

Chapter 1

Simplified Toolbar to Accelerate Repeated Tasks (START) for ArcGIS: Optimizing Workflows in Humanitarian Demining

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ABSTRACT

This paper presents START (Simplified Toolbar to Accelerate Repeated Tasks), a new, freely downloadable ArcGIS extension designed for non-expert GIS users. START was developed jointly by the Geneva International Centre for Humanitarian Demining (GICHD) and the University of Geneva to support frequent workflows relating to mine action. START brings together a series of basic ArcGIS tools in one toolbar and provides new geoprocessing, geometry and database management functions. The toolbar operates as a bridge between non-spatial repositories (e.g. MySQL and Excel) and GIS. It also connects mine action professionals recording data in the field to GIS experts and improves data interoperability between GIS professionals working in different disciplines. Originally created to help humanitarian demining actors optimize GIS workflows and be more efficient in their everyday work, the toolbar might also benefit scientists operating in other fields.

DOI: 10.4018/978-1-5225-8054-6.ch001

1. INTRODUCTION

According to the International Campaign to Ban Landmines (ICBL), 72 states and 7 non-internationally recognized territories were confirmed or suspected to be mine-affected as of August 2011 (ICBL, 2011). Within the framework of mine action, the Geneva International Centre for Humanitarian Demining (GICHD), a non-profit foundation established by Switzerland and several other countries in 1998, strives to eliminate Explosive Remnants of War (ERW) and reduce their humanitarian impact. In cooperation with its partners, the GICHD provides capacity-development support to national and local authorities in affected countries to “efficiently plan, coordinate, implement and monitor safe mine action programmes” (GICHD, 2012). In addition, the GICHD supports the implementation of relevant instruments of international law, such as the anti-personnel Mine Ban Treaty.

Countries that have signed the treaty are obliged to collect, analyze and report spatial data on mine action. This data allows the directors of national mine action authorities to provide an overview of their work to the global mine action community and to donors, and enables operations officers to prioritize and access the areas to clear (Benini et al., 2003; Yvinec & Renaissance, 2005).

Each year, hundreds of thousands of records are collected in the field, many of them with GPS and mobile digital tools (Dunbar, 2010). This data is registered in a RDBMS called “Information Management System for Mine Action – Next Generation” (IMSMA^{NG}) (GICHD, 2011), an ArcGISTM Engine-enabled self-contained information system. The data is stored in MySQL format in the form of 2D coordinate pairs. As of 2012, 3’500 users have been trained to use IMSMA^{NG} in more than sixty mine-affected countries. To perform spatially-explicit analysis, most of these actors are using ArcGIS in conjunction with an IMSMA^{NG} data server. Users’ needs include performing common GIS tasks such as data extraction from non-spatial repositories, conversion to GIS formats, georeferencing, and visualization. These tasks are typically repeated many times given the amount of data and updates. Users do not necessarily have GIS expertise or experience, and computer literacy is sometimes limited, as well as financial resources. Therefore, these users should be provided with simple, comprehensive, readily accessible and free add-ins.

While ArcGIS is one of the most powerful and comprehensive platforms for managing and analyzing geographic information (Hilton, 2007), its complexity tends to discourage new users. However, the scripting capacity of ArcGIS permits the development of toolbars (or toolboxes) that can extend ArcGIS capacities and/or greatly facilitate the use of existing functionalities. Examples include toolboxes related to particular topics such as topography (Dilts, 2010), CAD (Kuehne, 2005), and marine geospatial analysis (Roberts, 2009). More generalist toolboxes also exist, such as ET SpatialTechniques (Tchoukanski, 2009), XTools (Data East, 2012), the ArcGIS Workflow Manager extension (Esri, 2012) and the Geospatial Modelling Environment suite (Spatial Ecology LLC, 2012), which replaces Hawth’s Tools (Beyer, 2004) with version 10 of ArcGIS. ET SpatialTechniques proposes one hundred functions located in seven different toolbars, but not all tools are free. XTools and ArcGIS Workflow Manager are commercial products. The Geospatial Modelling Environment suite is free but requires advanced GIS skills.

To address the specific needs of the mine action community, we developed START (Figure 1), which brings together a series of existing and new ArcGIS tools that are frequently used in typical workflows. START allows efficient access to the most commonly used tools, provides a series of functionalities for spatializing tables and managing vector and raster geospatial data, as well as making it possible to easily design maps. The toolbar aims both to assist novice users of GIS technologies and to enhance the productivity and comfort of GIS professionals.

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