IMSMA Core

The power of GIS at the service of mine action
1. ‘Mine Action is inherently geographic’
IMSMA Core is built with GIS

- Geo-enabled mobile data collection
- Map-based tools
- Geographic data logic
- Strategic partnership between GICHD and Esri
2. ‘Mine Action is driven by context’
IMSMA Core enables data integration

- Integrate contextual data into planning
- Better data sharing between mine action actors
- Better data sharing between mine action and other sectors
3. ‘Mine Action decisions-makers need accurate and timely information’
IMSMA Core puts IM in the hands of decision-makers

Role- and task-specific tools
**Input type**
Risk Assessment

**Locate on map**
UNMAS reference number
ojco__1502178889668

Risk Assessment Methodology
- Desktop map study only
- Site visit/survey only
- Combination

**Threat Analysis**

**ERW Risk Assessment Level - Initial**

**Initial ERW Risk Assessment look-up reference**

ERW Risk Assessed (Initial)
- No significant risk
- Low risk
- Medium risk
- High risk

**Mitigation recommendation**
4. ‘Mine Action programmes are all the same but different’
IMSMA is a knowledge-base of templates and tools.
FindMine – by Urs Endress Foundation

UAS-based mine detection

Jean-Gyl Capt, Foundation Board Member
Target of the Urs Endress Foundation:

→ Reduce the number of injured and killed people and increase the speed for deminers to reach their goals
Basic idea:

Ground Penetrating Synthetic Aperture Radar (GPSAR) with low energy and light weight ...
Basic idea:

... GPSAR as its prime sensor for mine localization mounted on an autonomously flying Unmanned Aerial System (UAS)
FindMine 1:
GPSAR ending 2019

Automatic mapping of the Suspect Hazard Area (SHA)-topography
- mines recognized by FindMine-Unmanned Aerial System (UAS)

www.ue.foundation
FindMine 2:
Integration of additional sensors ending 2022

Additional Sensors:

- Gas detector
- Hyperspectral imaging
- Thermal imaging
- Evaluation of several sensing methods suitable for mine detection and as Unmanned Aerial System (UAS)-payload
FindMine 2: Evaluate found signals
Integration of additional sensors ending 2022

Evaluate found signals
- Determine % of likelihood of mines
  
  Increase the probability up to 99.7%
FindMine 3:
Increase flying capabilities ending 2025

Walking into suspected buildings and dense forest / jungle
FindMine's Vision

Make the world safer by helping to get rid of mines and UneXploded Ordnances (UXO) with recent technologies and to support:

- Suspected Hazardous Area (SHA) Identification
- Land Release
- Completion and Mapping
- Main Supply Route (MSR) Verification
- Camp Security

Jean-Gyl.Capt@findmine.org

Distributed Satellite / Drone Imagery Analysis Systems
Introduction to UNOSAT

- A programme in the United Nations Institute for Training and Research (UNITAR)
- Fifteen years of operations, 30 people
- Fully dedicated to satellite imagery analysis and capacity development
- Based at the CERN supercomputing centre
Drone flight, image processing, upload, internet service…

4 hours!
Connecting Imagery Service to IMSMA Core
Scale!

200 locations, 600 images, in a user-friendly portal.
Explorer et interagir avec la carte
UAV Survey to Virtual Reality

https://skfb.ly/6qJSM
UNITAR Operational Satellite Application Programme (UNOSAT)
Contact information:
Lars Bromley - Lars.BROMLEY@unitar.org
ADVANCED DETECTION SYSTEMS FOR SUBMUNITION CLEARANCE

Presented by: Alistair Moir, MAG Country Director

Date: 16 February, 2018

Challenges

➢ Very high levels of cluster munition contamination

➢ Reliance on relatively old detection technology for shallow buried UXO

➢ Majority of current detection systems faced significant problems with mineralized soil and high levels of metal clutter
Above is a screen shot of Grid G17 Scorpion data processed in Boris, showing (circled in red) the 40mm Rifle Grenade Illumination Cartridge detected by Scorpion and a 3D view of its data to the right side of the screenshot.
The above is a comparison chart between Scorpion and LLD.
The Scorpion was more productive this month where the overall time needed to full clearance for Scorpion was 72 hours less than the one of the LLD.
Scorpion Lite

Scorpion Lite functions on an identical platform as Scorpion but utilizes a shorter center boom that eliminates the magnetometer. Ideal for areas without high-threat for very deep targets

- Smaller footprint, reduced weight
- Improved obstacle avoidance
- Reduced operator fatigue
- Reduced equipment stress
- Improved scanning efficiency
- No quantifiable degradation of detection performance over sub-munitions

Additional ballast added for even weight distribution
Phum Vorng Site Characteristics:

- 357,000m² of suspect land captured by NTS
- Extremely high levels of CM contamination
- Close proximity to residential area
- Very high levels of mineralized soil
- Extremely high scrap metal contamination
In the most contaminated area there were over 1.5 cluster munitions found per m².

No one detector could clear the site efficiently without facing obstacles (clutter, poor GPS, mineralization)

<table>
<thead>
<tr>
<th>Box ID</th>
<th>LLD Scan</th>
<th>Scorpion Scan</th>
<th>VMX10 Scan</th>
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<tbody>
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</tr>
<tr>
<td>A19</td>
<td>Yes</td>
<td>Obstacle</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Observations & Lessons Learned

1. Innovation works best when its focused on a clearly defined problem

2. The trial and development process has been improved through having taken place in a live operational environment over several years

3. The process has worked through effective partnership and cooperation between HDR&D and MAG

4. There is no single solution - new detection technology has performed best in combination with proven equipment
UNMAS Innovation Case Study
Risk factor South Sudan

National Director’s Meeting 2018
16 February 2018
“Innovate? No—we already tried that once. It didn't work out”
Innovation in South Sudan

1. The Problem
2. The Concept
3. The Model
4. X Factor to Risk Factor
5. Stakeholder Collaboration
6. Implementation
7. Impact
• How to deliver compelling MRE messaging to South Sudanese population via mass media given the limited access to beneficiaries due to insecurity.
• A live newsworthy event (a traditional Mine Action Day approach) that results in a multi-media product to be promoted via traditional and social media over time.
The Model

• The X Factor is a hugely popular and replicated TV talent competition.
• The winner of The X Factor is awarded a £1 million recording contract.
• The various acts often go viral on YouTube and other Social Media.
• This generates even larger viewership online long after the live show has concluded.
**X Factor to Risk Factor**

- **Live Talent Show:** Children in ten schools to write and perform a song about the impact of landmines and ERW during a live talent competition covered by traditional media.

- **The Recording Contract:** the winner to record and film a video with one of the hottest local hip-hop group, Jay Family’

- **Social-media Follow-up:** photos and videos from the competition to be promoted by UNMAS, UNMISS, UN agencies and Jay Family.
Collaboration

- Donors
- Government
- Civil Society
- NGO/INGO
- Mission
- Media
Implementation
The Music Video

https://www.youtube.com/watch?v=e52wOEVIgXE&feature=youtu.be
Impact

- **Event**: covered by traditional media including the South Sudan Broadcasting Corporation, Radio Miraya, Eye Radio, Citizen and Juba Post and The Citizen.

- **Radio**: “Beware” – the winning song – played on national radio stations reaching audiences across the country.

- **Social Media**: the music video uploaded to YouTube and heavily promoted by all collaborators including Jay Family reaching young people all over the country.

- **Social influencers**: Jay Family become social influencers on mine action and continue to perform the song at various events.

- **Increased media interest**: BBC approached UNMAS to include MRE messaging into radio dramas.

- **SG Award**: 2017 SG Award for innovation and creativity.
Thank You
From GIS to UAVs to Artificial Intelligence – Innovation and Technology Disruption @ #NDMUN21

- Friday February 16th 2018 - 21st International Meeting of
- National Mine Action Programme Directors and United Nations Advisers

Joel K. Myhre - Nordic Geospatial Consulting
WHO Advisory Group for Mass Gatherings
& former One Concern Global Engagement EMEA,
IMMAP, UNOSAT & NetHope Ebola GIS Manager
History of Humanitarian Technology Disruption

Via these Forums, it is important to understand from whence we come and what were the ‘what if we could’ dreams of the past.

1970 – ? What if we could have digital maps, vivid cartography, and query-able geospatial data? - Modern GIS Invented in California

1972 - ? What if civil society could have global satellite data to monitor humanitarian events and environmental changes? – US LANDSAT launched

2010 - ? What if we could leverage Social Media, Volunteer Digital Responders globally, and sub-meter Satellite Images for Disaster Response – modern CrisisMapping spawned via Haiti EQ via Harvard Humanitarian Initiative, UNOSAT, etc.

2015 - ? What if we could have Humanitarian Robots and UAVs to help fight fires, conduct Search & Rescue, and rapidly map crises? – UAViators and WeRobotics founded

#NDMUN21
The holy grail of Humanitarian Response, Preparedness, Resiliency and Sustainability has always been the following ‘What if’s ..?

- What if we could ‘shine the digital flashlight’ of all-hazards, multi-jurisdictional situational awareness further down the preparedness path?

- What if EOC administrators, Public Health analysts, First Responders and International/NGO/UN partners could train together and simulate real-world response scenarios BEFORE they happen and accurately replay the events with digital After Action Reporting and Exercises?

- What if we could leverage a resilient global network of millions of cloud-based servers to have actionable Search & Rescue, EMS, Fire, etc. plans not in Days or Hours but in 15 Minutes?
Existing Issues in Natural Phenomena Modeling

Data Constraints

**Antiquated data** is used in all the models, thereby giving unreliable estimates of damage.

Computational Constraints

The high resolution models for each structure **take days, sometimes, weeks** to run to predict the response.

Methodological Constraints

**2-dimensional statistical methods** are used to quantify vulnerability and risk, thereby limiting the scope and extent of their estimates.
Evolution of Humanitarian Information Management

Analytical Power

Data Management

All disasters

Resilience score

Data overlays

Crit. Infrastructure

Simulations

SA

Ti
Jan 12th 2010 EQ - UN, NGOs, academia and civ-mil entities collaborated via Web 2.0 mobile and portal technologies. CrisisMappers network leveraged the Free and Open Sourced Ushahidi application.

What if today we could leverage 1 million servers @ Amazon to predict down to the building level which structures would fail, allowing for accurate Search and Rescue planning and UN/NGO Logistics? Well, we can....

Imagine If...

From Crisis Mapping In Haiti to #AIforGood
#AIforGood requires Ethical Governance to Counter #AIforBad Realities
Across the Asymmetric Warfare / UXO / ERW Domain

- Future armed conflicts and insurgencies will leverage #AI, cyber warfare, and #DronesForBad
- UN, ITU (AI for Good Global Summit) and NGOs can Help
Imagine If …

An Example from Afghanistan and UN-HABITAT

- Building upon Enterprise GIS data and Remotely Sensed Imagery, #AIforGood and Machine Learning could...
  - Help Model Refugee Shelter Locales
  - Predict Future Floods and Earthquakes
  - Analyze Climate Change Effects
  - Understand how Floods may Migrate UXO
  - Help Inform Disaster Exercises
  - Help Protect Cultural Heritage

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[Image: AFGHANISTAN Housing, Land Property Task Force (HLP-TF) Kabul City Overview.](https://www.geomatics-world.co.uk/content/article/from-afghanistan-to-artificial-intelligence)
Lessons Learned & Conclusions

- #AiforGood, Earth Observation (Satellite, Orthophoto & UAV) data combined with Mobile & Crowd-sourced tools can give a rich geo-temporal picture to Humanitarian Response and Mine Action stakeholders;

- Data-sharing, Coordination and Interoperability are vital before, after, and during Complex Crises;

- In an era of lean budgets across the government, private, and NGO spectrum, collaborative Public-Private Partnerships are instructive;

- Artificial Intelligence will require both innovative applications AND global governance to ensure that its use is equitable, humanitarian, and helps augment and enhance humanitarian demining efforts globally.
Thank You

Joel K Myhre

Principal and Founder – Nordic Geospatial Consulting
Geneva SWITZ

+1.503.310.3595 - joel@nordicgeospatial.com
Colaborative ORDnance Data Repository
What is CORD?

- ORDATA → CORD
  - CISR
  - GICHD
- Ordnance identification system
- Sustainable collaborative resource
- Easy user interface
- Expanding
What is new?

- Ontology $\rightarrow$ 2D DB
- Ordnance type modifications
- Text search
- Name search
- New improved imagery
- Associated evidence
- Useful links
The Collaborative ORDnance data repository (CORD) enables web-based search of landmine and other unexploded ordnance data to assist humanitarian demining and ordnance disposal operations.

Managed by the Geneva International Centre for Humanitarian Demining (GICHD).
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Managed by the Geneva International Centre for Humanitarian Demining (GICHD).
U.S. DOG MNT FRAG, ELLSW, ELLSW, ELLSW, & ELLSW-150

DESCRIPTION

These are small, semi-transparent, spherical artifacts, high-explosive fragmentation bombs. They are made of unrefined elements, hard materials, and metal. The ELLSW bombs are made of lead and the ELLSW and ELLSW-150 bombs are made of steel. These bombs contain a high-velocity core of metal that is designed to penetrate and destroy targets. The core of the bomb is surrounded by a casing that is designed to disperse the core into smaller fragments upon impact.

PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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<tbody>
<tr>
<td>Size (diameter)</td>
<td>64</td>
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<tr>
<td>Height/Length</td>
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<tr>
<td>Weight</td>
<td>-</td>
</tr>
<tr>
<td>Explosive Yield</td>
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</tr>
</tbody>
</table>

Component Materials:
The core of the ELLSW-150 and ELLSW-150 bombs is made of high-velocity metal, while the ELLSW bombs are made of lead or steel.

METHODS OF DETECTION:

These bombs are detectable using x-ray imaging, metal detectors, and other explosives detection equipment. The core of the bomb is made of high-velocity metal, which makes it highly reflective and detectable.

References:

- A spherical bomb with a metal core is shown in the image. The bomb is made of lead and is designed to penetrate and destroy targets.
- The core of the bomb is surrounded by a casing that is designed to disperse the core into smaller fragments upon impact.

Useful Links:

- http://www.gsfc.nasa.gov/ellsw150
- http://www.gsfc.nasa.gov/ellsw
- http://www.gsfc.nasa.gov/ellsw-150
BLU-26 fragmentation heavily weathered after decades in a tropical environment. The three items at the top are parts of an M219 fuze. The five items below are parts of the ball bearing fragmentation jacket. Image©Roly Evans

Useful Links

http://cmid.gichd.org/Munition/487/1
http://www.designation-systems.net/usmilav/asetds/u-b.html#_BLU26
https://www.gichd.org/resources/publications/detail/publication/a-guide-to-cluster-munitions/#.Wb_6gE197mE
What is new?

- Quality checked by a qualified experienced operator
- Promotion of the tool

Social media
- T: @therealCORD_ID
- FB: @therealcord.id
- IG: @cord.id
What can you do?

• Technical improvements
• Field photos
• Usage in country

• To better serve MA, humanitarian disarmament and other sectors with YOUR help
Help us make CORD better

Contribute to CORD

CORD is maintained by the Geneva International Centre for Humanitarian Demining (GICHD). To contribute to CORD, fill out the feedback form below. Please send images or other attachments to cord@gichd.org.

Provide Feedback

- First Name*
- Last Name*
- Organization*
- Phone
- Email*
- Message*

Submit
RBM Courses 2017-18

Course 1: Effective MRE
Strengthen your skills to design, prioritize, implement, monitor and evaluate MRE programmes through the development of robust theories of change and results frameworks.
-- By invitation/nomination --

Course 2: Integrated Mine Action For Better Results
Re-examine your programme, learn how to use public health approaches and collaborate to develop theories of change and results frameworks that integrate all of the components of mine action.
-- By invitation/nomination --
21st International Meeting of Mine Action
Programme Directors and UN Advisors
Geneva, February 13–16, 2018

Dr. Kenneth R. Rutherford, Director
The Global CWD Repository

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Contribute to the Global CWD Repository at:

http://jmu.edu/cisr/research/cwd-repository.shtml

Dr. Ken Rutherford
Email: rutherkr@jmu.edu