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OPERATIONALIZED MANAGEMENT INFORMATION SYSTEMS IN IRAQ'S DMA

By Mark Steyn and Arie Claassens [iMAP]



Figure 1. RMAC-S area of responsibility.
Figures courtesy of Mark Steyn.

The Republic of Iraq remains severely contaminated with explosive ordnance (EO) according to the *Landmine and Cluster Munition Monitor* report 2019.¹ Located in southern Iraq, the Iraq Directorate of Mine Action's (DMA) Regional Mine Action Center South's (RMAC-S) area of responsibility contains the most contaminated area in Iraq in terms of surface area. The region's hazard areas recorded in the national mine action database (IMSMA) stood at 1,592 sq km by mid-July 2020, with the Basra Province alone containing 1.27 billion sq m of hazard area.² This contamination predominantly originates from various armed conflicts in the region, ranging mostly from the Iran-Iraq War in the 1980s to the 2003 Iraq War.¹ The region has seen relatively little

conflict with Islamic State of Iraq and the Levant (ISIL), which bodes well for regional security but means funding for conventional minefield clearance is limited.

From a natural hazard perspective, the region is exposed to a range of natural and human-induced disasters, e.g., droughts, floods, sandstorms, desertification, and various epidemics. Compounding the situation is the country's poor economic situation, infrastructure, and unreliable internet connectivity. In addition to navigating the contamination hazards mentioned previously, RMAC-S is tasked with prioritizing land release activities based on, *inter alia*, the socio-economic status, population vulnerability, and development sectors' activities that are restricted by the hazardous areas within each

district. The presence of minefields in the region's large oil fields, on which the government relies heavily, further hampers the effective management of mine action resources available to RMAC-S.

ROLE OF MANAGEMENT INFORMATION SYSTEMS

Timely access to relevant information is a key enabler for effective decision-making in any organization and even more so when these decisions affect lives and livelihoods. Since 2004, iMMAP has supported and developed the humanitarian mine action (HMA) program's information management (IM) systems, delivered capacity building activities and facilitated coordination on IM, planning and prioritization between the DMA and other HMA actors in Iraq. Balancing the access restrictions and security requirements imposed by the government on the national mine action database contents, DMA's activities created an array of information products that provided decision makers with easier access to data subsets, assisting with data analysis and the contextualization of the hazard areas. The previous system resulted in delayed responses from fully-taxed personnel when staff from RMAC-S operations are met with urgent requests for planning or mine action tasks submitted by implementing partners. The shortfalls of the national budget contribute to the difficulty of retaining skilled national IM staff, complicating the DMA's operating capacity, and further delaying the output of (paper-based) field report submissions stemming from the problematic infrastructure.

To overcome the inherent inefficiencies related to complex data

structures, data formats, resolution, and limited IM staff availability, RMAC-S' management committed to the co-development and subsequent use of a common operating picture tool for regional use by the RMAC-S operations department. The initial design for the required solution focused on

- supplementing IMSMA data with relevant spatial data, including mine action tasking data;
- providing tools for the use of offline imagery as a data source;
- conforming system maintenance to the existing operational workflows; and
- enabling operations coordinators to conduct mine action planning and task reviews with stakeholders, without IM staff support in the majority of activities.

Infrastructure unreliability, specifically electricity availability and the quality of internet connectivity, had a major influence on the technological design criteria of the solution.³ The RMAC-S IM department made the decision to develop a desktop-based, standalone implementation of the first version of the tool. The remaining primary functional and non-functional requirements for the tool centred on

- low cost and low technology adoption;
- powerful functionality but ease of use, i.e., with a low learning curve; and
- low maintenance requirements still allowing for easy, periodic updates.

In October 2018, the RMAC-S "Field Map" application was rolled

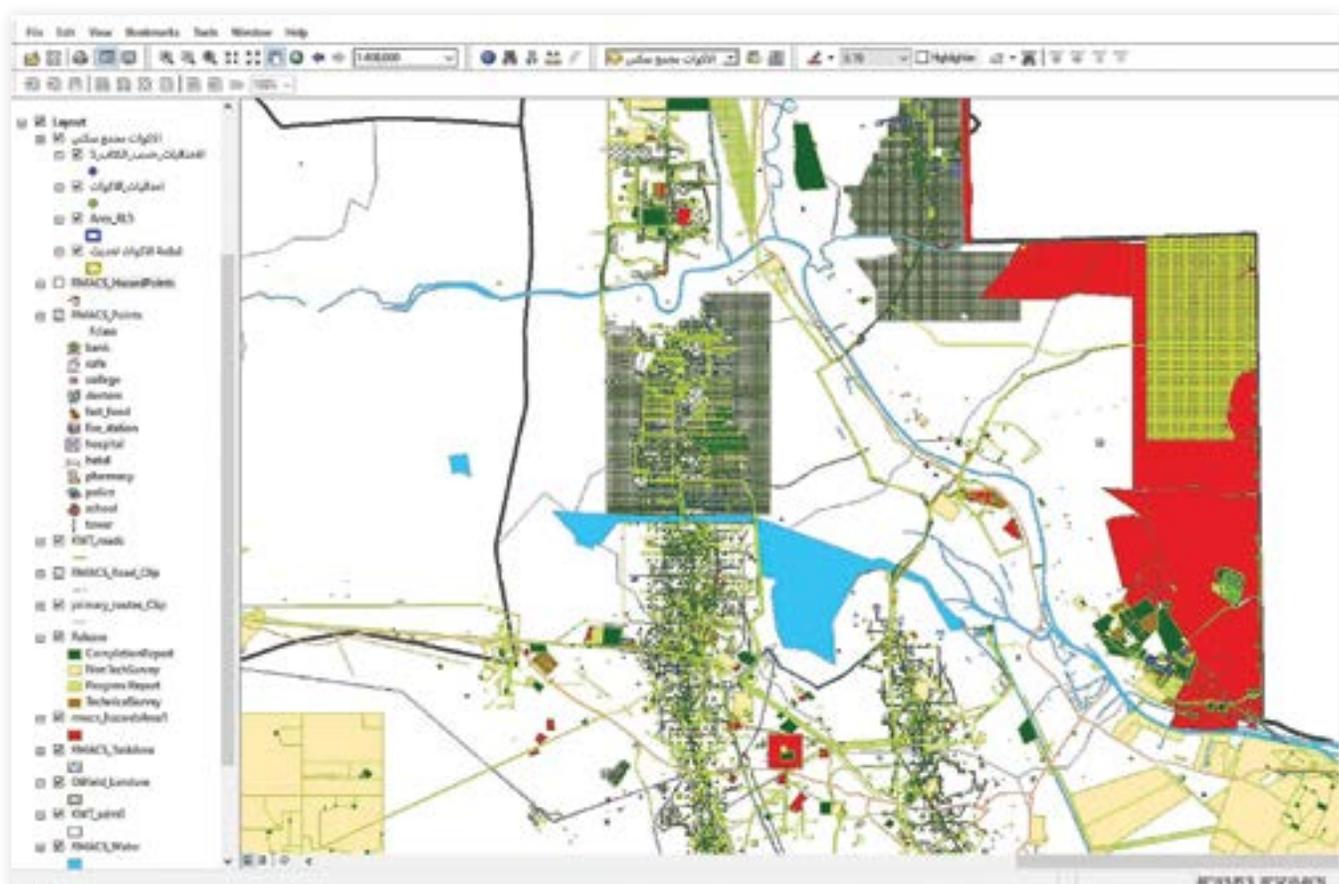


Figure 2. RMAC-S Field Map user interface.

out for use by the RMAC-S operations coordinators with a planned expansion to the management staff following a six-month trial period. The effectiveness of the application, its ease of use, and achievement of the remaining functional and non-functional requirements led to an accelerated adoption by the RMAC-S operations manager that exceeded all expectations, culminating in the mandated use of the Field Map application announcement in January 2019.

Authored in the Esri ArcMap application and using the ArcGIS Publisher extension ArcMap, the RMAC-S Field Map application is a digital spatial data package that enables users to interact with, query, measure, markup, and print high-quality maps while maintaining data integrity in the Esri ArcReader software. The ArcReader application provides users with the ability to view and print maps on the Microsoft Windows platform and only requires the Microsoft.Net platform to be installed before it is deployed. The software is included with ArcGIS Desktop and can also be downloaded for free from the Esri website. The decision to utilize a commercial off-the-shelf (COTS) solution, as opposed to the development of a custom application, was anchored in the range of functionality already present in the application. Moreover, in combination with the desktop GIS software, it allows GIS-capable staff to quickly roll out an easy-to-use MIS tool with a low learning curve.

The RMAC-S Field Map application currently offers the following high-resolution thematic spatial datasets for analysis within the application:

- Administrative boundaries
- Hydrological
- IMSMA data subsets in both polygon and point formats
- Infrastructure
- Oil and gas operations
- Points of interest
- Remote sensing
- Topographic

An additional advantage of the Field Map application is that it offers an intuitive user interface consistent with the look and feel of many GIS applications, which allow for the transfer of GIS application skills to the new application. Inversely, the application also instills the required skills in non-GIS staff for basic spatial data interaction and operations that can then be transferred to desktop GIS applications.

In a country where HMA data management is extremely important and often limits timely access to the required information, the RMAC-S Field Map enables staff to have a nearly 360-degree view of the primary information needed to make well-informed decisions for the benefit of affected communities. This makes it an invaluable asset to all RMAC-S staff involved in the management of the land release process. The impact of this application in increasing the efficiency of service delivery, along with the improved overall situational awareness of the RMAC-S operations staff, is best reflected with a review of one of the application use cases.

RMAC-S conducts annual planning and review exercises with HMA implementing partners and other actors. RMAC-S conducts typical sessions of this format over a two-to-three-day period, with the IM staff required to be present for the full session to assist with data presentation, analysis, and map production. In the second quarter of

2019, a Ministry of Defense (MoD) official delegation arrived in Basra, Iraq, to conduct the annual planning exercise for a scheduled period of three days. The RMAC-S operations manager and his team completed all the required planning activities with the MoD delegation by the end of the first day. The Field Map application not only delivered cost and time savings, but improved relations between the stakeholders through enhanced communications, as well as fast and easy access to evidence needed for informed decision-making.

Comments from RMAC-S Operations Manager, Haitham Fatah, illustrate the success of this operationalized MIS application:

... the application presents us [with] the capability to clarify technical discussions and decide on the recommended technical procedure directly in the presence of the beneficiaries and the HMA actors working in the area ... being able to discuss and agree on the technical way forward with a task is also having a positive effect on the quality of the various field reports that we receive from our HMA partners, the error rate is significantly reduced, and as Operations, we see that as a direct result from the use of the Field Map application.

In looking toward future utilization of the RMAC-S Field Map application, users want a version for mobile devices that supplements the desktop allocation map, leveraging the ArcGIS Enterprise platform's web GIS functionality while providing operations coordinators with field-based tools that minimize paper-based workflows and improve data quality and the speed of business processes. A prototype solution is in the final stages of development and will be field tested by the RMAC-S staff and refined for mainstream use by DMA in the near future. ©

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Mark Steyn has worked in the GIS industry for twenty-nine years in various capacities. After completion of his military service in the South African Army, he spent two years as a meteorologist on the South African National Antarctic Expeditions (SANAE) to both Antarctica and Gough Island. In 1992, he graduated with a bachelor's degree from the University of Pretoria and since 2018, he has been based in Basra, Iraq, in the role of HMA IM Technical Advisor for iMMAP Iraq.

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