

UK Location Programme

Location Information Interoperability Board

Design Coordination Group

Technical Architecture Overview

DOCUMENT CONTROL

Change Summary

Version	Date	Author/Editor	Change Summary
0.1	01/10/2010	Ian James	First draft issue
0.2	12/10/2010	Ian James	Updated following initial review Published in UKLP standard document template
0.3	15/10/2010	Ian James	Minor changes following further review

References

Ref.	Title/Version/Publication Date/Author
[1]	UK Gemini, version 2.1, August 2010 - http://www.gigateway.org.uk/metadata/pdf/GEMINI2_1_published.pdf
[2]	UK Gemini Encoding Guidance, version 1.0, September 2010 – http://location.defra.gov.uk/wp-content/uploads/2010/09/UK-GEMINI-Encoding-Guidance-20100930-v1-01.pdf
[3]	OpenGIS Catalogue Services Specification, version 2.0.2, 23rd February 2007 - http://portal.opengeospatial.org/files/?artifact_id=20555
[4]	List of OGC-compliant products, by specification, at http://www.opengeospatial.org/resource/products/byspec
[5]	OpenGIS® Web Map Server Implementation Specification, version 1.3.0, 15th March 2006 - http://portal.opengeospatial.org/files/?artifact_id=14416
[6]	Technical Guidance to implement INSPIRE View Services, v2.0, 20th July 2009 - http://inspire.jrc.ec.europa.eu/documents/Network_Services/Technical%20Guidance%20View%20Services%20v%202.0.pdf
[7]	Ordnance Survey OpenSpace API, http://openspace.ordnancesurvey.co.uk/openspace/
[8]	Technical Guidance for INSPIRE Discovery Services, v2.0, 22nd July 2009 - http://inspire.jrc.ec.europa.eu/documents/Network_Services/Technical%20Guidance%20Discovery%20Services%20v2.0.pdf

CONTENTS

1	Main Body	5
1.1	Purpose.....	5
1.2	Document structure.....	5
2	Overview	6
2.1	Data Publisher Registration	6
2.2	Metadata Registration	6
2.3	Metadata Catalogue Publication	7
2.4	Discovering Datasets	7
3	Detailed Overall Architecture	8
3.1	Data Providers	8
3.1.1	<i>UK Location Metadata Editor</i>	<i>8</i>
3.1.2	<i>Other Metadata Tools.....</i>	<i>9</i>
3.2	Data Publishers.....	9
3.2.1	<i>Discovery Service (CSW).....</i>	<i>9</i>
3.2.2	<i>Web Accessible Folder (WAF)</i>	<i>9</i>
3.2.3	<i>View Service (WMS)</i>	<i>9</i>
3.3	data.gov.uk	10
3.3.1	<i>Registry</i>	<i>10</i>
3.3.2	<i>User Management.....</i>	<i>10</i>
3.3.3	<i>Metadata Resource Management</i>	<i>10</i>
3.3.4	<i>Catalogue Services</i>	<i>10</i>
3.3.5	<i>Search Service.....</i>	<i>10</i>
3.3.6	<i>Map Widget (Search)</i>	<i>10</i>
3.3.7	<i>Map Widget (Evaluate).....</i>	<i>11</i>
3.4	Others	11
3.4.1	<i>Catalogue Publishing Service</i>	<i>11</i>
3.5	Supporting Services	11
3.5.1	<i>Gazetteer Service.....</i>	<i>11</i>
3.5.2	<i>Mapping Service.....</i>	<i>11</i>
4	Process Support.....	12

4.1	Data Publisher and Metadata Registration.....	12
4.2	Metadata Harvesting	12
4.3	Metadata Catalogue Publication	14
4.4	Discovering Datasets	15

1 MAIN BODY

1.1 Purpose

- 1 The purpose of this document is to provide an overview of the technical solution being developed for the UK Location Information Infrastructure (UKLII), as part of the UK Location Programme (UKLP). It is intended as an overview document for a general audience, rather than a design document aimed at a technical audience. As such it aims to communicate general concepts and the overall workings of the solution, rather than be a definitive, detailed technical document.

1.2 Document structure

- 2 The document provides the following views of the solution:
 - A high-level overview (section 2)
 - A more detailed view of the components that make up the solution (section 3)
 - A process view, showing how the components are used to satisfy a number of scenarios (section 4)

2 OVERVIEW

- 3 The diagram below at Figure 1 provides an overview of the technical architecture of the UKLI. The numbers in the diagram relate to process descriptions detailed below.

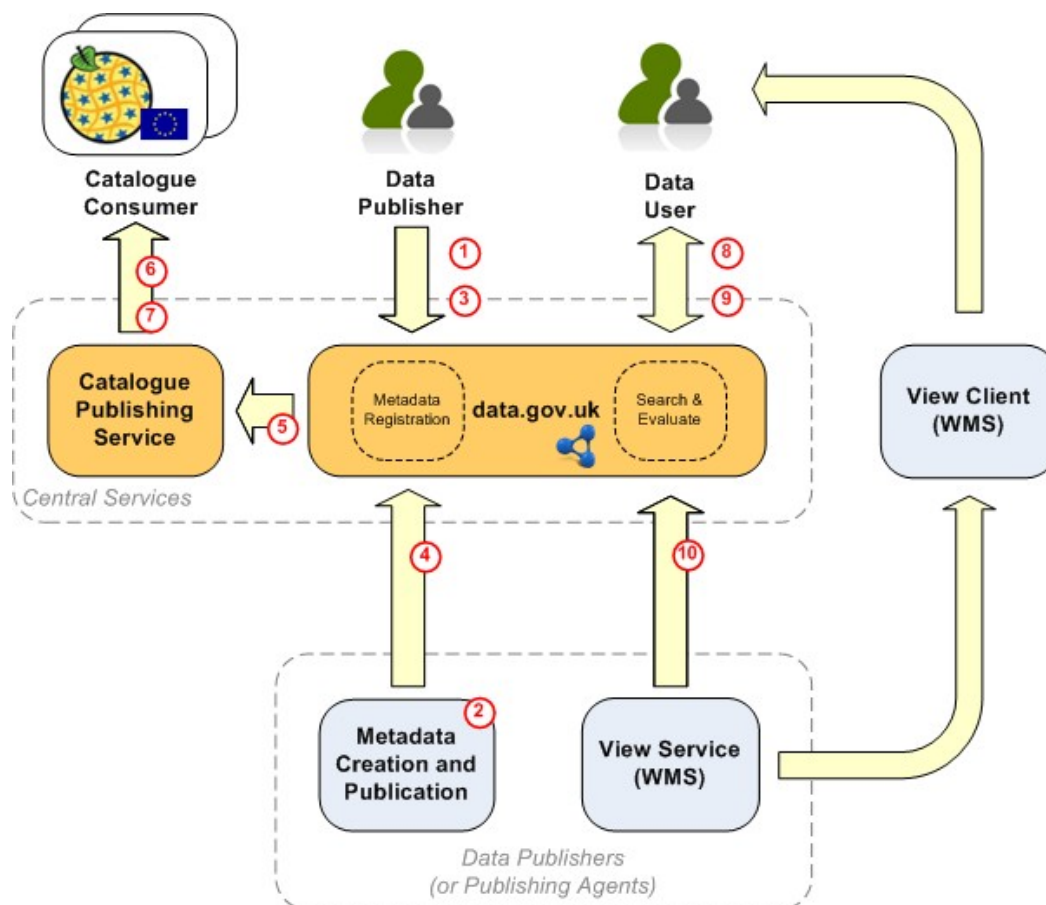


Figure 1 - Overview Technical Architecture

2.1 Data Publisher Registration

- Data Publishers will create a user account on data.gov.uk which allows them to register the source of their metadata. [1]

2.2 Metadata Registration

- Data Publishers¹ will use Metadata Creation and Publication tools to create UK GEMINI2-compliant metadata resources. The UK Location Metadata Editor is one such tool, but its use is not mandated. Data Publishers will then publish that discovery metadata so that it can be uploaded to data.gov.uk. [2]

¹ This may be the Data Provider themselves, or an agent acting on their behalf.

- Data Publishers will register with data.gov.uk where their metadata resource has been published to (i.e. the internet location where there metadata resource is published). [3]
- data.gov.uk will harvest the metadata created by the Data Publishers from the locations that they have registered, and incorporate that metadata into the core data.gov.uk metadata catalogue. [4]

2.3 Metadata Catalogue Publication

- The INSPIRE-related content held within the data.gov.uk metadata catalogue will, on a regular basis, be extracted to a Catalogue Publishing Service. [5]
- The EU geoportal will regularly harvest UK INSPIRE-related metadata from the Catalogue Publishing Service, via an OGC Catalogue Service for the Web (CSW) interface, and load this data into the EU geoportal. [6]
- Other applications that wish to access the UK INSPIRE-related metadata via a CSW interface will also be able to access the data through this service. [7]

2.4 Discovering Datasets

- Data Users will be able to discover all data and service metadata resources published by UK Location Data Publishers through the standard data.gov.uk search interface. [8]
- This search interface will also support a “geographic” search function. This will allow Data Users to search for datasets based on a geographic extent, and other UK GEMINI2 metadata fields. [9]
- Where an INSPIRE View service (i.e. OGC Web Map Service – WMS) is registered for a dataset, an “Evaluation” viewer be provided which allows specified datasets to be viewed within data.gov.uk by directly accessing the WMS for that dataset. [10]

3 DETAILED OVERALL ARCHITECTURE

- 4 Figure 2 provides a more detailed view of the technical architecture being implemented for UKLII. Each component of the solution is described below.

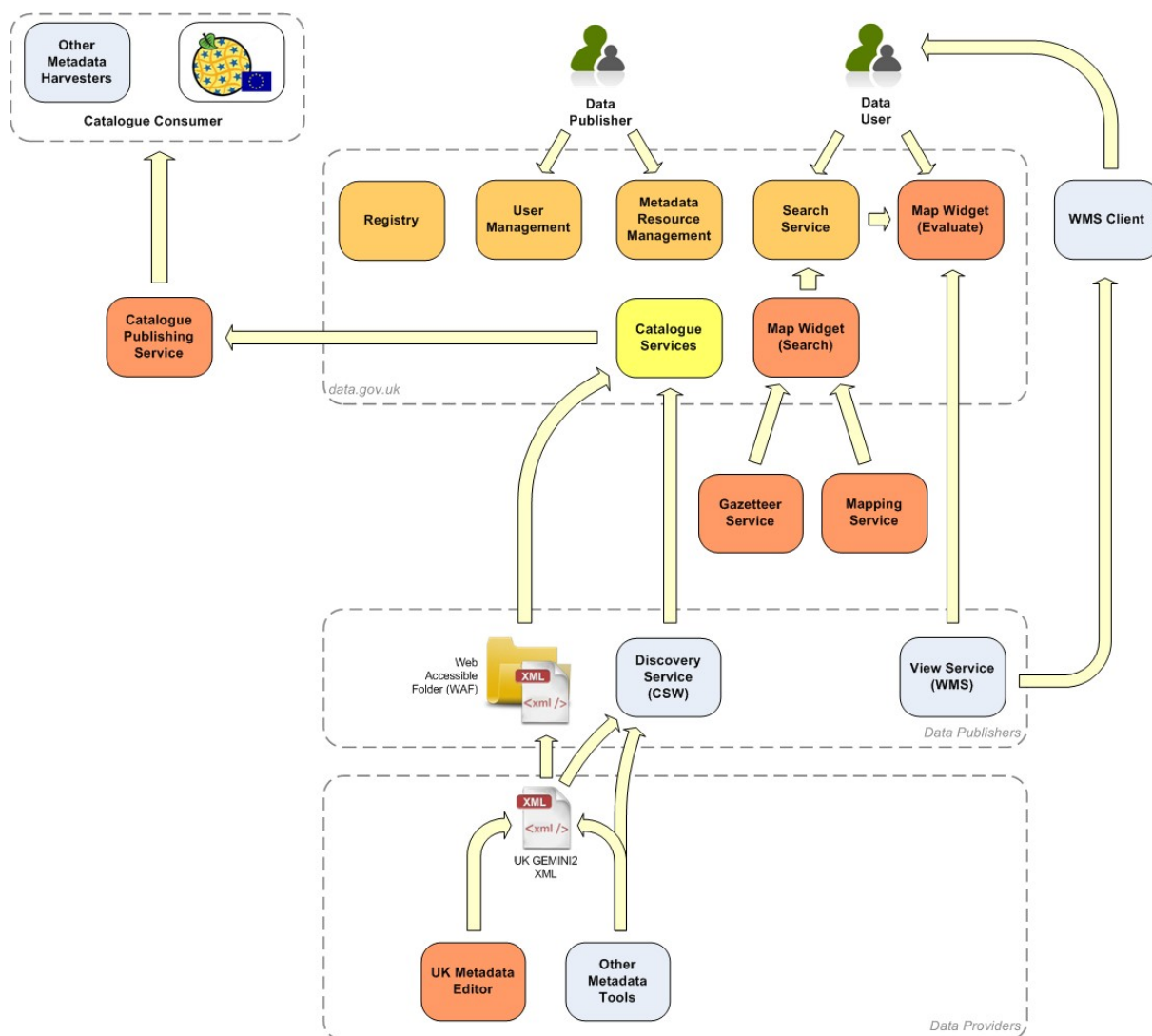


Figure 2 - Detailed Technical Architecture

- 5 The solution is made up of the following components.

3.1 Data Providers

3.1.1 UK Location Metadata Editor

- 6 The UK Location Metadata Editor is a tool that has been created for the UKLII which allows a user to create and edit UK GEMINI2 compliant metadata records (ref. [1]). The editor is based on the open-source GeoNetwork product (version 2.6). The editor can be used in one of two ways:

- A web-hosted version of the tool is provided, which provides full functionality to create, edit and validate metadata records. Records are saved locally as XML files (see ref. [2]).

- A downloadable version of the same tool. This allows the data provider to install the UKLII-configured GeoNetwork software locally and create their metadata using that tool. The download is provided as a set of configuration files to be installed on top of a standard (new or existing) GeoNetwork 2.6 install².

3.1.2 Other Metadata Tools

- 7 Whilst UKLP is providing a supported tool for creating UK GEMINI2 metadata (see 3.1.1), use of this tool is not mandated. Any other tool that can create metadata can be used. The tool will need to support the publication of data as UK GEMINI2-compliant XML (see ref. [2]), either through a CSW interface (see 3.2.1) or via a Web Accessible Folder (see 3.2.2)³.

3.2 Data Publishers

3.2.1 Discovery Service (CSW)

- 8 A Data Publisher, or their agent, may choose to publish their metadata records through a CSW interface (ref. [3]). UKLP are not providing a specific tool to support this (although a localised installation of the UK Location Metadata Editor can be expanded to provide a CSW). Additionally there are many other tools available, both commercial and open-source, which support this specification. Details of compliant products are published on the OGC web-site (ref. [4]).

3.2.2 Web Accessible Folder (WAF)

- 9 If the Data Publisher chooses not to publish their metadata records through a CSW interface, they will need to publish the data via a Web Accessible Folder (WAF). A Web Accessible Folder is an HTTP-accessible directory of files, in which all files and their time-stamps are visible to a web browser or client. All the files in this folder must be UK GEMINI2 XML files.

3.2.3 View Service (WMS)

- 10 Data Publishers will need to publish their data (as opposed to metadata) via an OGC Web Map Server (WMS) compliant specification (refs. [5],[6]). This service will be used as part of the central services to allow Data Consumers to evaluate (i.e. view) the dataset. Once discovered, and subject to any access and/or licensing restrictions the data provided by this service can be accessed by any WMS-compliant client application.

² Note that the local system manager will have to take responsibility for any interaction with an organisation's existing GeoNetwork configuration.

³ To support this integration, a number of additional resources are being produced as part of the UKLII: UK GEMINI 2 XML encoding guidance; Schematron Schema and Guidance; and Discovery Metadata Harvesting Specification.

3.3 data.gov.uk

3.3.1 Registry

- 11 The Registry provides the central repository for all salient domain data of the location information domain (but excluding metadata and gazetteer data). This includes code lists and valid values that are relevant to the UKLII. Initially the Registry will be implemented as a simple set of web pages within data.gov.uk. Later phases of UKLP may look to implement the Registry as a more machine-usable service.

3.3.2 User Management

- 12 The User Management component allows users of data.gov.uk to manage user accounts. This includes tools to create, update and delete user accounts. All Data Publishers will need an appropriately privileged account on data.gov.uk to allow them to register their metadata resources. Data Users do not have to have an account to allow them to use the search and evaluation tools.

3.3.3 Metadata Resource Management

- 13 The Metadata Resource Management component will be accessible to appropriately privileged users via data.gov.uk. It will allow those users to register the source of their metadata (either a CSW or WAF), and to manage the registration of those resources. This includes defining when and how often metadata should be harvested from those sources.

3.3.4 Catalogue Services

- 14 The Catalogue Service component is the “back-end” component of data.gov.uk which manages all the metadata. As well as storing the metadata, it has three key roles in the context of UKLII:
- Harvesting metadata from Data Publishers, based on criteria specified by Data Publishers, either via CSW or WAF interfaces. This includes updates to existing records, as well as import of new records.
 - Supporting search queries from Data Consumers, by returning matching metadata records based on specified search criteria.
 - Supporting the extraction of INSPIRE-related metadata records as requested by the Catalogue Publishing Service (which subsequently makes this data accessible to the EU and others).

3.3.5 Search Service

- 15 The Search Service component is an extension of the current data.gov.uk search tools. It provides a mechanism to allow all metadata records within data.gov.uk to be searched, based on a spatial extent and/or INSPIRE-related fields. Definition of the spatial extent is provided by the Map Widget (Search) (see 3.3.6) embedded within the Search Service.

3.3.6 Map Widget (Search)

- 16 The Map Widget (Search) component is browser-based mapping component, embedded within the data.gov.uk Search Service, which allows a Data Consumer to specify the spatial extent of a search they wish to run against the metadata catalogue. The spatial extent of the search, defined by a rectangle, is defined by the user against a backdrop of contextual mapping (provided by the Mapping Service). The component also supports identification of a location based on a gazetteer search of named locations (supported by the Gazetteer Service).

3.3.7 Map Widget (Evaluate)

- 17 The Map Widget (Evaluate) component is a browser-based mapping component, embedded within the data.gov.uk web-site, which allows the contents of datasets to be viewed. This interacts with View Services (WMS) provided by data publishers, and displays the contents of those services directly within the browser. A limited set of GIS-type tools are provided to allow basic viewing and display of one or more datasets, either singularly or in combination, for evaluation purposes.

3.4 Others

3.4.1 Catalogue Publishing Service

- 18 The Catalogue Publishing Service provides the CSW interface which the EU geoportal uses to harvest UK INSPIRE metadata. It extracts relevant records from the data.gov.uk Catalogue Service and stores those in its own repository. It will supply metadata records in response to CSW query requests received from other applications, of which the EU geoportal is one. The Catalogue Publishing Service will be based on the open-source GeoNetwork product.

3.5 Supporting Services

3.5.1 Gazetteer Service

- 19 The Gazetteer Service provides information, including the spatial location, about a named feature. It is used to support searching for datasets, by providing information about the geographic location of a named location. It is implemented based on the Ordnance Survey OpenSpace API (ref. [7]).

3.5.2 Mapping Service

- 20 The Mapping Service provides context background mapping as part of the spatial search function, to enable a Data Consumer to adequately define the spatial extent of their search. It is implemented based on the Ordnance Survey OpenSpace API (ref. [7]).

4 PROCESS SUPPORT

- 21 The purpose of this section of the document is to demonstrate how the various components of the UKLII technical infrastructure are used to satisfy a number of business scenarios. The numbers in the diagrams relate to the process descriptions detailed below each diagram.

4.1 Data Publisher and Metadata Registration

- 22 Figure 3 shows the components that are involved in the registration of a Data Publisher within data.gov.uk, and that Data Publishers subsequent registration of their metadata source.

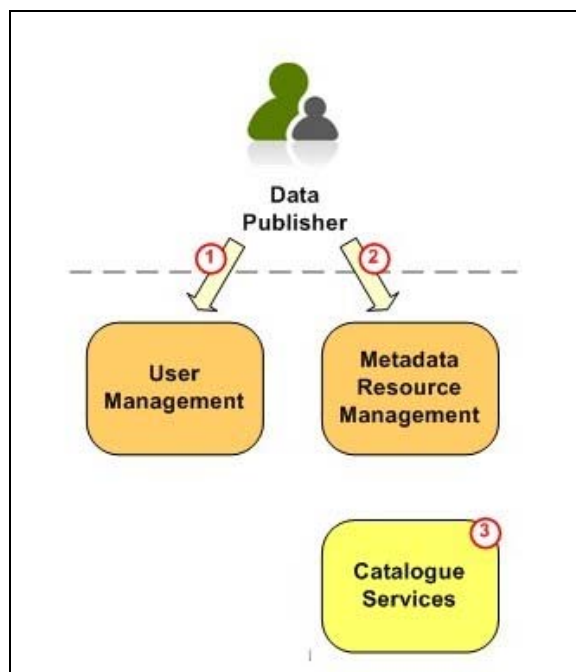


Figure 3 - Data Publisher and Metadata Registration

- 23 The process steps are as follows:
- The Data Publisher will create an account with data.gov.uk. As part of that registration they will identify that they wish to be a Data Publisher. [1]
 - The request to be a Data Publisher will be verified by an off-line manual process.
 - The Data Publisher will log on to their data.gov.uk account. They will register metadata resources and the harvesting source (i.e. a CSW or WAF location). [2]
 - The metadata resource information will be stored as part of the Metadata Catalogue, managed by the Catalogue Services component. [3]

4.2 Metadata Harvesting

- 24 Figure 4 shows the components that are involved in the process of harvesting metadata from a registered metadata source.

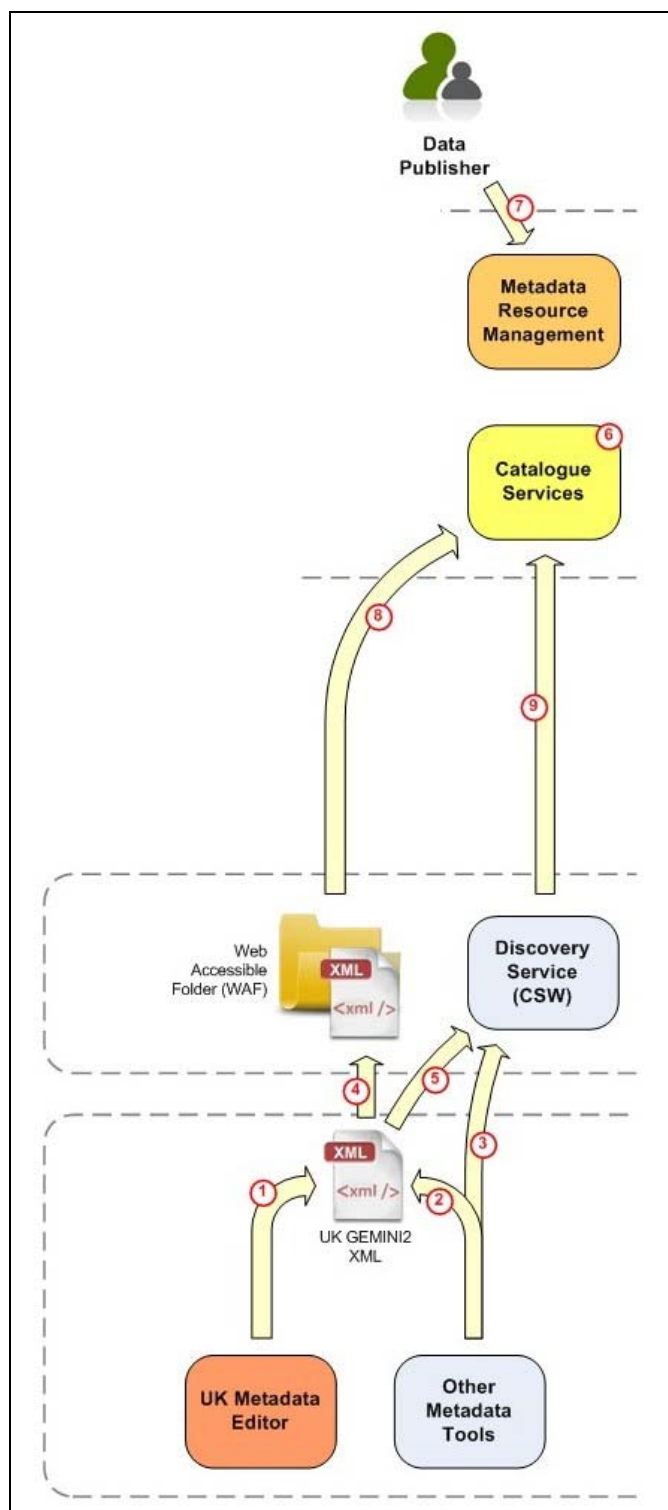


Figure 4 - Metadata Harvesting

25 The process steps are as follows:

- Data Publishers may use the UKLP-provided Metadata Toolkit to create UK GEMINI2 metadata as XML files. These files are saved locally to the Data Publisher. [1]

- Alternatively, Data Publishers may use their own Metadata Tool to create UK GEMINI2 metadata. In this instance, the Data Publisher may choose to either output this metadata as XML files [2], or else may choose to make this data available through a CSW service [3].
- If the Data Publisher has chosen to publish their metadata as XML files, they will need to upload their local XML files to a Web Accessible Folder (WAF) [4]. Alternatively, the Data Publisher may choose to load this XML into a CSW service [5].
- Either on a pre-determined schedule [6], or as initiated by the Data Publisher [7], the Catalogue Services will look for updated Metadata records.
- If the source of the Metadata records is registered as a WAF, the Catalogue Services will scan the folder for XML files, and will attempt to upload all the metadata records detailed in those files. Records in the metadata catalogue will be replaced where they already exist, else new records will be created. [8]
- If the source of the Metadata records is registered as a CSW, the Catalogue Service will query the CSW for any records updated since it last queried that CSW. The information returned will be used to update the metadata catalogue - records will be replaced where they already exist, else new records will be created. [9]

4.3 Metadata Catalogue Publication

26 Figure 5 shows the components that are involved in the process of making the metadata catalogue available to other users.

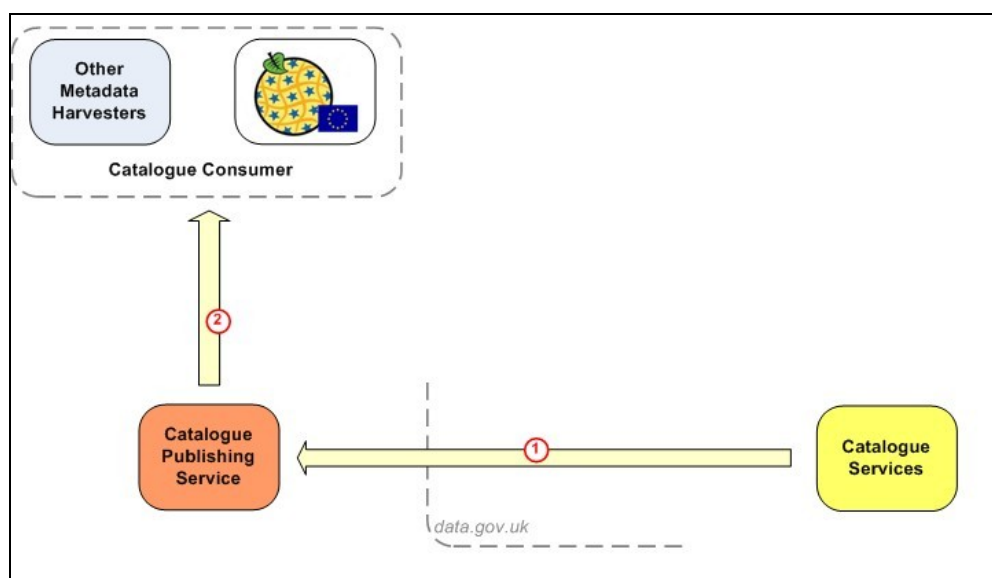


Figure 5 - Metadata Catalogue Publication

27 The process steps are as follows:

- On a scheduled basis, the Catalogue Publishing Service will refresh its holding of the relevant metadata from the data.gov.uk Catalogue Services. [1]
- Applications may use the Catalogue Publishing Service CSW interface to query the catalogue for metadata records. The Catalogue Publishing Service will return the requested records. [2]

4.4 Discovering Datasets

28 Figure 6 shows the components involved in the process of searching the metadata catalogue to locate datasets.

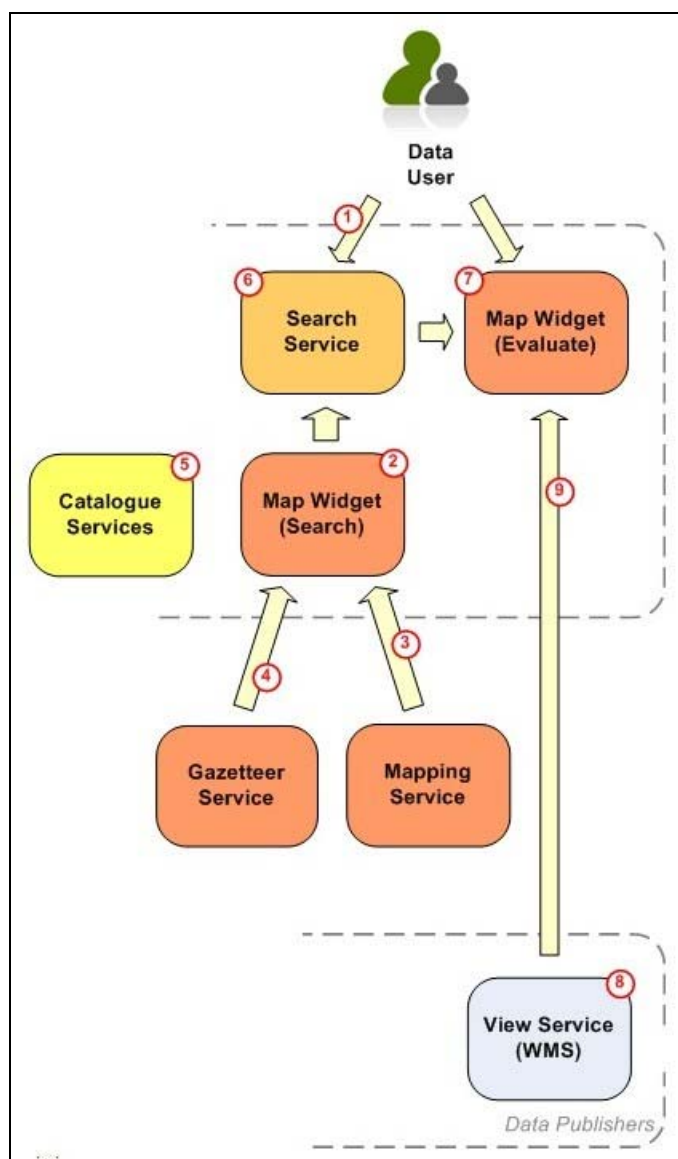


Figure 6 - Searching the Metadata Catalogue

29 The process steps are as follows:

- The Data User accesses the data.gov.uk website, and elects to search for Data. [1]
- Optionally, the Data User may also choose to search by spatial extent, and if so uses the Map Widget (Search) to specify a rectangle defining that extent [2]. The definition of this extent is done against a backdrop map [3], and the user may search for a location to enable them to define the extent [4].
- When the Data User hits the “Search” button, the search parameters, including spatial extent (if specified), are passed by the Search Service to the Catalogue Service. [5]

- The Catalogue Service returns the results of the search to the Search Service, and these results are displayed to the Data User. [6]
- Where the search results indicate that a WMS service is available for the dataset, the Data User decides that they want to evaluate (view) one or more of these datasets. When they do this, the Map Widget (Evaluate) is started. [7]
- For each of the datasets selected, the Map Widget (Evaluate) sends a query to the relevant View Service (WMS) for that dataset, the details of which were contained in the metadata returned by the search query [8].
- The results of that query are displayed as a map within the Map Widget (Evaluate). [9]