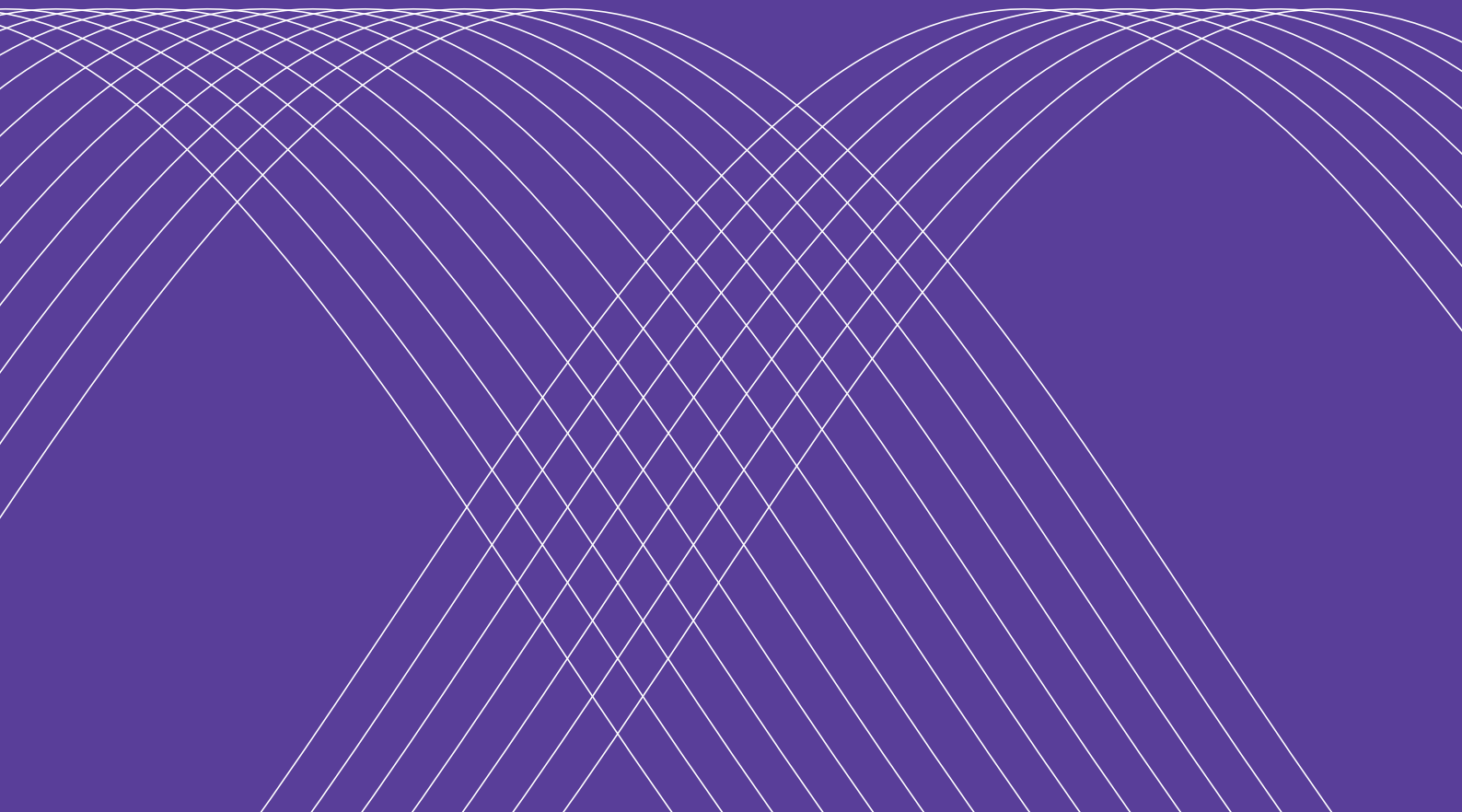




Geographic Information: An Analysis of Interoperability and Information Sharing in the United Kingdom

This report is based on the results of a 2004 survey on interoperability and information sharing



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Chapter One: Introduction

1. Introduction

This study represents the findings from research among the Geographic Information community. It was conducted by the e-Government Unit of the Cabinet Office.

If the UK is to make the best use of its information assets and reduce duplication in gathering data, information sharing across the public sector is essential. From tracing the origins and spread of Foot and Mouth disease to locating crime hot spots for law enforcement, Geographic Information Systems (GIS) have become indispensable to effective knowledge transfer within both the public and private sector.

The potential importance is indicated by a stream of recent research. For instance a recent US study showed that projects which had adopted and implemented geospatial interoperability standards had a risk-adjusted ROI (Return on Investment) of 119.0%. This ROI is a Savings to Investment ratio, which can be interpreted as for every 1 USD spent on investment, 1.19 USD is saved on operations and maintenance costs. Overall, the project that adopted and implemented geospatial interoperability standards saved 26.2% compared to the project that relied upon a proprietary standard¹.

This survey set out to gather some basic data about the use of GIS in government in the UK, the interoperability of the current data being collected, the creation of metadata and the adherence to standards.

The result of this survey could be used to inform the work of the Office of the Deputy Prime Minister's Panel on Geographic Information.

¹ *Geospatial Interoperability Return on Investment Study*, National Aeronautics and Space Administration (NASA): Geospatial Interoperability Office, April, 2005.

Chapter Two: Methodology and Summary of the Survey

The survey consisted of 37 questions divided into five sections. It was designed to be completed in a single sitting and estimated that the average time from beginning to end would be about 10 minutes. Most of the questions required only a short answer but some questions allowed for further expansion. There was a final open question that allowed general observations and thoughts to be submitted.

The survey was formatted with an online browser based interface. During the week of 8 November, 2004, invitations were sent out to all Intra-governmental Groups on Geographic Information (IGGI) and the Improvement and Development Agency (IDe&A) members. IDe&A's database contains members from the Local Government Association (English LGA), the Welsh Local Government Association (WLGA) and the Convention of Scottish Local Authorities (COSLA). Also included are police, fire, and national parks organisations, which altogether amount to more than 500 authorities. IGGI has 400 members and represents 135 organisations. Access to the questionnaire was via a common login and password. An initial screen was comprised of a letter from Ian Watmore, CIO of the e-Government Unit, which explained the rationale for the survey and invited participation. A sidebar included contact details if assistance was required at any point. This sidebar appeared on each page. The survey ended on 31 December, 2004.

A team from the e-Government Unit discussed the information needed and the expected outcomes from the study. Terms of Reference were written (see Appendix 3). We discussed the forthcoming study with several of the industry leaders, including Ordnance Survey and the Office for National Statistics.

The questions were developed by the e-Government Unit's Technology Policy team. At several points during this development, questions were assayed by experts in the field and feedback requested and considered. We offer special thanks to all of you who assisted in this way.

Section A:

This comprised demographic and contact information for the person/organisation filling out the survey.

Section B:

Data Use: The purpose of this section was to ascertain the type of data being used, where it is sourced, and current data sharing and data creation projects. An important question also queried whether or not data was paid for or free.

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Section C:

Geographic information systems (GIS): These questions were designed to ascertain the pervasiveness of GIS, the type of installations and their interoperability.

Section D:

Geospatial metadata awareness and use: This section posed questions about metadata creation and the standards used, knowledge of metadata, and the current barriers to creating metadata.

Section E:

Financial and human resource investment: These questions asked, very broadly, the current costs/investment in Geographic Information Systems.

Section F:

This was a free text section that allowed respondents to offer thoughts or comments on the study or to allow them to expand their answers to previous questions.

There was a total of 243 respondents. Duplicate entries were identified by email address and removed. The result was a total respondent population of 207. This variance is accounted for mostly by participants beginning the survey and then discontinuing an initial session which was started again later. This was due to either a 'timing out' of the session or a need on the respondent's part to end the session in order to gather additional information for the response(s).

Chapter Three: Summary of Findings

- 3.1. 207 total responses;
- 3.2. 49% participate in data sharing projects;
- 3.3. Top two data providers: Ordnance Survey and Office for National Statistics;
- 3.4. Top four areas covered by data sets: Geographical Names, Administrative units, Coordinate referenced systems and Geographical grid systems;
- 3.5. 43% are currently gathering or creating data;
- 3.6. Of 302 responses (respondents were allowed to submit their top three), 24% of the responses identified Central Government as the major data sharing partner. Other government agencies and local authorities were identified respectively as second and third;
- 3.7. Of 302 responses, 4% identified trading funds as partners in data sharing;
- 3.8. 86% of data is not paid for;
- 3.9. Of the 14% of data which is purchased, the majority (35%) is purchased from the private sector;
- 3.10. The major barrier to data sharing is lack of awareness of the information held by other organisations;
- 3.11. 79% of the respondents use GIS, of which 29% use a spatial database, a large object oriented database;
- 3.12. 51% of the GIS systems support XML which very closely represents the number of respondents who identified themselves as engaging in a data sharing project (49%);
- 3.13. ESRI at 33% is the major GIS system in use;
- 3.14. 31% of the respondents, the majority, report using an 'Other' metadata standard and 27% report creating their own standard;
- 3.15. Responses indicated confusion about metadata standards generally;
- 3.16. Of the 20% of respondents who indicated that they didn't create metadata, the majority of the responses focused on resource issues and a lack of support;
- 3.17. 36% report spending over £50k on their initial capital investment in GIS;
- 3.18. 14% report data procurement costs in excess of £100k per annum.

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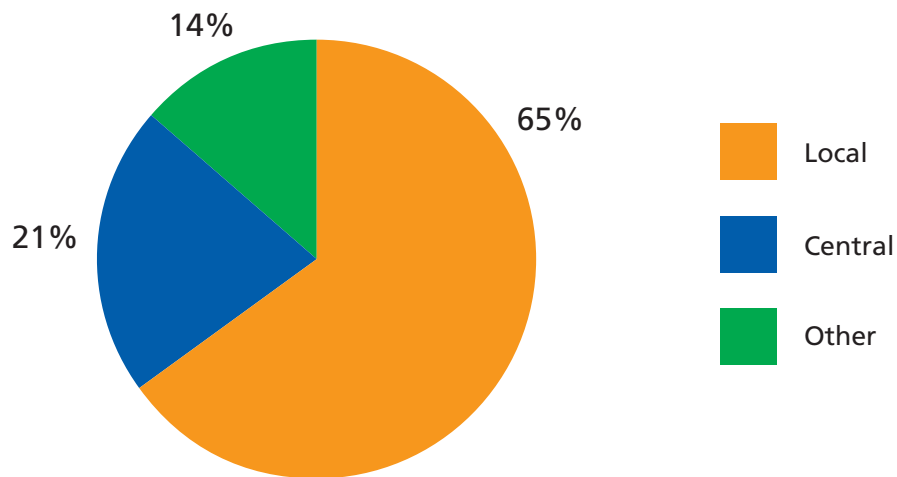
Chapter Four: Profile of respondents

The e-Government Unit thanks all who took time to carefully consider and respond to this important survey.

4.1. A1. Type of organisation you represent:

The majority (65%) of the respondents were from local authorities with 21% from central government. Those who identified themselves as 'other' (14%) were from organisations such as private transport companies, police agencies or special environmental/countryside programmes.

Fig 1. Type of Organisation



4.2. A2. Does your response cover your entire organisation or just your section?

The majority of the respondents were participating in the survey on behalf of the entire organisation. This adds value to the data.

The following demographic questions were included for identification purposes and for avenues of further contact. This aggregated information has not been included in this report.

A3. Name

A4. Job title

A5. Organisation

A6. Section

A7. Address

A8. City

A9. Postcode

A10. Telephone number

A11. Email address

A12. Web site URL

A13. Number of people employed by this organisation (both full and part time)

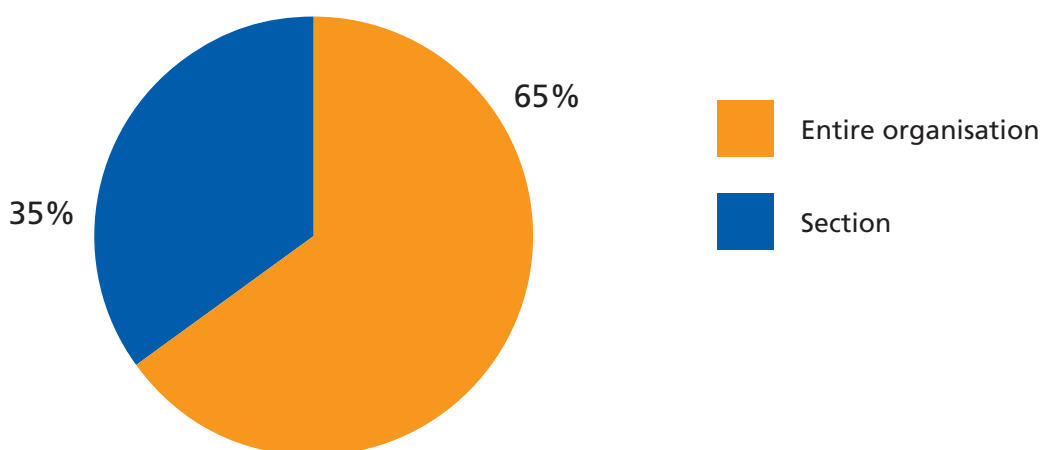
The primary contact for GIS implementation (if different from above) is:

A14. Name

A15. Phone number

A16. Email address

Fig 2. Organisational representation of the respondent



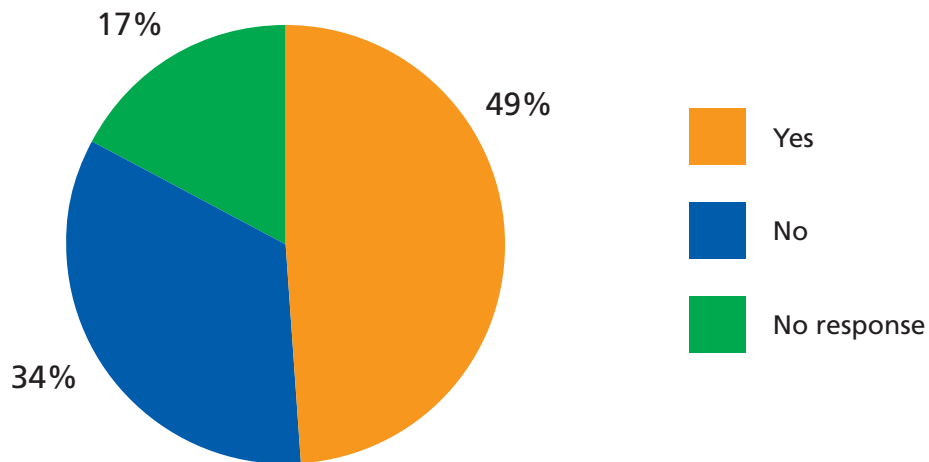
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Chapter Five: Data Use

This section of the survey creates a snapshot to assess the current state of data creation and information sharing.

5.1 B1. Are you currently participating in a Geographic information based (GI-based) data sharing project?

Fig 3. Current participation in a data sharing project



Almost half of the respondents are sharing data in some way. The next question (B2) was a free text option which allowed further explanation of the nature of the data sharing projects.

5.2 B2. If yes, please specify the type of GI-based data sharing project(s)

The following responses are a sample.

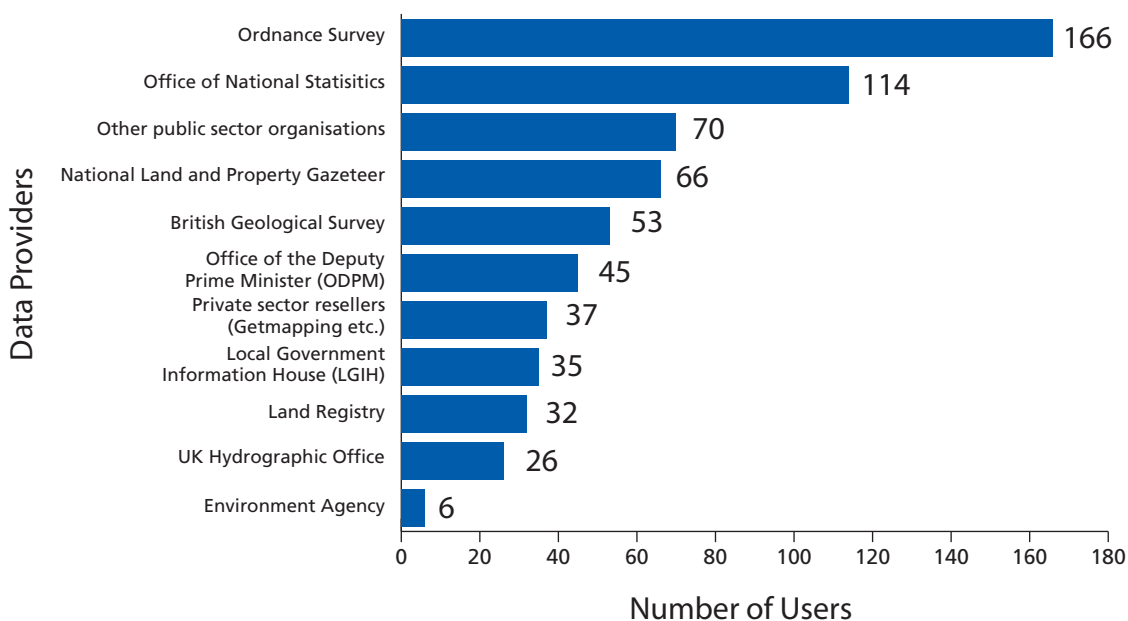
- FVGIS [Forth Valley GIS] is a joint public sector partnership unit providing corporate GIS services to three neighbouring local authorities – Clackmannanshire, Falkirk and Stirling councils – services are delivered via a common regional GIS datastore and integrated web GIS portal.

- Our [English Heritage] main internal GI Project is focusing on the concept of a central corporate GeoDatabase for the storage of our data. This is due to be launched in Spring 2005. Currently data tends to be held by those that create it rather than those who need it.
- A large proportion of the council's project involves sharing GI information typically relating to transportation, planning, countryside and community safety. [Buckinghamshire County Council]
- Virtually all our projects involve some kind of data exchange / sharing. [Centre for Ecology and Hydrology.]
- Sharing of point and boundary data, mainly related to crime and antisocial behaviour may well expand to other areas during 2005. [Northeast Regional Information Partnership]
- Extranet connection with District and partners such as police and NHS via the following applications: SurreyAlert (GI based emergency planning application); Secure password protected web site; SCADIS (Surrey Crime And Disorder Information System) with local districts. Secure password protected web site Surrey Shared Data with Voluntary groups. Interactive Map Public access GIS www.surreycc.gov.uk/maps [Surrey County Council]

5.3 B3. Do you use geographic data from (please indicate all that apply)

This question defines the major sources of data supply in the UK. All applicable providers were able to be indicated. There were very few respondents who listed a single source of data. Those few who did, listed Ordnance Survey, which, as expected from the UK national mapping agency, was the primary supplier. There were a few health related agencies that noted data suppliers other than Ordnance Survey. There were a few respondents (36) who left this question blank.

Fig 4. Data Provision in the UK



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This question also allowed the identification of other public sector organisations from which data was procured. These were frequently mentioned:

General Register Office	Police Service
Royal Commission on the Ancient and Historical Monuments of Scotland	Probation Service
Scottish Natural Heritage	Fire Service
Forestry Commission	DEFRA
Council Archaeologists	Ordnance Survey Northern Ireland
English Nature	Inventory (NAEI)
Royal Mail	Hadley Centre
	Met Office

The question also allowed respondents to identify data sources other than public sector sources. Some of these were:

GeoInformation Group	Climatic Research Unit
Landmark Information	LINK project
House builders and others	Wildlife Trust
ESRI	National Trust
Aerial photography	Transco
Planning studies	Bartholomew's Road Grid
Infoterra	Simmons Aerofilms
QAS (QuickAddress)	National Atmospheric Emissions

5.4. B4. Please indicate all of those areas covered by your data sets.

This question was created to discover which data that was being held (and created) by the respondents. The data themes are those specifically indicated and defined in Annexes I, II and III of the proposed INSPIRE directive (<http://inspire.jrc.it>).²

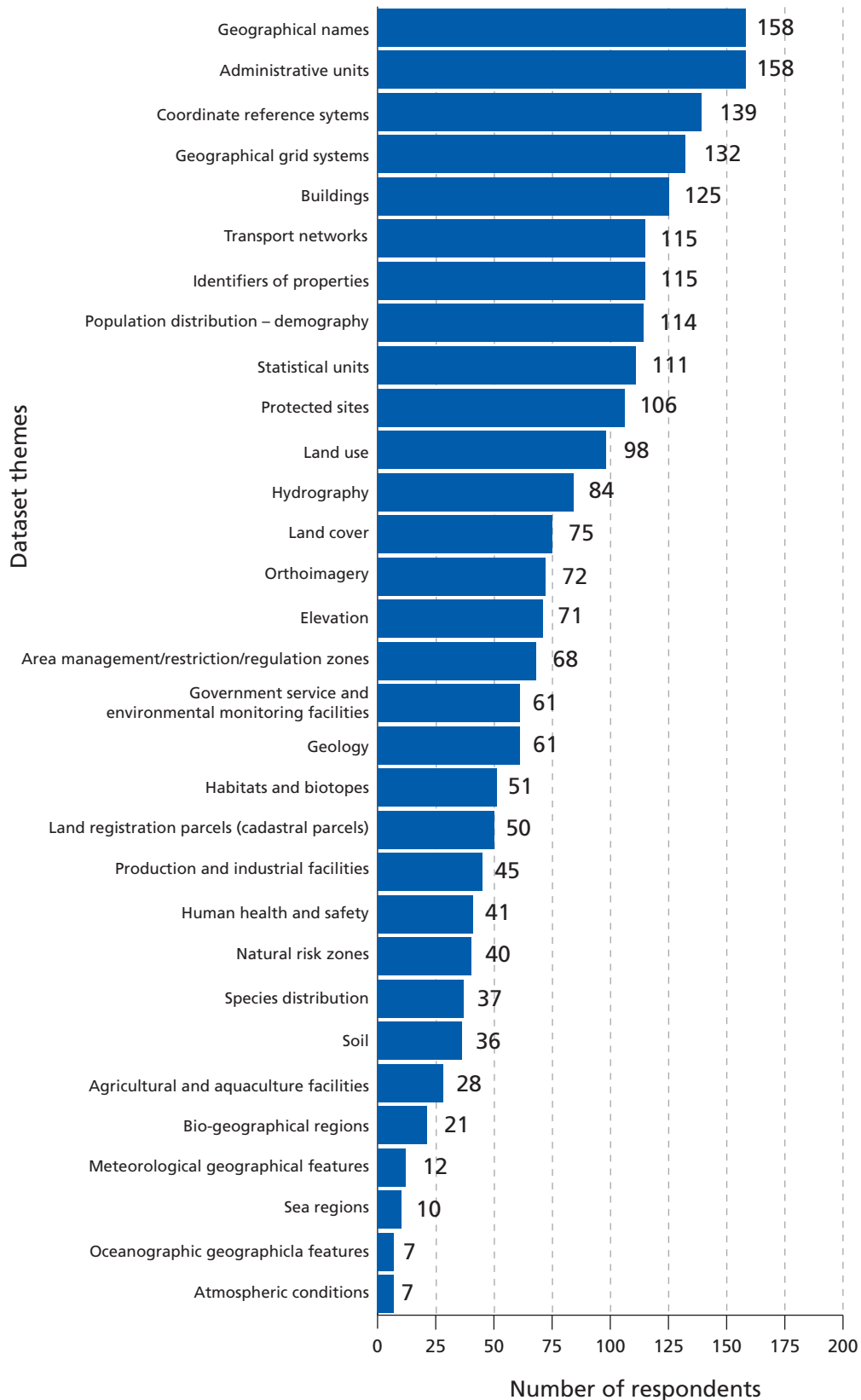
Respondents were able to indicate any number of data themes and each of the themes was hyperlinked to the INSPIRE definition, eliminating any possibility of ambiguity.

The most prevalent data themes from all respondents are geographical names (158) and administrative units (158). Positioned at third and fourth respectively were coordinate reference systems (139) and geographical grid systems (132).

² Member States shall adopt measures for the sharing of spatial data sets and services between public authorities. Those measures shall enable the public authorities of member States, and the institutions and bodies of the Community, to gain access to spatial data sets and services, and to exchange and use those sets and services, for the purposes of public tasks that may have a direct or indirect impact on the environment. Data -sharing and re-use, Chapter V, Article 23 (1),

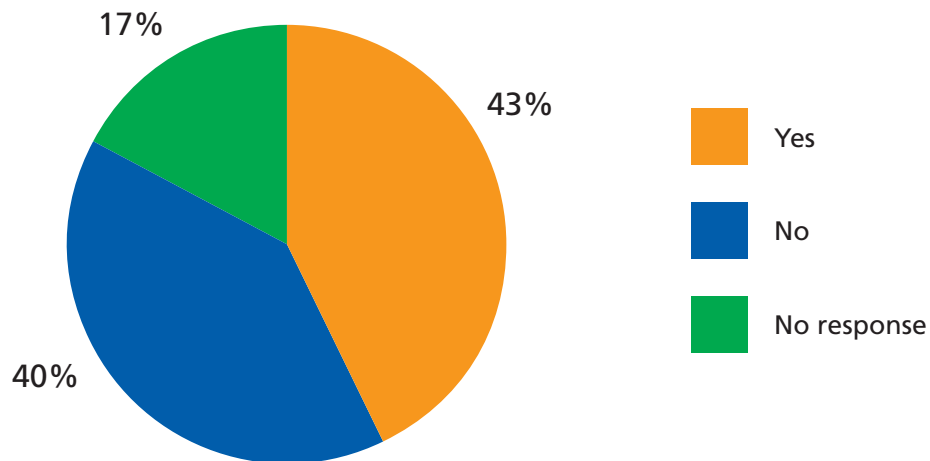
Proposal for a Directive of the European Parliament and of the Council establishing an infrastructure for spatial information in the Community (INSPIRE). 23, July, 2004.

Fig 5. Areas covered by respondents' datasets



5.5. B5. Are you currently conducting any major geospatial data gathering or data creation activities?

Fig 6. Current data gathering or data creation activities



This question saw almost an equal split between those who are engaging in projects and those who are not. The types of projects were explored in question B6.

5.6. B6. If yes, please specify.

This question was in many ways a prototype for the way GIS can be effectively used. Responses have been grouped under broad headings. They included:

Highways and transport

- Documenting highway extents and its associated data e.g. assets and traffic management information.
- Creating a feasibility study around M6 Toll Highway Extents Landscale Characterisation.
- Inventorying highway extents.
- Contributing to the National Public Transport Access Node (NaPTAN) database.
- Noise mapping – data gathering for a specific road noise pollution project

Planning (town and country)

- Creating a listing of local listed buildings and refuse collection routes.
- Creating a land and property terrier.
- Standardising data for LDF [Local Development Framework] monitoring and SEA SA [Strategic Environmental Assessment and Sustainability Appraisal] work.

- Completing the UK component of the pan-European CORINE Land Cover Map 2000.
- Collecting data regarding the Regional Spatial Strategy e.g number of houses completed by area, previously developed land, employment floorspace etc.
- Creating a farm field register, community right to buy areas and land management contracts.
- Digitising paper records for all planning applications from 1974 to 2000 (30,000 property boundaries) and out grounds maintenance records and land terrier plans to clearly define the councils land ownership.
- Project Cycleau – examining hydrology and water catchment for four river areas in the county village greens, common land and owned and maintained highway – in support of an automated land charge service.
- Locating all properties with a thatched roof.
- Identifying green space, recycling and refuse collection, community health, LLPG, licensing, etc.
- Identifying public rights of way for England for use in the Rural Development Service Rural Payments Agency – digitisation of rural land parcels.
- Used in habitat surveys, highway limits, land terrier, archaeological projects.

Population and migration statistics

- Planning for the 2011 Census and the ongoing data collection for Neighbourhood Statistics Continuous Population Survey planning.

Waterways and shipping

- Maintaining an ongoing programme of geoscientific survey onshore and offshore in the UK covering geological, geophysical and geochemical data. Also the scanning of analogue geoscientific records and gathering data from third parties.
- Identifying British waterways ownership, property and asset infrastructure.
- Gathering ship traffic data through Automatic Identification System (AIS) to monitor traffic patterns of vessels over 300 gross tons. Also gathering data to provide risk assessment of passenger vessels in UK waters referenced to search and rescue (SAR).

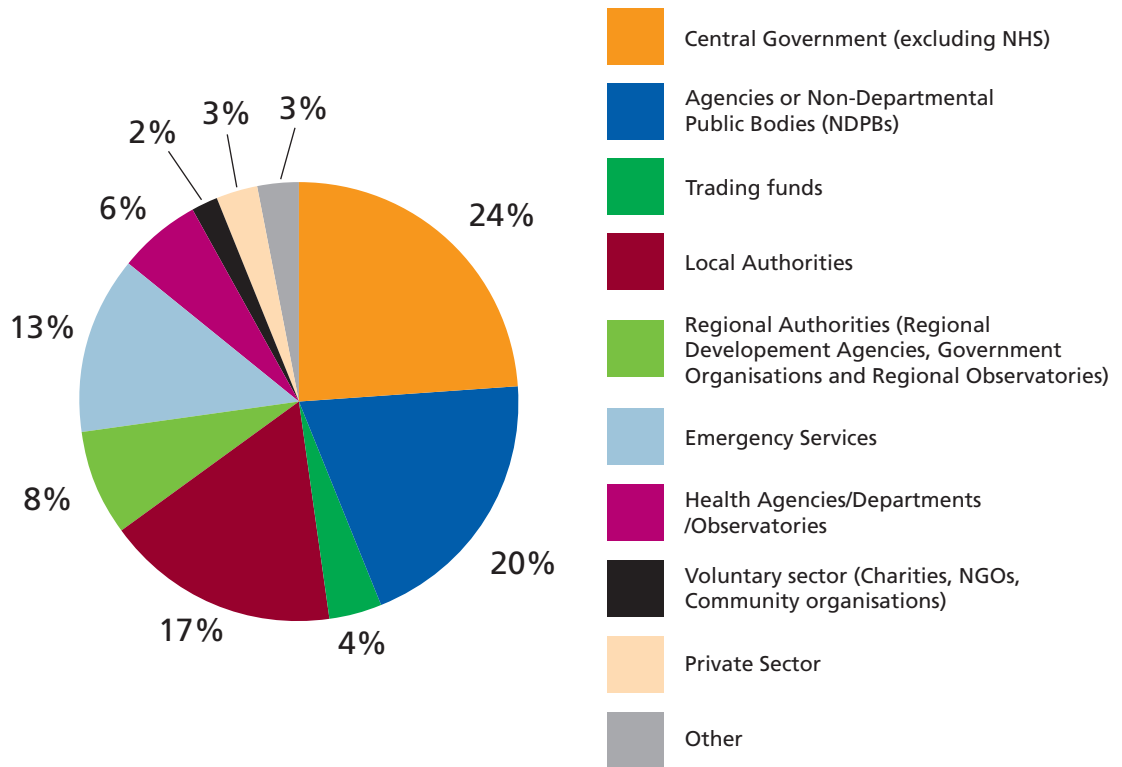
Other

- Creating and maintaining the Local Land and Property Gazetteer.
- Creation of geo-coded data set for the courts in England and Wales.
- Creating biodiversity action plans – species/habitats.
- Making available scenarios of climate change for the UK. These data can be imported into a GIS. The UKCIP02 scenarios are the latest set of climate scenarios data which have been released. These will be updated by another set in 2006/07.
- Geo-referencing patient data sets for incorporation into GIS.

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5.7. B7. What organisations are your major partners in data sharing (please indicate the top three).

Fig 7. Partners in data sharing

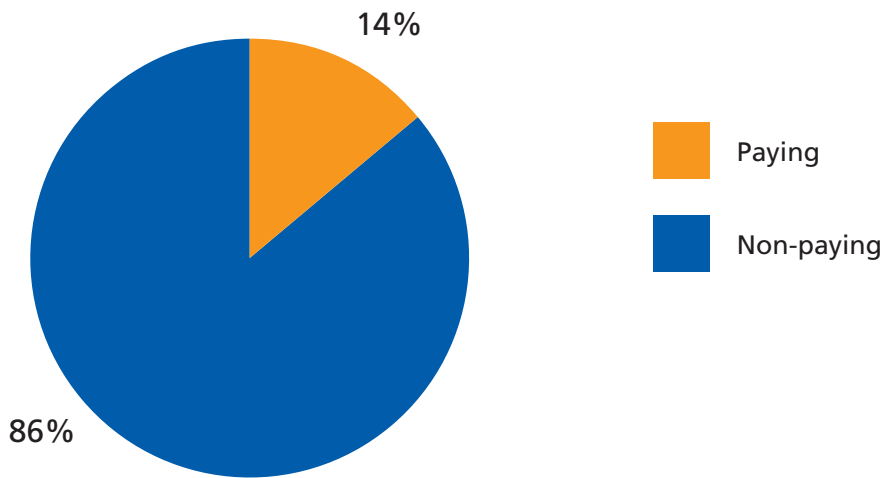


This question ascertains the major public sector and private sector data partners. Respondents were allowed to indicate their top three choices. Central government was the primary partner, with other government agencies and local authorities respectively second and third. Trading funds which include Ordnance Survey, UK Hydrographic Office, HM Land Registry and Registers of Scotland, surprisingly, accounted for only 11% of the total.

Partners and partnerships are defined by two organisations agreeing to exchange data either at no cost or for an agreed amount of money.

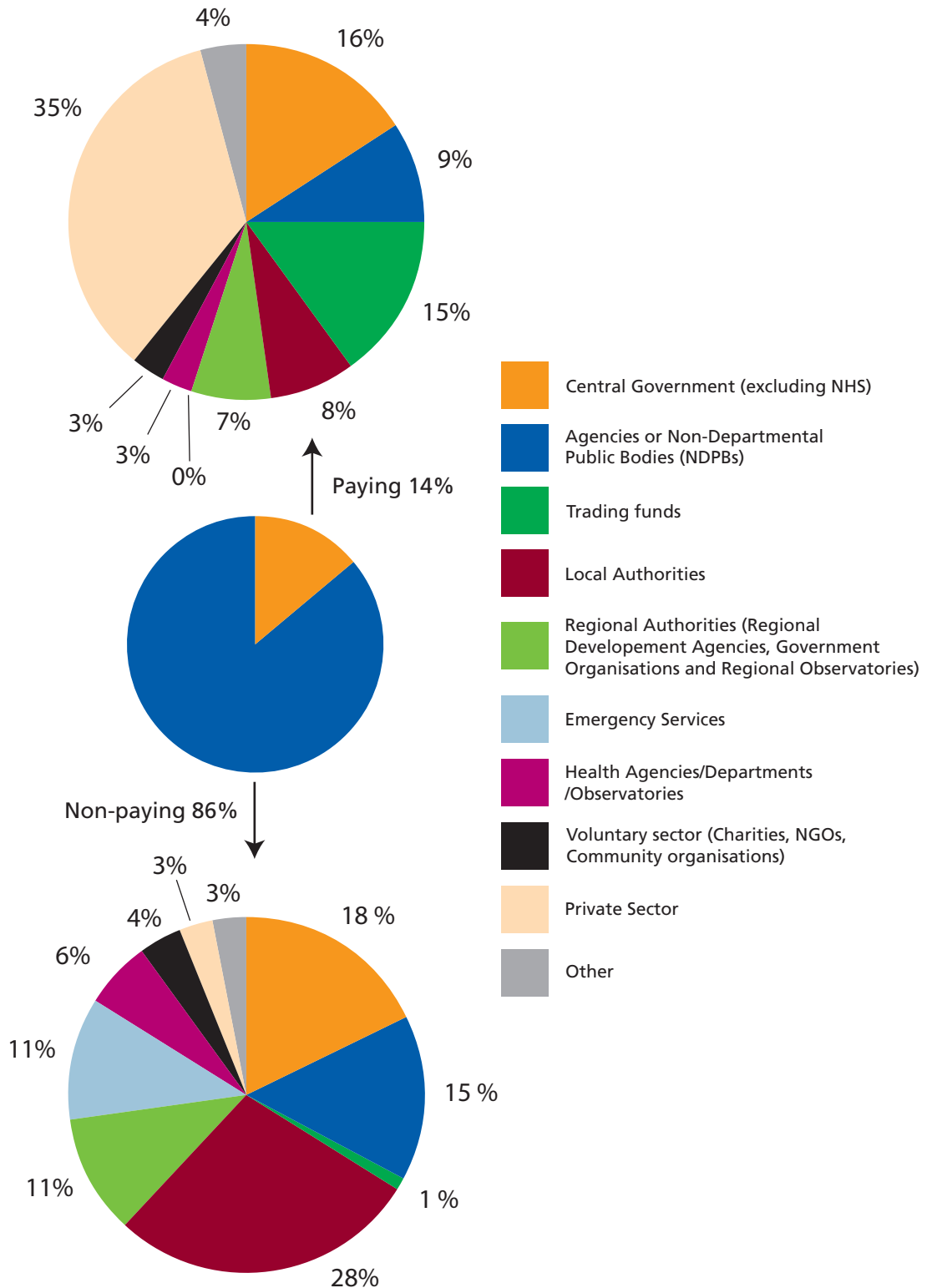
5.8. B8. For each of your above top three agencies, please indicate whether you pay for the data or if there is a mutual arrangement which involves no financial transaction.

Fig 8. Data sharing partners; pay or non-paying



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Fig 9. Data partners where data is purchased or not purchased



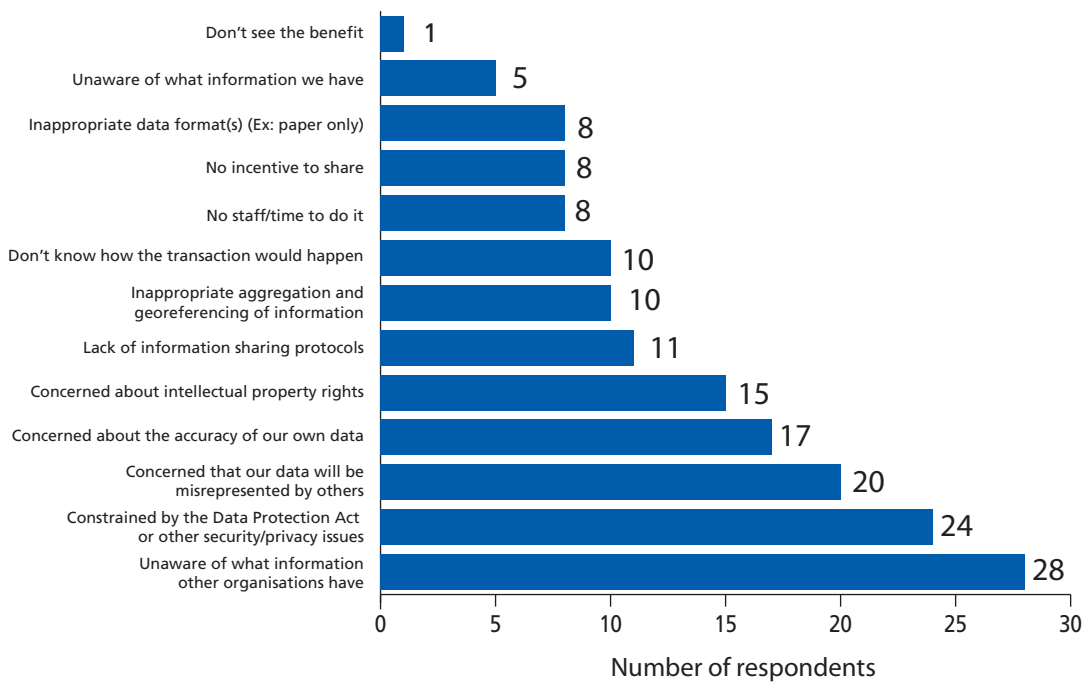
The majority of existing data sharing projects are on a non-paying basis, presumably quid pro quo. As could be anticipated, of the paid for data, the private sector represents 35% of the total. Nevertheless, this is still a small amount as compared to the total data sharing projects in operation.

5.9. B9: If you don't share data across the public sector, please indicate all reasons why.

This question allowed the respondents to indicate any reasons which they perceived as barriers to data sharing. Multiple responses were allowed. The lack of knowledge of the data being created and held by other organisations was by far (28 respondents – 17%) the primary reason data was not being shared.

Overwhelmingly, it is non-technical factors which respondents perceived as barriers to data sharing.

Fig 10. Barriers to data sharing



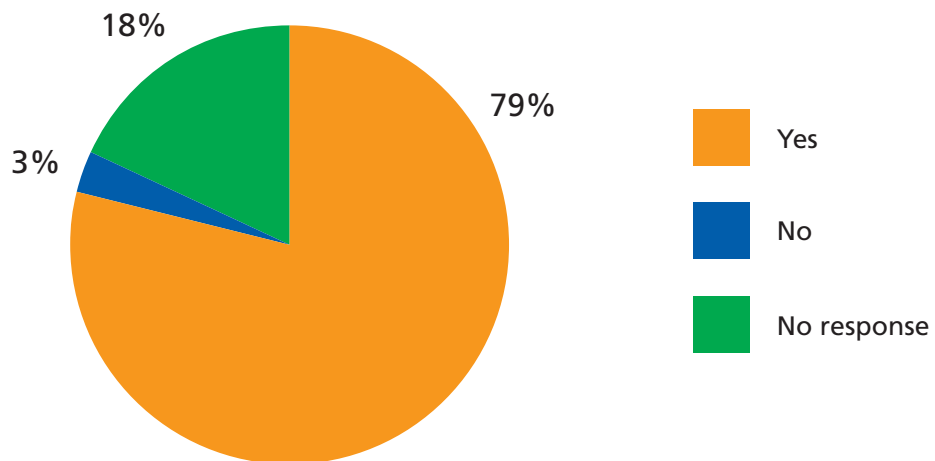
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Chapter Six: Take up and use of GIS

The following section assessed the take up and use of GIS. The results demonstrate that GIS technology is recognised as an essential tool in many areas of the public sector. The overwhelming majority of the respondents use GIS, although some did not complete this section.

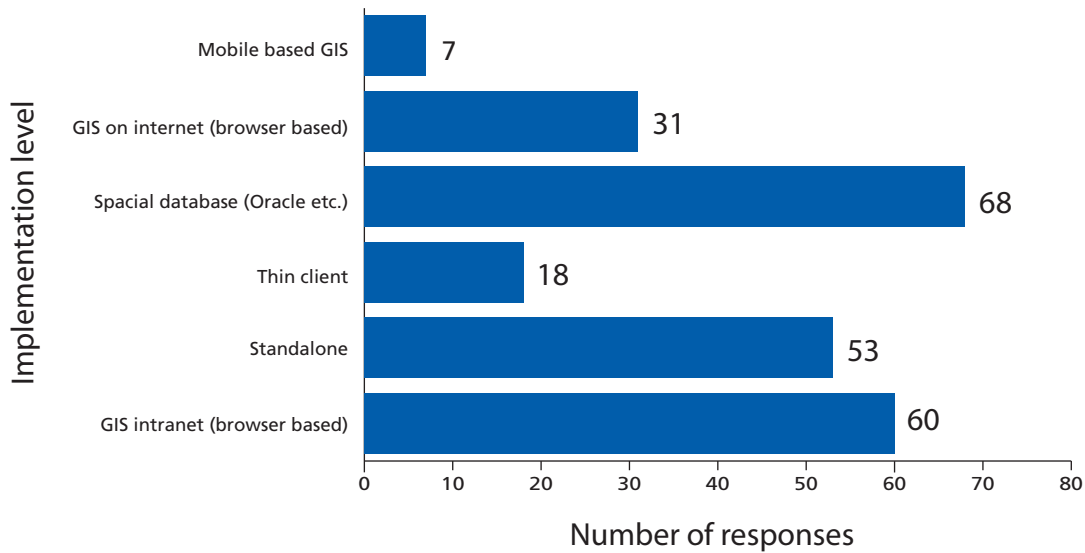
6.1. C1. Does your organisation currently use GIS?

Fig 11. Use of GIS



6.2. C2. If yes to C1, at what level of implementation.

This question determined the level of installation. Respondents were able indicate more than one response.

Fig 12. Implementation level of GIS

6.3. C3. If you answered no to C1, please tick all of the responses which describe your situation.

We once used GIS but found it was not useful or cost effective	0
We once used GIS, found it useful, but did not have sufficient funding to continue operations	0
We are not interested in GIS at this time	0
We are interested in GIS, but don't have the technical expertise to move forward	1
We are interested in GIS, but we do not have a cogent business case for moving forward	1
We need more information on GIS, before we can make a decision	1
Other	5

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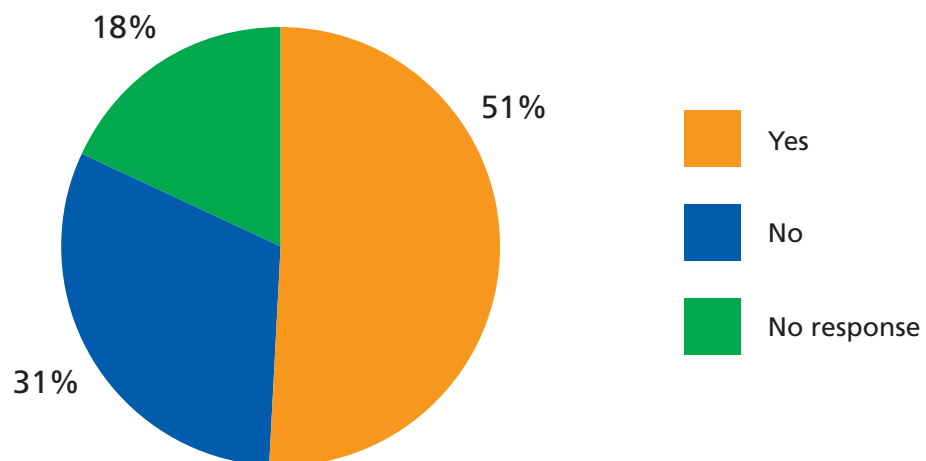
6.4. C4. Can data from your system be exported in XML (Extensible Markup Language) or a variant of XML (eg GML).

This question was a generalised assessment of eGIF (e-Government Interoperability Framework) compliance. A Key Policy of the eGIF is:

Adoption of XML as the primary standard for data integration and data management for all public sector organisations.

*e-Government Interoperability Framework
Version 6.1, 30 April, 2005
Page 5. 'Key Policies'*

Fig 13. System support for XML

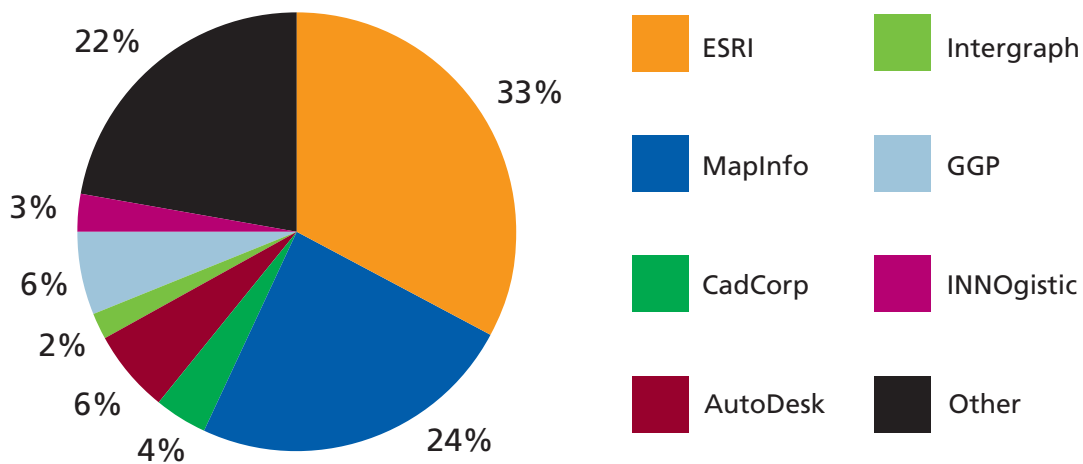


51% of the respondents have systems which support or output XML.

6.5. C5. Which system do you use.

This question listed the major commercial vendors of GI systems and queried the current systems in use by the respondents.

Fig 14. Geographic Information Systems in use



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Chapter Seven: Metadata and Standards

Intrinsic to implementation of the e-Government Interoperability Framework is the concept of metadata and its use for information retrieval. The eGIF states that a key policy is:

the addition of metadata to government information resource

*e-Government Interoperability Framework
Version 6.1, 30 April, 2005
Page 5. 'Key Policies.'*

As set out in the e-Government Metadata Standard, version 3.0, metadata is necessary for managing and retrieving information of all kinds, and for metadata to be effective, it needs to be "structured and consistent across organisations." Therefore, standard(s) are necessary.

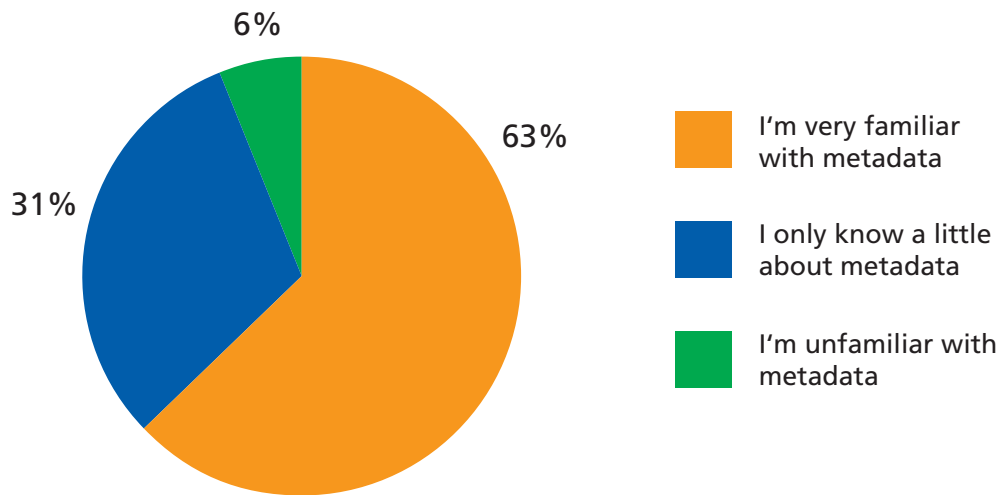
Section D was created to assess and measure current awareness and use of metadata. A number of studies have established that although the value of geospatial data is recognised by both government and society³, the effective use of the data is inhibited by poor knowledge of the existence of data, poorly documented information about the data sets and data inconsistencies.⁴ Given the dynamic nature of geospatial data in a networked environment metadata is an essential requirement for locating and evaluating available data.

³ *The Principles of Good Metadata Management*, The Intra-governmental Group on Geographic Information, 2nd edition, May, 2004, Office of the Deputy Prime Minister, London.

⁴ *Independent Review of the Sustainability of a UK Metadata Service for Geographically Related Information*, version 1.1, November, 2004.

7.1. D1. Are you familiar with metadata?

Fig 15. Familiarity with metadata

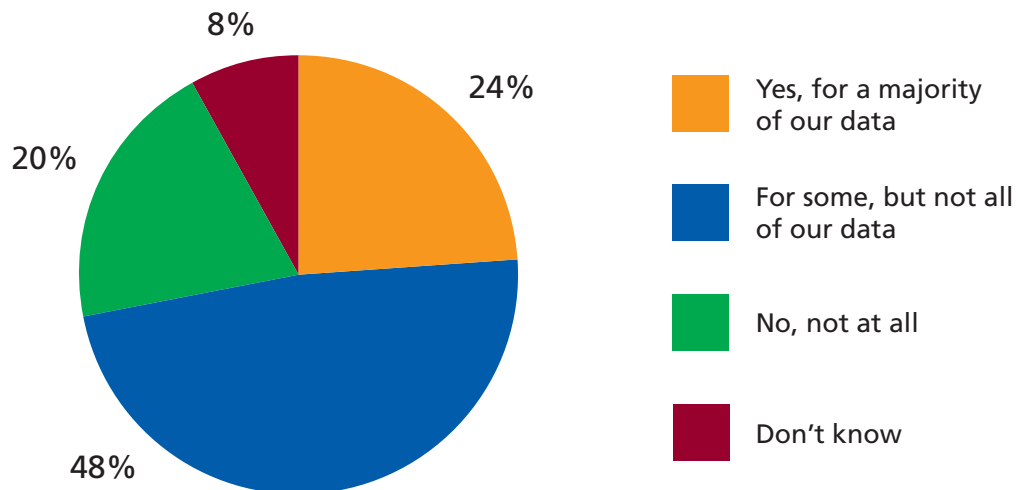


63% of respondents consider themselves to be very familiar with metadata, with 31% being familiar. Only 6% of the respondents are unfamiliar with metadata.

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7.2. D2. Does your organisation create geospatial metadata and/or maintain metadata?

Fig 16. Organisational creation and maintenance of metadata



72% of the organisations responding already create metadata. 24% create metadata for most of their data sets and 48% create metadata for some of their data. This indicates that organisational processes and workflow are already in place for the creation of metadata. Only 20% of the respondents create no metadata at all.

Referring again to Figure 3 and the above Figure 16, although 72% of the respondents create metadata, only 49% of the respondents reported to be engaging in data sharing projects.

7.3. D3. If your organisation creates geospatial metadata, what metadata format/standard do you use

In this question, respondents who had responded to question D2 with either the answer of Yes, for a majority of our data or, for some but not all of our data, were requested to answer question D3.

Ideally, metadata structures and definitions should be referenced to a standard. Interoperability is dependent upon solid, consultative based standards.

Fig 17. Metadata Standard used

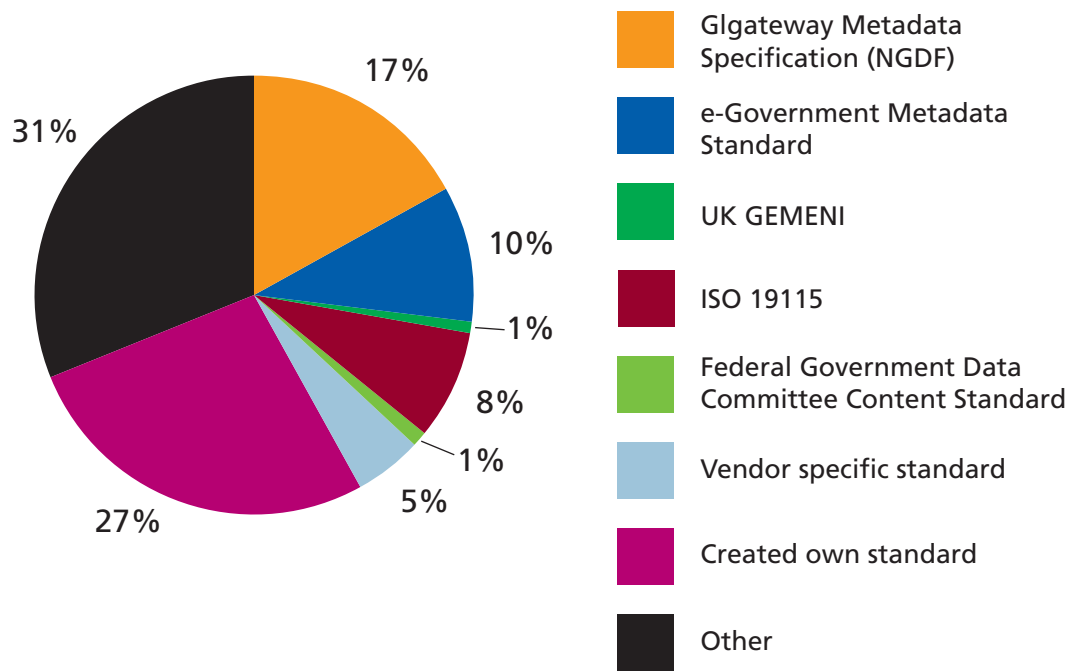


Table of results:

1. Other	47	31%
2. Created own standard	41	27%
3. Gigateway Metadata Specification (NGDF)	27	17%
4. e-Government Metadata Standard	16	10%
5. ISO 19115	13	8%
6. Vendor specific standard	8	5%
7. UK GEMINI	2	1%
8. Federal Government Data Committee Content Standard	2	1%

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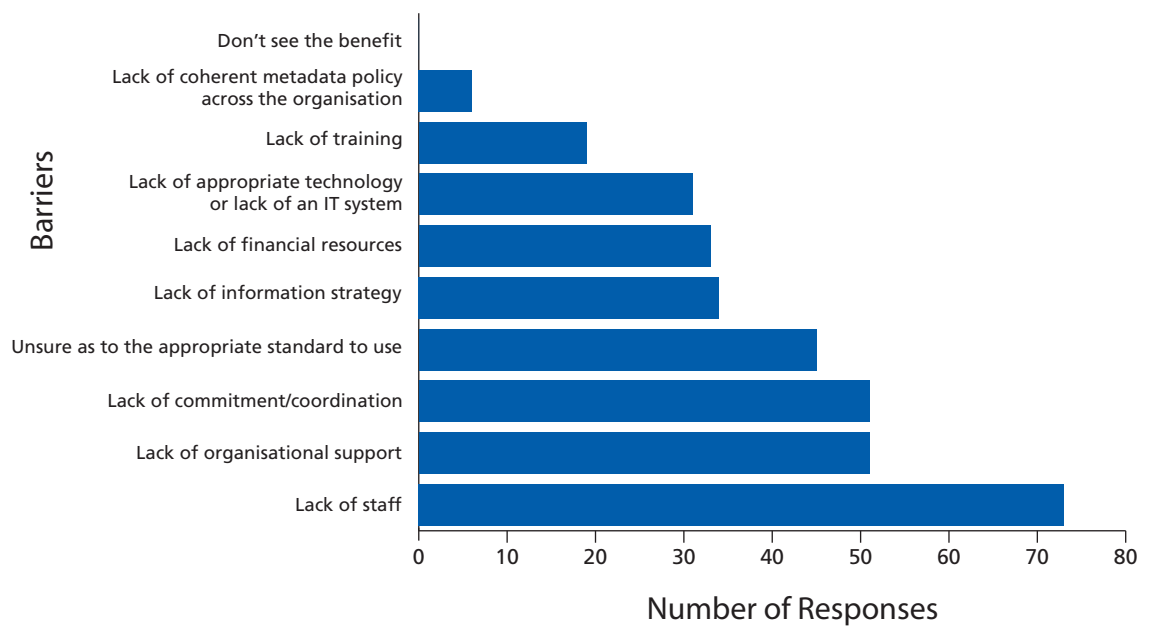
The results of this question are very concerning and are indicative of a confusing standards environment.

With 31% of the respondents stating that they use some 'other' metadata standard and 27% saying that they had created their own 'standard', there is still considerable work to be done before there is universal acceptance and conformance to a basic geospatial metadata standard.

7.4. D4. What are the barriers to your creation and maintenance of geospatial metadata?

Respondents who had answered question D2 with No, not at all, were requested to skip to D4 in order to register their barriers to metadata creation. They were allowed to tick all that applied.

Fig 18. Barriers to metadata creation



1. Lack of staff	18	22%
2. Lack of organisational support	17	22%
3. Lack of commitment/coordination	17	22%
4. Unsure as to the appropriate standard to use	9	12%
5. Lack of information strategy	8	10%
6. Lack of financial resources	2	3%
7. Lack of appropriate technology or lack of an IT system	3	4%
8. Lack of training	0	0%
9. Lack of a coherent metadata policy across the organisation	4	5%
10. Don't see the benefit	0	0%

This question allowed multiple responses. No respondent offered a response indicating No Benefit. No respondent noted a lack of training as a barrier. However lack of staff, lack of organisational support and lack of commitment/coordination shared top barrier status at 22%. This may indicate a lack of articulation of the benefits of metadata at the levels where resource is allocated. There is also some continuing uncertainty about standards.

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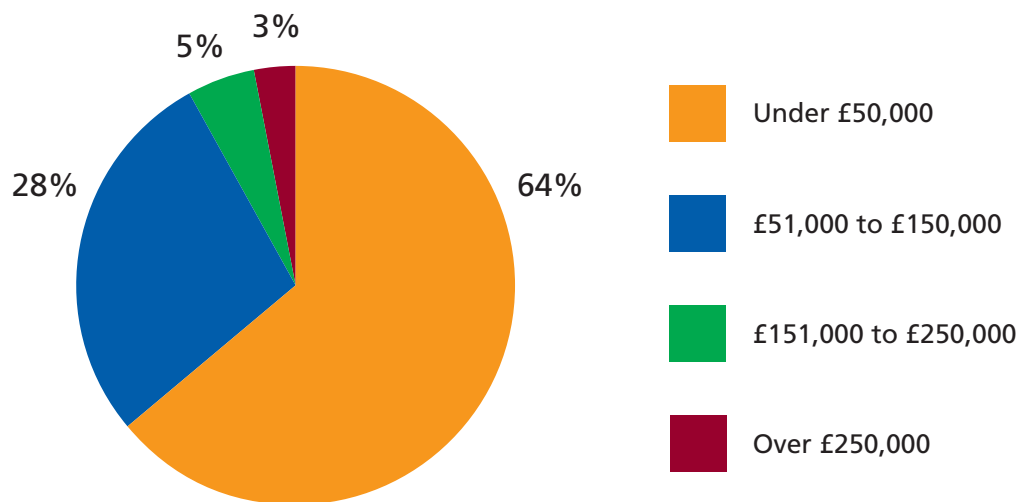
Chapter Eight: Technology and Investment

This section was a broadly based assessment of the responding organisations' investment in GIS technology.

These questions assess the current investments in both GIS and data procurement. These questions were non-mandatory to the completion of the questionnaire.

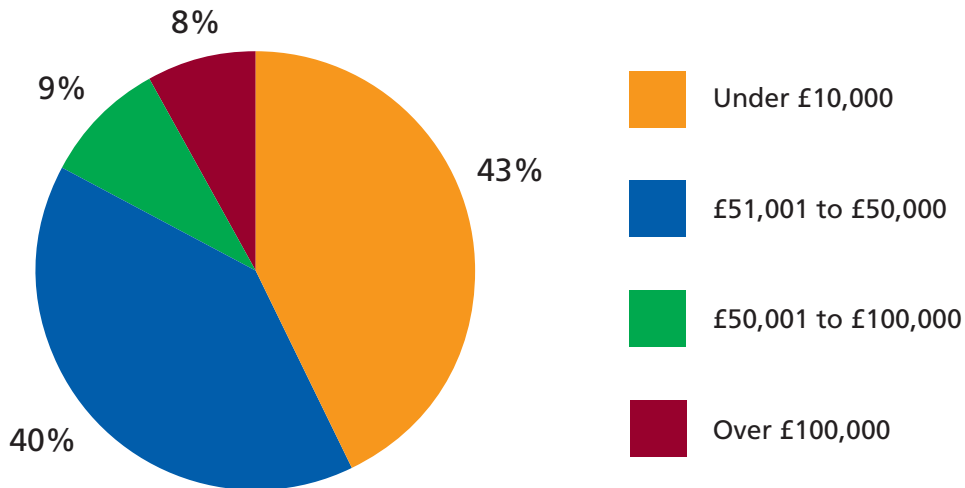
8.1. E1: Initial capital investment (invested within the last 2 years): Defined as Hardware/infrastructure and software:

Fig 19. Initial Capital Investment in GIS



8.2. E2. Annual maintenance: Defined as hardware/infrastructure and software

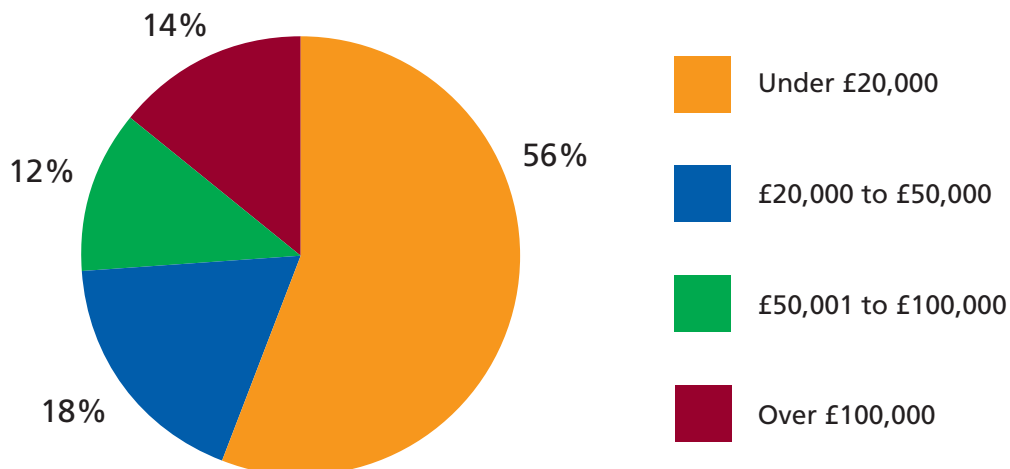
Fig 20. Annual Maintenance Costs



8.3. E3. Data procurement and data licensing (annual costs)

Costs associated with collecting and maintaining geographically referenced data and systems appear more significant than capital investment.

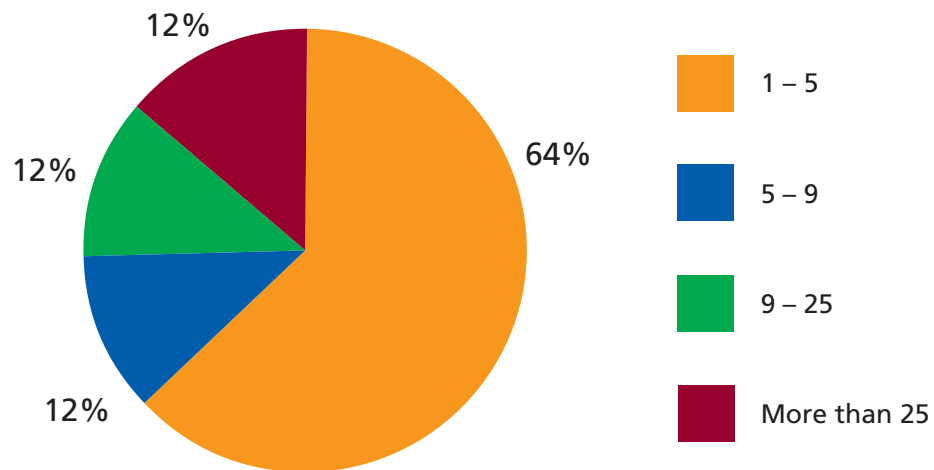
Fig 21. Data procurement and licensing annual costs



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8.4. E4. GIS Personnel (number of staff)

Fig 22. GIS Personnel



The results here are very similar to the above. GIS is just beginning to be seen as integral to the delivery of e-government services.

Chapter Nine: Other comments

Section F:

This section was a free text section which allowed respondents to offer observations/reactions which arose from completing the questionnaire. Answers included:

- “A data sharing community would be a logical development exploiting the benefit of government’s being able to share data under the terms of the local and central government OS agreements.”
- GIS is used within a Health Informatics Service mainly “to produce thematic maps of prevalence, demographics, registered patients and similar information”.
- “Currently there is no corporate GIS strategy or co-ordination. However, the authority is currently investigating the possibility of establishing a corporate GIS and research team.”
- “One of the main barriers to information exchange is data integrity, especially in terms of potential legal liability. An example would be if incomplete data on a land parcel was provided to us and this land was later discovered to be contaminated in some way after it had been sold.”
- [name of organisation] makes use of large amounts of data supplied by other government departments and agencies and in turn supplies some of its own data to them. This is currently all done under licences (including Ordnance Survey [OS] Derived Data licences) which have to be managed and impose a significant administrative burden on all involved. “Would it be possible to create something similar to the OS Pan Government Agreement for other government data for sharing across government? – at least for a range of core and frequently used data?”
- [name of organisation] is currently in a transitional period moving from a completely standalone setup to a more corporate setup. Recently formed a corporate ‘GIS group’ of which there are now a ‘PAI subgroup’ and a ‘GIS Standards and Strategy subgroup’. Also investigating the use of GIS on the Internet and an Intranet based solution to further the role of GIS throughout the Authority.
- “The metadata needs to be collected when overlays are created by users a requirement which the software needs to support this requirement. This topic has been raised at GGP [a *commercial GIS system*] user groups over the last two years. GML Import/Export needs to be provided. GML should be used in preference to proprietary formats. Inter-operability Government units should be encouraged to adopt OGS standards. With data held in OGS

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databases, GIS software could be sourced from various suppliers ensuring functionality matches requirements and best value is achieved. Organisations need not be tied in to one supplier.”

- “Our organisation does not currently originate any GI or geographically referenced statistical data, but relies on availability and accessibility of such data by Government departments and others. Often, the bar to use of GI and mapping is not down to lack of statistical data availability (mostly through ONS), but issues with availability and use of organisational boundary information, i.e. GI that does not form part of the PGA. With a UK-wide customer base, the lack of availability in the PGA of data for Northern Ireland, and the pricing structure for its addition, is a major issue.”
- “We are pleased to see this survey happening. A next step in this process would be to determine how the GIS was actually being used, which datasets are being combined, which are statistically integrated and which simply act as backgrounds. Other pertinent questions would be what kind of GIS operations are being applied to different datasets i.e. are the datasets being produced at the relevant scale/format for their use.”
- “Making data accessible and standardising formats is only worthwhile if the information is being used appropriately. The biggest problem facing data integration is incompatible data.”
- “Most of the barriers to data sharing within Councils or other organisations are organisational rather than technical. have made quite a number of property based databases available via intranet to maintenance staff and management who remarked that they felt very empowered to be able to check/interrogate/access this data, which had been previously only available on maps to them.”
- “Application of GIS in [*name of organisation*] has many in the service who recognise its potential value. But is seriously under-developed due to lack of coordination/financial support from central government unlike in local authorities and also absence of any [*name of organisation*] pan-license agreement with OS.”
- “Major investment in Mapinfo over 2 years ago with 70 Mapinfo professional seats, MapXtreme for Intranet/Internet work, and Spatialware for storing geospatial data. Also looking at ‘Exponare’, a Mapinfo product to allow integration with the .Net framework. By the end of 2005 we should have a lot of council data displayed on the website. There are few technical problems with GIS. It’s a resource problem. In an ideal world there would be a ‘data controller’ and another analyst/programmer, making a team of three.”

Chapter Ten: Conclusions

“Currently, data tends to be held by those that create it rather than those who need it.”

The high number of replies we received (207 replies from central and local government, agencies and others) indicates that there is strong interest and concern in geospatial data issues across the UK public sector.

Unsurprisingly, most respondents' data sets include geographical names and administrative units (Figure 5). These are key factors in sharing and comparing data, and in using data to help provide localised services to citizens. It is not clear from our results whether organisations are using standard names and units, or inventing their own, nor is it clear if a lack of standardisation is leading to data sharing problems.

Respondents expressed a clear desire for greater awareness as to existing datasets and for avenues for sharing this information. An encouraging 49% were taking part in some sort of data sharing project. This indicates that they are aware of the advantages and have overcome any technical difficulties to data sharing. It was beyond the scope of this survey to determine the gains of increasing this figure, not only in terms of cost savings but in terms of improved quality, breadth and depth of the resulting data sets.

Much data is generated locally (Figure 6), as part of each organisation's normal business activities. A great deal (14%) is also purchased.

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Recently the Office of the Deputy Prime Minister has created a cross sector panel to advise on issues pertaining to geographic information. The Terms of Reference for this GI Panel are:

- To identify the key medium to long-term geographic information issues and advise Government through regular short reports to Ministers;
- To encourage more effective, extensive and systematic use of geographic information, led by the example of Government Departments and other public bodies where appropriate;
- To facilitate a co-ordinated position on potential legislation, both national and international, that might impact on the geographic information market;
- To promote a coherent approach to the management of geographic information in the United Kingdom.

It is hoped that the findings in this report will assist in the deliberations of the Panel.

Appendices

Appendix 1

Survey Methodology: Data Processing and Analysis

In order to collect the answers to completed surveys, a website was constructed based around the 6 sections of the survey. Each section contained an HTML form that allowed users to enter their answers through their web browser. Each form consisted of several questions, using a variety of data input devices (eg: input boxes, radio buttons, check boxes etc), chosen depending on the nature of the information being collected.

Upon submission of each form, the submitted data was validated to ensure that all questions were being answered appropriately. If the data did not validate, the user was informed of the problem and allowed to try again. This processing was performed using Microsoft Active Server Pages, written in VBscript.

Once validated, answers were stored in a SQL Server 2000 database. Each attempt at the survey was stored in an individual database record. Each record contained one field per question in the survey, plus several metadata fields to store information about the submission, such as date and time.

The final report consisted of retrieving all records from the database, and collating basic statistics such as the number of successful submissions.

Answers to questions were lodged in an Excel spreadsheet. This spreadsheet was converted to an Access database from which the actual analysis was derived.

The online survey was published on the GovTalk website and was accessible via a URL. The website was housed and maintained by Clark McKay and Walpole and we worked very closely with their technical team to ensure that the functionality of the survey was optimum. The questions themselves were quite complex with multiple dependencies and variables.

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Appendix 2

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Appendix 3

CabinetOffice



e-Government Unit
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Geospatial Information Survey

Terms of Reference

Geographic Information is central to the delivery of electronic government. It touches upon every aspect of life and serves as a common thread that can join up diverse information.

Geographic Information (GI) is any data or information resource which has a geographic reference, e.g. data that can be displayed on a map, statistics that cover a given location, or a report about a named town. It has been estimated that about 80% of public sector information falls into this category.

GI is used in planning, monitoring pollution and land use, dispatching of emergency services, analysing crime, joining up services and much, much more. Good GI enables government to compare data from multiple sources, to enhance the decision making process and support evidence based policy making.

The e-Government Unit of the Cabinet Office is charged with improving the delivery of public services by joining up electronic government services applications and in particular for ensuring the interoperability of public sector IT systems.

The GI Survey will reveal the scope/use of and investment in GI systems in the UK public sector and the potential for improved interoperability and data sharing.

Primary Objectives:

- To assess the current penetration and use of Geographic Information Systems;
- To ascertain the barriers to GIS take-up;
- To ascertain the extent of data use, data creation and information sharing;
- To ascertain the extent of metadata creation across the public sector and the standards being used;
- To assess compliance of current systems with the e-Government Interoperability Framework (e-GIF);
- To assess the current investment in GI systems;
- The final project report will analyse and report these findings and make recommendations for future work;
- Final report will be published next spring.

Appendix 4

Geospatial Information Survey

e-Government Unit

Cabinet Office

The purpose of this questionnaire is to assess the expansion of geographic information systems and the degree of interoperability and information sharing.

Definition:

A Geographic Information System (GIS) is a system to capture, store, manipulate, and graphically present geographic information of all kinds. A GIS allows users to query, analyse and model spatially referenced data, as well as integrate different kinds of location based information.

Instructions: The survey consists of 37 questions, divided into five sections. Each section will be completed separately although you will have the option of returning to previous questions in order to change answers if necessary. You will also have the opportunity to provide suggestions and comments at the close of the questionnaire. Please complete this online survey by 31 December, 2004 and submit as directed.

Section A:

Contact information of the person filling out the survey and the government department/organisation:

A1. Type of organisation you represent:

Local

Central

Other

A2. Does your response cover your entire organisation or just your section:

Entire organisation

Section

A3. Name:

A4. Job title:.....

A5. Organisation:.....

- A6.** Section:
- A7.** Address:
- A8.** City:.....
- A9.** Postal Code:
- A10.** Telephone number:.....
- A11.** Email address:.....
- A12.** Web site URL:
- A13.** Number of people employed by this organisation (*both full and part time*):.....

The primary contact for GIS implementation (if different from above) is:

- A14.** Name:.....
- A15.** Phone number:.....
- A16.** Email address:.....

Section B: Data Use

B1. Are you currently participating in a GI based data sharing project:

- Yes
- No

B.2. If yes, please specify the type of GI based data sharing project(s):

.....

.....

.....

B3. Do you use geographic data from (Please indicate all that apply):

- Ordnance Survey
- Office of National Statistics
- Local Government Information House (LGIH)
- National Land and Property Gazetteer
- Environment agency
- Land Registry
- UK Hydrographic Office

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- British Geological survey
- Office of the Deputy Prime Minister (ODPM)
- Private sector resellers (Getmapping etc.)
- Other public sector organisations: Please specify.....
- Other sources of data:.....
- B4.** Please indicate all of those areas covered by your datasets:⁵
- Coordinate referenced systems
- Geographical grid systems
- Geographical names
- Administrative units
- Transport networks
- Hydrography
- Protected sites
- Elevation
- Identifiers of properties
- Land registration parcels (cadastral parcels)
- Land cover
- Orthoimagery
- Statistical units
- Buildings
- Soil
- Geology
- Land use
- Human health and safety
- Government service and environmental monitoring facilities
- Production and industrial facilities
- Agricultural and aquaculture facilities

⁵ From: *Proposal for a Directive of the European Parliament and of the Council Establishing an infrastructure for S-patial Information in the community (INSPIRE)*, 23 July, 2004, Annex I, II, III.

- Population distribution – demography
- Area management/restriction/regulation zones
- Natural risk zones
- Atmospheric conditions
- Meteorological geographical features
- Oceanographic geographical features
- Sea regions
- Bio-geographical regions
- Habitats and biotopes
- Species distribution

B5. Are you currently conducting any major geospatial data gathering or data creation activities?

- Yes
- No

B6. If yes, please specify:

B7. What organisations are your major partners in data sharing (please indicate the top three):

- Central Government (excluding NHS)
- Agencies or Non-Departmental Public Bodies (NDPBs)
- Trading funds
- Local Authorities
- Regional Authorities (Regional Development Agencies, Government Organisations and Regional Observatories)
- Emergency services
- Health Agencies/Departments/Observatories
- Voluntary sector (Charities, NGOs, Community organisations)
- Private sector
- Other

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B8. For each of your above top three agencies, please indicate whether you pay for the data or if there is a mutual arrangement which involves no financial transaction.

Central Government (excluding NHS)	Pay <input type="checkbox"/>	don't pay <input type="checkbox"/>
Agencies or Non-Departmental Public Bodies	Pay <input type="checkbox"/>	don't pay <input type="checkbox"/>
Trading funds	Pay <input type="checkbox"/>	don't pay <input type="checkbox"/>
Local Authorities	Pay <input type="checkbox"/>	don't pay <input type="checkbox"/>
Regional Authorities	Pay <input type="checkbox"/>	don't pay <input type="checkbox"/>
Emergency services	Pay <input type="checkbox"/>	don't pay <input type="checkbox"/>
Health Agencies/Departments/ Observatories	Pay <input type="checkbox"/>	don't pay <input type="checkbox"/>
Voluntary sector (Charities, NGOs, Community organisations)	Pay <input type="checkbox"/>	don't pay <input type="checkbox"/>
Private sector	Pay <input type="checkbox"/>	don't pay <input type="checkbox"/>
Other	Pay <input type="checkbox"/>	don't pay <input type="checkbox"/>

B9. If you don't share data across the public sector, please indicate all reasons why (tick all which apply):

- No incentive to share.....
- Concerned about intellectual property rights
- Constrained by the Data Protection Act or other security/privacy issues
- No staff/time to do it.....
- Unaware of what information we have
- Unaware of what information other organisations have
- Don't know how the transaction would happen.....
- Inappropriate data format(s) (For example: paper only).....
- Concerned about the accuracy of our own data.....
- Concerned that our data will be misrepresented by others
- Lack of information sharing protocols.....
- Inappropriate aggregation and georeferencing of information.....
- Don't see the benefit.....

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Section C: Geographic Information Systems

A Geographic Information System (GIS) is a system to capture, store, manipulate, and graphically present geographic information of all kinds. A GIS allows users to query, analyse and model spatially referenced data, as well as integrate different kinds of location based information.

C1. Does your organisation currently use GIS?

Yes

No

C2. If yes to C1, at what level of implementation:

GIS intranet (browser based).....

Standalone

Thin client

Spatial database (Oracle etc.).....

GIS on internet (browser based)

Mobile based GIS

C3. If you answered no to C1, please tick all of the responses which describe your situation:

We once used GIS but found it was not useful or cost effective

We once used GIS, found it useful, but did not have sufficient funding to continue operations.....

We are interested in GIS, but we do not have a cogent business case for moving forward....

We are interested in GIS, but don't have the technical expertise to move forward.....

We need more information on GIS, before we can make a decision.....

We are not interested in GIS at this time

Other (*please specify*):

C4. Can data from your system be exported in XML (Extensible Markup Language) or a variant of XML (eg GML)?

Yes

No

C5. Which system do you use:

ESRI

MapInfo

CadCorp

AutoDesk

Intergraph

GGP

INNOgistic

Other: please indicate:.....

.....

.....

.....

Section D: Geospatial Metadata Awareness and Use

D1. Are you familiar with metadata (i.e. what it is; what it used for; why it is important)?

I'm very familiar with metadata

I only know a little about metadata

I'm unfamiliar with metadata

D2. Does your organisation create geospatial metadata and/or maintain metadata?

Yes, for a majority of our data (*continue with question D3*)

For some, but not all of our data (*continue with question D3*)

No, not at all (*skip to question D4*)

Don't know

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D3. If your organisation creates geospatial metadata, what metadata format/standard do you use?

- Glgateway™ Metadata Specification (NGDF)
- e-Government Metadata Standard
- UK GEMINI
- ISO 19115
- Federal Government Data Committee Content Standard
- Vendor specific standard.....
- Created own standard.....
- Other
-
-

D4. What are the barriers to your creation and maintenance of geospatial metadata? *(Please tick all that apply)*

- Lack of staff
- Lack of training
- Lack of a coherent metadata policy across the organisation.....
- Lack of organisational support.....
- Unsure as to the appropriate standard to use
- Lack of financial resources
- Lack of appropriate technology or lack of an IT system which allows metadata creation
- Lack of information strategy
- Lack of commitment/coordination
- Don't see the benefit.....

Section E: Financial and human resource investment

GIS involves four major levels of investment. Please indicate your organisation's investment in each of these four areas:

E1. Initial capital investment (*invested within the last 2 years*)

Hardware/infrastructure and software:

- Under £50,000
- £51,000 to £150,000
- £151,000 to £250,000
- Over £250,000

E2. Annual maintenance

- Hardware/infrastructure and software
- Under £10,000
- £10,001 to £50,000
- £50,001 to £100,000
- Over £100,000

E3. Data procurement and data licensing (*annual costs*)

- Under £20,000
- £20,000 to £50,000
- £50,001 to £100,000
- Over £100,000

E4. GIS Personnel (*number of staff*)

- 1-5
- 5-9
- 10-25
- More than 25

Appendix 5

Responding Organisations*

Aberdeen City Council

Advantage West Midlands

Angus Council

Argyll and Bute Council

Ashfield District Council

Audit Commission

Barnsley MBC

Basingstoke & Deane Borough Council

Bath & North East Somerset Council

BBC

Berkshire Unitary Authorities Joint Strategic

Big Lottery Fund

British Geological Survey

British Waterways

Bromsgrove District Council

Buckinghamshire County Council

Burnley Borough Council

Caerphilly CBC

Calderdale and Huddersfield Health Informatics Service

Cambridgeshire Constabulary

Cambridgeshire County Council

Cambridgeshire Police

Carmarthenshire County Council

Centre for Ecology and Hydrology

Centrex

Cheltenham Borough Council

City of Edinburgh Council

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Cleveland Police	English Heritage
Colchester Borough Council	English Nature
Communities Scotland	English Partnerships
Conwy County Borough Council	Epping Forest District Council
Cornwall County Council	Epsom and Ewell Borough Council
Coventry City Council	Falkirk Council
Crofters Commission	Fisheries Research Services
Croydon Council	Glasgow City Council
Cumbria Constabulary	Gloucester City Council
Dartmoor National Park	Government Office for London
Daventry & South Northants PCT	Greater London Authority
Defence Analytical Services Agency (DASA)	Greater Manchester Police
Defence Estates, Ministry of Defence	General Register Office for Scotland (GROS)
Defra	Hampshire County Council
Department for Constitutional Affairs	Harborough District council
Department for Social Development (NI)	Highland Council
Department for Transport	Highways Agency
Department of Health	Historic Scotland
Derbys Police	House of Commons Library
Devon Fire and Rescue Service	Inland Revenue
DfES	Inverclyde Council
District of Bolsover	Isle of Wight Council
East Ayrshire Council	Lancaster City Council
East Lothian Council	Land Registry
East Staffordshire Borough Council	Leeds City Council
East Sussex County Council	Legal Services Commission
Eastern Region Public Health Observatory	Leicester City Council
East of England Regional Assembly (EERA)	Leicestershire Fire & Rescue Service
Ellesmere Port & Neston Borough Council	Lewes District Council
Elmbridge Borough Council	Local Government Data Unit – Wales

London Borough of Croydon, Dept of Social Services	Nottinghamshire County Council
London Borough of Ealing	Nottinghamshire Police
London Borough of Hackney	Nuneaton and Bedworth Borough Council
London Borough of Wandsworth	Office for National Statistics
Macaulay Institute	Office of government Commerce
Maldon District Council	Office of the Deputy Prime Minister
Manchester City Council	Ordnance Survey
Maritime & Coastguard Agency	Oxford City Council
Medway Council	Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS)
Middlesbrough Council	Renfrewshire Council
Midlothian Council	Rochdale MBC
Mole Valley District Council	Rossendale Borough Council
National Assembly for Wales	Rotherham MBC
National Services Scotland	Royal Berkshire Fire & Rescue Service
Northeast Regional Information Partnership (NERIP)	Royal Borough of Windsor and Maidenhead
Newark and Sherwood District Council	Royal Botanic Garden Edinburgh
Newport City Council	Scottish Crop Research Institute
Norfolk County Council	Scottish Enterprise
Norfolk County Council – P&T	Scottish Executive
North Ayrshire Council	Scottish Natural Heritage
North Dorset District Council	South East Public Health Observatory (SEPHO)
North East Lincolnshire Council	Sevenoaks District Council
North Herts District Council	Shropshire County PCT
North Lincolnshire Council	Shropshire Fire and Rescue Service
North Wiltshire District Council	Slough Borough Council
Northampton Borough Council	Snowdonia National Park Authority
Northern Ireland Statistics Research Agency	South East England Development Agency
Norwich City Council	South Gloucestershire Council
Nottingham City Council	South Manchester PCT

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South Oxfordshire District Council	Tyne and Wear Research and Information
South Yorkshire PTE	UK Climate Impacts Programme
Staffordshire County Council	Wakefield MDC
Staffordshire Moorlands District Council	Warrington Borough Council
Staffordshire Police	Warwickshire County Council
State Veterinary Service	Warwickshire Habitat Biodiversity Audit
Stirling Council	Warwickshire Police
Stockport PCT	West Devon Borough Council
Strathclyde Passenger Transport	West Lothian Council
Strathclyde Police	West Midlands Cancer Intelligence Unit
Suffolk County Council	West Midlands Fire Service
Surrey and Sussex Strategic Health Authority	West Midlands Public Health Observatory
Surrey County Council	West Sussex County Council
Sussex Police	West Yorkshire Fire and Rescue Service
Tandridge District Council	West Yorkshire Fire Service
Taunton Deane Borough Council	Western Isles NHS Board
Tees Valley Joint Strategy Unit	Wiltshire Fire Brigade
Thurrock Council	Wiltshire Police
Torbay Council	Worcestershire County Council
Torridge District Council	Yorkshire Forward

*Please note: In some cases there was more than one person responding from an organisation

Appendix 6

Aggregated Data of Survey Questions

A1. Type of organisation you represent:

Local	135
Central	44
Other	28

A2. Does your response cover your entire organisation or just your section:

Entire organisation	135
Section	72

B1. Are you currently participating in a GI based data sharing project:

Yes	100
No	71
Blank	36

B3. Do you use geographic data from *(Please indicate all that apply)*:

1. Ordnance Survey	166
2. Office for National Statistics	114
3. Local Government Information House (LGIH)	35
4. National Land and Property Gazetteer	66
5. Environment Agency	6
6. Land Registry	32
7. UK Hydrographic Office	26
8. British Geological Survey	53
9. Office of the Deputy Prime Minister (ODPM)	45
10. Private sector resellers (Getmapping etc.)	37
11. Other public sector organisations	70

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B4. Please indicate all of those areas covered by your datasets

1. Coordinate referenced systems	139
2. Geographical grid systems	132
3. Geographical names	158
4. Administrative units	158
5. Transport networks	115
6. Hydrography	84
7. Protected sites	106
8. Elevation	71
9. Identifiers of properties	115
10. Land registration parcels (cadastral parcels)	50
11. Land cover	75
12. Orthoimagery	72
13. Statistical units	111
14. Buildings	125
15. Soil	36
16. Geology	61
17. Land use	98
18. Human health and safety	41
19. Government service and environmental monitoring facilities	61
20. Production and industrial facilities	45
21. Agricultural and aquaculture facilities	28
22. Population distribution – demography	114
23. Area management/restriction/regulation zones	68
24. Natural risk zones	40
25. Atmospheric conditions	7
26. Meteorological geographical features	12
27. Oceanographic geographical features	7
28. Sea regions	10

29. Bio-geographical regions	21
30. Habitats and biotopes	51
31. Species distribution	37

B5. Are you currently conducting any major geospatial data gathering or data creation activities?

Yes	88
No	83
Blank	36

B7. What organisations are your major partners in data sharing (*please indicate the top three*)

1. Central government (excluding NHS)	75
2. Agencies or non-departmental public bodies (NDPBs)	59
3. Trading funds	11
4. Local authorities	52
5. Regional authorities (Regional Development Agencies, government organisations and regional observatories)	23
6. Emergency services	38
7. Health agencies/departments/observatories	18
8. Voluntary sector (charities, NGOs, community organisations)	7
9. Private sector	9
10. Other	10

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B8. For each of your above top three agencies, please indicate whether you pay for the data or if there is a mutual arrangement which involves no financial transaction.

	Pay	Don't Pay
1. Central government (excluding NHS)	12	81
2. Agencies or non-departmental public bodies (NDPBs)	7	68
3. Trading funds	11	5
4. Local authorities	6	125
5. Regional authorities (Regional Development Agencies, government organisations and regional observatories)	5	52
6. Emergency services	0	51
7. Health agencies/departments/observatories	2	27
8. Voluntary sector (charities, NGOs, community organisations)	2	20
9. Private sector	26	14
10. Other	3	13

B9. If you don't share data across the public sector, please indicate all reasons why (*tick all that apply*)

1. No incentive to share	8
2. Concerned about intellectual property rights	15
3. Constrained by the Data Protection Act or other security/privacy issues	24
4. No staff/time to do it	8
5. Unaware of what information we have	5
6. Unaware of what information other organisations have	28
7. Don't know how the transaction would happen	10
8. Inappropriate data format(s) (For example: paper only)	8
9. Concerned about the accuracy of our own data	17
10. Concerned that our data will be misrepresented by others	20
11. Lack of information sharing protocols	11
12. Inappropriate aggregation and georeferencing of information	10
13. Don't see the benefit	1

C1. Does your organisation currently use GIS?

1. Yes	163
2. No	7
3. Blank	37

C2. If yes to C1, at what level of implementation:

1. GIS intranet (browser based)	60
2. Standalone	53
3. Thin client	18
4. Spatial database (Oracle etc.)	68
5. GIS on internet (browser based)	31
6. Mobile based GIS	7

C3. If you answered no to C1, please tick all of the responses which describe your situation:

1. We once used GIS but found it was not useful or cost effective	0
2. We once used GIS, found it useful, but did not have sufficient funding to continue operations	0
3. We are interested in GIS, but we do not have a cogent business case for moving forward	1
4. We are interested in GIS, but don't have the technical expertise to move forward	1
5. We need more information on GIS, before we can make a decision	1
6. We are not interested in GIS at this time	0
7. Other	5

C4. Can data from your system be exported in XML (Extensible Markup Language) or a variant of XML (eg GML)?

1. Yes	105
2. No	65
3. Blank	37

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C5. Which system do you use?

1. ESRI	53
2. MapInfo	37
3. CadCorp	7
4. AutoDesk	9
5. Intergraph	3
6. GGP	9
7. INNOgistic	4
8. Other	35

D1. Are you familiar with metadata?

1. I'm very familiar with metadata	107
2. I only know a little about metadata	52
3. I'm unfamiliar with metadata	10

D2. Does your organisation create geospatial metadata and/or maintain metadata?

1. Yes, for a majority of our data	40
2. For some, but not all of our data	80
3. No, not at all	33
4. Don't know	14

D3. If your organisation creates geospatial metadata, what metadata format/standard do you use?

1. Other	47	31
2. Created own standard	41	27
3. Glgateway™ Metadata Specification (NGDF)	27	17
4. e-Government Metadata Standard	16	10
5. ISO 19115	13	8
6. Vendor specific standard	8	5
7. UK GEMINI	2	1
8. Federal Government Data Committee Content Standard	2	1

D4. What are the barriers to your creation and maintenance of geospatial metadata?

13. Lack of staff	18
14. Lack of organisational support	17
15. Lack of commitment/coordination	17
16. Unsure as to the appropriate standard to use	9
17. Lack of information strategy	8
18. Lack of financial resources	2
19. Lack of appropriate technology or lack of an IT system	3
20. Lack of training	0
21. Lack of a coherent metadata policy across the organisation	4
22. Don't see the benefit	0

E1. Initial capital investment (*invested within the last 2 years*)

Hardware/infrastructure and software:

1. Under £50,000	86
2. £51,00 to £150,000	37
3. £151,000 to £250,000	7
4. Over £250,000	4

E2. Annual maintenance

Hardware/infrastructure and software

1. Under £10,000	62
2. £10,001 to £50,000	58
3. £50,001 to £100,000	13
4. Over £100,000	11

E3. Data procurement and data licensing (*annual costs*)

1. Under £20,000	83
2. £20,000 to £50,000	26
3. £50,001 to £100,000	17
4. Over £100,000	20

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E4. GIS personnel (*number of staff*)

1 – 5	99
5 – 9	18
10 – 25	18
More than 25	19

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