CHAPTER 2

Setting Up a Strategy for a GIS Platform to Empower the Transport Sector

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Introduction

In 2010, Transport Malta (2010) amalgamated the previous Malta Transport Authority, Civil Aviation Authority and the Malta Maritime Authority into a single regulator that is responsible for all the modes of transport in Malta. The role of Transport Malta is to plan and provide sustainable, high quality, safe, integrated and efficient transport service that will meet the travelling needs of commuters and the transport requirements for the movement of goods within the national framework.

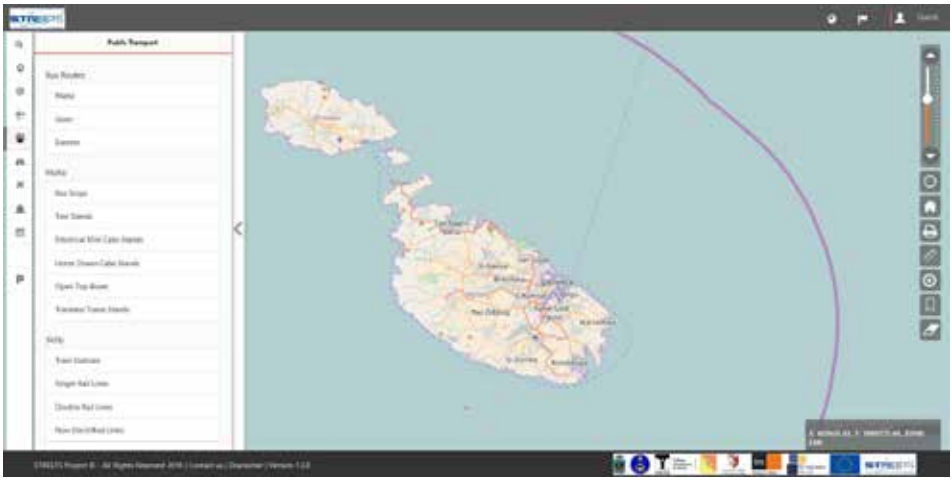
As the Authority is responsible for all the modes of transport, harmonisation between the directorates needed to be strengthened. Following an extensive Gap Analysis exercise across Transport Malta directorates to take stock of all the spatial data stored at the various directorates within Transport Malta and also to catalogue the operational systems, between 2011 and 2012, the Authority sought the means to justify the budget required to implement the platform required. A GIS Platform would consolidate operations within the directorates and facilitate transportation planning decisions in providing one common source to integrate, visualise and share spatial data.

In view of this, a proposal was submitted to implement STREETS project (2016) in collaboration with academia and also Italian partners under the Italia – Malta 2007-2013 programme (Figure 1). This proposal was accepted as a STRATEGIC PROJECT under the Italia-Malta Programme.

The Lead Partner of the project was Regione Siciliana Dipartimento Regionale Infrasstrutture mobilita e trasporti, and the other partners were Arces Collegio Universitario (Sicily), Transport Malta, University of Malta, Comune di Vittoria (Sicily) and Autorita Portuale di Catania (Sicily). This Strategic project had a total budget of €2.5M, of which was co-funded by ERDF (85%) and National Funds (15%).

In March 2015, the public interface of the GIS platform was launched. This platform is continuously evolving and internal services deployed across the Land, Air, Roads Infrastructure and Sea directorates plays a central role in providing a fully empowered solution that can manage all the different aspects of processes, infrastructure, software and data.

Figure 1: STREETS interface



Source: http://egis.transport.gov.mt:8030/egis

Rationale

The overall objective of this project was to strengthen the transport link between Malta and Sicily, identify bottlenecks and come up with a common strategy to provide an efficient transport link between Malta and Sicily. In order to strengthen the transport link required with its counterpart in Sicily, Transport Malta aimed to internally equip with the required infrastructure to reinforce its backbone infrastructure, by ensuring that processes, resources and isolated datasets are fully integrated in this platform. Through STREETS, Transport Malta embarked on implementing the required GIS Platform across all Authority focusing on building the platform to create and integrate GIS applications with other business systems deployed at Transport Malta.

Transport Malta's ultimate aim is to sustain a multimodal network to provide efficient connections between the ports, land and air transport models at all levels. The transport network is a key element and serves as an essential reference data to each transportation application providing spatial information on the Mediterranean Roads in Malta and Sicily

as well as the maritime and aviation links between them. Thus, the resultant GIS Platform offers a common language for viewing transport features across all directorates, and also process geographic data from a variety of sources to integrates them with the GIS.

Project Deliverables

The project deliverables were structured around a series of hardware, software and protocol deliverables as detailed herein:

- Review and analyse requirements from all the partners of the project and also capture the requirements of all directorates for the GIS Platform, taking into consideration all relevant factors;

- Build the foundation transportation data model, infrastructure, and database for the GIS System within Transport Malta;

- Procure the Hardware and Licensing required for the GIS Platform;The delivery of the GIS Platform and providing Geospatial information and services; Use GIS data, and processes to capture all the transport lifecycle from planning, design, construction, operations, maintenance processes;The platform shall be interoperable with other Transport Malta business systems;

- The GIS Platform is developed using an ArcGIS Server Platform, expected to be modular and scalable system which is flexible to meet the varying demands of usage and applications;

- Create an internet and intranet, where each directorate shall integrate GIS applications with other Transport Malta business systems namely RPS (Road Permit System for Road Works and Diversions), Public Transport, AIS, TM IHO – Nautical Charts Data;

- An intranet portal that would provide accurate and reliable geospatial information and services to Transport Malta Directorates most importantly in land transport, aviation, Roads Infrastructure and maritime sector; and

- Amalgamate spatial data of Sicily and Malta onto the same platform and provide schedules of the Transport link provided through air and sea transport between Malta and Sicily.

The GIS Platform Activities

The platform was structured through the following series of Activities:

Activity 1 Requirements Review

During the first activity, the low level requirements of all parties involved were captured including Transport Malta directorates and also STREETS partners. This enabled Transport Malta and also the project partners to take informed decisions with respect to transport planning, operations, design and deployment of national wide projects in their respective fields. The proposed work plan sought to implement these requirements in the most technical feasible and efficient manner to address the requirements. During this activity, the project team met with key personnel of every directorate to capture the requirements from the respective directorate perspective.

Target Groups

The first deliverable of STREETS deployment pertained to the Public Service interface. The Public facing service shows the travel times between the two islands for different transport modes available on the two islands. Based on a Opensource basemap, the Public Portal provides information to the public and most imperative to commuters. To facilitate ease of use, the Public Portal has a simplistic interface providing the end users with the required information in one single source. End users can search for the public transport information from bus to sightseeing routes and stands, charging points. Interoperable with various solutions, provides link to live data, whereby road closures are automatically displayed on the GIS Platform. Also any events taking place in Malta are automatically captured and displayed on the portal.

Land Transport Service

The Land Transport service provides outputs for the surface and public transportation activities including the public transport route networks. The rendering and visualisation of spatial data captured from either hand held devices or directly on screen are interoperable with the Land Transport Service, thus keeping data up-to-date.

Maritime Service

The Maritime service includes the visualisation of AIS Automatic Identification System (AIS) in the port area and within the 12 mile buffer zone, where interoperability with automatic tracking services used on ships shall be viewable on the MAP and enabled through this platform. In addition, this service shall be interoperable with spatial datasets created in S57 format and rendered on the map service.

Transport Strategy Service

For this service, Transport Malta aims to provide a rich map service, with editing capabilities to cater for spatial analysis in order to maintain the data of the national transport system which brings together diverse expertise and resources from legacy organisations.

Sicily Government Portal

This service includes the same functionality as the public portal mentioned above with additional tools to help Sicilian government officials to perform spatial analysis. Detailed transport connectivity between the two islands of Malta and Sicily shall be included in the public portal to facilitate the transport link and help commuters in searching for internal and external mixed mode of transport link between the two islands. Apart from a rich map service, spatial analysis is also supported to generate an on-the-fly isochronous map of an area, level of service map, safety map and accessibility maps.

Road Infrastructure Service

This group provides a robust Map Service including reporting, printing, navigation with rich GIS functionality superimposed on referencing data that is the basemap, LIDAR data (Formosa, 2014) and orthophotos (MEPA, 2013).

The Road Infrastructure service is interoperable with the Road Closures and Diversions System currently implemented at Transport Malta. This system manages the permits for any Road Closure and Diversion in Malta, whereby any closures are processed through the system and given a permit in order to close and divert traffic accordingly.

The rendering and visualisation of spatial data captured from hand held devices is interoperable with the Roads Infrastructure service. Users have the facility to go beyond viewing information, whereby this service have built-in interfaces to enter and manipulate spatial datasets and their structures through web based viewers, and also attach multimedia objects. This service enable users to store ACAD drawings within STREETS eGIS databases and also facilitate the support of image geotagging within the database.

Activity 2 Transportation Data Model

This activity relates to building a robust Data Model holding all the transportation features. Through this model, we aimed to reduce data duplication, while improving the currency of data used for analysis and visualisation. Most imperative during this activity relates to the ownership of the spatial data to the respective directorate. The use of standards in data and development is trivial.

Activity 3 – GIS Platform Development

In parallel to the drafting of Transport Data Model, Transport Malta together with the developer focused on the development of the public portal. The subsequent deployments of the other services followed. The interfaces of each group is based on a Service Oriented Architecture, where each service launches GIS specific application and datasets in different sectors to cater for the transport modes. The proposed solutions have mixed modes of services to cater for specific needs of STREETS. The service specific for every directorate meets the key requirements, captured during the first activity of the project.

As this is an ongoing process, the GIS Platform of STREETS provides the backbone infrastructure required to streamline processes, and interpolate with other systems. Enterprise data warehousing, data services, and applications are centrally provisioned and available throughout the GIS Platform. Such interfaces listed features a group specific service for the provisioning of related specific data and tools required. This platform allow an authority-wide access to GIS data based on authorised content, whereby each directorate can visualise the data they own superimposed on vector and raster basemaps.

Transport Malta is continuously aiming to streamline the authority business process through visualising, sharing and monitoring transport related data. The end results signify and simplify data sharing whilst facilitating data access as part of an informed decision making tool.

Interoperability with other Transport Malta systems

A Service Oriented Architecture ensures that the platform supports standards that promote enterprise wide availability of GIS services. Exposing such web services ensures interoperability between the GIS based systems. Also, the interoperability to other current solutions implemented at Transport Malta is highly required and evolving.

Spatial Database Infrastructure

The GIS Platform is based on a Spatial Database Infrastructure (SDI), ensuring that data and resources available to the Authority and Stakeholders providing a clean institutional structure for the local organisation, storage, management and delivery of data.

The database leverages the full capabilities of a Spatial Database Infrastructure to centralise all spatial data of Transport Malta and other third party datasets whilst integrating isolated datasets of different directorates into a single spatial data warehouse encompassing the entity wide transport network.

Technology

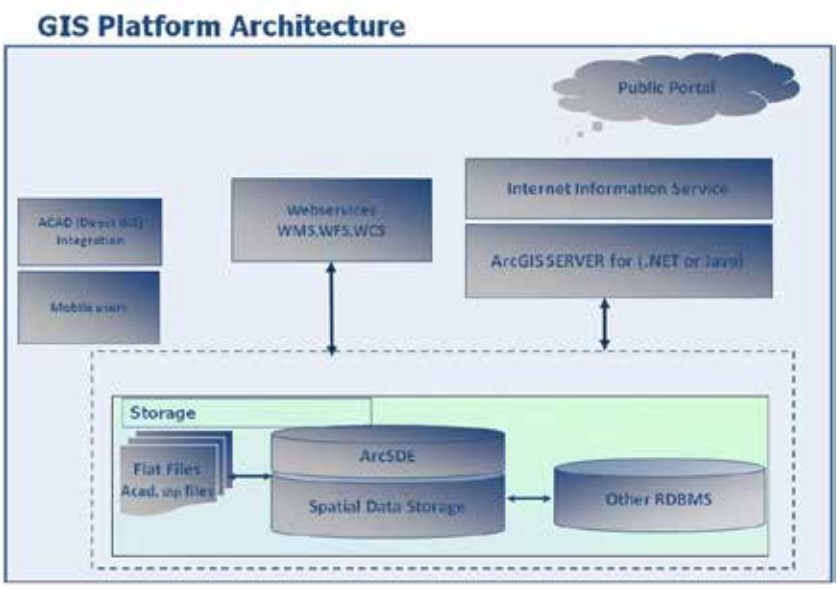
The GIS platform is plug-in free, cross browser and platform independent deployable also on kiosk based solutions. Thus the deployment of the GIS Platform is featured on two kiosks at the Virtu Ferries Terminal.

Following thorough research on the suitable GIS technology for a Transport Authority, the ESRI technology is most suited for Transport Malta needs and uses the following software:

- Microsoft SQL Server 2012 R2 Enterprise
- ArcGIS Server Standard Enterprise Edition

Figure 2 shows the architecture of STREETS where a detailed overview of each component is depicted below.

Figure 2 – GIS Platform Architecture



Mobile Solutions

Transport Malta procured three high performance hand held devices having submeter accuracy and one decimetre accuracy using Arcpad licences, in order to capture data directly in the field. Communication is facilitated between hand held devices by synchronising this output data from the handheld devices with STREETS GIS Platform.

Activity 4 Training

As GIS resources in Malta and at Transport Malta are very limited, the GIS Unit at TM embarked on providing various training sessions. Committed to increase the resources having this skill, basic GIS technology training was provided to every Directorate key personnel. Subsequently provided training was also provided on using hand held devices to equip field officers capturing data directly in the field and once back at the office plug data directly in the GIS Platform. In order for personnel to familiarise themselves with this technology, training personnel on GIS technology is an ongoing process

Benefits

GIS technology plays a central role to Transport Malta not only on merging all the technical components but in providing a fully empowered solution that can manage all the different aspects of processes, infrastructure, software and data.

This technology shall breaks down the barriers within the Authority, fluidly integrating different disciplines, and simplifies the ability for sharing within our directorates, authority, partners and entities. As the backbone infrastructure of the GIS Platform is based on a service oriented architecture, the services are continuously evolving to be interoperable with other business solutions and furnish spatial data to the service.

Conclusion

This GIS platform brings together operations on aviation, ports, roads infrastructure, land and sea transportation, through integration of isolated datasets and processes in one common platform. The information throughout an enterprise results in better decision making and also advancement of the transport sector in cooperation with neighbouring countries whilst providing a secure structure to store sensitive data for the use of internal staff and help in clean institutional structure for the local organisation, storage, management and delivery of data.

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