization (NATO) and special GIS conferences. Other training may evolve as IMSMA use accelerates.

- A one-week "IMSMA 101" course could cover management issues but not technical details.
- A second week "IMSSA for operators" course (follow-on to "101") for advisers and Ops could cover reporting and GIS in detail without developing SysAdmin skills.

Training within the MAC creates a progressive working environment and expedites day-to-day activities. IT cannot be lazy or impatient about training less technical oriented colleagues and Ops must not have an attitude that they are above doing basic IMSMA tasks. IT people must not have a "knowledge is power" attitude toward sharing information. Ops should not look at IT as "geeks" who cannot understand demining. Hands-on mission-oriented training, using IMSMA reports and GIS queries to develop useful operations information, teaches valuable skills in a practical way. Cross-training where Ops and IT learn about each other's work enhances team building. U.S. Army Special Forces teams constantly cross-train. An ideal IMSMA training team might be an experienced, patient, technical person working with a similar operations person.

**Customization**

Mine action managers sometimes criticize IMSMA for not supporting actual demining—for being a "headquarters toy" to impress visitors. This may be a valid criticism but is clearly not the intention of IMSMA developers or local SysAdmin. IMSMA can give powerful support to field operations. Perhaps something in standard IMSMA doesn't match local needs. This is why IMSMA is designed to be customized. Local teams should continually think about new development of their system. Any customization must be fully documented in accordance with good software development practice. IT should encourage non-technical feedback and do required development—but avoid unsolicited customization.

Customization possibilities include:

- Normal Access modifications, e.g., adding data fields to forms. Reports can be customized and completely new reports written. Good IT work will make this accessible to customers. If new fields are correctly written and necessary Access work done, the language translation capabilities of IMSMA V3.8 will be retained. Custom GIS themes can be created, which requires higher-level SysAdmin skills since custom SQL queries are needed to support the themes. Local customizations must be undertaken only by well-trained people and may not be retained during upgrade, thus the importance of full documentation! Upgrades will be more complex in MACs where a lot of IMSMA customization was done.

**Management Within the MAC**

In mine action programs around the world, IMSMA technical personnel are utilized for report and map printing by operations. But IMSMA is designed to be used directly by Ops for such tasks. Reporting tools are user-friendly, and basic GIS skills like producing maps and overlays—developed with practice and perhaps an ArcView tutorial. Being able to do this within "Ops," without having to wait for IT, means faster information. Misunderstandings are avoided and accuracy increases.

Similar circumstances occur in other business situations. Legacy databases, with complex reporting tools, were beyond the ability of anyone except specialists to extract reports from. Executives would request requirements and submit to IT, waiting days to get the information they needed. Often the report would not meet their needs, so a change would be requested and the process repeated. Mine action cannot wait for this to happen!

Modern desktop (or notebook) databases changed that. A big part of the beauty of IMSMA V3.0 is that it retains the friendly Microsoft Access front-end to connect with the powerful SQL datapool.

Mine action managers extract the information they need in minutes without waiting on IT—who may be in the middle of repairing the network, getting an IMMA back online or any other essential task. IT can then spend more time training users, optimizing the system for better performance and doing higher-end analysis in support of management.

**Distributed IT**

To accomplish all of this, a distributed approach to IT within the MAC may prove helpful. That is, IT may give up some centralized control of information management and give greater responsibility to "Ops." IMSMA allows this to be safely done with various administrative accounts and user logins. Read-only terminals allow extraction of information, while other terminals may allow data entry but no customization. With proper training, Ops may take over certain data input activities, e.g., survey and clearance reporting. Ops may even be faster and more accurate getting this information into IMSMA's datapool compared to data entry people unfamiliar with the field environment. Quality control procedures may need revision in distributed IT, this may be...
This IMSSMA plot shows how ArcView's powerful spatial analysis tools help establish clearance priorities. Note how buffers show the impact of mined areas on civilian activities to ETAC Switzerland.

Acknowledgments

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Ukraine Responds to New Mine Action Demands

The Ukraine has been testing demining equipment as well as practicing new mine action methods in order to meet international guidelines. The following article discusses the different types of demining equipment that Ukrainian deminers have tested and hope to use in the future.

by Lt. Col. Sergei Pashinsky, Director, UMAIC

Introduction

In addressing the landmine problem in the Ukraine, we must first examine the magnitude of the problem and secondly, categorise and distribute issues into relevant categories. With more than one million mines and pieces of UXO tested in Ukrainian soil and over 11 million munitions stockpiled, most of the Ukraine’s problems relate to explosive remnants of war (ERW). Twenty to 24 domestic explosive ordnance disposal (EOD) teams travel daily to places where UXO is detected, and they neutralise on average 150 to 200 pieces of munitions. In 2001–2002, about 548,000 various explosive devices were found and destroyed. Fortunately, over the past 10 years, the international community has focused on alleviating the humanitarian impact of APIs.

In the Ukraine, we are taking steps to launch our own National Mine Action Program (NMAP), and the interim infrastructure of our prospective NMAP is actively being developed. In addition to the Ministry of Defense, the Emergency Ministry and the Special Police Bomb Disposal Division, which were traditionally involved in this issue, several EOD/demining and research and development (R&D) commercial companies have been established. The personnel of these companies has been trained according to the International Mine Action Standards (IMAS) and has experience using new mine action methodologies and technologies. However, we would also like to see the international mine action community expedite the process of implementing a global EIRP program.

Ukraine Responds to New Mine Action Demands

Ukrainian deminers in south Lebanon used detectors and prosa made in the Ukraine.