A Socio-Technic Enterprise

Securing the Spatial Environment

Striving to develop a baseline spatial information system for cross-domain thematic analysis, Malta has embarked on a project aimed at integrating the environmental themes in their wider aspect: the natural, physical and social domains. Targeting the full data-cycle, the project focused on various activities: strategy drafting, data capture, information system development, acquisition of technologies, territorial zone scanning and ultimately, the development of a Shared Environmental Information System aimed at disseminating all the data for free to the general public.

By Saviour Formosa, Elaine Sciberras and Janice Formosa Pace

Figure 1: Aerial image depicting the Fort Chambray in Gozo

An initiative started in 2006 and awarded in 2010, focused on the spatial data enhancement of information in the physical, social and natural environment domains, leading to an integrated monitoring system. The mechanism employed to finance such a major undertaking formed part of a €4.6 million project, entitled Developing National Environmental Monitoring Infrastructure and Capacity. This project was co-financed by the European Regional Development Fund, which has provided 85% of the project's funding and the Government of Malta, which financed the rest under Operational Programme 1 - Cohesion Policy 2007-2013 - Investing in Competitiveness for a Better Quality of Life.

The authors are implementing the project through the Malta Environment and Planning Authority in collaboration with the Malta Resources Authority (MRA), the Department of Environmental Health, the National Statistics Office (NSO) and the University of Malta.

The project was required to span the divide between the theme-specific fieldworkers in the natural-physical-social environments, the relative information specialists, the thematic analysts and the policy makers. The problem to date has been garnered by the fear of information by social scientists on one hand and the society-phobic developments of the techno-centric experts on the other.

The Maltese endeavor aims to create a socio-technic environment that sits in the middle and delivers high end technological functionality for the technology knowledgeable, whilst providing easily workable information systems for the phobics.

Concentrating on creating a strategy and a series of methodological requirements for the environmental domains, the project sought to create baseline datasets in the spatial fields, through the ambitious launching of a high resolution 3D terrestrial data coverage for the Maltese Islands. This was undertaken through a combination of oblique aerial imagery (Figure 1) and Light Detection and Ranging (LIDAR) data (Figure 2), as well as through a bathymetric survey

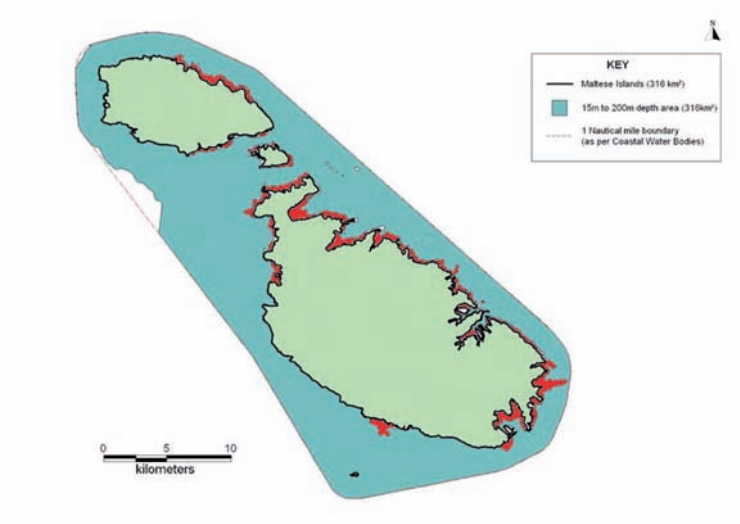

Figure 3: The Blue area depicts the bathymetric sidescan zone, the brown depicts the bathymetric LIDAR zone and the green depicts the terrestrial LIDAR zone.

of coastal waters within 1 nautical mile (nm) radius off the baseline coastline, which utilised a combination of bathymetric LIDAR surveys, acoustic scans and a physical grab sampling survey of the entire land area (316.16 km.sq) and the immediate marine area (361 km.sq) (Figure 3). The terrestrial and bathymetric scans were entrusted to Terraimaging and their subcontractors Aqua-BioTech Group.

The main outputs to be disseminated to the public within an accessible interface comprise:

- LIDAR Scan: Terrestrial (Topographic Light Detection and Ranging (LiDAR)) Digital Surface Model (DSM) and Digital Terrain Model (DTM) (316 km.sq)
- Bathymetric LIDAR aerial survey - depths of 0 m to 15m within 1 nautical mile from the Maltese coastline (38 km.sq)
- Bathymetric Scan: Acoustic (side scan sonar) Digital Surface Model and an acoustic information map of sea bed (361 km.sq)
- High resolution oblique aerial imagery and derived orthophoto mosaic and tiled imagery of the Maltese Islands (316 km.sq)
- Satellite imagery (GeoEye, RapidEye, Quickbird) (316 km.sq)

In addition to the service deliveries, a number of supply technologies have been acquired and implemented. These include:

- Remote GPS Cameras (Remote capture GPS receiver)
- Integrated GI infrastructure (workstations, servers, san and GI raster/vector –based software)
- 3D scanner and 3D printer
- GIS Handhelds for field surveys
- Global Navigation Satellite System Station

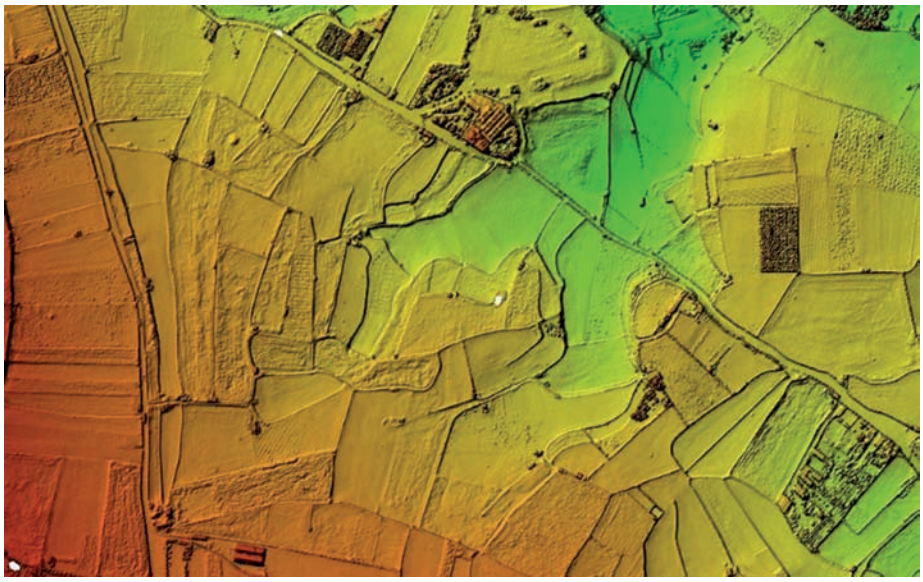

Figure 2: Lidar image depicting the Maltese countryside

There are many ancillary spin-offs envisaged from the activity, such as nautical charts, viewshed analysis maps and cross-thematic studies in the physical, social and environmental domains. Of special interest is the impact that the planning development has on the health and socio-psychological fields through shadow-analysis and other cross-thematic studies. Users will be able to generate digital terrain 3D models, which can be used for various applications planned for urban and transport planning, environmental impact assessments, infringement analysis, security review, green criminology, risk maps, climate change and its socio-economic impact, monitoring of and enforcement of land use activities and predictive analysis and migration, amongst others.

All this will be possible through the implementation of an innovative product that adheres to international directives, in turn ensuring the free delivery of all project-related data to the general public. This drive effectively brings together the requirements as outlined by the Commission's Communication COM (2008) 46 Final "Towards a Shared Environmental Information System", the INSPIRE Directive (Directive 2007/2/EC) and the Aarhus Convention. The tool is being developed by Epsilon International through the creation of a viewing, analytical dissemination tool employing a web portal, which is compliant to the EU's Shared Environmental Information System (SEIS). It will lead the way for voluntary geographic input, for which a system is to be launched in the coming months.

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