UK Location Programme

Conceptual Design

UKLII Conceptual Model

Author: Tim Manning/Keith Murray

Owner: Ray Boguslawski

File Reference:

DOCUMENT CONTROL

Change Summary

Version	Date	Author/Editor	Change Summary
3-0	14/09/2009	Tim Manning/Keith Murray	Revised in response to public review conducted in August/September 2009.
4-0	19/11/2009	Tim Manning	Re-formatted and base-lined version.

References

Ref.	Title/Version/Publication Date/Author
1	Communities and Local Government , “Place Matters: The Location Strategy for United Kingdom”, November 2008 http://www.communities.gov.uk/publications/communities/placematters
2	Official Journal of the European Union, Directive 2007/2/EC of the European Parliament and of the Council, “Establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)”, March 2007 http://inspire.jrc.ec.europa.eu/

CONTENTS

1 EXECUTIVE SUMMARY

The Conceptual Model represents the first step towards defining the framework required to support the implementation of the UK Location Strategy [1] and fulfil the INSPIRE Directive obligations [2].

The issues raised in the UK Location Strategy highlight the lack of coordination, the absence of standards and the consequential unnecessary cost burden and lost opportunities attributable to the collective failure to better coordinate the UK's location information assets.

Without such a framework it will be difficult and perhaps impossible to move forward in a coordinated way and address the issues present in today's environment. Such frameworks are present in many other modern industries e.g. telecommunications, bank clearing system and retail stock management systems.

The paper outlines the choices before the Location Council and recommends a minimal "light touch" approach to support better coordination and access at all levels of government. This will be necessary to meet the growing demand for high quality information over the next decade, underpinned by common protocols.

1.1 Purpose of Document

The purpose of this document is to describe the overall conceptual model as a basis for discussion and agreement by the Location Council.

Agreement of this document is on the critical path to more detailed work. Any delay will impact adversely on meeting INSPIRE obligations in 2010.

2 INTRODUCTION

The purpose of the UK Location Information Infrastructure Conceptual Model is to provide a top level view of what the UK location information infrastructure will be and how it will operate. The conceptual design in its full form will be documented in the UK Location Information Infrastructure Blueprint.

Establishing a conceptual design is the first step towards fulfilling the objectives of the UK Location Strategy and our obligations under the INSPIRE Directive. The Conceptual Model in the initial form presented here is to stimulate discussion within the Location Council – it is a top level view of what the location information infrastructure could be. A more detailed description of the conceptual design and the approach adopted towards its development will also be published.

The objective of the design is to provide a framework within which we can better manage, coordinate and improve the integrity of location information across the United Kingdom, at all levels.

2.1 Value Proposition

The 'Value Proposition for UK Location Information Infrastructure '- how UK Location Information Infrastructure will create value and benefits for its target customers - is expressed in Figure 1 below.

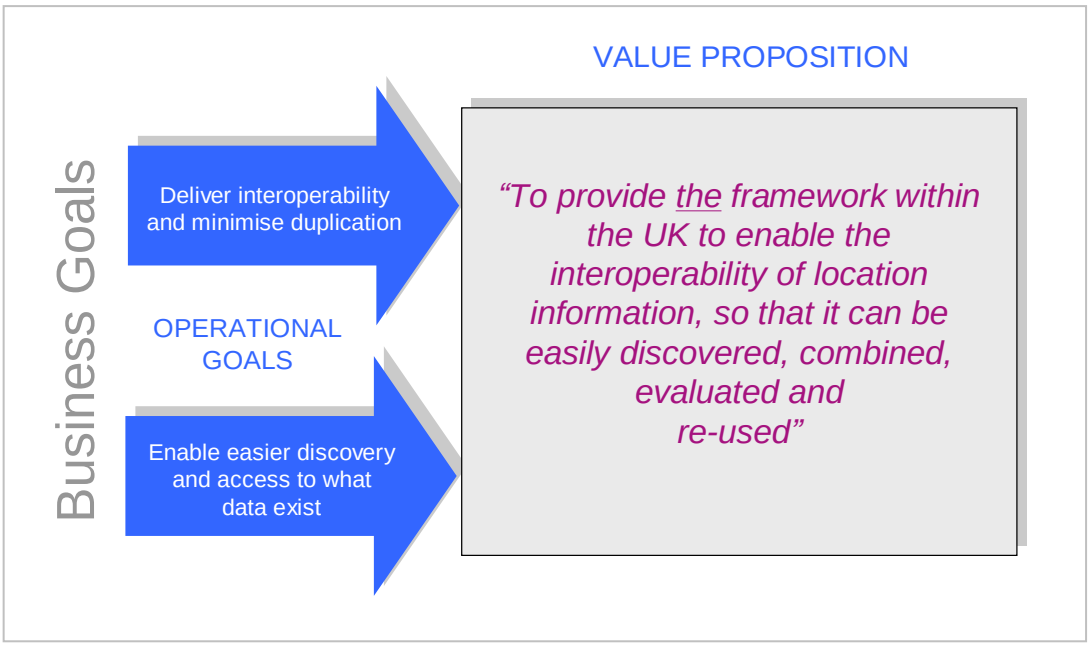

Figure 1 UK Location Information Infrastructure Value Proposition

Associated with this Value Proposition is the delivery of two primary operational goals:

- to deliver Interoperability and minimise duplication of location information datasets; and
- to enable easier discovery and access to what data and services exist.

2.2 Design Choices

In defining what the UK Location Information Infrastructure will be, there are a number of design choices to make. These are illustrated in Figure 2. The positions shown reflect the Conceptual Model presented in this paper and that of the overall design blueprint.

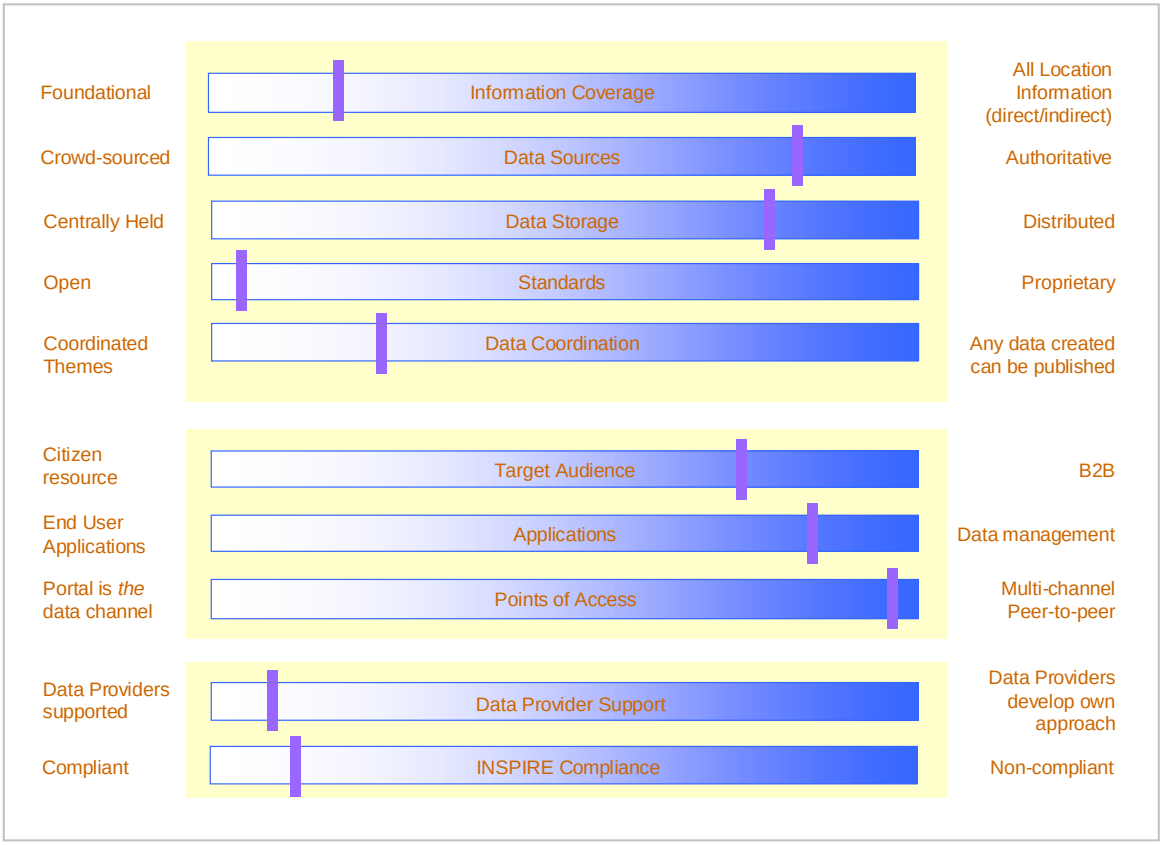

Figure 2: UKLII Design choices

The primary purpose of the programme is to meet the two overriding goals of the design (ref. sec. 2.1) - improving data coordination and data management, promoting reuse and making users aware of what data exist and the quality of that data.

These goals in turn influence the design choices that have to be made. The choice is not in fact one of several options, as can be seen from Figure 2. Rather, the choices and policy decisions need to be made holistically and along several dimensions. The resultant position is the full aggregation of these choices. The rationale for a number of the key design decisions is set out below.

2.2.1 Information Coverage

The intended scope of information covered by the UK Location Information Infrastructure is shown Figure 5 below:

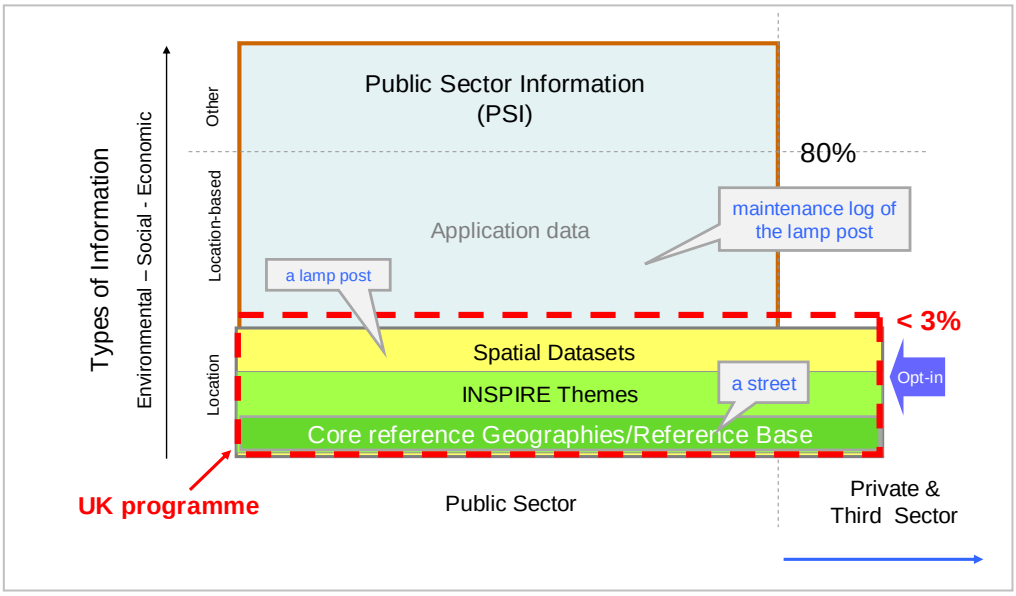

Figure 5: UKLII Information Coverage

Although a significant proportion of public sector information is either directly or indirectly related to location, much of this is business application related. The purpose of the UK Location Information Infrastructure is not to provide an infrastructure capably of supporting all forms of location information, but to create the foundational spatial objects against which other location-based information can be related.

The aim is to take a holistic approach to coverage which will extend across land, sea and air, covering spatial datasets relating to:

- Topographic surface objects;
- Terrain;
- Marine (topographic);
- Underground – natural;
- Underground – man-made; *and*
- Atmosphere.

This will incorporate those objects associated with the features recorded in any of these domains as covered by the INSPIRE Directive, or additionally defined by the Location Council. The extent will be the UK and the “UK marine area” as defined in the UK Marine Bill.

The infrastructure will primarily be for public sector information (PSI), but there will be provision to include private sector location information, where the private sector sees a benefit to publishing their data through the UK Location Information Infrastructure.

2.2.2 Data Sources

The focus of the UK Location information infrastructure will on the publishing of authoritative data, held by public bodies; with the provision for private and third sector bodies to also publish their data.

The primary public sector datasets within the information scope of the programme have been collected and maintained over several decades in different forms and are highly tuned to satisfy key public sector business processes, e.g. taxation, flooding, property ownership and traffic management.

The “capture once and use many times” model will be adopted, although it is acknowledged that this may not always be a practical solution. Nevertheless, the future state should be more coherent and definitive than today, with less duplication and greater inter-theme/object interoperability.

Within the scope of authoritative sourcing, there is scope for users of all kinds to contribute by pointing out corrections, beneficial changes or errors; either through the provision of intelligence, or location information that can be subsequently incorporated into the dataset.

2.2.3 Data Storage

Apart from the registered meta and master data (catalogues, coordinate systems etc), no data will be stored (cached) within a UK central data hub. Data will be supplied in line with the INSPIRE model – either directly from the data provider or through a ‘publishing agent’. .The latter will see the creation of thematic, sector or regional data hubs, as deemed beneficial by the different data provider communities.

Unlike smaller communities (e.g. Northern Ireland where data is held centrally), there is no justification for the creation of a UK central data hub. The volumes and data synchronisation issues and hence costs would be prohibitive (in the order of £10+ million).

It is recognised that this distributed approach will make it harder to ensure compliance, data quality and ease of combined use. But by placing the ‘point of control’ at the data source, or within a specific data provider community, it will over time result in a much more sustainable and flexible infrastructure for data sharing and re-use.

2.2.4 Open Standards

The absence of common data architecture and the failure to adopt and comply with standards is widely recognised as the root cause of many of the documented problems relating to data sharing and re-use. Data providers often find their data satisfactory for their own internal processes, but an external user would find many datasets unsuited for an application. The INSPIRE implementing rules are grounded on ISO and OGC standards and these, together with the necessary technical guidance, will provide the framework for the UK.

The alignment with the current initiatives around “linked data” is good, supported by the INSPIRE data model and by the aims of the UK Location Strategy.

2.2.5 Data Coordination

All core reference geographies and INSPIRE themes will be managed collectively as themes (e.g. transport network) supported by sub-theme (rail) or object (railway station). For most themes there may often be several datasets. Sometimes there will be overlap and sometimes their contribution is complementary. The themes will be coordinated by a process driven by the Location Council to ensure that unnecessary duplication is driven out and where different views remain, these are linked (normally by cross referencing) to support the sharing of business information across the different “views”. Any new themes outside the scope of the Location Strategy and INSPIRE will be similarly treated to bring greater coherence than we have at present, where the absence of standards and coordination leads to significant duplication and rework by users.

2.2.6 Target Audience

The principal target audience for the UK location information infrastructure are organisations, either in the public, third or private sectors. Its focus will be to provide a business-to-business interface for the sharing and re-use of public sector location information, for improving public sector policy making, service delivery and encouraging innovation.

But within this, there is the recognition that the nature of how information-based public sector services are delivered and by whom is changing, particularly with regard to the engagement and involvement of the citizen. Also, it is recognised that the citizen themselves have a need for primary location information, which should be made available to them, particularly as in most cases they have paid for its creation; and that citizens will become an increasingly important source of intelligence on the data sources themselves. To this end, the infrastructure will be designed to serve the needs of those citizens engaged in the use of public sector information, as well as those of organisations.

2.2.7 Applications

It will not be the role of the UKLII to create or provide end user business applications; rather to encourage their creation by others using the published data and services.

The inclusion of end user applications would distract from the primary purpose of the UKLII. .. Beyond the UK Geoportal, the market in terms of applications will be able to grow as required by data users, uninhibited. Users will adapt and adopt, embed as today in organisational websites and grow new user communities. The functionality of the UK Geoportal will be minimised and restricted to simple common tools required to support the key customer groups (e.g. pan/zoom/locate/measure and possibly save image) to publish, search, evaluate and re-use location information.

2.2.8 Points of Access

Member States are not obliged to develop a geoportal under INSPIRE – but there are several good reasons to establish a member state point of contact and coordination.

Any European service will be unable to provide an efficient and oriented service customised to UK needs. Each Member State context is unique and stakeholders will require support, resources and datasets beyond the European baseline. A UK Geoportal can fulfil a unique role as a point of contact and coordination, by providing central registration of data and services; and associated resources.

Beyond its infrastructure and publishing coordination role, the UK Geoportal will be just one of many points of access to discover and view published location information. These are likely to reflect the current landscape of thematic, sector and regional based information portals.

2.2.9 Data Provider Support

INSPIRE requires the adoption of a set of specifications and standards, as set out in the Implementing Rules, relating to data and services. In one extreme it would be possible to issue specifications and expect data providers to provide conformant data and services. This would not necessarily realise business benefit or return on investment. By working within a common alignment and thereon providing self help tools, guidance and recommendations for training, a solution that is “collectively greater than the sum of the parts” is feasible.

In promoting data sharing and reuse, the intention is to develop only those aspects that do not exist today and are unique to the world of spatial information. In addition to reusing other government services, this also implies contracting third parties to adopt existing systems, rather than engineer these aspects from scratch.

2.2.10 INSPIRE Compliance

The comparative importance of the data and the INSPIRE Directive does not warrant heavy regulation. Indeed, it is desirable that users identify business benefits of adopting the standards and protocols. INSPIRE Compliance will largely be achieved through self regulation and by ensuring an effective dialogue between data providers and data users. This will be supplemented by assurance and auditing activities, conducted by the Coordination Unit.

2.3 Facilitating Interoperability

The design will provide a common framework used by all levels of government in the adoption of common standards and protocols. This will significantly assist in the migration from the current environment of duplication and disconnection, to a more coherent infrastructure, that will more readily support solutions to problems that are unaffordable today.

2.4 Enlarging the Market for Location Information

The conceptual design for the UK Location Information Infrastructure is set within the context of the existing market for the re-use of public sector location information. This is characterised by the individual marketing activities of data provider organisations; and the development of sector-based 'thematic' geoportals e.g. underground assets (National Underground Assets Group), marine environment (Marine Environmental Data and Information Network) providing access to limited sets of data to specific groups of data users.

The purpose of the UK Location Information Infrastructure is to extend this market to a much broader range of users. It is important that it is seen as being complementary to the activities of individual organisations, with the potential of greatly assisting their own marketing and business development activities. For organisations not engaged in the re-use of their data by other parties, it should be seen to represent a significant opportunity to extend the benefits derived from the data they hold.

2.5 Conceptual Model

UK Location Information Infrastructure will provide an effective and efficient environment for the re-use of location information. This will be achieved through the creation of 'operating frameworks' for:

- the discovery of what data exists;
- the creation of foundational, coordinated 'core geographic reference' datasets and INSPIRE themes;
- dataset interoperability;
- data publishing; *and*
- data sharing, inc. rights management and charging.

The conceptual model is based on the following design principles:

- federated, collaborative 'joint venture', involving the public, third and private sectors;
- minimum intervention, to achieve the desired effect;
- built on open standards;
- build on what already exists (i.e. reuse);
- harnesses the market to provide re-usable products and services:

- public sector(cross Government Enterprise Architecture); and
- commercial offerings (inc. open source);
- establishes the basics and achieve benefits early; *and*
- evolves as the environment evolves.

Location information does not exist or operate in isolation and to support better integration with mainstream information close working will be required in line with emerging public sector information policy and new developments such as “linked-data”.

A ‘rich picture’ representation of the Conceptual Model for the UK location information infrastructure is shown in Figure 3. The design seeks to bring together data providers and users; and create a strong community for the reuse of location information.

The creation of this community will be coordinated and facilitated through the creation of a UK Geoportal. This will deliver a range of services to data providers to support data and service publication, including discovery metadata publishing and registry services.

Access to published data and services will be through a range of information portals, both public sector and commercial.

These information portals will provide the ability to discover and evaluate published location information and access associated services, including view, download, invoke and transformation.

Location information will be either published directly by the data provider, or through a ‘Publishing Agent’. ‘Publishing Agents’ will act as a shared service provider for the publishing of data into the UKLII. It is anticipated that Publishing Agents will be one of three types: Corporate, Thematic/Sector or Commercial.

The ability to search and find relevant location information will be achieved through discovery metadata catalogue and registry services. Data providers or their publishing agents will submit catalogue and registry entries via the UK Geoportal, either directly or through a data ‘harvesting’ service. These entries will record key attributes relating to the location information, including any restrictions on use, licensing requirements and associated charges.

Data providers or their agents will also submit details about the data services available, including view, download, invoke and dataset transformation (coordinate reference grid system and data schema).

The publishing of location information will be subject to a set of data and interoperability standards. In the case of the UK Location Strategy, these will apply to the core geographic reference datasets and INSPIRE themes. Additional themes may be added, as agreed by the Location Council. These will also be subject to the same standards.

The UK Geoportal will provide a range of supporting services, focused on facilitating the exploitation of registered location information, by both professional and non-professional users. This will include a Learning and Resource Centre, forums, feedback and monitoring services. The portal will also provide a ‘listings’ service, to showcase the application of UK location information across the private and public sector and the availability of other information portals - sector, thematic and regional.

The rights management of location information will operate within an agreed framework, developed in conjunction with the Office of Public Sector Information (OPSI). This will be based on the existing Information Fair Trader Scheme to ensure transparency, fairness and simplicity.

The design will enable reuse in support of other Geoportals. It will support the exchange of catalogue data and offer the UK Geo-portal client application as a reusable component for other Geoportal sites, e.g. devolved administrations (both national and RDAs).

The development of the infrastructure will be based on the INSPIRE Implementing Rules, underpinned by open standards, services and technical guidance; with the objective of achieving the maximum re-use of IT services and components.

The UK Location Information Infrastructure will operate within the context of a collaborative network of organisations and individuals, linking data providers and their agents, application developers and major data end user groups, coordinated through the Location Council and the devolved administrations.

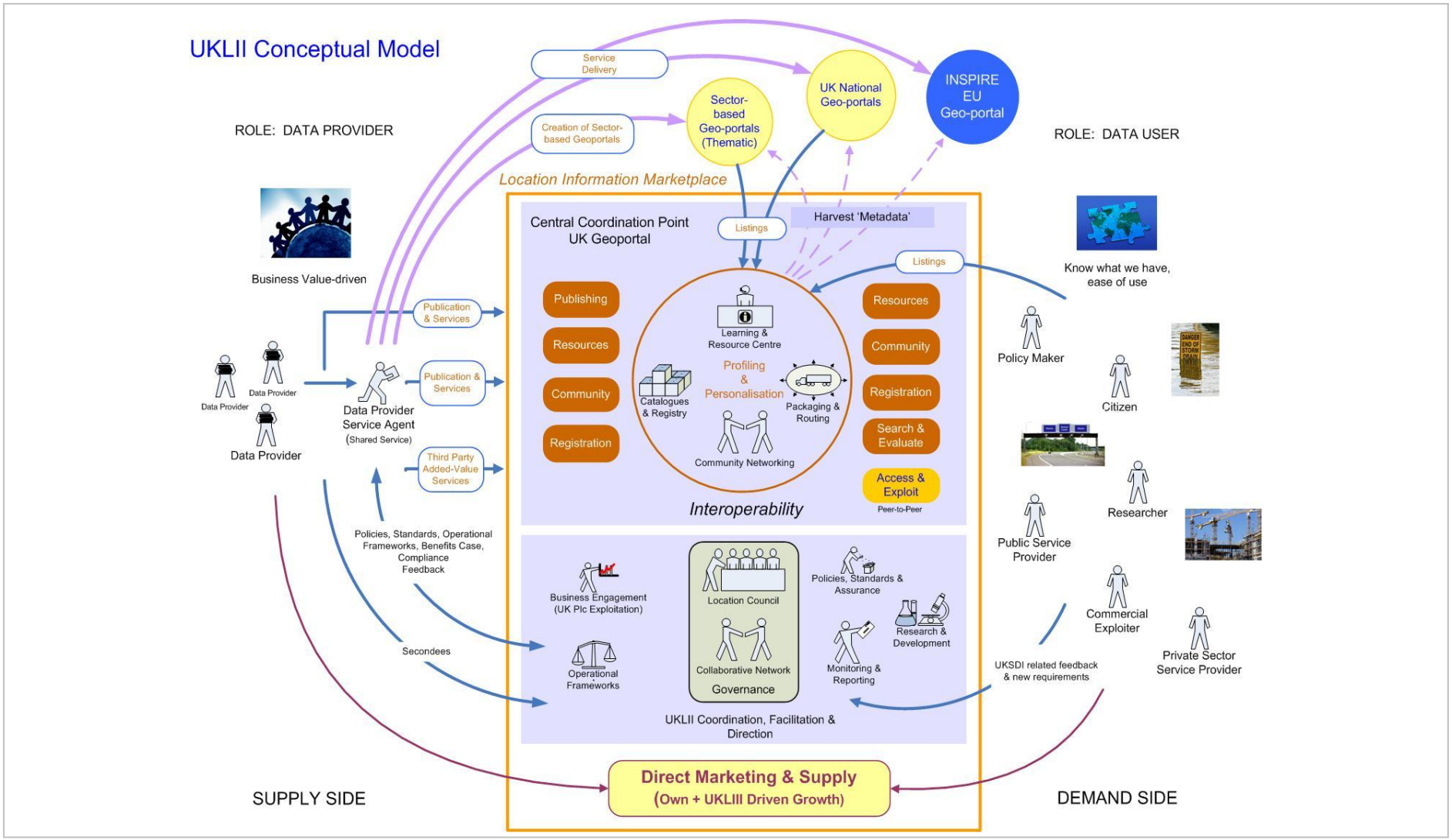

Figure 3 UK Location Information Infrastructure Conceptual Model View

2.6 UKLIII Service Delivery Model

The Service Delivery Model for UK location information infrastructure will be made up of a number of core and supporting services (figure 4), delivered by the UK Location Programme.

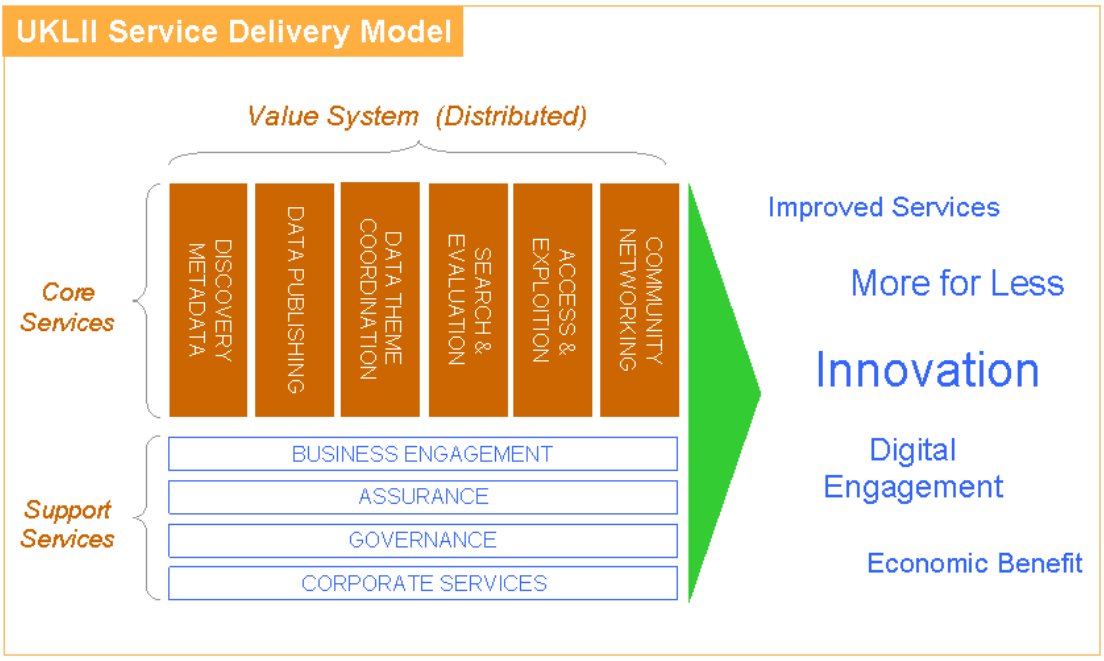

Figure 4 UK Location Information Infrastructure Service Delivery Model

There will be two primary bodies associated with the day-to-day operation of the UKLII. These are outlined below.

2.6.1 Interoperability Board

The Interoperability Board will oversee the technical aspects of the infrastructure and provide advice and guidance to the Location Council including:

- adoption of INSPIRE Regulations and the provision of guidance and self help resources;
- the design of a federated yet strategically aligned approach (data providers & users, CIO/CTO Council, European Commission, Co-ordination Unit….);
- opportunity development, e.g. creation of core geographic references, removal of duplication, interoperability; *and*
- maintaining the strategic technical direction (decision support).

2.6.2 Co-ordination Unit

The Co-ordination Unit will be responsible for the operational maintenance of the UKLII and (with the Devolved Administrations) for ensuring compliance with the INSPIRE Directive. It will perform the following activities:

- the maintenance of the UK Geoportal;
- the maintenance of centrally supplied UKLII products and services;
- stakeholder engagement (inc. communications and marketing);
- customer insight and market research;
- assurance services – conformance to INSPIRE data and network services standards;
- performance monitoring and reporting(inc. UK and EC report creation on behalf of the Location Council) *and*
- capacity building and sustainability, inc. the long term funding model.