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ServiceCube

Brief Introduction

ServiceCube is a Web application for describing and searching web services by means of metadata. This application is in development as a new version of CatMDServices by GeospatiumLab in collaboration with the Spanish Geographic Institute (IGN). It will be available soon.

Main Features

The tool has been implemented with J2EE and GWT technology and has the following features:

- Multi-platform (Windows, Unix). As it has been developed with J2EE and the storage of metadata records is managed directly through the file system, the application can be deployed in any platform with the minimum requirements of having installed Tomcat and a Java virtual machine. On the client side users only need a web browser with Javascript support.
- Multilingual. The application has been developed following the Java internationalization methodology. Nowadays, there is support for Spanish, English, French, Portuguese, Catalan, Galician and the Basque language. With little effort, other languages can be supported.
- Description of services by means of metadata in compliance with the metadata implementing rules of the INSPIRE directive. The metadata model proposed follows the guidelines for mapping the metadata implementing rules to ISO 19115/19119.
- Web services searching of metadata stored in the local metadata repository according to different criteria such as the geographic extension of the data provided by the service, the keywords, the service type or the services provider.
- Automatic metadata generation from the "getCapabilities" operation supported by a service that complies with the OGC Specifications (WMS, CSW, WFS, WCS or WPS).
- Thesaurus and controlled list utilities to facilitate the edition of metadata. This enables metadata creators to use them in order to fill in some metadata elements. The use of controlled keywords facilitates the mapping between a selected vocabulary and a large collection of records.
- On-line help.

Installation guidelines

Downloads

The following downloads are needed to install ServiceCube:

- Download the Java Development Kit or Java Runtime Environment v.1.5. (http://java.sun.com/javase/downloads/index.jsp or http://www.oracle.com/technetwork/java/javase/downloads/index-jdk5-jsp-142662.html).
- Download Apache Tomcat v.5.5 (http://tomcat.apache.org)
- The application ServiceCube can be downloaded from the URL http://sourceforge.net/projects/spatiumcube/

Installation of ServiceCube with Tomcat

Once the application has been downloaded, the steps to install it are listed below:

- Install the Java Development Kit (http://java.sun.com/javase/downloads/index.jsp) and set the JAVA_HOME environment variable with the JDK installation path value. For example, this variable can take the following value:

```
JAVA_HOME=C:\Archivos de programa\Java\jdk1.5.0_14
```

- Install Tomcat (http://tomcat.apache.org), for example, in the path "C:/Tomcat" (if you want to install it in other location you have to change this path in several application files). In the next steps we will refer to this path as TOMCAT_HOME. Check that you have installed Tomcat properly starting it (one way to do it is running the TOMCAT_HOME/bin/startup.bat file) and trying to load the URL "http://localhost:8080/" from the web browser, then shutdown Tomcat for the next steps (you can run the TOMCAT_HOME/bin/shutdown.bat file).

- If you wish access to manage and edit metadata records you have to include in the file TOMCAT_HOME/conf/tomcat-users.xml the user roles supported by the application, ie, include the following two lines (within the tags "tomcat-users"):

```
<role rolename="ServicesSearchEditor"/>
<role rolename="ServicesSearchAdmin"/>
```

Users having the role "ServicesSearchEditor" may create, edit and delete service metadata records from the catalog.

Users having the role "ServicesSearchAdmin" may import and export service metadata records to/from the catalog.

Users with access to these options should be included in the same file (TOMCAT_HOME/conf/tomcat-users.xml, within the tags "tomcat-users"). For example, we may wish to include the following users:

- User "john" with permissions to create, modify, or delete metadata records from the catalog:

```
<user username="john" password="johntest" roles="ServicesSearchEditor"/>
```

- User "peter" with management permissions, such as import or export service metadata records to/from the catalog:

```
<user username="peter" password="petertest" roles="ServicesSearchAdmin"/>
```

- User "mary" with access to all functionalities of the application:

```
<user username="mary" password="marytest" roles="ServicesSearchEditor,ServicesSearchAdmin"/>
```

- Create the directory where the service metadata records will be stored (the default path is "C:/ServiceCube/repository") and include the metadata records desired to be loaded initially into the catalog.
- Create the directory to store the compressed files (ZIP) from the exportation metadata catalog operation. The default path is:

```
"C:/ServiceCube/exportedServices/"
```

- Create the directory to store the compressed files (ZIP) from the importation metadata catalog operations. The default path is:

```
"C:/ServiceCube/importedServices/"
```

- Deploy the ServiceCube.war file in Tomcat. This task can be done in two ways:
  - 1) Manual. Copy the file into the directory TOMCAT_HOME/webapps and start Tomcat (for the last one you can run the TOMCAT_HOME/bin/startup.bat file).
  - 2) Tomcat Manager. Start Tomcat and access the Tomcat Manager (http://localhost:8080/manager/html). In order to access to Tomcat Manager you will need to add "manager" role to the users config file (TOMCAT_HOME/conf/tomcat-users.xml) and access entering this user and password. For example:

```
<role rolename="manager"/>
<user username="tomcat" password="s3cret" roles="manager"/>
```

Then select the file ServiceCube.war in the "WAR or directory URL" and click "Deploy."

- If everything has gone well, you can load the application in the web browser with the URL:

```
http://127.0.0.1:8080/ServiceCube/index.html
```

Change default installation paths and properties

This project is preconfigured to work with default paths. The following lines explain in detail the modifications to be carried out depending on the path you want to change after the deployment of the web application in Tomcat. We refer to the path where the application is deployed (TOMCAT_HOME/webapps/ServiceCube) as DEPLOYMENT_DIR.

- TOMCAT_HOME. Default value: C:/Tomcat. If you install Tomcat in other path you have to update it in the following files:
  - DEPLOYMENT_DIR/WEB-INF/classes/log4j.properties
  - DEPLOYMENT_DIR/WEB-INF/config/metadataManager.properties
  - DEPLOYMENT_DIR/WEB-INF/config/thesaurusCatalog.properties
  - DEPLOYMENT_DIR/WEB-INF/repository/defaultSources/sourcesSelector.rdf
  - DEPLOYMENT_DIR/WEB-INF/repository/defaultSources/standard_sources.rdf
  - DEPLOYMENT_DIR/WEB-INF/repository/defaultSources/thesaurusSelector.rdf
  - DEPLOYMENT_DIR/WEB-INF/web.xml
- DEPLOYMENT BASE URL. Default value: http://127.0.0.1:8080 . If you wish to change the base URL or the connection port only, you have to change this value from 127.0.0.1 to that URL in the following files:
  - DEPLOYMENT_DIR/WEB-INF/config/mdServicesSearch.xml
  - DEPLOYMENT_DIR/WEB-INF/config/metadataManager.properties
  - DEPLOYMENT_DIR/WEB-INF/config/sourceAccessClientStub.rdf
  - DEPLOYMENT_DIR/WEB-INF/web.xml
  - DEPLOYMENT_DIR/WEB-INF/classes/Capabilities2.0.2.xml
- GEOGRAPHIC LOCATION CRITERION WMS URL. Default value: http://www.idee.es/wms/IDEE-Base/IDEE-Base . If you wish to change this map service URL you have to replace all ocurrences of this value with the wanted wms URL by means of a text editor (there are a lot of ocurrences).
- METADATA REPOSITORY. Default value: C:/ServiceCube/repository. If you want to change this path you have to update it in the following file:
  - DEPLOYMENT_DIR/WEB-INF/classes/sourceAccessServicesSearch.rdf
- METADATA INDEXES DIRECTORY. Default value: C:/ServiceCube/indexes. If you want to change the path where indexes for search are stored you have to update it in the following file:
  - DEPLOYMENT_DIR/WEB-INF/classes/sourceAccessServicesSearch.rdf
- METADATA EXPORTATION DIRECTORY. Default value: C:/ServiceCube/exportedServices/. If you want to change this path you have to update it in the following files:
  - DEPLOYMENT_DIR/WEB-INF/config/metadataManager.properties
- METADATA IMPORTATION DIRECTORY. Default value: C:/ServiceCube/importedServices/. If you want to change this path you have to update it in the following files:
  - DEPLOYMENT_DIR/WEB-INF/config/metadataManager.properties
- METADATA IMPORTATION/EXPORTATION BASE URL. Default value: http://127.0.0.1:8080/ServiceCube/selection . If you want to change this path you have to update it in the following files:
  - DEPLOYMENT_DIR/WEB-INF/config/metadataManager.properties
- LOG FILES. Default value: DEPLOYMENT_DIR/logs/. If you want to change the path where the application logs are stored you have to update it in the following file:
  - DEPLOYMENT_DIR/WEB-INF/classes/log4j.properties
- ACCESS CONTROL. Default value: 1 (enabled). If you want allow all users to manage and modify metadata records set the property ACCESS_CONTROL=0 (disabled) in the file:
  - DEPLOYMENT_DIR/WEB-INF/config/ServicesSearch.properties
- CSW CAPABILITIES. If you want to change default CSW service capabilities you have to change them in the following file:
  - DEPLOYMENT_DIR/WEB-INF/classes/Capabilities2.0.2.xml

Common errors

- **Tomcat can't be loaded**. If you execute TOMCAT_HOME/bin/startup.bat and Tomcat can not load or you get the following message in the command line:

```
C:\Tomcat\bin>startup.bat
Neither the JAVA_HOME nor the JRE_HOME environment variable is defined
At least one of these environment variable is needed to run this program
```

Check the value of the JAVA_HOME environment variable. If this variable is not set, you can solve the problem setting the JAVA_HOME with the JDK installation path value.

- **Out of memory error**. If deploying the installer (ServiceCube.war) in Tomcat you get an error similar to the following line means that the application need more memory to be loaded:

```
java.lang.OutOfMemoryError: Java heap space
```

you can solved it by adding to the file TOMCAT_HOME/bin/catalina.bat the following line:

```
set CATALINA_OPTS=%CATALINA_OPTS% -Dsun.io.useCanonCaches=false -Xms256M -Xmx512M -XX:MaxPermSize=256M
```

If Tomcat is installed as service you have to add an environment variable:

```
Name:  CATALINA_OPTS
Value: -Xms256M -Xmx512M
```

- **Cannot connect with the server**. When you try to load the application from a web browser, client is loaded but shows a message reporting that client cannot connect with the server. This error may occur for several reasons, the most likely are listed below:
  - Check if tomcat is installed in the default path. If tomcat is installed in a different path, change the files listed in section Change default installation paths and properties related to TOMCAT_HOME.
  - Firewall configuration. It could be that your firewall blocks the connections to the server.
  - Network connection. Go through your network configuration and check that server can be accesed from your machine. You can try also to load the following URLs in your browser:
    - http://[host]:[port]/ServiceCube/Dispatcher: If a white page is loaded, the servlet that allows metadata queries is loaded.
    - http://[host]:[port]/ServiceCube/selection: If a page with the content "Selection servlet loaded" is loaded, it means the servlet that allows manage metadata is loaded.
  - Check the url to connect to server in the following files:
    - DEPLOYMENT_DIR/WEB-INF/config/mdServicesSearch.xml: The file must contain an element with the url to access the file in which are defined the metadata repository access properties, it should be similar to:

```
<?xml version="1.0" encoding="UTF-8"?>
<gmd:MD_Metadata xmlns:gco="http://www.isotc211.org/2005/gco ⧉"
    xmlns:gmd="http://www.isotc211.org/2005/gmd ⧉"
    xmlns:gml="http://www.opengis.net/gml ⧉"
    xmlns:srv="http://www.isotc211.org/2005/srv ⧉"
    xmlns:void="http://iaaa.cps.unizar.es/void ⧉" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance ⧉">
    <gmd:fileIdentifier>
        <gco:CharacterString>mdServicesSearch</gco:CharacterString>
    </gmd:fileIdentifier>
    [..]
    <gmd:distributionInfo>
        <gmd:MD_Distribution>
            <gmd:transferOptions>
                <gmd:MD_DigitalTransferOptions>
                    <gmd:onLine>
                        <gmd:CI_OnlineResource>
                            <gmd:linkage>
                                <gmd:URL>http://127.0.0.1:8080/ServiceCube/sourceAccessServicesSearch.rdf ⧉</gmd:URL>
                            </gmd:linkage>
                        </gmd:CI_OnlineResource>
                    </gmd:onLine>
                </gmd:MD_DigitalTransferOptions>
            </gmd:transferOptions>
        </gmd:MD_Distribution>
    </gmd:distributionInfo>
</gmd:MD_Metadata>
```

- - - DEPLOYMENT_DIR/WEB-INF/config/sourceAccessClientStub.rdf: This file must contain the url to the servlet that allows to get the metadata from the repository, it should be similar to:

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:dct="http://purl.org/dc/terms/ ⧉" xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns# ⧉" [..]>
    <rdf:Description rdf:about="http://iaaa.cps.unizar.es/instances/art_1991_IJCIM_Insim ⧉">
        [..]
        <iaaa:manager>
            <iaaa:Component>
                <iaaa:class>iaaa.sourceAccess.http.SourceClientStub</iaaa:class>
                <iaaa:params>
                    <iaaa:param>
                        <iaaa:paramName>communicationsPoolURL</iaaa:paramName>
                        <iaaa:value>http://127.0.0.1:8080/ServiceCube/Dispatcher ⧉</iaaa:value>
                    </iaaa:param>[..]
                </iaaa:params>
            </iaaa:Component>
        </iaaa:manager>
    </rdf:Description>
</rdf:RDF>
```

- - - DEPLOYMENT_DIR/WEB-INF/web.xml. Check the url in the configuration of the Dispatcher Servlet (servlet that gets the metadata from repository) section:

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app id="ServiceCube">
  [..]
  <servlet>
    <servlet-name>Dispatcher</servlet-name>
    <servlet-class>iaaa.sourceAccess.sourceServer.DispatcherServlet</servlet-class>
    <load-on-startup>1</load-on-startup>
    <init-param>
      <param-name>startSources</param-name>
      <param-value>
        <![CDATA[
        <init>
          <source>
            <initSourceName>C:/Tomcat/webapps/ServiceCube/WEB-INF/classes/sourceAccessServicesSearch.rdf</initSourceName>
            <initSourcePath>http://127.0.0.1:8080/ServiceCube/sourceAccessServicesSearch.rdf</initSourcePath>
          </source>
        </init>
        ]]>
      </param-value>
    </init-param>
    <init-param>
      <param-name>logsFileProperties</param-name>
      <param-value>C:/Tomcat/webapps/ServiceCube/WEB-INF/classes/log4j.properties</param-value>
    </init-param>
  </servlet>
  <servlet-mapping>
    <servlet-name>Dispatcher</servlet-name>
    <url-pattern>/Dispatcher</url-pattern>
  </servlet-mapping>
  [..]
</web-app>
```

- **Geographic Location Map cannot be loaded**. Check if the map service is available loading the following url in your web browser: http://www.idee.es/wms/IDEE-Base/IDEE-Base?FORMAT=jpeg&LAYERS=Todas&STYLES=sombreado2&SERVICE=WMS&VERSION=1.1.1&REQUEST=GetMap&EXCEPTIONS=application%2Fvnd.ogc.se_inimage&SRS=EPSG%3A4326&BBOX=-43.799062500000005,13.587890625,30.0290625,58.412109375&WIDTH=420&HEIGHT=255 ⧉. If the map service is not available (i.e. you cannot see the map in your web browser) you can wait service to be

restored or change the map service url replacing all ocurrences of http://www.idee.es/wms/IDEE-Base/IDEE-Base ⧉ as shown in Change default installation paths and properties section (GEOGRAPHIC LOCATION CRITERION WMS URL).

- **Exportation or importation files cannot be downloaded**. If exportation or importation files cannot be downloaded from other machines (different from server where ServiceCube is installed) check if the urls EXPORTATION_STORAGE_URL and IMPORTATION_STORAGE_URL set in the file DEPLOYMENT_DIR/WEB-INF/config/metadataManager.properties are accessible from these machines (make sure that it is not localhost or 127.0.0.1).

User Manual

Introduction

ServiceCube is a web tool that allows the edition of service metadata as well as search and retrieval of metadata records that fulfil the specified criteria of users.

This services catalog is compliant with the INSPIRE implementing rules and the metadata model proposed follows the guidelines for mapping the metadata implementing rules to ISO 19115/19119 ([1]). The encoding of service metadata in XML format follows the guidelines established by the technical specification ISO/TS 19139 ([2]). This specification defines the way to translate the UML models proposed in ISO 19115 (and other related standards) into an XML syntax. In particular, the syntax that has been used is the one proposed in the XML-Schemas ⧉ accompanying the "ISO Metadata Application" profile ([3]) of the OGC catalog services specification, which adopts ISO 19115 ([4]) as metadata information model.

The initial page (see Figure 1) is divided into two parts: the left one shows the criteria for searching, and the right one shows the results of the search as well as the metadata edition interface.
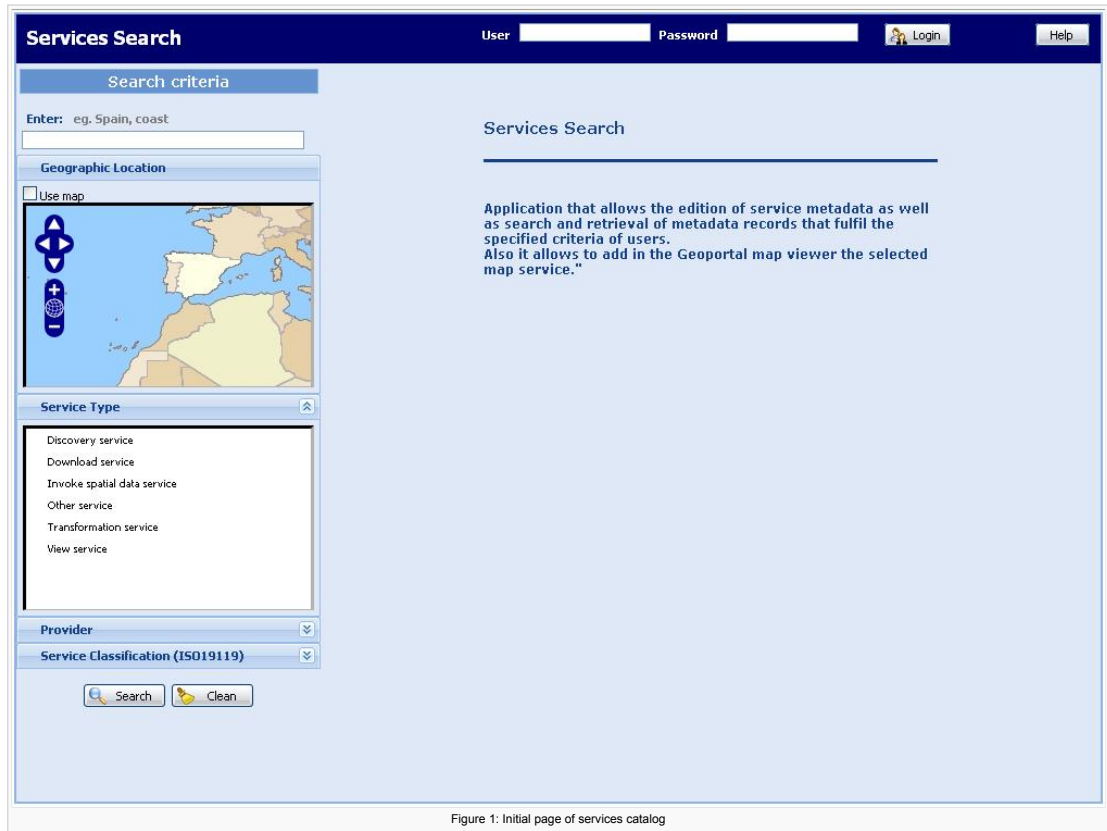

Figure 1: Initial page of services catalog

Language Selection

The application can be run in different languages by adding the parameter "locale" to the URL with the corresponding language code. All the languages supported and the way they are selected are shown in the following table:

Language	Invocation
Spanish	http://[host]:[port]/ServiceCube/index.html?locale=es
English	http://[host]:[port]/ServiceCube/index.html?locale=en
French	http://[host]:[port]/ServiceCube/index.html?locale=fr
Portuguese	http://[host]:[port]/ServiceCube/index.html?locale=pt
Galician	http://[host]:[port]/ServiceCube/index.html?locale=gl
Catalan	http://[host]:[port]/ServiceCube/index.html?locale=ca
Basque	http://[host]:[port]/ServiceCube/index.html?locale=eu

Table 1: Language codes

It has to be taken into account that metadata language does not depend on the client's language, their language depends on the language they are stored in the metadata repository.

Search of services

Search will be carried out taking into account the logical criteria defined by the user. That is to say, only the metadata records fulfilling all the criteria specified at the search will be returned.

Once criteria have been completed, the button "Search" should be clicked on in order to carry out the search. To come back to the initial state of any criteria selected (see Figure 1: Initial page of services catalog) the button "Clean" should be clicked on. This option deletes the previous search criteria as well as the results list.

Now each search option will be described in detail.

Search criteria

Title, abstract, keywords or file identifier criterion

This option, located in the first place of the criteria column, searches records containing the specified words within the following elements of metadata: title, abstract, keywords or metadata file identifier.

Figure 2: Text search on title, abstract, keywords or file
identifier of the metadata

 One or more words should be specified. A search for more than one word means that the results will contain one or other but not necessarily both words. For example: if we search for *vegetation*, we can find a number of results; if we search for *vegetation ortophoto* we will find more results because we retrieve metadata records containing *vegetation* and metadata containing *ortophoto*.

The character * is used to retrieve all existing metadata records. Moreover, this special character can be used to retrieve metadata records with a part of a word, for example, if we put it in the search field:

- Administr*: it will retrieve all metadata records containing words starting with this string on the fields mentioned above, like *administrate*, *administration*, *administrative*, *administrator*.
- *soil: it will retrieve all metadata records containing words finished with *soil*, like *SDIsoil*, *map_soil*.
- *map*: it will find every metadata records containing *map* in any position of it, like *map*, *MapService*, *WebMapService* or *StreetMap*.

Geographic location criterion

This option allows users to restrict the results of a search to a specific geographic area according to the geographic coordinates of the service metadata record.
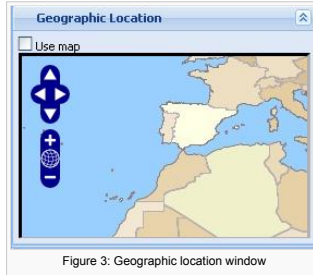
Figure 3: Geographic location window

Users can operate the map (see Figure 3 Geographic location window) and point the minimum (X minimum and Y minimum) and maximum (X maximum and Y maximum) coordinates where the metadata will be searched.

In order to use this criterion, the option 'Use map' should be selected and then zoom in or zoom out over the area to search on (press '+' or '-' sited on the map or the mouse wheel) and/or visualizing the outline map covering a concrete zone (press the arrows or the mouse to move the map). To visualize the world press the world globe icon.

Service type criterion

This criterion (see Figure 4) allows to obtain results according to a specific service type (serviceType field from ISO19119: Service information > Identification information > SV_ServiceIdentification > ServiceType).

A controlled list is provided with the possible values that can be introduced at this field during the edition of service metadata records. All the possible values and its correspondence with OGC Specifications are shown in Table 2. These values have been defined by the metadata implementing rules of data and services approved by the European Parliament according to the INSPIRE Directive [5].

Service type	Service type description	Correspondence with OGC Specifications
Discovery service		Catalog Web Service (CSW)
View service	Service that makes it possible, as a minimum, to display, navigate, zoom in and out, pan or overlay viewable spatial data sets and to display legend information and any relevant content of metadata.	Web Map Service (WMS)
Download service	Service that enables copies of spatial data sets, or parts of such sets, to be downloaded and, where practicable, accessed directly.	Web Feature Service (WFS) Web Coverage Service (WCS)
Transformation services	Service that enables spatial data sets to be transformed with a view to achieving interoperability.	Web Processing Service (WPS)
Invoke spatial data service	Service that allows defining both the data inputs and data outputs expected by the spatial service and a workflow or service chain combining multiple services. It also allows defining the external web service interface of the workflow or service chain.	
Other service		

Table 2: Service Type possible values description and its correspondence between OGC Specifications
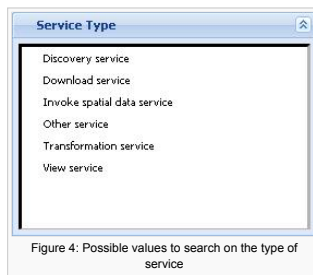

Figure 4: Possible values to search on the type of service

Provider criterion

This criterion allows the user to limit the search according to the service point of contact (responsible organization). The provider should be introduced by a character string.
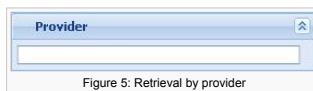

Figure 5: Retrieval by provider

As in the text criterion by title, abstract or keywords, if two words are introduced to make the search, the results will contain one word or another one, but not necessary both.

Service classification criterion

It allows the retrieval of metadata records according to a service classification which values are inserted in the field keywords of the service metadata.

According to the metadata implementing rules of data and services of INSPIRE approved by the European Parliament ([1]), this classification is provided to be used as a controlled list in the field keywords. The list consists of 8 general categories equivalent to the service taxonomy of ISO 19119 and other subcategories, added to obtain more specific terms.
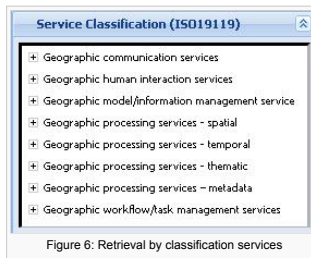
Figure 6: Retrieval by classification services

Search results

After introducing the search restrictions and press the option Search, the user will retrieve a list of the results (see Figure 7 Results list).

Each and every one of the pages the results for the search will be comprised of:

- A number of results of the total found (10 results per page).
- List of the found results, identified by the title of the service and the associated URL (only the first 50 characters will be shown and the complete URL will be displayed at the detailed metadata record).
- Navigation tool between result pages.
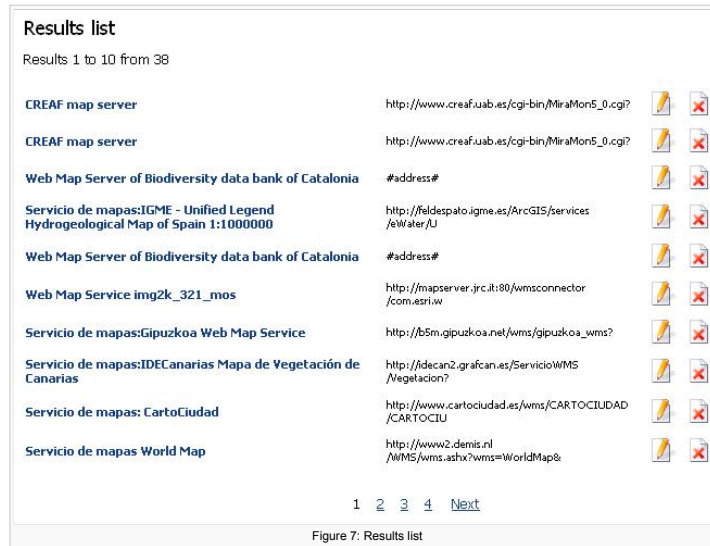
Figure 7: Results list

Each result is identified as follows:

- Title of the service: it is a link to the page showing the content of service metadata record in details (see Figure 8).
- Web url associate with the service.
- Options to edit metadata and delete metadata will be only available when accessing the tool from a user and password (see the section Service Metadata Edition).

When the user presses a title of a metadata record (see Figure 7), a detailed view of it, with all the fields completed, will be shown (see Figure 8 Detailed view of a metadata record).
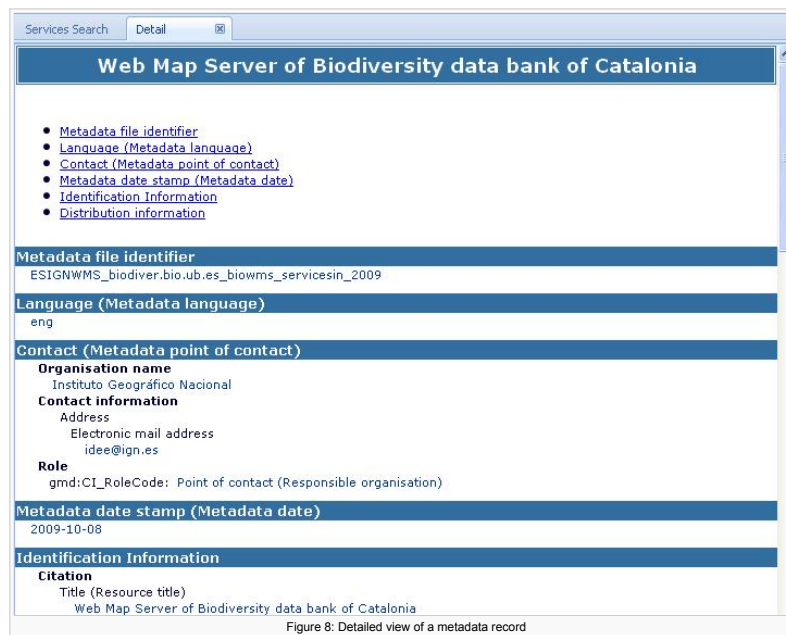
Figure 8: Detailed view of a metadata record

Management of users and permissions

In any system there are different types of users and needs. So, services catalog offers to each type the most suitable options adjusted to it according to a system based on users and roles.

User types

In this system there are three types of users, which will require different permissions:

- Users allowed to **search**. Most of users will be in this group. There is no necessary any special permission.

- Users allowed to **edit** service metadata records, that is, create new metadata records and modify or delete the existing ones. These users should enter the catalog as a user name with edition permissions ("ServicesSearchEditor" role) to carry out these operations.
- Users allowed to do **management** tasks like importing and exporting the metadata repositories. This group of users should have administration permissions ("ServicesSearchAdmin" role) in order to carry out these operations.

Authentication of users

In case of membership to one of the last two groups, it will be necessary to identify oneself by introducing the user and password on the top of the page and press "Login" (see Figure 9).

Figure 9: User authentication

If user name and password are correct, this user will appear at the top of the page like connected (see Figure 10)

Figure 10: Connected user

To close the session, just press the option "Logout".

Service metadata edition

In order to access the metadata records edition it is necessary to identify oneself by introducing the user and password with edition permissions (see Authentication of users). Once the user has been authenticated, he/she will be able to create new service metadata records or delete the existing ones.

Creation of a new service

To create a new service metadata record, the button "New service" at the top of the page should be clicked on (see Figure 11) .
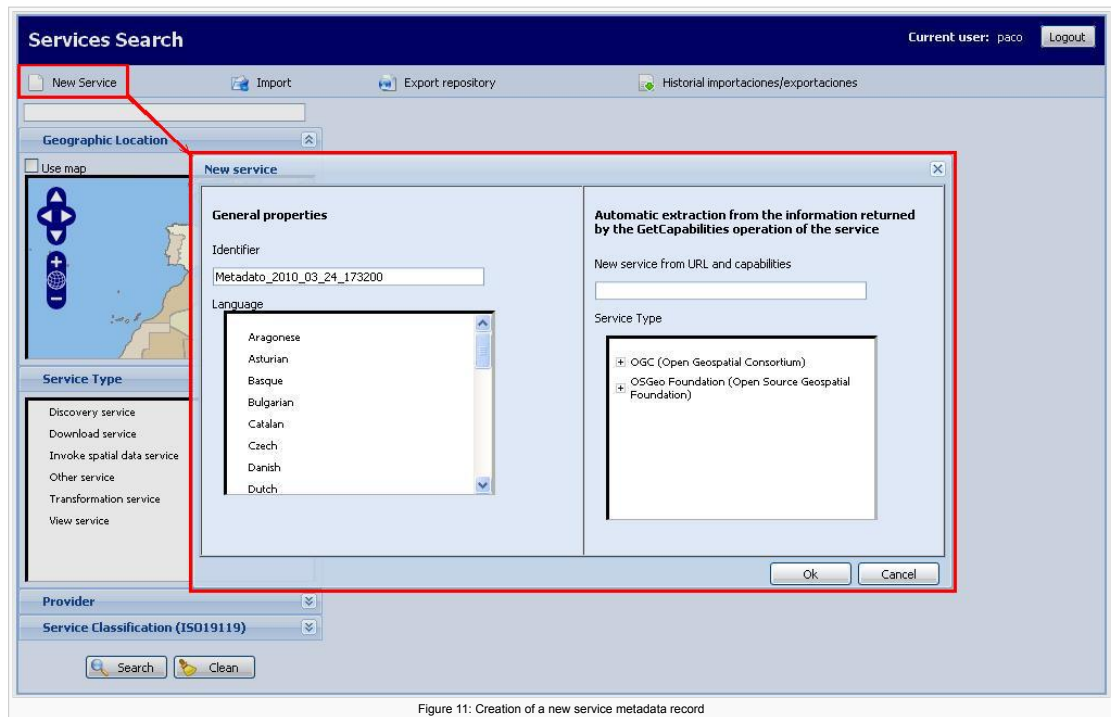
Figure 11: Creation of a new service metadata record

The "New service" window is divided into two parts.

The left one allows users to insert some general elements of service metadata:

- **Identifier** of metadata: this string is mandatory and it will be used, on the one hand for giving name to the metadata record file (xml) and on the other hand for being inserted as a value in the "fileIdentifier" field of the metadata record. A default identifier is generated when this window is opened, which can be modified by the user as he/she needs.
- **Language** in which the metadata record will be completed. If any value is selected, it will be created in the language client application is loaded.

On the right area are included two optional fields to allow users automatic generation of metadata from the information of "GetCapabilities" operation of services that complains with OGC specifications:

- **New service from URL and capabilities** optional field where the path of service or of its GetCapabilities operation can be inserted in order to connect with it for automatic extraction of some metadata fields. In this box the URL with all the parameters of the service capabilities should be inserted, for example, http://www.idee.es/wms/IDEE-Base/IDEE-Base?REQUEST=GetCapabilities&SERVICE=WMS ⧉. In case of inserting just the service URL, the services catalog will automatically add the basic parameters of capabilities and will try to obtain information from the service. In case of inserting an invalid URL or incorrect capabilities parameters, information about the service will not be extracted, but an empty metadata will be created so that the user can complete it manually.
- **Service type**: it allows the selection of the service typology between a controlled list of options. This field is mandatory if an URL has been provided for extraction and this URL does not contain a param specifying the service type.

The Table 3 shows a summary of the main fields of service metadata that can be generated automatically according to the OGC services classification. This table also shows the correspondence between the elements extracted from the Capabilities files and metadata descriptors defined by INSPIRE specifications. Only the information that is extracted for the latest versions of the service in compliance with OGC specifications is displayed; however, the automatic generation component is also able to extract information from other older versions, but this information has not been included here for simplicity.

INSPIRE metadata	WMS 1.3.0	CSW 2.0.2	WFS 1.1.0	WCS 1.1.0	WPS 1.0.0
Resource Title	Service.Title	ServiceIdentification. Title	ServiceIdentification. Title	ServiceIdentification. Title	ServiceIdentification. Title
Resource Abstract	Service.Abstract	ServiceIdentification. Abstract	ServiceIdentification. Abstract	ServiceIdentification. Abstract	ServiceIdentification. Abstract
Responsible organisation	Service. ContactInformation	ServiceProvider. ServiceContact	ServiceProvider. ServiceContact	ServiceProvider. ServiceContact	ServiceProvider. ServiceContact

Keywords	Service.KeywordList	ServiceIdentification. Keywords	ServiceIdentification. Keywords	ServiceIdentification. Keywords	ServiceIdentification. Keywords
	WMS	*CSW*	*WFS*	*WCS*	*WPS*
	infoMapAccessService	*humanCatalogueViewer*	*infoFeatureAccessService*	*infoCoverageAccessService*	
	List of SRS supported by the service				
Conditions for access and use	Service. AccessConstraints	ServiceIdentification. AccessConstraints	ServiceIdentification. AccessConstraints	ServiceIdentification. AccessConstraints	ServiceIdentification. AccessConstraints
Spatial data service type	view	discovery	download	download	transformation
Resource locator	Created from the getCapabilities url	Created from the getCapabilities url	Created from the getCapabilities url	Created from the getCapabilities url	Created from the getCapabilities url
Contains Operations	Capability.Request	OperationsMetadata. Operation	OperationsMetadata. Operation	OperationsMetadata. Operation	OperationsMetadata. Operation
Geographic bounding box	Capability.Layer. EX_GeographicBoundingBox		FeatureTypeList. FeatureType. WGS84BoundingBox	Contents.CoverageSummary. WGS84BoundingBox	
Coupled resource	Capability.Layer				

Table 3: Correspondence between OGC Capabilities Specifications and the INSPIRE service metadata profile

If service type is WMS, information from each layer of map service is extracted, adding an element in the "Coupled resource" metadata field for each one. Table 4 shows all the elements that can be extracted for each layer from a WMS service, distinguishing between different versions of the WMS specification.

INSPIRE metadata	WMS 1.0.0	WMS 1.1.0 and 1.1.1	WMS 1.3.0
Identifier	Capability.Layer.name		
Title	Capability.Layer.Title		
Abstract	Capability.Layer.Abstract		
Responsible organisation		Capability.Layer.Attribution	
Keywords	Capability.Layer. Keywords	Capability.Layer.KeywordList	
Spatial Resolution (Scale)	Capability.Layer.ScaleHint		Capability.Layer. MinScaleDenominator; Capability.Layer. MaxScaleDenominator
Geographic bounding box	Capability.Layer.LatLonBoundingBox or Capability.Layer.BoundingBox		Capability.Layer. EX_GeographicBoundingBox
Temporal Extent		Capability.Layer. Dimension; Capability.Layer. Extent	Capability.Layer. Dimension

Table 4: Correspondence between map layers information of OGC WMS Capabilities Specifications and the INSPIRE service metadata profile

Deletion of service metadata

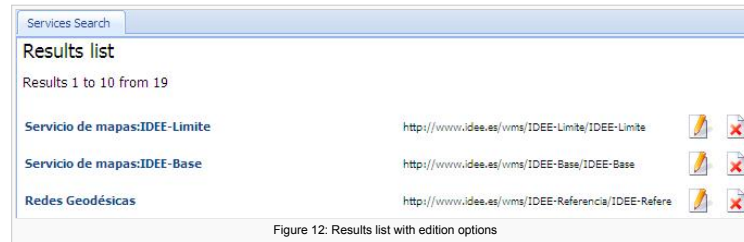The only way to delete service metadata is by accessing to the results list.

Figure 12: Results list with edition options

From this page, users can delete metadata by pressing the button ![x].

Edition of service metadata

There are two ways of accessing the edition of metadata:

- 1) From the new metadata creation windows, detailed at section Creation of a new service.
- 2) From the results page, that shows the edition option ![edit] (see Figure 12).

Edition window

After accepting the creation of a new service, as well as pressing the edition button ![edit] of an existing metadata, the following page should be shown (see Figure 13).
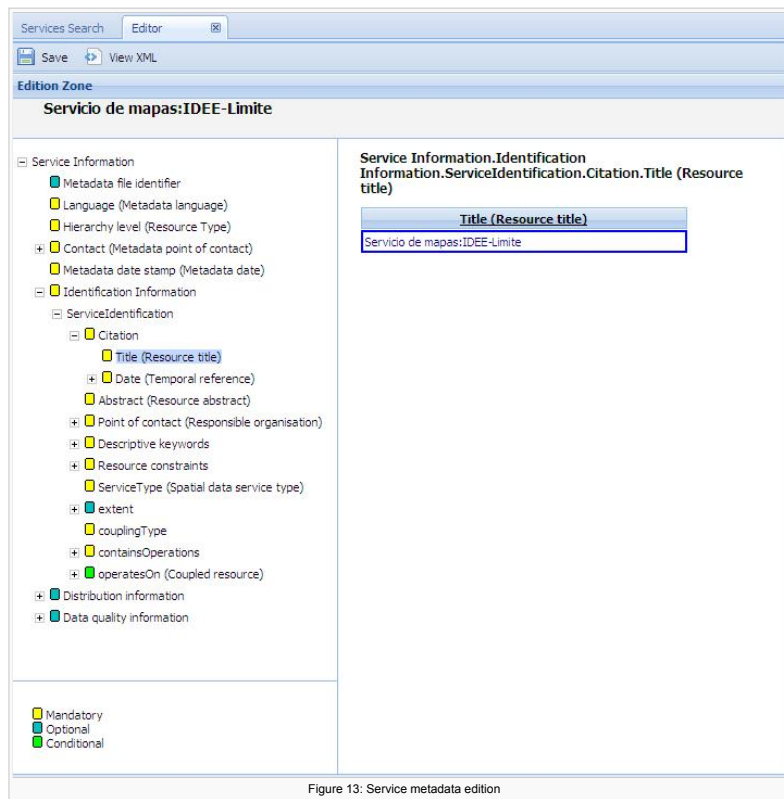
Figure 13: Service metadata edition

At the top of the page there are two options:

- **Save** it saves the changes
- **View XML** it displays the content of metadata in XML format, structured with labels as the International metadata standards establishes

The page is divided in two. On the left side the navigation tree allows the movement across the sections of metadata, as far as the end of a branch, which is an element. In the bottom of the left column has been included the legend of icons used in the tree elements. The right side allows the introduction of information in each element when it has been previously selected on the left side.

Simple and multiple elements edition

In order to complete a simple element, it is necessary to press it, insert the content at the emerging text box and accept it.
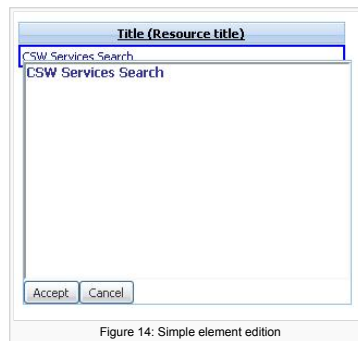
Figure 14: Simple element edition

Multiple elements (those that can be repeated) are represented by a table where there are as many lines as times the field is repeated. In order to add a new line, press the last one. The way to insert a value is the same as in the case of simple elements.
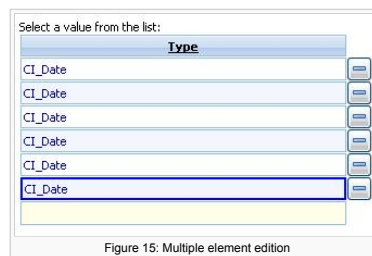
Figure 15: Multiple element edition

Temporal elements edition

Temporal elements can be completed either writing manually the text, or clicking to edit this field and then selecting the date from the graphic calendar selector that appears automatically.

Figure 16: Temporal element edition

The edition of "Time Instant" elements can be done in a similar way. These elements can be completed writing manually their value or selected it by means of graphic calendar selector (see Figure 17).
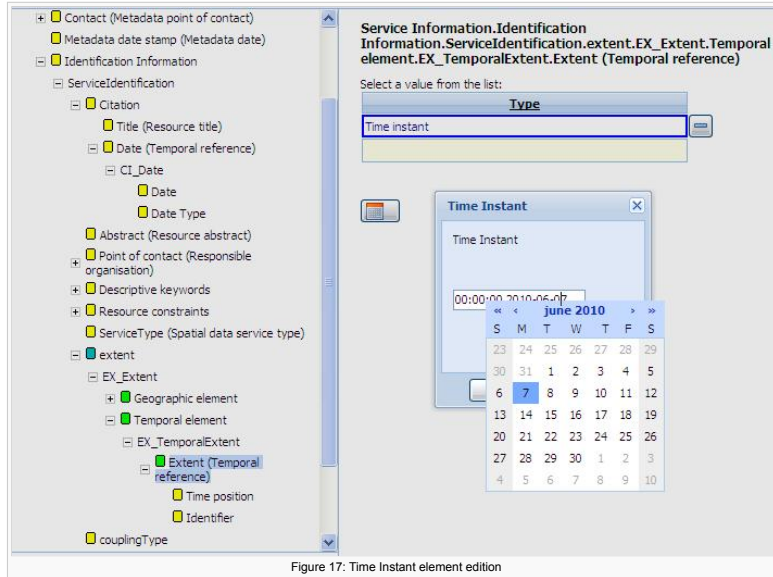
Figure 17: Time Instant element edition

The edition of "Time Period" elements can be also done in a similar way (see Figure 18).
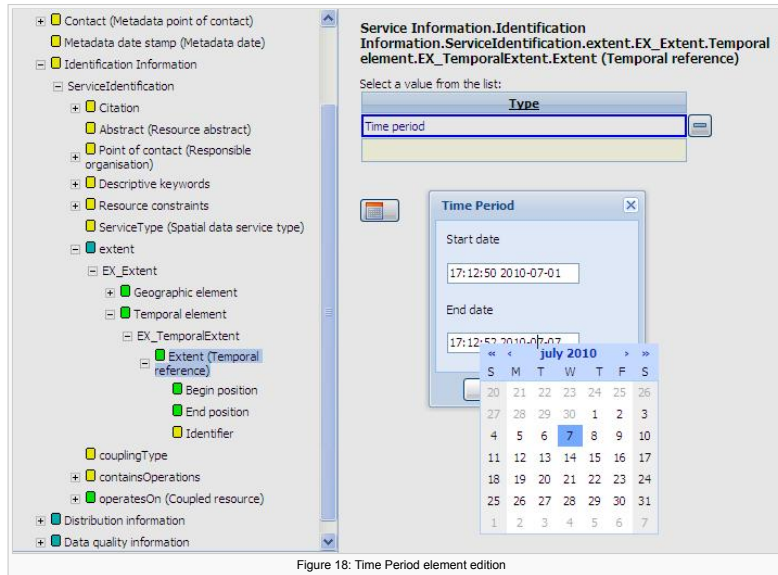
Figure 18: Time Period element edition

Geographic extension edition

Geographic extension edition can be completed writing manually each of the coordinates (north, south, east, west), or selecting these coordinates by means of the graphic coordinates selector which is shown automatically when you click on the button.
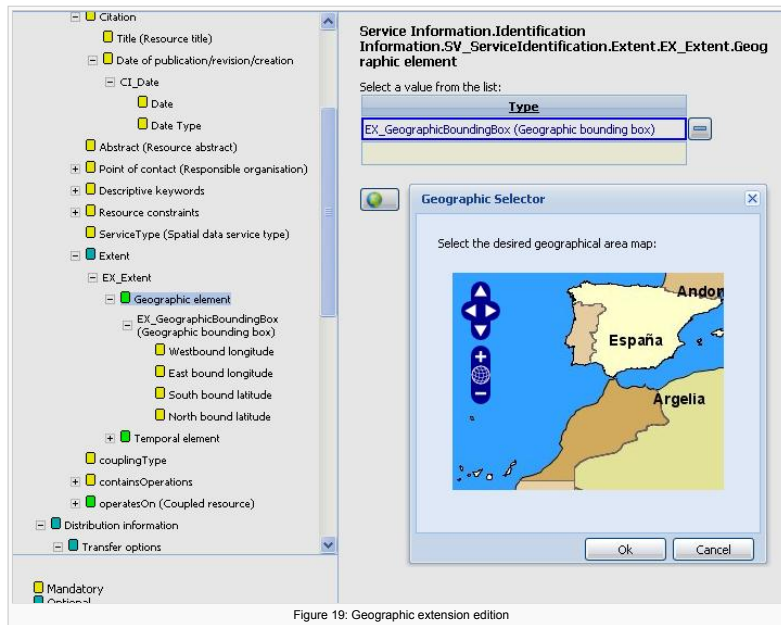
Figure 19: Geographic extension edition

Keywords edition

The metadata keywords, as with temporal or geographic extension elements, can be entered in two ways. On one hand, the keywords can be written manually. On the other hand, some keywords can be selected from the thesaurus repository and entered automatically (see Figure 20).
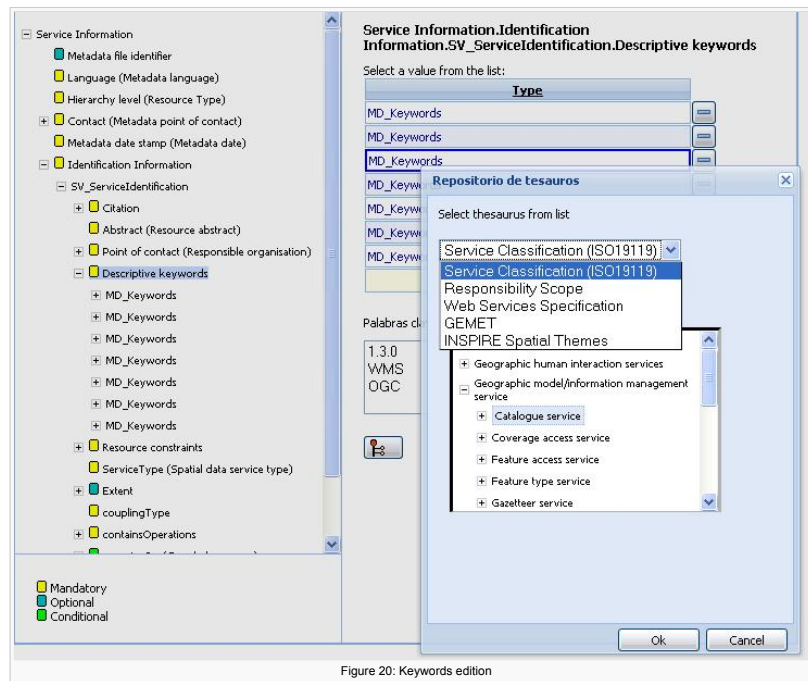
Figure 20: Keywords edition

Administration of ServicesCube

To access the management tasks of the services catalog, as mentioned at section Introduction, it is necessary to identify oneself as a user with management permissions (see section Authentication of users). These tasks include importation and exportation of metadata.

Importing service metadata records

This tool allows the importation to the services catalog of one metadata or a set of metadata. After pressing the option ![Import], there will be possible to select the kind of importation (see Figure 21).
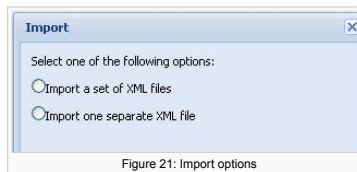
Figure 21: Import options

Importing one metadata record

In case of selection the option "Import one separate XML file", press "Browse" to select the XML service metadata file to be imported and then accept. This feature includes also an option to overwrite metadata with duplicated identifier, so if you set it and a metadata with the same file identifier exists in the repository, that metadata will be replaced with the new imported metadata.
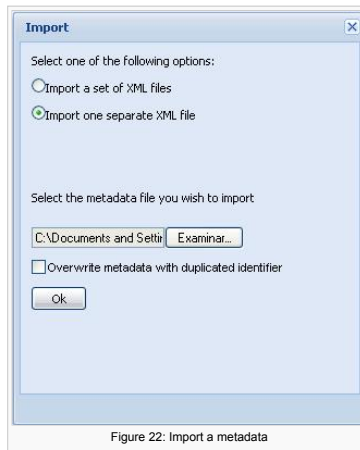
Figure 22: Import a metadata

After importing a separate metadata file, you can make a search to check that the metadata record has been correctly imported.

Importing a set of metadata files

The option "Import a set of XML files" allows the importation of a collection of metadata compressed into a ZIP file. To carry out this task, the option "Browse" should be clicked on in order to select the path where the file is stored. Moreover, if the number of metadata files is large, the process could take some minutes, therefore, the user can be working with the application and he or she will be notified when the proccess is finished.
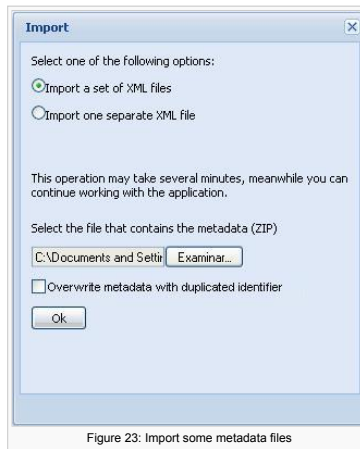
Figure 23: Import some metadata files

After importing the set of metadata files, make a search to check that metadata has been correctly imported. The importation details will be register in the system and the user could look at them by clicking the option "Import/export History" (see section Import / export History): state of importations, date, number of files imported,...

Exporting service metadata records

Services catalog offers the possibility of exporting all its stored metadata records. Press the option ⟨ Export repository ⟩ situated at the top of the page, then the dialog shown in the Figure 24 will be shown warning the user that this operation can take several minutes. While the application exports the metadata the user can continue working with the application.

Figure 24: Export metadata warning

The status of the export operation will be shown in the "Import/export History".

Import / export History

This history, which can be accessed from the option ⟨ Import/export history ⟩, keeps track of imports and exports carried out in the system during the last days. Imports and exports information are shown in different tabs.

The exportations and importations history are very similar. Both registers shows the following information from the exportations and importations respectively (see Figure 25 and 26):

- **User**: Name of user who ordered the exportation or importation.
- **State**: State of exportation or importation proccess. It can takes the following values:
  - In proccess: While the proccess is being carried out.
  - Finish: When the operation has finished.
  - Unknown: This value appears when the system cannot get information about the state of the operation.
- **Date**: Date in which exportation or importation was ordered
- **Expiration date**: Date limit to store the history information about the operation and the exported/imported files.
- **Link**: Link from which user can download the exported/imported files.

Figure 25: Exportations history

Figure 26: Importations history

CSW service request operations and their answers

The url to access to the transactional CSW interface of ServiceCube has the following structure:

```
http://[host]:[port]/ServiceCube/servlet/cswservlet
```

The supported requests by the CSW interface of ServiceCube are detailed in the section CSW query examples.

External references

1. INSPIRE Metadata Implementing Rules: Technical Guidelines based on EN ISO 19115 and EN ISO 19119, v. 1.0. European Commission (EC), Joint Research Centre

2. Geographic information - Metadata - XML schema implementation. ISO/TS 19139:2007. International Organization for Standardization (ISO)

3. OpenGIS Catalogue Services Specification 2.0.2 - ISO Metadata Application Profile. OGC 07-045, Open Geospatial Consortium Inc.

4. Geographic information – Metadata. ISO 19115: 2003. International Organization for Standardization (ISO)

5. Commission Regulation (EC) No 1205/2008 of 3 December 2008 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata (Text with EEA relevance)

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