

BIOGRAPHICAL INFORMATION

Carsten Rönsdorf
GI Consultant
Ordnance Survey®

Specific Responsibilities

Joined Ordnance Survey in 2002 to become Lead Consultant for Positional Accuracy Improvement of large-scale geodata. This involves consultancy work with customers in government and utilities, software vendors and service providers as well as other mapping agencies worldwide. Responsible for providing customer support for the migration of positionally improved large-scale base maps, analyzing market requirement to enable Ordnance Survey to satisfy customers' needs, maintaining relationships with private-sector companies, and development of technical methodology, case studies and business cases.

Past Experience

Involved in Geographical Information Systems (GIS) since 1995 in various different market sectors and countries. These include planning of worldwide mobile telephone networks with T-Mobile® International, developing a Land Information System for the Indonesian National Land Agency in West Sumatra, Indonesia, as part of a development project managed by the German Technical Cooperation Agency GTZ and being project manager and team leader for a corporate Technical and Geographical Information System implemented in an electricity, gas and water multi-utility company in Germany.

Educational Information

Dipl.-Ing. (comparable to Masters) – Geodesy, University of Bonn, Germany

MAKE THE CASE TO DELIVER REAL VALUE

Carsten Rönsdorf

Ordnance Survey

Romsey Road

Southampton

SO16 4GU

United Kingdom

Telephone: +44 (23) 8030-5733

Fax: +44 (23) 8079-2039

E-mail: Carsten.Roensdorf@ordnancesurvey.co.uk

ABSTRACT

The future development of Geospatial Information Technology (GIT) will not only be determined by technological advances but also by the way benefits of applications can be proven. When it comes to funding, it is important to note that GIT will have to compete with other investments often considered more mainstream and of higher priority.

This paper highlights examples of how various organizations in the UK have utilized high-quality geodata to deliver these benefits. It is shown that the availability of consistent and high-quality base data provides a framework to reduce the costs to create and maintain data and to enable integration and data sharing. Advances in technology such as web delivery have the potential to save costs if more expensive software packages can be replaced and allow a large number of users to access spatial data without much training. Finally spatial concepts demonstrate their potential to serve as a central access point to corporately access all kinds of data within one organization. Given examples cover the government and utility (electricity) sectors.

INTRODUCTION

Lord Chorley's report in 1987 on GIS and their potential for the future stated that *"Most human activity depends upon geographic information, on knowing where things are and how they relate to each other"* (DoE, 1987).

Most professionals working in the field of GIT and spatial data will happily agree with this, but it is left open how and to what extent geographic information should be utilized and if this is necessarily related to an investment in GIT and spatial data. It should also

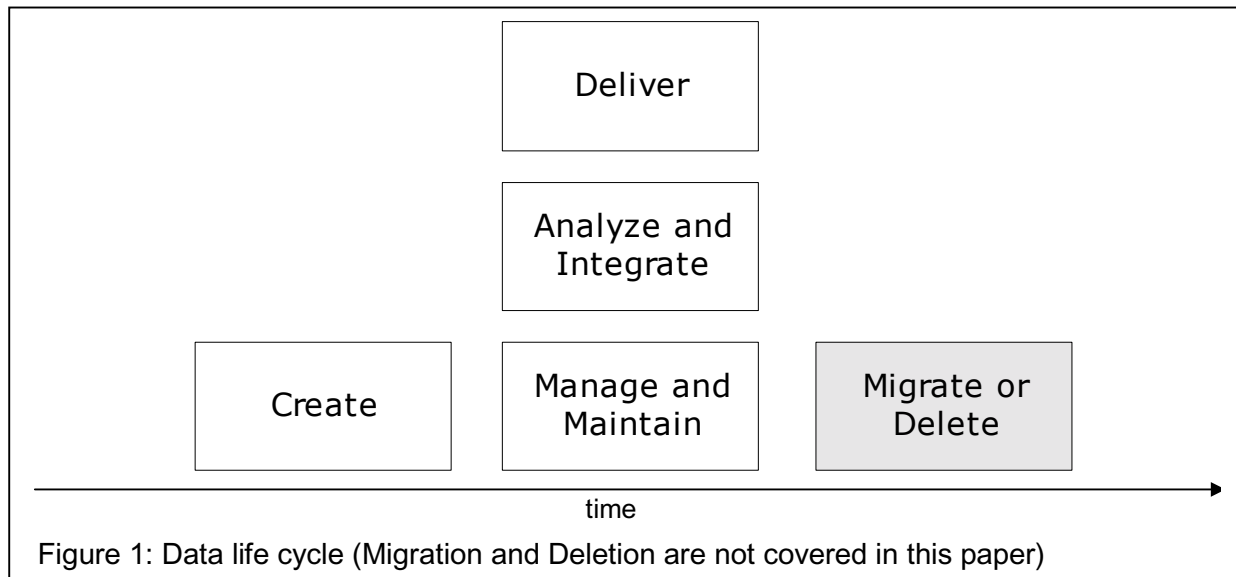
be stressed that an investment into GIT should primarily be driven by business needs rather than the excitement of technical staff.

An investment to utilize digital spatial information consists of three components:

- Technology (hardware and software)
- Skills (staff)
- Information (spatial data)

While skills and technology are tools to access, organize, manipulate and analyze the information, the real value lies in the data itself.

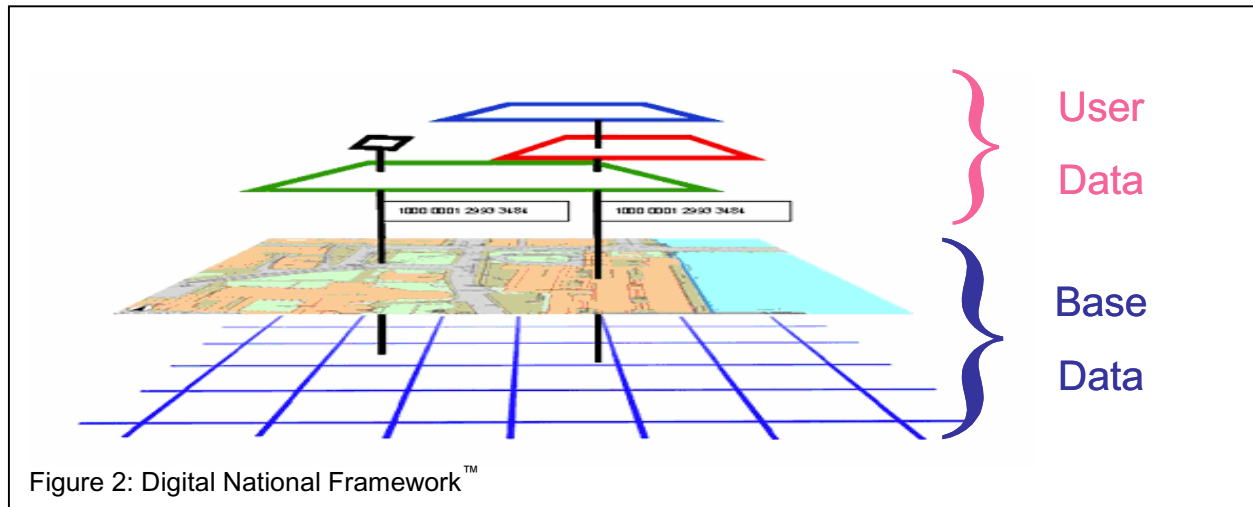
Any particular dataset can be seen as a product with a life cycle. From the manufacturer's viewpoint, it is created, distributed and sold, and finally taken off the shelf if it ceases to generate profits. Similarly, data has to be created, maintained, analyzed and possibly integrated with other datasets before either the data itself or the result of a query can be delivered to the user or an application. Finally, a dataset becomes irrelevant and it is deleted or parts of it are migrated into another dataset. This is illustrated in figure 1.



Example: Applied to a road map as one form of spatial data that is a product as well, it means that the road information is collected and the map is drawn. A car driver buys the map and analyzes the map in conjunction with his/her current location and where he/she wants to go. This analysis delivers possible routes as a result. Because new roads are built and existing ones change, the map maker needs to survey these to maintain the currency of the map. At some point the market ceases to be big enough for paper maps to be sold and the manufacturer may therefore decide to drop the product. The data may then be digitized and migrated to a digital road network to work in a route finder application on a PDA.

Base Data and User Data

It is the nature of spatial data that it hardly stands on its own, but requires a spatial reference framework it can relate to. This is principally provided by coordinate systems, datum definitions and projections. Spatial references can be given in two ways: the absolute position within a reference system and relative to other known features. While the coordinate value of a tree, for example, enables you to find it using GPS positioning, the information that it stands outside of 55 Acacia Avenue will be much more useful.



Geospatial data within a GIS can usually be divided into two categories: base data that provides the geospatial reference (including the geodetic reference framework) and user data that comprises additional features dependant on the particular application and use. This is expressed as one of the main principles in the Digital National Framework (DNF[®]) (Ordnance Survey, 2004) and illustrated in figure 2. In many cases the user data is generated by the user while the base data is provided by a National Mapping Agency or a private vendor.

The base data provides the basic spatial infrastructure the user data relates to. Therefore accurate and consistent user data requires accurate and consistent base data.

Facilitators and Doers

Within any project two main roles can be identified that are crucial for a successful outcome: facilitators and doers—they could also be described as sponsors and champions. While the doers will need to drive both the concept and the implementation of the project, a facilitator is needed to provide the necessary framework for the doers to operate in. This should include buy-in to the project's goals, assuring that the project fits into the overall strategy of the organization as well as provision of financial and staff resources.

In many cases, the doer who has identified a need for a project, will have to find a facilitator and will be tasked to provide detailed evidence to justify a business case. Without a facilitator it won't be impossible but could be quite difficult to get the business case approved by senior management. If a senior manager who is part of the decision-making process can be won for the project as the facilitator in the very early stages, it will be much easier. To do this it will be necessary to find out how the project goals could be related to the possible facilitator's goals. At the end of the day the idea of the project needs to be sold. If we look into the glittering world of advertising and sales, we may find that we don't necessarily buy the product that objectively gives us the most value for money, but the one we subjectively like best. It could be that we were only made to believe a product offers high value for money because of the way it is being sold.

This should not distract us from the necessity to create a sound business case, but it shows that influencing beforehand, building alliances and getting relevant people's assistance should not be neglected in the project-planning phase.

In the UK it was found that a lot of geoinformation projects are predominantly or solely driven by the technical doer and that the role of the facilitator is often not adequately developed. In fact, many unsuccessful projects can directly be related to the failure to find a suitable sponsor or an insufficient level of cooperation between facilitators and doers.

Costs versus benefits

A business case tries to prove that the benefits of a project outweigh the costs. Different values such as net present value (NPV), which describes today's value of a future investment, and return of investment (ROI), which describes the ratio of net benefits (NPV) to costs, can be calculated to assess if a project is worthwhile. NPV also allows the comparison between a number of different projects to find out which generates the biggest benefits (GITA, 2004). In any case the main input parameters are costs and benefits.

In the case of digital geographic information, costs are usually quite high and involve technology, skills and data. In many cases consultants have suggested an exponential ratio hardware:software:data in the order of 1:10:100. Most IT and, therefore, GIT projects also require high initial investment but will deliver benefits gradually over time.

Three different types of benefits can be identified:

- a) tangible: short- and mid-term hard, financial benefits
- b) intangible: long-term, difficult to express in numbers
- c) strategic: long-term with large potential impact but even more difficult to express in numbers

Business cases usually require hard numbers and the task of creating a business case usually falls to the doer, the project manager for example. In most cases it will be possible to specify costs based on estimations, but to express the benefits in hard numbers will be quite difficult for intangible and strategic benefits. While some benefits geographic information provides fall into category a), it seems that most fall into categories b) and c).

INVESTMENTS INTO GEOGRAPHIC INFORMATION

GIT and spatial data is heavily utilized by a variety of governmental and private organizations throughout the UK. Current market trends and developments in the field of spatial data and GIT are subsequently shown alongside examples for the justification of investments. Since most of the associated business cases are confidential, the benefits are not illustrated by numbers. The activities are grouped by the position they fulfill in the data life cycle as introduced in the previous chapter:

- Create data
- Maintain data
- Analyze and integrate data
- Deliver data

The final phase of the life cycle, Deletion and migration, is not covered in this paper.

Create data

A consistent and accurate base data framework with national coverage, such as OS MasterMap® in Great Britain, makes high-quality base data available to a wide user community. The fact that virtually all large-scale spatial data in the country is referenced against OS MasterMap* enables true data sharing between different organizations.

The Digital National Framework is a conceptual model for the integration of all kinds of geographic information—from national reference datasets to application information at the local level. The DNF provides a permanent, maintained and definitive geographic base to which information with a geospatial content can be referenced. It also contains a set of enabling principles and operational rules that underpin and facilitate the integration of georeferenced information from multiple sources (Ordnance Survey, 2004). One of the main principles that help to make data capture more efficient states that data should be collected only once and then reused.

Data capture for polygons such as land parcels, planning applications or highway extents was traditionally being done by digitizing along the geometry of the base map with an optional snapping routine to pick-up vertices from the base data geometry. Data capture from a polygonized and very detailed topographic map dataset such as

* Or Ordnance Survey Land-Line®, which is geometrically identical to the OS MasterMap Topography Layer, but not polygonized

OS MasterMap allows either direct data association to the base map polygons or copy, paste and join operations to create the new geometry.

Medway Council in Kent, England has proved that data capture costs were significantly reduced as data can be captured three times faster from polygonized OS MasterMap than from a CAD- based Land-Line dataset. The data capture of highway records for all 2 800 streets in Medway took one man-year in comparison to three man-years (Medway Council and Ordnance Survey, 2004).

Since OS MasterMap is available to local authorities in Great Britain under a collective agreement, Medway Council only needed to invest into additional software and changes of the data management and capture procedures.

In another, much smaller project Medway Council produced a retail survey for the local shopping street by extracting all buildings from OS MasterMap and overlaying them with x and y coordinates from a retail survey. This provided the exact footprint of buildings that can now be used for shopping guides, etc. The new data capture technique saved about five days for data capture. The resulting cost savings are not only realized for one-off data capture projects but will also achieve greater efficiency in business-as-usual tasks such as the ongoing capture of planning applications.

Maintain data

A widespread problem within the utility sector is the maintenance of the land base, particularly of new buildings that usually need to be connected to the utility network before the building is officially surveyed and integrated into the base map. In many cases utilities survey these buildings themselves and conflate the information to the official base map once the building is included in a base map update.

EDF Energy™ distributes electricity to almost 7.8 million homes and businesses across London, the east and the south-east of England. The company is currently planning to introduce advanced conflation technology to integrate network records captured against architectural site plans to the Ordnance Survey base map. Up to now the network assets are manually shifted to their correct position, which can take several weeks for large building sites. A new process will be introduced to drastically reduce costs by automating this task to a large extent. New software will automatically match the site plan geometry to the definitive base map and corrects the utility information to the correct position. At the same time, geometric (cartographic) conditions, such as parallelism of cables, are maintained.

Costs can also be cut if the new building geometry can be centrally sourced from a base map that includes pre-build information collated from large construction companies and architects. If these plans are finalized plans, which have been approved by the local authority planning office, confidence is high that the data represents what the developers will build, usually within the next three months. In Great Britain pre-build data is centrally available as an addition to the base map.

Analyze and integrate data

Government organizations, particularly local government, offer a large variety of services to the general public and can have up to 700 *product lines*. As part of initiatives to modernize government, Great Britain is currently experiencing a trend to provide a single point of contact to all local services from a central call center. The nature of local government is primarily about people and places and GIT has the power to connect these. Most of the more than 400 local authorities have recently invested into GIT and spatial data and a GIS is often seen to be a core system.

Portsmouth City Council has proved that geographic information can be used to organize and access large amounts of data very quickly within a call center application as part of a customer relationship management system (CRM). When the council started to develop its City Help Desk they realized that it was very difficult to access data that was held in a variety of separate, specialized systems. Subsequently, a simple system, based on the free MapInfo® ProViewer, to allow quick access to data was implemented within a week's time. Initially planned as a temporary solution, the system is still in place after a year and a half. The system integrates existing data from the following departments: Planning, Environmental Health, Housing, Local Taxation, Waste Management, Land Charges and others. A screen shot of various datasets that can be displayed is illustrated in figure 3.

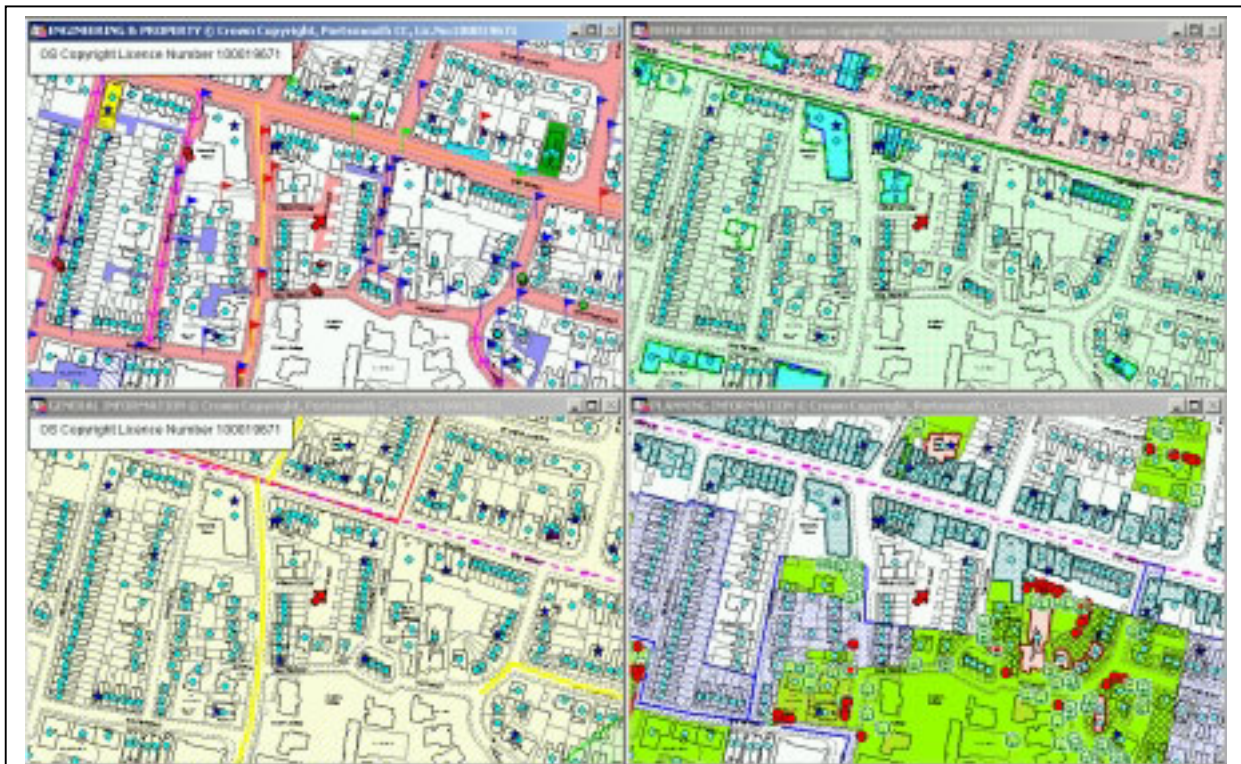


Figure 3: Portsmouth City Council's CRM

In fact the system is today used as the main screen for most calls the call center receives. The client's area of interest, their own property, for example, can be located

with a few mouse clicks and all relevant data in this area that may have an impact on the property is graphically displayed on screen. Many queries can be answered without having to call the client back. The use of spatial data within this application has increased customer service by directly providing answers and has led to a 50% reduction in call backs and therefore significant time savings for the council and a better service to the public because more queries can directly be answered.

Since the tool is based on free software, the council's investment into the system has been minimal. The limited functionality is sufficient for the tasks that need to be performed and new operators can be trained on the system within about 10 minutes. Comments from the user base suggest that they do not need to know anything about GIS and that they "cannot operate without the *map thingy*".

The outlined CRM system is a recent step in the implementation of Portsmouth City Council's GIS that started in the late 1990s. It has already realized significant benefits in improving services to the citizen, efficiencies in the council, and is now helping to meet e-government targets. Portsmouth City Council's Information Systems manager Jac Cartwright states: "Underpinning virtually all e-government services is the fundamental need for common, unambiguous location reference, in particular client-address data" (Portsmouth City Council and Ordnance Survey, 2004).

Deliver data

Stockton-on-Tees Borough Council (SBC) is a medium-sized unitary authority in the north-east of England. Its system, Maps@Stockton, is a web-based mapping application that has produced significant gains for a modest outlay. Maps@Stockton is based upon web-GIS technology and includes various Ordnance Survey data products

as base datasets. The expanded council-wide service enables any officer to use their desktop PC to access Ordnance Survey mapping for less than the cost of a keyboard and mouse (or less than \$35 per seat based on the current 2 500 users).

By rationalizing existing software licenses, creating easy-to-use interfaces and offering self help training, significant cost savings were made. The challenge for Stockton was to expand access to geographic data from a single file

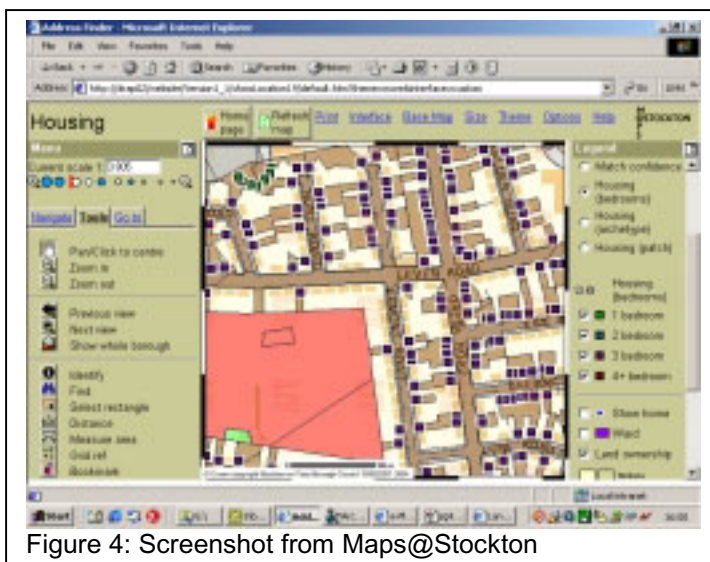


Figure 4: Screenshot from Maps@Stockton

server with about 50 advanced users to a corporate data store, which would be potentially accessible by 3 000 to 4 000 council employees, including access to selected datasets by Stockton schools.

Existing users with full desktop GIS licensing were identified in order to understand whether browser-delivered access to data could still offer all the functionality they required. Manipulation of data by, for example, “red-lining” or querying associated attributes could also be designed into the browser functionality where required.

By creating free, easy-to-use, browser-based tools (as illustrated in figure 4) to access data, significant savings were made by removing the need to install and support new software. For school admission and performance information, the name of the councilor for a particular ward to the location of street lights, using Maps@Stockton the user simply enters the zip code or street name and within seconds relevant data is displayed. It takes minutes to learn how to use the system, and as the user becomes more proficient there is an increasing range of tools available to them. On a typical day the system delivers more than 3 000 maps, most of which are generated in less than a second. By April 2005 this number is expected to increase to 10 000 maps per day. David Renn, Stockton-on-Tees Borough Council’s GIS manager, notes that *“Enabling better, more open and objective decision making allows users to focus on the job they are employed to do rather than becoming geographic information specialists”* (Stockton-on-Tees Borough Council and Ordnance Survey, 2004).

CONCLUSIONS

“With GIS we can answer queries in ten minutes that would once have taken two weeks” (Ipswich Borough Council)

“The system is so effective it makes you wonder how we managed before”
(Huntingdonshire District Council)

“I don’t know how they could do their jobs without it” (Lancashire County Council)

These quotes taken from local authorities in England illustrate that the use of high-quality spatial data generates important value for their organization. It was shown in this paper that high-quality geodata used in conjunction with the latest GIT delivers benefits on three different levels:

- Tangible: cost savings in data capture, maintenance and web delivery
- Intangible: better service delivery with geodata as a central access point to other datasets and better analysis results
- Strategic: a base data framework that enables data sharing across departments and organizations

The given examples have illustrated the benefits, but what are the critical success factors to reap benefits from geographic information? You need high-quality base data as the reference, a sound business case and the right facilitators and doers to make it happen.

REFERENCES

DoE, 1987. Handling Geographic Information: the report of the Committee of Enquiry, Her Majesty's Stationary Office, London (The Chorley Report)

GITA, 2004. Business Case and ROI: Justifying IT Spending Seminar, proceedings of GITA conference 27, Seattle

Medway Council and Ordnance Survey, 2004. Integrated solutions Implementing OS MasterMap at Medway Council (to be published on www.ordnancesurvey.co.uk)

Ordnance Survey, 2004. The Digital National Framework—evolving a framework for interoperability across all kinds of information, white paper, Ordnance Survey, Southampton

Portsmouth City Council and Ordnance Survey, 2004. Implementing an integrated system (http://www.g-intelligence.co.uk/local_gov/pdfs/PortsmouthPDF.pdf)

Stockton-on-Tees Borough Council and Ordnance Survey, 2004. Best value services and savings at Stockton-on-Tees Borough Council (to be published on www.ordnancesurvey.co.uk)