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ACCESS TO DATA IS A SMALL ISLAND STATE: THE CASE FOR MALTA

Saviour Formosa

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ACCESS TO DATA IS A SMALL ISLAND STATE: THE CASE FOR MALTA

SAVIOUR FORMOSA[1]

Access to Data: A long and winding road

In a rapidly developing world where the introduction of massive online information systems has enabled both the scientist and the general public to interact with remotely-located data from across the globe, the reality of access to data and eventually to information is slowly bringing forth the realisation that decades-old barriers to access to data still need to be overcome. Whilst the massive volumes of data at hand can easily lead one to acquire a perception that there is everything one could require at the touch of a button, reality speaks with another voice; the data is there, the issue of reliability speaks otherwise. The fundamentals of research lie in the availability of reliable data, a phenomenon that has left disciplines struggling with issues of repeatability of scientific outcomes. Technology and legislative measures have caught up with the realities facing researchers.

Data availability suffers from a plethora of scourges that have left entire countries with a dearth of reliable baseline information, particularly small states which have limited human capacity to manage the whole datacycle in the physical, social and environmental domains. The main limitations include the fact that there are few homogeneous structures in operation, which governance situation has rendered data gathering agencies as a series of independent hoarding kingdoms, where data 'ownership' is seen as a private not as a corporate or a national affair thus the main users instead of being custodians transform themselves as the private owners of such data.

Other more technical issues include the fact that there are too many standards to follow, data is not dynamic (gathered ad hoc as a one-off and not real-time), data is not quality assured/controlled, queries are not organised and recorded, data is not secured – ('illegal' use of storage on personal storage devices and other digital media) and that versioning is not practiced.

In addition, even where the data is available, there is an upsurge in requests for access to such data which has increased drastically since Tim Berners-Lee's 1989[1] world wide web (WWW) proposal changed society as never before. The WWW changed a medium that was at best techno-centric to one that is now essentially socio-technic. Increasing requirements for bandwidth has resulted in a need for a reanalysis of Dahrendorff's (1990) access issue in contemporary worlds, both real and virtual, where not all society has access to the information through on-line services. This lack of access is leading to a situation where a new type of poverty is being created: that related to information drought, with users lacking internet-access losing out on progress in the various socio-economic themes.

This is already being seen in the North-South divide across European countries in terms of access to the medium that transports this data, where internet access disparities range from 33% in Greece to 88% in Iceland (NSO, 2009).

[1] http://www.w3.org/History/1989/proposal.html

[1] Senior lecturer, Institute of Criminology, University of Malta, Rm113, Humanities A (Laws, Theology, Criminology), Msida MSD 2080. Email: saviour.formosa@um.edu.mt

The other most important issue relates to the access to standardised processes for information-creation which is being tackled from various legislative loci such as the Data Protection Act (OJ, 1995), the Århus Convention (OJ, 2003a; OJ 2003b), the Freedom of Information Act (OJ, 2003c) and the INSPIRE Directive (OJ, 2007), the as well as other guidance documents that are targeted to enable the smooth and free flow of effective information.

In this paper, the Malta case study is brought to the fore with an analysis of the approaches taken to ensure that despite the limitations imposed on a small country, access is being made to the diverse users of data ranging from data in the physical and social domains.

The Information Dilemma - Tower of Babel or Valhalla?

Research methodology is currently facing a period unprecedented in history, where a data-rich but information poor scenario is the norm but which situation risks resulting into a Tower of Babel re-enactment.

The issue of access to data is spread across diverse realities covering the real world – real world data, real-virtual and virtual-virtual. Dahrendorff's (1990) argument that information has become a social issue where users are confronted with various barriers to access that data becomes a reality when power is viewed from an access point of view. The method of accessing data in analogue format in order to analyse it in analogue format (real-real) is not a throwback to decades past but a shocking reality in various fields of study, mainly the social sciences and the arts. Though many tools are available in proprietary and open-source formats, they may not be enough to bring the schools into the modern era where researchers use high-end technology; such needs a cultural and generational change. This is the trumpet call for a veritable plethora of potentially society-changing themes as data needs to be depicted as a real-time scenario, not something that can be gathered ad hoc. The second case where researchers do take up the digital data option and convert analogue data into digital form for analysis is growing, however the fear of data itself is not a reality that one can ignore, particularly where that analysis requires comparison with data from a virtual reality, where the data being reviewed sits in a distributed database. The latter could be located somewhere in another country where the source is not clearly defined, due to the lack of knowledge and availability of metadata. The third concept is one where all data sources are virtual and users may not have access to such dissemination services and thus experience a new form of poverty called the digital divide. This is a reality that proponents of fully-digital systems can rarely afford to ignore and need to cater for through easily understandable tools such online databases and visual mapservers with help files. The spate of technologies that have been created over the past decade has been mind-numbing to the effect that users are lost for choice: the first webmap technologies which included the early XEROX PARC Map Viewer[2] (launched June 1993) were primitive but today's access to real-time data download and access to information will leave all those who have yet to make the jump on the wayside. Thus it is important that all users are accounted for and that technology is unobtrusive enough to ensure that those not adept to the virtual worlds do not feel alien to their own thematic domain as it develops in another reality.

This access problem is inherent in its very structure: understanding all the available structures is still complex for GI experts let alone for the non-technic users. There are still too many languages and too many platforms that work in differential modes, which situation has created a veritable modern Tower of Babel. The problem that first Tower faced pivoted on the multiple-languages that the architects ended up speaking in and thus lost communicative processing, which fact killed the edifice. This time round too many protocols and too many dissimilar systems may yet kill the contemporary one. The need for technologists to understand the issues

[2] Xerox PARC Map Viewer (1.0X), http://mapweb.parc.xerox.com/map

underlying data structures, datacycles and issues of access is paramount, especially when transferring this function to those related to the social disciplines.

The Case for Techno-Centric and Socio-Technic approaches

Data analysis in the diverse domains has traversed a path that evolved from one employing purely techno-centric approaches based on the concentration of technology as the fulcrum for research to one that is gathering pace towards the implementation of such technologies as a tool for the social sciences. This evolution is being successfully used for a wide range of functions including policy-making, implementation and monitoring interventions on levels of such areas as environmental monitoring to landuse assessment to crime analysis. This migration to the data as against the technology as the major focal point has resulted in a wider legacy disseminated through real-time and updated systems that allow socio-economic and related data to be mapped and displayed either on an intranet or on the internet. As an example, the latter, through Web-GIS functionality has enabled users to view crime in the neighbourhood as well as report crime on-line. Most current tools still leave much to be desired but they are being improved to an extent that real full web-maps will soon be regarded as the main modus operandi enabling real-time research. The functions enable regular monitoring and updating of data, though work is still required to automatically transform that data to information and eventually to knowledge leading to effective policymaking.

The socio-technic approach took off due to the initiation of the analysis process outlined by CMAP has in their criminological process which was based on the concept of creating information based on the analysis of the what, why, who, when, where, why not and how phenomena (W6H). Such data phenomena has helped users build a real or virtual structure that pushes the data remit away from the pure technology to what actually constitutes the data remit. To take a particular social discipline, crime analysis was taken up as a case-study by the MAPS[3] programme (previously called the Crime Mapping Analysis Program (CMAP[4])), which based its approach on the above and even splits its activities around 4 functions: 'i) investigative or crime series analysis, ii) operations research or resource allocation studies, applied research/problem solving, and iv) discrete site analysis such as schools' (Fritz, 2002; 4). The assumption was that once data became available, the technologies would follow suit.

Analysts seek to investigate each of the W6H pivots to identify patterns to reach conclusions whether correlations between the thematic variables exist or not. The six pivots can be investigated as follows (CMAP, 2002):

- **What** data categories were identified? What routines can be identified? What relationships are there between the social variables and other variables?
- **Why** did an activity occur? Why did the interviewee partake in the activity (commonalities of a pattern – root cause of a social problem)?
- **Who** carried out the activity? Who witnessed the action? Who was the offender and the victim (target profiling)?
- **When** did an activity occur (temporal analysis)?
- **Where** did the activity occur? Where did the target hail from (geographic analysis – environmental analysis) – (opportunity and routine activity)?

[3] http://www.ojp.usdoj.gov/nij/maps/
[4] http://www.justnet.org/Pages/Topic.aspx?opentopic=59&topic=59

- **How** did an activity occur (deductive approach - classification and modus operandi analysis)?

- **Why not** investigate unrelated variables to elicit if some type of relationship exists (correlation between data layers)?

The steps Malta took to initiate the process to ensure that data is made available to all comprised the setting-up of a series of data-management processes that ensured that data can be verified and used across the thematic domains. This data collection process was carried out over a period of twenty-five years from 1985 to 2010 and included such agencies as the National Mapping Agency, the Planning Authority, the Local Councils, the Land Registry, Transport Authority, Resources Authority, National Statistics Office, the Common Database Agencies and the Utilities (Water Services, Enemalta, Roads, Cable TV, Telecoms and Posts). This phase was followed by a series of application-based processes that enables information to take a new road towards data dissemination and dataflows. These processes include the implementation of development planning at strategic and local levels, the issue of dataflows to the EU which gave an impetus to the implementation of this phase such as the implementation of the Environmental Acquis, the creation of mapservers, the establishment of an Environmental Impact Assessment regime, the implementation of legislation based on access to data and datacycle management (Data design, gathering, inputting, cleaning, analysis and output). The main factors were taken up as depicted in the following series of steps:

- Data input and verification

  This initial step looked at the availability of data and the requirement for data acquisition issues and included the implementation of a package of different technologies such as scanning, digitisation, manual data capture and use of manual and automated tools to capture such data from remotely sensed imagery. Such data acquisition also required users to verify sources, remove errors, and carry out essential quality control exercises.

- Data storage and database management

  Essentially concerned with hardware constraints and the need for more storage space, this step saw users going beyond the physical issues and identified methods to store data in reliable and easily accessible formats. This major process involves the building up of such entities as are datasets where users can access data in a variety of forms and designs. However, care needs to be taken to ensure that the correct structures are used. The main advantage with of databases is the ability to access attributes within different databases situated in remote sites, facilitating the access to data across networks such as the global Internet, through so-called distributed databases.

- Data analysis and modelling

  Data models help to create a system of information processes such as layering, cross-dataset linkages and integration of internal and external datasets. Analysis can take the form of querying functions through languages supporting the data. Structured

Query language (SQL) is a useful tool, though even more rudimentary tools such as functions within Excel and other base software can help achieve good results. Other software such as Statistical Package for the Social Sciences (SPSS) help in the analysis of socio-economic data, though SQL and spatial options within SQL help environmental scientists to carrying out multi-dimensional analysis: such as in the case of Spatio-temporal analysis of habitat change. Modelling is important at this stage as it aids the researcher to build up a functional model that could also be dynamic and deliver automated analysis for eventual report development.

- Data display and outputs

  The final aspect of the data process concerns the issue of data display and output. This can take a variety of forms: histograms, tables, maps and interactive maps. On the dissemination side there are a variety of technologies that help users to publish their research results, ranging from on-line html reports to dynamic web-mapping services to fully-fledged GIS mapservers.

The International Imposition: A Trauma or Heaven-Sent?

The resultant data structures called for the setting up of various data management functions which were based on a three-pronged approach: the data-function, the GI-function, and the research function. The data function included the setting up of a series of data and information processes that sought to lay the foundation for dissemination protocols inclusive of data protection, which were followed by the integration of standards for the management of the data cycle, data design, acquisition/gathering, warehousing, analysis and reporting. This process included the integration of the physical sciences data together with the socio-related data thereby ensuring data interactivity and synergies through the integration of both tabular and spatial processes. In turn, the functionality could integrate such processes as the Geographical Information (GI) function which took the data to a new level, mainly that employing visual means. This data resulted in the setting up of a series of information systems that allowed for the geographical information systems data creation delineation, thematic analysis, 3D modelling, interpolation and spatio-statistical analysis. In turn this process lead to the structuring of a Research function that ensured the setting-up of robust survey methodology, statistical analysis, prediction modelling and reporting. Whilst the process appears to depict a smooth process, in actual fact, whilst few entities such as MEPA and MITA were taking up the process as part of their remit, it was only when Malta became an EU member state and more specifically a member of the European Environment Agency (EEA), which the structures began to take form. Thus the impetus to create such structures resulted from the need to submit data to the EEA and the EU which data required the necessity to conform to international standards on such issues as metadata, common protocols, common projections and calibration methodologies.

The process was enabled through a number of organizational setups and legislative tools that helped initiate the process to deliver data at the national level and also at the international level. In effect the membership/collaboration of Malta in the European Environment Agency, EUROSTAT, Joint Research Centre and the various EU Directorates General as well as being signatory to a number of UN Conventions. Legislative tools such as the Data Protection Act, the Freedom of Information Act, the Aarhus Convention, and the INSPIRE Directive. Whilst the first three have had a major impact on how one can access information through formal procedures and thus have a heavier socio-technic outcome, the INSPIRE Directive took up a

more techno-centric role, directing the countries to implement a series of protocols to ensure that data is created in a homogenous manner that allows for analysis across the different states. Such protocols called implementation rules have resulted in the setting up of a smoother process to disseminate data in both visual and tabular formats. Data can now be created following a structure enabling analysis across the different disciplines. This said, INSPIRE caters for spatial data but being a small country, Malta has taken up the initiative to use the metadata forms both for spatial and non-spatial data, thus ensuring that for the first time social, economic and other non physical and environmental data be structured through the same process as the spatial one. The relatively low expert capacity has led these few experts to effectively create the metadata reports for both spatial and non-spatial without major requirements for organisational and business restructuring. Dissemination has also been helped through the implementation of the Aarhus Convention which requires the free dissemination of data related to the environment to users, which in effect has broken the data hoarding and access-limitation that had been imposed on an ad hoc basis by the respective agencies[5].

The following section describes the input that the different international process had on the access to data in the Maltese Islands.

EEA: EIONET[6]

The European Environment Agency's EIONET (expert network) has managed to bring together experts in the different countries (EU member states and other neighbouring countries) through the setting up of National Focal Points, European Topic Centres, National Reference Centres, and Main Component Elements. Though the remit of these organisation is to provide the information that is used for making decisions for improving the state of environment in Europe and making EU policies more effective, in actual fact the EIONET resulted in the setting up of an excellence network that discussed datacycles and dataflows which eventually laid the ground for quicker take-up of the main Aarhus Directives and the implementation of the INSPIRE Directive, apart from ensuring that all data is sent on a yearly basis to the CDR (Common Data Repository) which served and still serves as the repository for all countries, but which benefitted the small states such as Malta and Cyprus in that there was no need to replicate the CDR on a local CIRCA[7] server and thus compliance for such state was quicker than for those who decided to install their own networks, hardware and software systems as well as dataflow methodologies.

The main impact that the EEA had on the Maltese dataflow process was through the identification and reporting of data for priority data flows on an annual basis. The process enabled the experts to ensure that the hoarding is longer the case, that data is sourced and gaps identified, that formats are identified and that information is updated and validated, something that was not necessarily the case due to the lack of protocols on calibration and validation. Finally the EEA required the data to be consolidated and eventually submitted respecting target dates and deadlines, the latter especially imposing a regime that ensures data dissemination to the EEA and through its website to the general public.

The main impetus in this international process was the setting up of an expert network that enabled data to flow to a common source for easy download by users as well as ensuring a timely delivery of the relevant datasets.

[5] One must note that whilst environmental data is disseminated for free, there may still be some charges related to the data creation and analysis work required for the particular query.
[6] http://www.eea.europa.eu/
[7] Country-based server system

EU/UN: Århus Convention[8]

Malta is party to the Århus Convention with its requirements for Access to information, Access to justice and Public participation. The Convention's Article 4 covers Access to Environmental Information which relates to how public authorities must make information available in the form requested unless such requests are unreasonable or where the information already exists in another form. The Convention also mentions specific deadlines for submission of such information emphasizing that data must be submitted by one month and two if such data request comprises a complex issue.

What is very interesting in the requirements of the Århus Convention is the fact that it outlines the cases where refusal is recommended, striving to limit the cases of refusal which should be only entertained if the requested information not held, it is manifestly unreasonable or too general and that it concerns material that has yet to be finalized and also that information relating to internal communications.

In terms of collection and dissemination of information, the Convention (Article 5) states that public authorities need to create and update environmental information relevant to their function as well as establish systems that ensure the smooth flow of information about existing and proposed activities relating to the environment and also to inform the public in case of imminent threats.

Finally, the main impact that the Convention had on Maltese data processes concerned the requirement to ensure that each country needs to make its information accessible through free information lists in a transparent manner employing electronic databases.

The main impetus emanating from the Århus Convention was the setting up of a requirement for free data which could be disseminated using the EIONET CDR.

EU: INSPIRE[9]

The INSPIRE Directive is the most robust Directive that has enabled data processing to be taken to a higher level as it encompasses the networks of the EIONET and the dissemination issues of the Århus Convention with the added function of creating a technical base for the data ensuring that it conforms to standardization and that any spatial data can be compared across the different states as well as the different themes.

The main tenets of the INSPIRE Directive include the requirement for member states‘ public authorities to provide datasets and services that can be used for policy making, reporting and eventual monitoring. Though requiring only public bodies to comply, in actual fact this will result in a ripple effect since most private entities engage in work with the public sector and any creation, analysis and subsequent transfer of data needs to comply with the public authorities structures, thus in effect ensuring that all sectors comply with the legislation.

In terms of access, datasets need to be made accessible through readily-accessible interfaces that would be capable of being discovered, viewed, and downloaded. Another requirement is related to the need to create metadata (data about data which allows users to acquire knowledge of what datasets exist and what they hold prior to acquiring such datasets). Malta is highly advanced in

[8] http://www.unece.org/env/pp/
[9] http://inspire.jrc.ec.europa.eu/

the implementation of the metadata process through its employments of a two-pronged approach based on an Excel-based input tools and the use of the JRC online editor[10] that creates an xml-based tool.

The main impetus of INSPIRE is set at removing obstacles to access as well as making data that is currently available only to a few GI specialists, available to the general public. In fact this process was hastened with such developments as Google Map and the related services that have pushed such data in the hands of the public even to the extent that it is transmitted in real-time should a researcher own a dedicated GPS handheld or even a smartphone.

EU: High-Level Collaboration between the Group of 4 (G4) [11]

The G4 as composed by the EEA, JRC, DG-Env and EUROSTAT took over the initiative to consolidate the diverse information-related activities in order to enable the setting-up of a common information system, called the Shared Environment Information System (SEIS). Though not legislation, such a process enabled the groups to bring together the various datacycle initiatives and tools in order to propose the best way forward for the reduction of redundancy and multiple-reporting, employing the gather-once/use-many dictum.

The G4 calls for the need for certified standards, the need for data-exchange, the need for an expertise audit of data, the take-up of the Århus EU-wide access standards and the integration of the INSPIRE as the integrative tool for SEIS implementation.

The impetus of the G4 will definitely lead to an integrated framework that will expand to the wider-environmental, physical, social and economic data enabling a reliable base for data analysis across the different thematic disciplines.

ERDF: Developing National Environmental Monitoring Infrastructure and Capacity[12]

Whilst Malta has experienced various access hiccups and limitations to data creation and access to data, the above four international activities have enabled it to set-up legislative and implementation procedures that ensure that data is reliable, consistently produced, validated and disseminated.

The resultant step was to integrate the requirements of the international activities and prepare a physical structure for data collection, input, storage, analysis and dissemination. Such was created through the acquisition of ERDF Funds through a project entitled “Developing National Environmental Monitoring Infrastructure and Capacity” that will comply with the requirements for EEA dataflows due to its remit to establish monitoring networks in line with EIONET requirements. This process ensures the free dissemination to the public inclusive of spatial, environmental and physical data through Århus requirements, will built its structures through the Implementation Rules of the INSPIRE Directive and will create its own shared information systems. The initiative is based on the concept that the thematic disciplines will have available a comprehensive infrastructure that will enable NGOs, academia and the general public to upload thematic data and carry out cross-thematic analysis without the need to create their own systems.

[10] http://www.inspire-geoportal.eu/inspireEditor.htm
[11] http://ec.europa.eu/environment/seis/
[12] http://www.mepa.org.mt/news-details?id=603

CRISOLA: A Conceptual Model for Integration of Thematic, Social and Physical Themes

As a case study to investigate the integration of data from the various themes into one integrated system, a conceptual model was created by FORMOSA (2007) to enable an understanding of the complex Maltese data availability situation. Such as created through the bringing together of the spatial requirements for data within the different landscapes that are posited by the crime, social and urban worlds. FORMOSA (2007) highlighted the need to bring together each aspect and built a mindmap that helps set out a process to depict a basic and generic model on how crime, social and landuse issues interact together, which process also identified techniques and datasets that could be used in the identification and understanding of crime. The conceptual model, termed the **CRI**me and to the **SO**cial and **LA**nduse aspects, herein embedded as the acronym CRISOLA.

As access to virtual spatial landscapes have gradually been placing more emphasis on the geographical perspective, there is a move towards more integrative and immersive spatial perspective. In the strive to effect a reliable scientific base of information, technological specialists may have missed the wood for the trees should data have been created for its own sake, however the socio-technical approach that GI has been put to since the early 2000s has ensured that data is understandable in the context it is created for. Studying thematic issues divorced from the locations they occur in results in a sterile outcome, since each activity has a time and space imperative attached to it (HIRSCHFIELD, 2001; HAINING, 1987; CLARKE, 1995). Sauer's (1925) early assertion that geography without a substantive content remained an abstract relationship held true with the essential content being the socio-cultural landscape (HIRSCHFIELD ET AL, 2001). Integrating both spatial and temporal crime, whilst linking social and crime statistics to such information layers, inclusive of development and urban use, and zoning activities in a Maltese context has enabled researchers to visualise a social construct such as crime in the space it occurred in (FORMOSA, 2007; FORMOSA, 2010).

The model outlines criminal activity within the social and physical structures it operates in through:

- the crime characteristics through an analysis of offender and offence composition and the interactivity between them (FELSON and CLARK, 1998),
- the social characteristics of an area through an analysis of its poverty/deprivation (GIDDENS, 1984),
- the physical characteristics of an area, particularly its landuse, structural and zoning parameters (EKBLOM, 2001).

Whilst, the high-level Phase 1 Model enables a generic focus on the study in question, a more detailed second level model was required which helped point at and identify the interactivity between the three parameters. This is accomplished preferably through the identification of datasets that may be used for analysis. Being a mindmap model, Phase 2 sought to identify those literature-related issues and integrate them within the model. It reviewed the different Theories, Datasets, Spatio-Temporal Aspects, predictors and the main tenets that can be used in such a study on crime. Taking the model one step further to Level 3, a series of statistical measures are listed for the variables within each dataset identified for model integration The model does not attempt to solve all CRISOLA issues but depicts the potential future studies that can be attempted. The following Figures 1a-b depict outputs from the CRISOLA model research based in Malta.

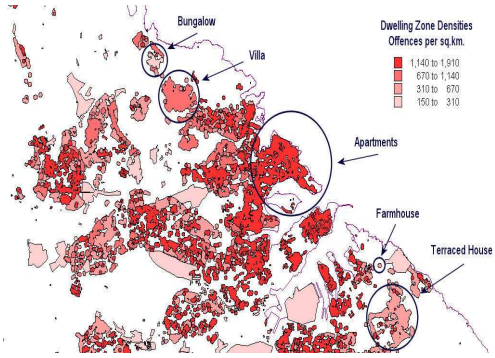

Figure 1a: Offence Densities by Dwelling Type

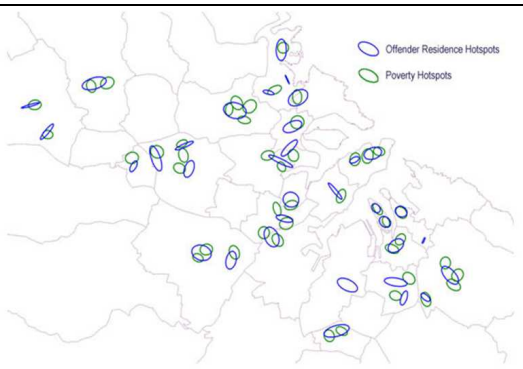

Figure 1b: NNH1 Poverty (social) ellipsoids and Offender residence

Source: Formosa 2007

Dissemination & Visualisation approaches: The Case for Maltese web-mapping

The CRISOLA output was based on a ten-year process that saw various activities and initiatives aimed at the setting up of baseline data for social data which process led to the creation of various web-maps that serve as the eventual structures identified in the processes identified in the international requirements for data creation and dissemination. The first thematic Maltese webmap was created in 2000 as based on the mapping of the Census of Population and Housing data (FORMOSA, 2000)[13], which service was based on image-mapping and GIS-client technologies (Figure 2a). A year later (2001) the Malta Planning Authority launched its development planning mapserver[14] which was based on MapInfo MapXSite[15] that however lacked extensive querying capabilities (Figure 2b). The next web-map employing interactive technology was published by the National Statistics Office depicting the Census of 2005[16], which employed geoclip[17] and MapInfo applications. The next process initiated through the creation of environmental GI data layers such as Corine 2006 and habitats maps (FORMOSA, 2005) which was carried out as part of a process to enhance spatial information for the general public and the research community in line with the EU/EEA dataflow requirements. This process was achieved through the implementation of the Aarhus Convention that ensures that environmental information is disseminated for free[18].

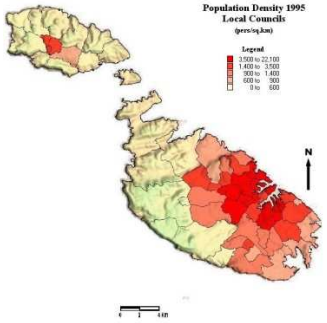

Figure 2a: Population Density Imagemap Source Formosa,

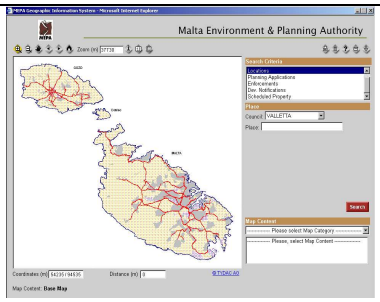

Figure 2b: MEPA Mapserver: www.mepa.org.mt

[13] http://www.mepa.org.mt/Census/index.htm
[14] http://www.mepa.org.mt/index.htm?links.htm&1
[15] http://www.pbinsight.com/
[16] http://www.nso.gov.mt/site/page.aspx?pageid=570
[17] http://www.geoclip.net
[18] http://www.nesis.eu/index.php?option=com_wrapper&view=wrapper&Itemid=158

The prototype site created by the author encompasses a Web-GIS view with interaction on a number of variables such as police-reports crimes from 1998 to 2010, vehicle crime, serious and non-serious crime, amongst others. In terms of benchmarking, it is tagged with a 3-star rating for its pre-prepared structure that at the same time allows extensive user interaction such as personalised map creation and outputting. Figures 3a-3b depicts the Malta Crime Web-GIS created for this study (www.crimemalta.com).

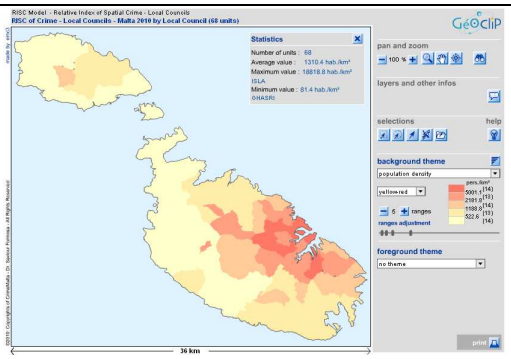

Figure 3a: Malta Crime Webmap Choropleth

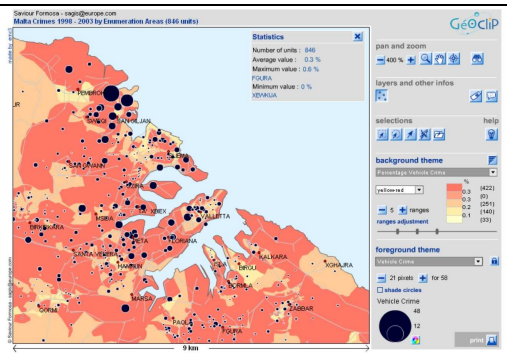

Figure 3b: Malta Crime Web-GI RISC map: choropleth and graduated

Source: www.crimemalta.com

The Next Steps for Data and Webmap Access in the Maltese Islands: Employing LIDAR technology

The next phase for webmapping and dissemination is currently being developed as part of the ERDF project which entails the integration of physical, social and environmental data within a comprehensive Shared Environmental Information System structure as proposed by the EC. Having experienced instances of lack of data, a dearth of metadata on one hand and a relentless drive to take up new technologies, the Maltese scenario is ripe to integrate all the three CRISOLA issues (together with other thematic natural-social-physical environments through the employment of hi-end technology both insitu and remote. Bringing on board the guidelines and regulations set out by the EU initiatives, the Maltese scenario is ripe for a full-blown data-service, eons away from the data-hoarding past. The resultant output will employ data-capture and scanning technologies that may yet make inroads in the social and planning operational fields that have to date been reluctant to take up the outcomes of the spatial technologies. Through a planned complete terrestrial LIDAR scan combined with a bathymetric acoustic scan up to 1 nautical mile from the baseline coast and the inclusion of bathymetric LIDAR ensuring consistency in data acquisition across the two surveys, the baseline data will be created for the eventual overlaying of the thematic data. Combined with oblique imagery takes and in-situ data trawling, the end result should enable the production of a unique model of the islands for use across the scientific platforms. The envisaged free dissemination of the data through Aarhus-compliance to the general public and the scientific community should enable the launching of integrated research across the spatial and social themes. Sociologists, criminologists, economists and other social scientists as well as physical urban and environmental planners can undertake urban modeling scenario-building for strategic, regional and local areas, with the addon integration of social, economic and criminological issues leading to healthier and safer localities.

In addition, the data will be integrated with impact-analysis of baseline studies for air, water, noise, soil and radiation themes and their impacts on high population/urban density Malta.

In summary, the next phases will encompass a number of operational and implementation changes that will lead to the dissemination of and access to a very wide range of information, which changes may require further legislation updates through the reviewing of current legislation and the publishing of new legislative outcomes. Such will be enhanced through updates to GI layers, the creation of a full metadata list and the installation of triggering alerting systems that inform researchers when specific information points to an increase or displacement of an activity.

Data Management and dissemination have taken the path of no-return; the legislative and technological advancements have ensured that access to data takes pole-position in the research process, where data reliability is ensured through a system of verifiable processes.

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