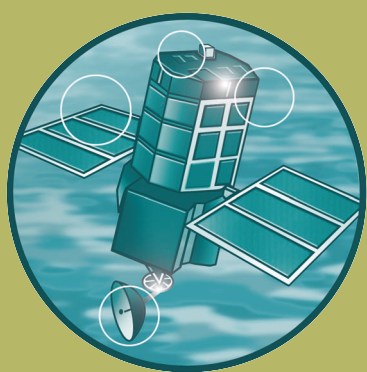


Improving Data and Knowledge Management for Effective Integrated FCERM

Metadata Standard Registry

R&D Technical Report FD2323/TR2



Joint Defra/Environment Agency Flood and Coastal
Erosion Risk Management R&D Programme

Improving Data and Knowledge Management for Effective Integrated Flood and Coastal Erosion Risk Management

Work Package 2 Metadata Standard and Registry

Final Report

R&D Technical Report FD2323/TR2

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Statement of use

This is the final report of work package 2 from FD2323 'improving data and knowledge management for effective integrated FCERM.' It explains and illustrates the development of an ISO 19115 compatible metadata standard for FCERM data and its management through an ISO 19135 compatible format. Its intended users are managers, suppliers, producers and users of FCERM information both within and outside the FCERM industry.

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Executive summary

Flood and coastal erosion risk management (FCERM) usually involves managing dynamic systems onto which loadings are continually acting, leading to responses which change the state of the system. Relevant, accurate and up-to-date information about the drivers of this change and their effects is necessary for effective FCERM. A review of approaches within the FCERM industry to planning data collection and the management of the data once obtained shows that there is a tendency to focus on data, as opposed to the business objectives for which the data is required to support. This data-led culture has resulted in an ineffective approach to data management, where the cart is effectively driving the horse. This current approach has given rise to:

- Inability to determine the optimum amount and quality of data required and hence justify the procurement of additional data when needed
- Data in the wrong form, requiring a lot of additional work to convert to useful information
- The duplication of data and its management, due to lack of awareness of data that already exists
- Data redundancies due to lack of objective-led planning
- The inability to re-use or maximise the use of data due to lack of knowledge about other parts of the business requiring the same data
- The inability to share data due to lack of knowledge about others requiring the data and inconsistent standards

Following earlier reviews of data issues within the joint Defra/Environment Agency R&D programme, Defra commissioned the FD2323 project to develop a strategic approach to FCERM data management, to ensure it effectively feeds into knowledge about the business and the delivery of FCERM objectives.

The FD2323 project involved the development of a framework for improving data and knowledge management through a move into a more objective-led approach to data management. A number of techniques and tools were developed within the project to support the culture change required to deliver the objective-led approach. The FD2323 project was carried out within five work packages. The key outcomes of work packages 1–4 (FD2323\TR1–4) feed into the principal output of the project, FD2323\TR5, which provides a guide to support a more effective management of data and knowledge within FCERM. This document (FD2323\TR2) develops tools to provide provenance to data, improve consistency and ability to share data. It addresses the need to provide provenance to data through the establishment of an ISO 19115 compliant metadata standard for FCERM and to improve standardisation of its management through ISO 19135 compliant processes and procedures.

First a review of the current available standards in the UK public sector was undertaken, together with the consideration of standards used within a case study, the Channel Coastal Observatory. This led to the decision to develop a FCERM metadata schema based on the UK GEMINI standard since it supports geo-spatial referencing, and is derived not only from ISO 19115 but also the

UK's e-Government Metadata Standard (e-GMS). Elements of the UK GEMINI standard have been altered and new ones have been created in the FCERM metadata schema, in line with ISO 19115 procedures, to accommodate the needs of the FCERM business.

Important considerations, including the provision for data quality flagging and the use of appropriate keywords, allow improved use with other tools developed within the overall project, such as the knowledge management tool (FD2323\TR3) and the data appraisal framework (FD2323\TR4). However, the development has been kept generic to enable use with other tools for accessing, processing and managing FCERM data.

A prototype metadatabase was created in Microsoft Access using the FCERM metadata schema. This enabled testing and further developments through the use of various forms of FCERM data (such as coastal, fluvial, urban and rural), thus ensuring that the metadata schema is relevant to the FCERM business needs. An investigation into the issues associated with incorporating the National Flood and Coastal Defence Database (NFCDD) into the metadatabase showed that the current version of NFCDD could be referenced but only as a single entry. This would not enable users to realise the full potential of its content. It is therefore recommended that data types within the NFCDD are described with their own metadata within NFCDD or with external metadata. This would then provide a mechanism by which it could be added to the overarching FCERM metadatabase. The Environment Agency is currently considering to describe the data held in NFCDD through the provision of metadata groups within NFCDD and will go some way towards improving its links to a FCERM metadatabase.

Details are provided on how the FCERM metadatabase could be more widely linked to metadatabases held within other organisations, which hold information of interest to FCERM. The increased availability and adoption of International Standards will, in the future, improve interoperability between such systems and ease data sharing. This would enable the FCERM community to have knowledge of relevant datasets and optimise the use of available information. The ISO 19135 management framework for the population and management of the metadatabase will also ensure compatibility with other systems.

The implementation of the FCERM metadata schema and subsequent metadatabase needs to be carefully considered. It is recommended that the metadatabase is built in a robust environment (e.g. Oracle or MS SQL server) to manage the envisaged size requirements. Discussions should be held with appropriate IT departments of the relevant operating authorities within the FCERM community to ensure that any proposals meet their IT policy and hardware/software procurement practices.

The benefits to the FCERM community will only be realised if the metadatabase systems are set up and a culture of providing metadata and associated quality information for all data is developed within the industry. This will then need to be backed by a responsibility and mutual trust to ensure good husbandry, ownership and quality management of the information.

Contents

Executive summary	iv
1. Introduction.....	1
1.1 Project background.....	1
1.2 Project objective and approach	1
1.3 Approach to Work Package 2.....	2
2. Metadata.....	4
2.1 What is metadata?.....	4
2.2 Why provide metadata?.....	4
3. Development of FCERM metadata schema.....	6
3.1 Introduction.....	6
3.2 Review of metadata standards	6
3.3 Channel Coastal Observatory current practice	7
3.4 Proposed FCERM metadata schema	8
3.5 Assessment of FCERM schema with National Flood and Coastal Defence Database.....	14
3.6 Proof of concept of FCERM metadatabase	17
3.7 Options for linking the FCERM metadatabase with other systems	18
3.8 Options for linking the FCERM metadatabase with NFCDD.....	19
3.9 Issues regarding FCERM metadata implementation	21
4. ISO 19135 Registry	23
4.1 Introduction.....	23
4.2 Management rules for the register of metadata elements and their code lists.....	24
4.3 Roles and responsibilities in the management of registers.....	25
4.4 Management of registers.....	27
4.5 Registry for FCERM input.....	31
5. Data specification.....	34
6. Future considerations.....	35
References	37

Appendices

- A. The FCERM Schema
- B. Step by Step Guide to FCERM Metadatabase Proof of Concept
- C. Metadata Dictionary Overview

Tables

Table 3.4.1	Metadata elements for geographic datasets	9
Table 3.5.3	NFCDD Compliance with Proposed Schema.....	16
Table 4.5.1	Code List register.....	33
Table 6.1	Stages to Implementation, actions for Contractors/ Consultant and FCERM community.....	36

Figures

Figure 1.2.1	Overview of FD2323 Work Packages and links	2
Figure 3.4.1	Metadata Community Profile.....	14
Figure 3.7.1	Relationship of FCERM and imported data from other metadatabases.	18
Figure 3.7.2	Links between FCERM and other metadatabases.....	19
Figure 3.8.1	Relationship of FCERM metadatabase and NFCDD through NFCDD metadatabase.....	19
Figure 3.8.2	Links between FCERM metadatabase and NFCDD.	20
Figure 3.8.3	Relationship of NFCDD database to other metadatabases. ...	21
Figure 4.1.1	System Diagram	23
Figure 4.3.1	Registry Information Flow	27
Figure 4.5.1	Relationship of Dictionaries to the Register	32

1. Introduction

1.1 Project background

The success of integrated flood and coastal erosion risk management (FCERM) is underpinned by the use of good data, information and knowledge management.

This project (FD2323 Improving Data and Knowledge Management for Effective Integrated FCERM) was carried out within the Joint Defra/Environment Agency R&D programme. Its purpose, following on from previous research and studies, is to produce tools and best practice guidance for effective data, information and knowledge management related to FCERM. The commission is split into five different components (Work Packages). This report (on Work Package 2) describes the development of an ISO 19115 compatible metadata standard for FCERM and its management through an ISO 19135 compatible format. The development provides provenance and improves the standardisation of data management processes and procedures.

The need for this project was identified within a preceding project, also commissioned under within the joint R&D programme 'A Position Review of Data and Information Issues within Flood and Coastal Defence' (FD2314). In order to facilitate a more effective and integrated flood and coastal erosion risk management at all levels, the FD2314 project identified an urgent need to understand and communicate the:

- Need, availability, quality of data and information and audit processes.
- Current roles and responsibilities related to data and knowledge management.
- Need and availability of policies, processes, research and development.
- Need and availability of enabling tools and techniques.

These recommendations, and building on other initiatives such as the Environment Agency's Data and Data Management Strategy, form the basis for this R&D project FD2323 to improve data and knowledge management for effective integrated FCERM within England & Wales.

1.2 Project objective and approach

The project has been developed with the following overall objective:

To document a structured process which will assist FCERM managers to assess their data needs and maximise the knowledge available on associated information in improving efficiencies in sourcing and management of information they require to carry out their business.

The package of work undertaken to fulfil the objective is summarised below and the relationships between them are illustrated in Figure 1.2.1:

- Work Package 1 (FD2323\TR1) – The development of an ‘ontology’ to provide a systematic representation of the links from FCERM objectives through to data required to underpin their delivery and the associated information exchange network;
- Work Package 2 (FD2323\TR2) – The development of an ISO 19115 compatible metadata standard for FCERM data and its management through an ISO 19135 compatible format;
- Work Package 3 (FD2323\TR3) – The development of a knowledge management tool to support the ontology by providing an interactive link between management objectives, tasks within these and available information;
- Work Package 4 (FD2323\TR4) – Development of a methodology for appraising the value of data to support business decisions; and
- Work Package 5 (FD2323\TR5) – The development of a best practice guidance for improving data and knowledge management from the outputs of the above research and development work.

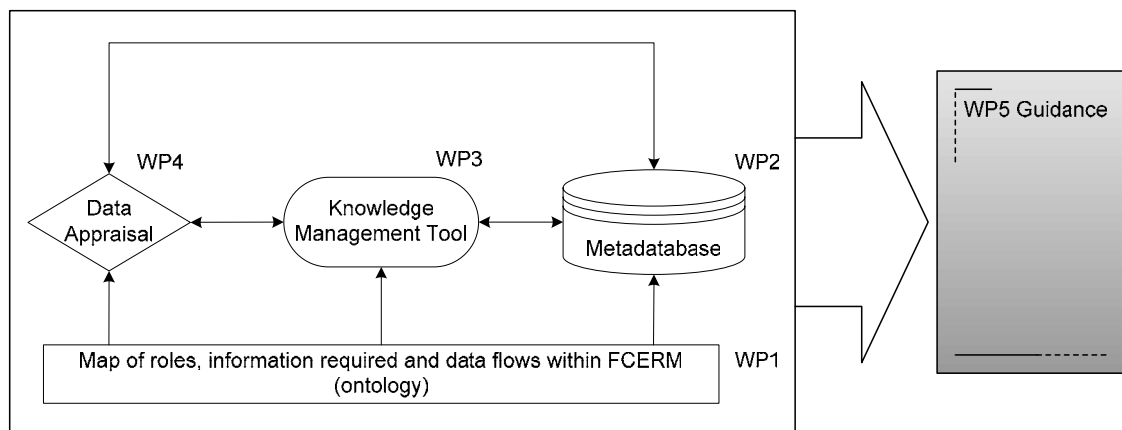


Figure 1.2.1 Overview of FD2323 Work Packages and links

The overall approach of the project team to the delivery of the improvement of data and knowledge management within FCERM is a culture change to embrace “objective-led data management”. The whole of the project plan has been designed around the achievement of this culture change and the provision of tools and guidance to support this change.

1.3 Approach to Work Package 2

The objectives of this Work Package are to:

- Establish an ISO-19115 compliant FCERM metadata schema;
- Establish an ISO-19135 compliant FCERM metadata schema registry;
- Introduce standard text that can be included into all Terms of Reference for DEFRA/Agency projects to ensure standardisation of data collected, stored and disseminated;
- Provide a demonstration register of metadata held within an example MS Access database and will aim to reference data currently held within the NFCDD and demonstrate allowance in the structure for any future data collection requirements;

- Show that data can be quickly and easily identified and understood by those involved at all levels of flood and coastal erosion management. This will be essential for the Knowledge Management Tool to function (described separately in Work Package 3, FD2323\TR3);
- Provide guidance documentation detailing the best methods of translating existing metadata, and adding new metadata.

This report details the route to defining an ISO-19115 metadata standard registry for all data types within the Flood and Coastal Erosion Risk Management (FCERM) program and provides a structure and guidance to the population of the metadatabase. This has been achieved by using knowledge obtained by team members in conducting an internal project to establish an ISO 19115 compliant metadata standard for all data held within their organisation. The consortium sought to build on this experience to provide the project with a similar standard. Based on their prior work the team has tailored the metadata standards used to meet the client's requirements and has addressed this through the use of existing examples of best practice in handling similar datasets. It must be noted that the ISO 19115 standards run to 409 entries, many of which will not be necessary and run the risk of non-compliance in form filling if made too onerous.

An investigation as to what other metadata systems are being proposed within the Environment Agency and DEFRA has also aided the choice of standard, with preferred use of the UK GEMINI Standard as the minimum description of all data sets and to then include additional categories from the ISO 19115 Standard. UK GEMINI is a recognised sub-set of the ISO 19115. The Channel Coastal Observatory experiences were explored as an example of practitioners' use of metadata standards and in particular with respect to how the metadata of bathymetric datasets has been addressed.

In addition, a test case of the NFCDD has been reviewed against the proposed standards to check for non-compliance/ similarities and recommendations have been made to ensure future compatibility.

Once the structure was defined, an example MS Access database was populated to enable a demonstration of the system to the project team. The final implementation of the database has the potential to become a key resource containing a large volume of data and will need to be hosted on a more appropriate system (e.g. Oracle, MS SQL Server etc.). It is clear that this implementation lies outside of the scope of the current project. Issues regarding its implementation are discussed in Section 6.

The management of the standard together with its use within the information management Tool developed in Work package 3 (FD2323\TR3) has been described through the establishment of an ISO-19135 compliant FCERM data standards registry. A standard text has been constructed that can be included into all Terms of Reference for DEFRA/Environment Agency projects to ensure the standardisation of data collected, stored and disseminated, detailed in Section 5.

2. Metadata

2.1 What is metadata?

Metadata is the technical word for 'information about data'. It is the term used to describe the summary information or characteristics of a set of data. In the area of geospatial information, or information with a geographic component, this normally means the What, Who, Where, When and How of the data. The only major difference between geographic metadata and the many other metadata sets being created for libraries, academia, professions, etc, is the emphasis on the spatial component - the 'where' element. Just as a consumer looks at the label on a food product to determine the ingredients, nutritional value and manufacturer, so too can a user of geospatial data review a metadata record to determine whether the dataset is fit for their purpose.

With the advent of GIS and the expanding use of digital data, the benefits and requirements for geospatial metadata are now well known. Consequently, there are recognised approaches to metadata documentation. For reference it should be stated that there are different levels at which metadata can be implemented and utilised:

- Discovery metadata - What data sets hold the sort of data I am interested in? This enables organisations to know and publicise what data holdings they have;
- Exploration metadata - Do the identified data sets contain sufficient information to enable a sensible analysis to be made for my purposes? This documentation is provided with the data to ensure that others use the data correctly and wisely; and
- Exploitation metadata - What is the process of obtaining and using the data that are required? This helps end users and provider organisations to effectively store, reuse, maintain and archive their data holdings.

Discovery metadata is generally considered the minimum amount of information that needs to be provided to convey to the user the nature and content of the data resource.

2.2 Why provide metadata?

The reason for collecting metadata is to assist in knowledge management, efficiency, quality and consistency. With increasing amounts of data being created and stored (but sometimes not organised) there is a real need to document the data for future use - to be as accessible as possible to as wide a "public" as possible. Therefore the need to make data and information easy for the users to locate and have knowledge of its relevance and usability for their purpose is fundamental in its description. There are significant benefits in doing so, which include the following:

- Provides provenance to data;
- Helps organise and maintain an organisation's investment in data;

- Provides information about an organisation's data holdings in catalogue form or to brokers, re-sellers and clearing houses;
- Accessible metadata records help to avoid duplication of effort by ensuring awareness of the existence of datasets, and promotes the availability of geospatial data beyond the traditional geospatial community;
- Users can locate all available geospatial data relevant to an area of interest or study. There is increasing pressure from customers for easier and quicker access to the right information, at little or no charge;
- Data providers are able to advertise and promote the availability of their data via online services; and
- Metadata cataloguing goes some way towards compliance with Government directives relating to easier access to information - Information Age Government, Data Protection and Freedom of Information Acts, Public Records Act, Crown Copyright, etc.

3. Development of FCERM metadata schema

3.1 Introduction

In order to identify a suitable metadata standard to adopt and develop a FCERM schema, it was necessary to first review metadata standards in the public sector to assess their utility, as well as current practice in recording and use of metadata standards. The Channel Coastal Observatory is focused upon as an example of current practice, following through its background and a review in relation to this project. Outcomes of the review indicated the current thinking towards the best metadata standards available and consequently aided the choice of standard adopted, developed and reviewed to produce a FCERM schema. An assessment of the developed schema is tested using the National Flood and Coastal Defence Database (NFCDD) through discussions with the Environment Agency and knowledge of the database.

3.2 Review of metadata standards

During the past few decades various bodies have produced metadata standards. Many of these have a great deal in commonality, but vary in the degree of complexity and the level of detail required to complete an entry. Over recent years there has been a steady convergence of standards culminating in a number of publications by the International Standards Organisation (ISO). These include ISO 15836:2003 (Information and Documentation - The Dublin Core metadata element set) and ISO 19115:2003 (Geographic information - Metadata).

Research into the UK Public Sector bodies shows that there are essentially four metadata standards that are currently used. These are listed and briefly discussed below:

- e-Government Metadata Standard;
- ISO 19115:2003 Geographic information - Metadata;
- The GI-gateway (Geographical Information gateway) Discovery Metadata Standard formerly known as National Geospatial Data Framework (NGDF) Standard; and
- UK GEMINI.

The **e-Government Metadata Standard (e-GMS)** is published by the Office of the e-Envoy and is mandated for use by all public sector bodies. It aims to make cross-government searching for all information resources a reality. Currently the e-GMS has restricted spatial referencing elements. This is likely to be problematic although it is being developed to incorporate ISO 19115, which will make it more suitable for FD2323 purposes. However this is unlikely to be completed during the project timescale.

The **ISO 19115:2003 Geographic information - Metadata** standard fully supports spatial referencing and should be ideal for the needs of the geographic information community within departments or agencies. However, no

implementation standard has yet been agreed by the International Standards Organisation. The working draft of ISO 19139 (Geographic information - Metadata -xml schema implementation) has been published for comment but its likely ratification date is unknown. Major vendors of geographic information systems have implemented ISO 19115:2003 compatible metadata systems within their most recent version releases and these provide a useful source of metadata. ISO 19115 has over 400 metadata elements, making it comparatively complicated and unwieldy, although a subset could be developed for the purpose of FD2323.

The **National Geospatial Data Framework (NGDF)** is widely used in the UK and continues to be the standard used by the Association for Geographic Information (AGI) supported Gateway. It is essentially the Dublin Core Metadata Standard with an extension for handling spatial co-ordinates, however this framework has now been superseded by UK GEMINI.

The **UK GEMINI** (UK Geo-spatial Metadata Interoperability Initiative) Discovery Metadata Standard is a defined element set for describing geo-spatial, discovery level metadata within the United Kingdom, developed by AGI for the Cabinet Office e-Government Unit. It is:

- Derived from ISO 19115 Geographic Information - Metadata and the UK eGovernment Metadata Standard (eGMS);
- Compliant with relevant national and international standards, specifically ISO 19115 and UK eGMS;
- Originated by the AGI and the e-Government Unit of the Cabinet Office and the UK Data Archive;
- Created from a rigorous process of national consultation, feedback and revision;
- Managed by a steering group representing central and local government, the private sector, academia and the geo-spatial industry at large.

Although current government policy indicates that all UK Governmental departments/ agencies should use the e-GMS, the current version (v2 - May 2003) does not support spatial referencing to a level appropriate for use with geographic information. This is a significant drawback that is recognised and has been addressed in UK GEMINI.

3.3 Channel Coastal Observatory current practice

3.3.1 Background

The Channel Coastal Observatory (CCO) is the data management and regional coordination centre for the Southeast Regional Coastal Monitoring Programme. The programme provides a consistent regional approach to coastal process monitoring, providing information for development of strategic shoreline management plans, coastal defence strategies and operational management of coastal protection and flood defence. The programme is managed on behalf of the Coastal Groups of the Southeast of England and is funded by DEFRA, in

partnership with Local Authorities of the southeast of England and the Environment Agency.

3.3.2 Review

Currently the CCO metadatabase uses Federal Geographic Data Committee (FGDC) standards and XML schema. The FGDC coordinates the development of the United States' National Spatial Data Infrastructure (NSDI). According to the CCO Metadatabase manager, the FGDC schema was the most appropriate solution at the time of its development. However since its inception new metadata standards have been created. It is recognised that some of these new standards such as the ISO 19115 and in particular the UK GEMINI standard would be more appropriate for their metadata. The rationale for this assessment is based on the fact that, the UK Government has adopted UK GEMINI, through the Cabinet Office e-Government Unit, and the majority of the CCO programme partners are local government. Any change by CCO to UK GEMINI would therefore integrate effectively with government policy. CCO have indicated that they would consider migrating to UK GEMINI in the future. The procedure for migrating the system would be relatively straightforward, as both their current standard and UK GEMINI are similar and contain many of the same elements.

3.3.3 Outcome

The review of the standards used within the CCO has shown that the one used currently is now out of date with those widely used. However, UK GEMINI would be a favourable option to move to since it is based on ISO19115 as well as e-GMS.

3.4 Proposed FCERM metadata schema

Based on the above evaluation, the UK GEMINI schema was selected as the most appropriate metadata standard on which to base the standard for the FCERM community. However, in reviewing the elements within the standard against the needs of the FCERM community, in particular the need to capture data quality information as highlighted in Work Package 4 (FD2323\TR4), areas have been augmented using ISO 19115. Where ISO 19115 did not contain a suitable element, a new one was created following the guidance provided in Annex C of ISO 19115. A full description of the standard proposed is given in Appendix A and the outline is shown in Table 3.4.1 (with reference to tables in Appendix A).

The resulting schema includes all 32 elements as described in UK GEMINI, the obligations quoted are those provided in the ISO 19115 standards and are mandatory as far as is possible to provide a coherent and full metadata description to 'data' entry. As with all schemas, not all datasets to be described within the metadata can fulfil all the elements, this is recognised by offering some elements as optional. For example element number 16, vertical extent information, cannot be described for a shoreline management plan, but can be used for beach profiles.

Table 3.4.1 Metadata elements for geographic datasets

Element number	Element name	Element Description	Obligation	Number of occurrences	Data Type/Domain	Source	Short Name
1	Title	Name given to the dataset (N.B. this should not be the digital filename)	M	1	Free Text	UK GEMINI ISO 19115 360	<i>resTitle</i>
2	Alternative title	Short name, other name, acronym or alternative language title by which the cited information is known e.g. SSSI for Sites of Special Scientific Interest etc	O	N	Free Text	UK GEMINI ISO 19115 361	<i>resAltTitle</i>
3	Dataset language	Language(s) used in the dataset e.g. ENG for English.	M	N	Free Text (see Table 3, Appendix A)	UK GEMINI ISO 19115 39	<i>dataLang</i>
4	Abstract	Brief narrative summary of the dataset This should be a clear statement of the content of the dataset and give details on what, how, why, where and when, not general background information	M	1	Free Text	UK GEMINI ISO 19115 25	<i>idAbs</i>
5	Topic category	Main theme(s) of the dataset e.g. environment or oceans.	M	N	Class/Code list (see Table 4, Appendix A)	UK GEMINI ISO 19115 41	<i>tpCat</i>
6	Subject*	Topic of the content of the dataset - typically it will be expressed as keywords or key phrases or classification codes that describe the main subject of the dataset. Other terms may also be added, however it is recommended best practice to select a value from a controlled vocabulary/ thesaurus.	M	N	Free Text (see Table 5, 6a - 6o in Table 2, Appendix A)	UK GEMINI ISO 19115 53	<i>Keyword</i>
7	Date	Time period covered by the content of the dataset (N.B. not its creation or publication date)	M	N	Class (see Table 2 Elements 7a -7b for domain reference)	UK GEMINI ISO 19115 351	<i>exTemp</i>
8	Dataset reference date	Reference date for the dataset (Notional date of 'publication' of the dataset, rather than the actual date of the currency of the data)	M	1	Date format DD/MM/YYYY	UK GEMINI ISO 19115 362	<i>ResRefdatae</i>
9	Originator	Person or organisation having primary responsibility for the intellectual content of the data	O	N	Free Text	UK GEMINI ISO 19115 29	<i>idPoC</i>
10	Lineage	Information about the events or source data used in the construction of the dataset. Dataset history i.e. how the dataset was created or any processes used to create the dataset. Could include the scale of capture and how the digital dataset was created	O	1	Free Text	UK GEMINI ISO 19115 83	<i>Statement</i>
11	West bounding coordinate	Western most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1	Real (WGS84 Decimal Degrees)	UK GEMINI ISO 19115 344	<i>westBL</i>

Element number	Element name	Element Description	Obligation	Number of occurrences	Data Type/Domain	Source	Short Name
12	East bounding coordinate	Eastern most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1	Real (WGS84 Decimal Degrees)	UK GEMINI ISO 19115 345	<i>eastBL</i>
13	North bounding coordinate	Northern most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)	M	1	Real (WGS84 Decimal Degrees)	UK GEMINI ISO 19115 347	<i>northBL</i>
14	South bounding coordinate	Southern most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)	M	1	Real (WGS84 Decimal Degrees)	UK GEMINI ISO 19115 346	<i>southBL</i>
15	Extent*	Extent of dataset by subdivision of country by Government Regions, Authorities and Environment Agency Regions, Districts	M	N	Class - (See Tables 15a -15d, Appendix A)	UK GEMINI ISO 19115 349	<i>GeoDec</i>
16	Vertical extent information*	Vertical domain of the dataset - to include lowest vertical extent, highest vertical extent, vertical units and the origin from which the elevation values are measured	O	N	Class and Free Text (see Table 2, Elements 16a - 16d, Appendix A)	UK GEMINI ISO 19115 354	<i>VertExtent</i>
17	Spatial reference system	Name or description of the system of spatial referencing, whether by coordinates or geographic identifiers, used in the dataset e.g. National Grid of Great Britain, Regional Sea.	M	1	Class/Code list- (see Table 8, Appendix A)	UK GEMINI ISO 19115 187	<i>refSysId</i>
18	Spatial resolution	Measure of the granularity of the data (in metres) For data captured in the field, it will be the precision to which the data is captured. For image data, it will be the resolution of the image. For data taken from maps, it will be the positional accuracy of the map	O	1	Real	UK GEMINI ISO 19115 61	<i>scaleDist</i>
19	Spatial representation type	Method used to represent the spatial aspect of the data e.g. vector, grid.	O	N	Enumerated Class/Code list - (see Table 9, Appendix A)	UK GEMINI ISO 19115 37	<i>spatRpType</i>
20	Presentation type	Mode in which the data is represented e.g. digital map, digital table etc	O	N	Enumerated list/Code list - (see Table 10, Appendix A)	UK GEMINI ISO 19115 368	<i>presForm</i>
21	Data format	Format in which the digital data can be provided e.g. ArcView Shapefile.	M	N	Free Text	UK GEMINI ISO 19115 284	<i>geoObjType</i>
22	Supply media	Type of media in which the data can be supplied e.g. CD or online.	O	N	Enumerated list/Code list - (see Table 11, Appendix A)	UK GEMINI ISO 19115 292	<i>medName</i>

Element number	Element name	Element Description	Obligation	Number of occurrences	Data Type/Domain	Source	Short Name
23	Distributor*	Details of the organisation(s) from which the resource can be obtained	M	N	Class - (see Table 2 element 23a -23g for domain reference)	UK GEMINI ISO 19115 279	<i>Distributor</i>
24	Frequency of update	Frequency with which modifications and deletions are made to the data after it is first produced - revision regime of the dataset	M	1	Enumerated list/Code list - (see Table 12, Appendix A)	UK GEMINI ISO 19115 143	<i>maintFreq</i>
25	Access constraint	Restrictions and legal prerequisites for the access of the data e.g. copyright, license etc	O	N	Enumerated list/Code list - (see Table 13, Appendix A)	UK GEMINI ISO 19115 70	<i>accessConst</i>
26	Use constraints	Restrictions and legal restraints on using the data - as above	O	N	Enumerated list/Code list - (see Table 13, Appendix A)	UK GEMINI ISO 19115 71	<i>useConst</i>
27	Additional information source	Source of further information about the dataset - may include a reference (e.g. URL) to external information	O	1	Free Text	UK GEMINI ISO 19115 46	<i>supplInfo</i>
28	Online resource	Information about the online sources from which the resource can be obtained - may be a URL	O	N	Free Text	UK GEMINI ISO 19115 277	<i>onLineSrc</i>
29	Browse graphic	Graphic that illustrates the data - this may be the address, or a pointer to, a picture or a sample of the data	O	N	Free Text	UK GEMINI ISO 19115 31	<i>graphOver</i>
30	Date of update of metadata	Date on which the metadata was last changed - this is the date at which the metadata can be considered current, rather than the dataset itself	M	1	Single Date DD/MM/YYYY	UK GEMINI ISO 19115 09	<i>mdDateSt</i>
31	Metadata standard name	Name of the metadata standard (including profile name) used	O	1	Free Text	UK GEMINI ISO 19115 10	<i>mdSName</i>
32	Metadata standard version	Version (profile) of the metadata standard used	O	1	Free Text	UK GEMINI ISO 19115 11	<i>mdStanVer</i>
33	Accuracy	Quantitative description of dataset	M	N	Class/Free text (see Table 2 Elements 33a -33b for domain reference)	ISO 19115 (created within this metadata schema)	<i>dqDatAcc</i>
34	Qualitative Data Quality Information*	Qualitative quality information	M	N	Class/Free text (see Table 2- Elements 34a -34o for domain reference)	ISO 19115 99	<i>DQElement</i>

* Additional mandatory elements to be used should this element be selected (see Appendix A Table 2: Additional Metadata elements for geographic datasets).

Although the metadata schema is a stand-alone item, in order to show the 'proof of concept' and to link the information held within the Knowledge Management Tool, developed in Work Package 3, the metadata was inputted into a Microsoft Access database. In order to accommodate links to FCERM objectives, information transfer and data quality flags, developed in Work Packages 1, 3 and 4, some alterations to the metadata elements have been necessary. These are detailed below.

3.4.1 Alterations to metadata elements

The elements that have been altered are number 6 (subject) and 15 (extent). Element number 6 has been divided into keyword categories as defined in the Ontology (see FD2323\TR1) and is provided as a dropdown list, with addition of user defined keywords being added as free text. During the development of the Tool and metadatabase it has become increasingly obvious that the management of the keywords (and categories) is paramount to the systems working and drawing back the correct information for the Tool to be of value. To this end the ISO 19135 register has been developed to regulate this process and define the overall management structure for the entire system, this is described in Section 4 of this document. The use of the conventional free text keywords enables the schema to maintain ISO 19115 compliance, in the future this could be regulated using the Integrated Public Set Vocabulary (Cabinet Office, 2005).

The 'proof of concept' Tool has been built outside the Geographic Information System (GIS) environment (see FD2323\TR3), and so to enable datasets of different spatial coverage to be described a second layer of regional description has been provided. This has been achieved through the adoption of the ISO 3166 standard, which has been incorporated into element 15 and is further detailed in Appendix A. The first layer of this element is consistent with both UK GEMINI and ISO 19115.

3.4.2 Data quality additions to FCERM metadata schema

Development work was carried out within this research project to assess data quality attributes for FCERM data, with the view to developing quality flags that could be used within an appraisal framework (developed in Work Package 4). This work involved the identification of data attributes to decide whether available data was appropriate for application to a particular objective or range of objectives. A process, here called 'flagging', for attributing quality to data is introduced. Data quality flagging gives provenance and can then allow the practitioner to judge if it is of appropriate quality for their task. Knowledge on the origin of data imparts confidence in its use. Six attributes were identified that provide provenance to data and confidence in its use:

1. Accuracy
2. Competence
3. Age
4. Temporal duration
5. Spatial resolution
6. Temporal resolution

Assigning data quality scores (see FD2323TR4) to these attributes enables ranking of data (see FD2323\TR3) and an easier judgement on the appropriateness for a particular task. Existing elements from UK GEMINI have been used, where possible, to relate to the data quality flags. The age of data can be calculated using the end temporal extent (element 7b) of the record. The temporal duration can be calculated using the start temporal extent (element 7a) and the end temporal extent (element 7b). Spatial resolution quality flag refers to the measure of granularity, which can be related to element 18. Temporal resolution flag refers to the frequency of data capture/collection over time and can be inferred from abstract (element 4).

However, two additional elements have been incorporated into the FCERM schema to address the need for data quality flags on “accuracy” and “competence”:

- Element 33 (accuracy) is newly formed in line with the ISO 19115 guidance;
- Element 34 (qualitative data quality information) is taken from the ISO 19115.

Element 33 (and Table 14 in Appendix A) addresses the need to record the level of accuracy of the dataset. This element provides the user with a degree of knowledge on the accuracy of the object described ranging from 1 to 5 with an associated description. Metadata entries are able to use this flag to rank datasets, when retrieved by the Knowledge Management Tool (or similar tool) and make some judgement on their suitability for use as defined in the quality-dependent appraisal framework drawn up in Work Package 4 (see FD2323\TR4).

Competence relates to the skill of the data’s author. Data collected or processed by an experienced person conveys more confidence in its use than if an inexperienced person collected it. This can be partially inferred from the abstract (element 4) and the originator (element 9). However, ISO 19115 contains an element on qualitative data quality information that logs any details of quality control/assessment of the dataset in the metadata description. This imparts a certain amount of confidence in the use of the dataset, and so has been adopted as element 34 in the FCERM schema (see Appendix A).

The inclusion of additional elements is not uncommon and it is recognised that individual communities, nations, or organisations will develop "community profiles" of the ISO standard, and will make a select set of metadata elements mandatory for their applications or special needs. In the FCERM case the need for data quality flagging was a feature not present in the standard elements, it has therefore been added, as described below. However, any added elements will not be known outside the community unless they are published. It is intended that the profile will only be applied within the FCERM user group, however if the need arose the addition could be published via the ISO as International Standardised Profiles (ISP) or even through the AGI as an extension to UK GEMINI.

Figure 3.4.1 shows how a community profile is integrated into the existing schema; this follows the rules given in Annex C - Metadata Extensions and Profiles, of the ISO 19115 standard.

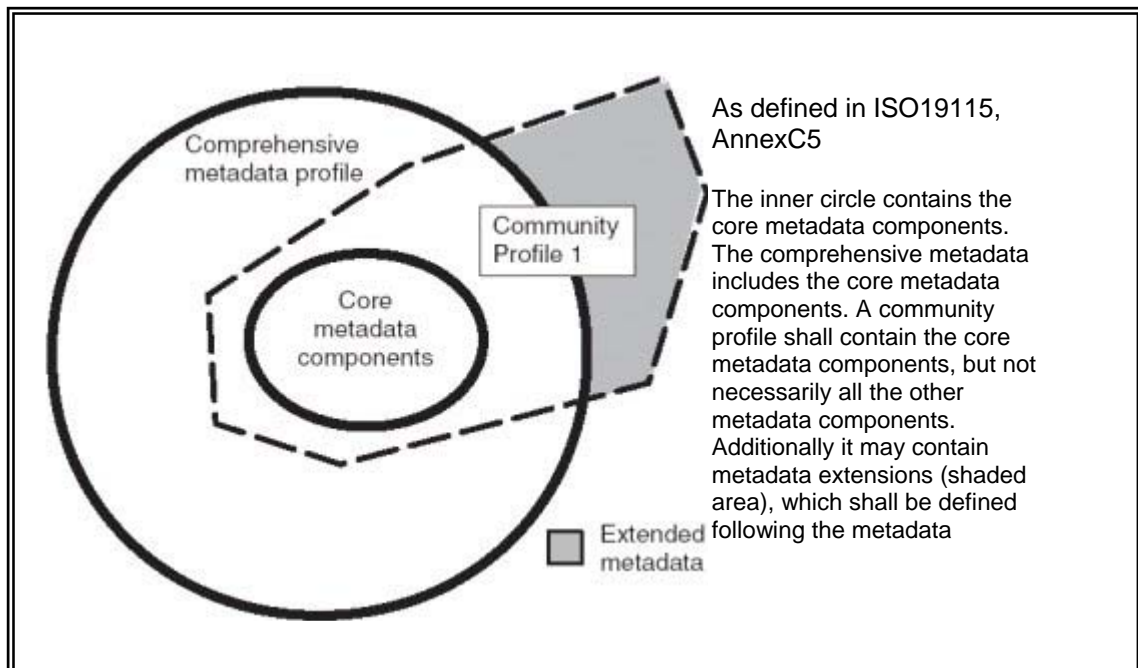


Figure 3.4.1 Metadata Community Profile

3.5 Assessment of FCERM schema with National Flood and Coastal Defence Database

3.5.1 Background

The aim of the National Flood Defence and Coastal Defence Database (NFCDD) is to provide a single, easily accessible and definitive store for all data collected on flood and coastal defences, which is made available to all operating authorities to allow them to make better-informed, risk-based decisions, in a transparent manner, on the implementation of flood and coastal erosion management.

Its development is an important component in enabling all operating authorities to comply with the requirements of Defra's High Level Targets, allowing the reporting of progress, and providing evidence that policy is being delivered on the ground.

The objectives of the project are to:

- Provide data on flood and coastal defence need;
- Facilitate the prioritisation of investment;
- Inform management decisions;
- Measure the achievement of policy aims.

The intention is that, through the provision of better data and a greater understanding of flood and coastal defence risk, expenditure can be more effectively targeted at those areas with the greatest need.

The database contains data provided by, and makes information available to, the flood and coastal defence operating authorities (the Environment Agency, Local Authorities and Internal Drainage Boards), Government and other interested public sector organisations. Linking these organisations with one common data source gives rise to potential benefits in terms of consistent policy development and improved procurement opportunities.

3.5.2 Review

NFCDD is primarily a 'warehouse' of data and a set of tools (e.g. GIS, querying tools, and reporting facilities) for manipulating that data. For example, NFCDD holds information about:

- The location, composition, standards and condition of fluvial, tidal and coastal defences referenced to identified risk areas;
- The location, composition, standards and condition of watercourses, also referenced to identified risk areas;
- All types of asset (i.e. property, infrastructure, environmental) at risk within identified risk areas and including those protected by fluvial, tidal and coastal defences; and
- The extent of floods related to different flooding scenarios (e.g. different return periods and different types of flood event such as overtopping or embankment failure).

In addition it also provides:

- Suitable analytical tools to allow combination, manipulation and calculation using the various data sets held on the database, and presentation of results, where appropriate, in map-based outputs to facilitate management decisions at all levels; and
- Suitable tools to allow reporting on information related to various areas, specifically Local Authority boundaries, Internal Drainage Board boundaries, Agency Committee and Area boundaries and ad hoc areas as required.

Fundamental to the success of NFCDD is good quality data. To allow meaningful comparisons to be made - for example when assessing the integrity of defences - it is important that all operating authorities use the same standards and formats. Data standards have thus been developed for those data sets that go into the NFCDD 'data warehouse'. These provide a benchmark against which existing data can be measured and new data collected. However, from the outset data quality has varied across operating authorities, and the system has needed to accept approximate or aggregate data until it could be updated with more detailed data. At present there is no standard governing the metadata for NFCDD. The only standards in place are:

- Oracle Spatial standards - which govern the data structure, storage elements of the data.
- E-GMS - which governs the contact details attributes of the data.

3.5.3 Outcome

Having examined the current structure of NFCDD and the FCERM schema it is clear that NFCDD data will fit without any real difficulty in to the proposed schema standard, (see compliance Table 3.5.1).

However, despite the potential for the relatively straightforward application of NFCDD to the schema proposed, Table 3.5.1 has highlighted that the size and complexity of the data would make it difficult for it to be described adequately in a single metadata record. It is recognised that NFCDD is a repository for many datasets, and it would be more valuable to define each as a layer with its own metadata. This could then be used to describe each layer within the FCERM metadata scheme and it is understood that the Agency is currently seeking to carry out this exercise (comm. S Greenwood, Agency September 2005). This would not only give the user greater flexibility when searching for the data but would also mean that the metadata records would contain information that more accurately reflects the data content, rather than a single record with a broader less accurate description.

Table 3.5.3 NFCDD Compliance with Proposed Schema

Element number	Element name	Obligation	NFCDD Compliance	Comments
1	Title	M	YES	
2	Alternative title	O	YES	
3	Dataset language	M	YES	
4	Abstract	M	YES	
5	Topic category	M	YES	Can be applied to the whole dataset however due to the complexity of the data it could prove difficult to apply adequately
6	Subject*	M	YES	Can be applied to the whole dataset however due to the complexity of the data it could prove difficult to apply adequately
7	Date	M	YES	Can be applied to the whole dataset however due to the complexity of the data it could prove difficult to apply adequately
8	Dataset reference date	M	YES	Can be applied to the whole dataset however due to the complexity of the data it could prove difficult to apply adequately
9	Originator	O	YES	Can be applied to the whole dataset however due to the complexity of the data it could prove difficult to apply adequately
10	Lineage	O	YES	Can be applied to the whole dataset although due to the complexity of the data it could prove difficult to apply adequately
11	West bounding coordinate	M	YES	Will have to apply to the whole NFCDD dataset
12	East bounding coordinate	M	YES	Will have to apply to the whole NFCDD dataset
13	North bounding coordinate	M	YES	Will have to apply to the whole NFCDD dataset
14	South bounding coordinate	M	YES	Will have to apply to the whole NFCDD dataset
15	Extent*	M	YES	Will have to apply to the whole NFCDD dataset

Element number	Element name	Obligation	NFCDD Compliance	Comments
16	Vertical extent information*	O	YES	Can be applied to the whole dataset although due to the complexity of the data it could prove difficult to apply adequately
17	Spatial reference system	M	YES	
18	Spatial resolution	O	YES	
19	Spatial representation type	O	YES	
20	Presentation type	O	YES	
21	Data format	M	YES	
22	Supply media	O	YES	
23	Distributor*	M	YES	Contact details already form part of the NFCDD data.
24	Frequency of update	M	YES	
25	Access constraint	O	YES	
26	Use constraints	O	YES	
27	Additional information source	O	YES	
28	Online resource	O	YES	
29	Browse graphic	O	No	
30	Date of update of metadata	M	YES	
31	Metadata standard name	O	YES	
32	Metadata standard version	O	YES	
33	Accuracy*	M	YES	Difficult to apply to the whole dataset due to the complexity of the data.
34	Quantitative Data Quality Information*	O	Partial	Can be applied to the whole dataset however due to the complexity of the data it could prove difficult to apply adequately

3.6 Proof of concept of FCERM metadatabase

3.6.1 Introduction

Having created the metadata schema, it was decided that a 'proof of concept' database would be constructed to show how the metadata could be stored and also to provide the link between the metadatabase and the Tool. Therefore for the purpose of this study we have chosen to use a MS Access database to store, enter and modify any metadata. MS Access was chosen because it is both simple to use and easy to distribute, making it the ideal test base for this project. However should the proposed methodologies be taken forward it is recommended that a more suitable medium such as Oracle or Microsoft SQL Server is used because MS Access is not suitable for storing large amounts of data, see Appendix B.

3.6.2 Metadatabase population

The built system was then populated by completing the metadata form, which is found at the front end of the database, with a number of types of information as identified during the development of the case studies in FD2323\TR3. These items include, for example:

- NFCDD as one single entry (due to the current limitations detailed above);
- FutureCoast as a number of discrete entries covering different topics;
- Beach profiles;
- Shoreline Management and Catchment Flood Management Plans;
- Ordnance Survey maps;
- Agricultural Land Classification;

- National Property Database; and
- Flood Map.

Linkages to the information held within each element field were then made via the Tool to be returned within the Tool, see FD2323\TR3 for details. However the metadatabase is a stand-alone system and can be queried through the front page of the database, see Appendix B.

3.6.3 Discussion

The metadata schema has been designed to ISO 19115 standards and as such is interoperable with other metadata schemas, by being made available as a downloadable XML- Schema for the use by others.

3.7 Options for linking the FCERM metadatabase with other systems

There are two proposed ways forward to integrate the FCERM metadatabase into the wider community. These are shown in Figures 3.7.1 and 3.7.2.

3.7.1 Option 1

The first imports relevant data from other metadatabases into the FCERM metadatabase so that all of the metadata is stored in the one place, illustrated in Figure 3.7.1. This provides duplication of effort, and requires maintenance of both the FCERM metadatabase and requires updates from all other metadatabases linked into the system.

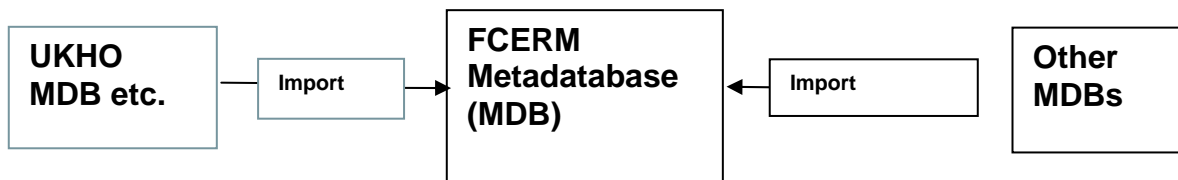


Figure 3.7.1 Relationship of FCERM and imported data from other metadatabases.

3.7.2 Option 2

Figure 3.7.2 depicts how the metadatabase could link with other metadatabases, thus reducing effort in maintaining the information within the FCERM metadatabase but relying on other organisations to regularly update their systems. This system requires common links to be made with the other metadatabases, these will involve IT and data agreements to be put in place. It is envisaged that in this system the metadata is held and maintained by the individual custodians while any data collected within the FCERM community would be referenced within the FCERM metadatabase. The metadata links would enable two-way flow of information thus enhancing the knowledge 'web' available to the user.

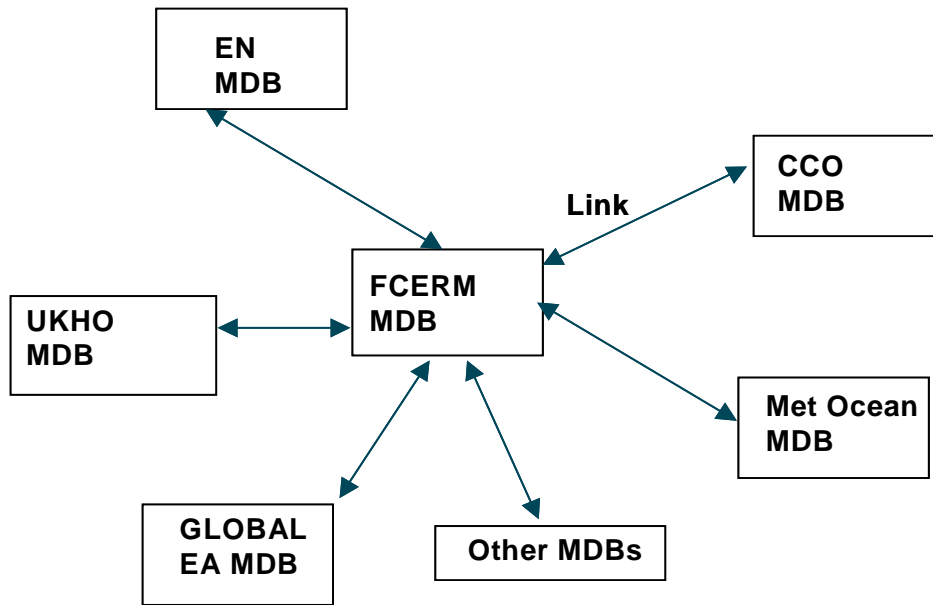


Figure 3.7.2 Links between FCERM and other metadatabases

3.8 Options for linking the FCERM metadatabase with NFCDD

It has been identified that the FCERM metadatabase may be able to assist NFCDD to be more readily used within the community. As previously mentioned, the Agency is planning to create metadata for the various layers of data held within the NFCDD.

3.8.1 Option 1

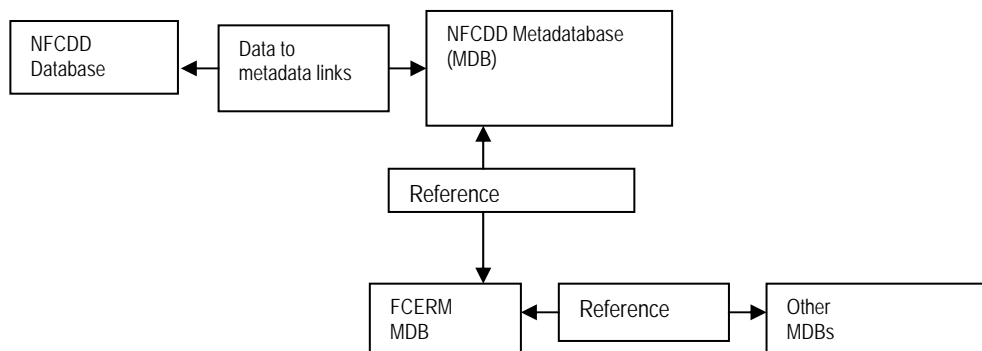


Figure 3.8.1 Relationship of FCERM metadatabase and NFCDD through NFCDD metadatabase.

The first option illustrated in Figure 3.8.1 will require NFCDD to have its own direct metadata for all data held within it. This will be the case whether this is already available in another metadatabase or not. As compared to the current plans by the Environment Agency, this will be for all data as opposed to layers of data or some other aggregated form of information. The FCERM metadatabase will reference this metadatabase in the same manner as it will reference other metadatabases and is possible because the databases are

designed to follow recognised standards. This option will produce a highly controlled system and will not be very flexible. It would contain a lot of redundancies and repetitions from other systems, with the potential to become out of sync with them. This repetition will imply high resource commitment to input metadata information compared with the options below, some of which exists within other systems.

3.8.2 Option 2

The second option is illustrated in Figure 3.8.2. Here the FCERM metadatabase will act as the metadatabase for NFCDD as well as other FCERM data not within NFCDD. The FCERM metadatabase then references other databases via the FCERM. This option removes the redundancies and inefficiencies (in Option 1) between NFCDD and the FCERM metadatabase. However, the FCERM metadatabase will however still record metadata for other relevant data, whether this is duplicated elsewhere or not. This system provides the control of metadata for NFCDD within the FCERM database and as both systems are FCERM industry systems any impact should be minimal.

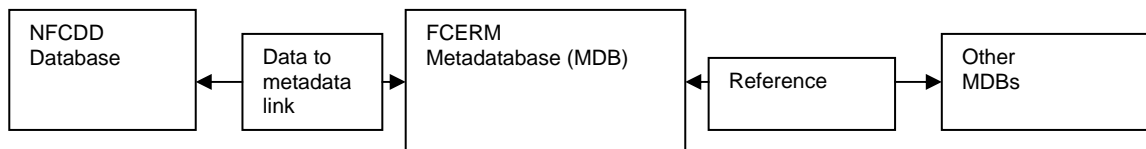


Figure 3.8.2 Links between FCERM metadatabase and NFCDD.

3.8.3 Option 3

The third option has wide reaching implications within the metadata environment where it relies on links between a network of self-maintained metadatabases, see Figure 3.8.3. The metadata for all FCERM related data, which is not sourced outside the industry will reside in the FCERM database. Here there is no redundancy and no possibility of information being out of sync. There is a high reliance on setting up links between all metadatabases as required and therefore less control on data from other sources, but the system provides greater flexibility, access and efficiency. There is also more reliance on the communications network and each system is responsible for its own data. This option will maximise the value of wide use of systems which all comply with ISO 19115 and ISO 19135. Similarly, it requires a mature industry which adheres widely the use of standards and takes their responsibilities as data managers seriously.

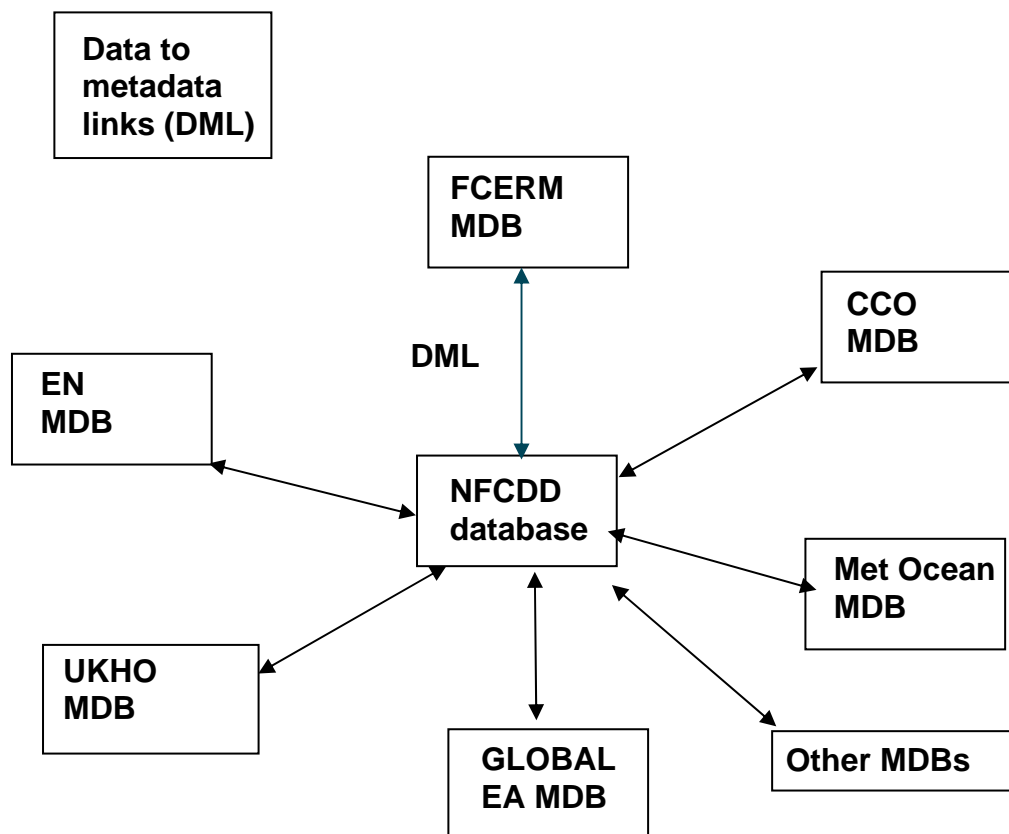


Figure 3.8.3 Relationship of NFCDD database to other metadatabases.

3.9 Issues regarding FCERM metadata implementation

The previous sections have shown the high level of detail required in the metadata content, technical terminology, and the variety of metadata formats. These are all reasons that may impede the use of metadata. These same reasons also contribute to the avoidance of creating metadata. The creation of any data is time-consuming and complicated by itself; metadata creation is therefore often considered an added burden. Studies demonstrate that even though a majority of data-producers recognise the benefits of metadata, there continues to be a reluctance to commit time to creating metadata. This is because a commitment to metadata could be seen as taking too much time away from seemingly more important or necessary responsibilities. The time required for training in order to implement metadata can be especially controversial.

A suggested method of dealing with the requirements of the standard is not to try to reduce its complexity (and therefore its usefulness) but rather to create "Metadata Manager" position(s), which takes responsibility for the quality control for in-putting data, similar to the approach being adopted in the Defra SPIRE initiative (Defra, 2006). This reduces the amount of training that regular users would require. Not all users and data producers should be required to know the standard, though they should be aware of it and understand the elements of its

content, which can be achieved through minimal training. In any case, a hierarchy of users with varying training needs can be developed to fit the requirements, size and skill levels of any organisation.

In order to achieve a successful implementation of metadata initiatives the following requirements should be addressed:

- Adoption of an operational plan;
- Establishment of procedures;
- Training;
- Assess technology infrastructure;
- Identification of suitable metadata repository.

The sophistication and complexity of the successful approach will vary with the needs and resources of the each organisation. As a result, proper consideration needs to be given to developing an appropriate management structure with a key user or hierarchy of users (with varying training requirements) to suit the needs, structure and skill levels of each organisation.

4. ISO 19135 Registry

4.1 Introduction

The ISO 19135 standard specifies procedures for the registration of items of geographic information and the management of any and subsequent additions or modifications. As well as information on management procedures this section also outlines the roles and responsibilities required to provide for the successful management of the system.

Registration offers several benefits to the geographic information community. Registration helps in the following ways, by:

- Supporting wider use of registered items by way of conforming to an ISO standard and making them available to potential users;
- Providing recognition to extensions of an ISO standard and source for updating;
- Providing a mechanism for managing temporal change; and
- Supporting cultural and linguistic tendencies by providing both a means for recording equivalent names of items used and for making those equivalent names publicly available.

In the context of the FCERM community and in particular the management of the common items used within the Knowledge Management Tool and in the metadata, the relationships with ISO 19135 standard are shown in Figure 4.1.1.

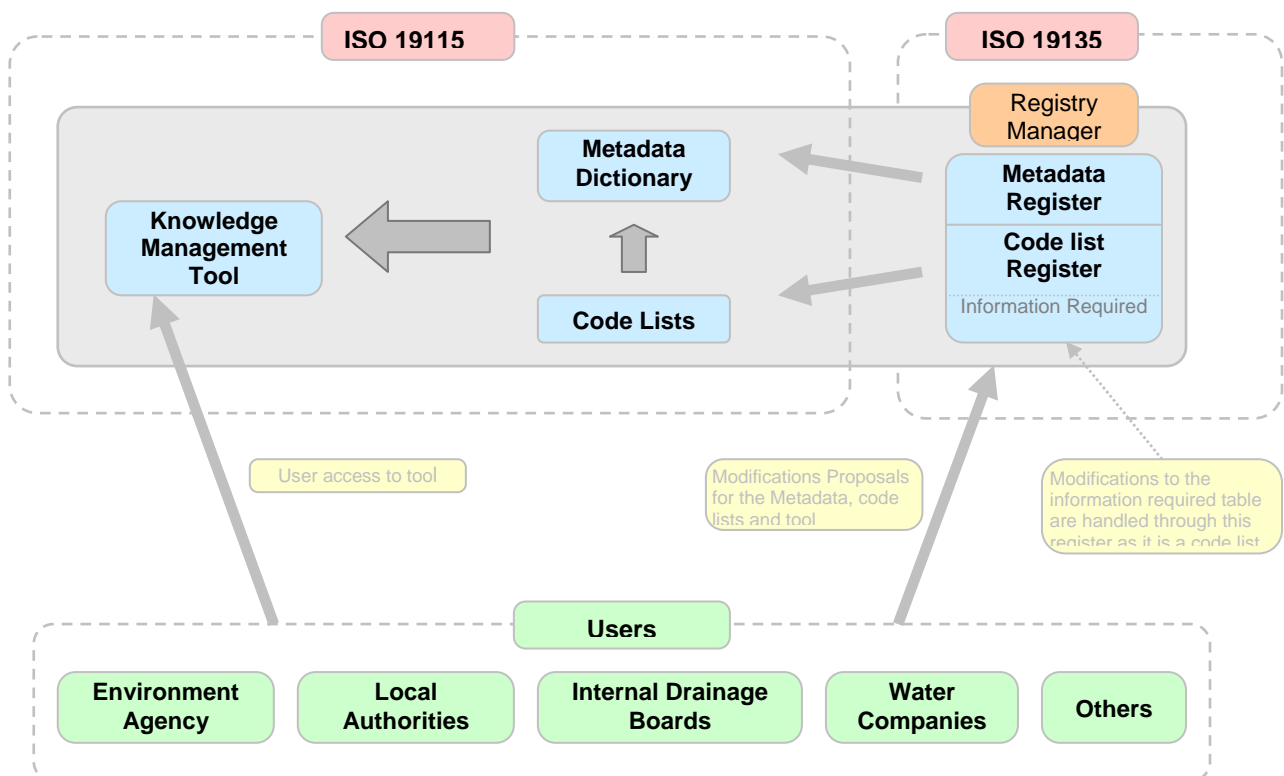


Figure 4.1.1 System Diagram

4.2 Management rules for the register of metadata elements and their code lists

4.2.1 Scope

The intention is that the registry will be used to enable the storage of features and attributes to significantly increase flexibility and facilitate the inclusion of new items which can be made available for use in relatively short timescales. This component specifies procedures to be followed for maintaining registers of items in the Metadata standard. Any organisation within the FCERM community may apply to establish registers of items related information in the FCERM Metadata Registry.

This section specifies procedures to be followed in establishing, maintaining, and publishing registers of unique, unambiguous and permanent identifiers and meanings that are assigned to Metadata elements and their associated data code lists. In order to accomplish this purpose, the standard specifies elements of information that are necessary to provide identification and meaning to the registered items and to manage the registration of these items.

4.2.2 Conformance

The establishment of such a system follows the rules as set out in the following standards:

- ISO/IEC 11179-3, describes the data element concepts
- ISO 19115:2003, Geographic Information - Metadata (described in previous sections)
- ISO 19111, Geographic information -spatial referencing by coordinates.
- ISO 19106, Geographic information Profiles
- ISO 19103, Geographic Information - Conceptual Schema Language
- ISO 3166-1, Codes for the representation of countries and their subdivisions - Country codes
- ISO 3166-2, Codes for the representation of countries and their subdivisions - Country Subdivision codes
- ISO 639-2, Codes for the representation of names of languages

4.2.3 Terms, definitions and abbreviations

For the purposes of this register the terms and definitions detailed below apply:

ISO - International Standards Organisation
IS - International Standard

4.2.4 General concepts

Register

A register is simply a managed list. It is easier to maintain than a fixed document, because new items can be added as needed to the register, and current items in the register can be modified or retired. The register item would have a "date stamp" that would indicate the date at which it was added to the register. For an item that is indicated as retired in the register, the item would remain in the register with an indication of the date at which it was retired. For an item that is modified in the register the original instance of the item would be rendered as superseded with a "date stamp" and a new changed item entered in the register with a new item identifier. There would be a forward reference from the superseded item to the modified item that replaced it. This means that a product specification, defined at a given date, would reference an item in the register in a table manner.

4.3 Roles and responsibilities in the management of registers

4.3.1 Registry Owner

The Registry Owner is the organisation that is responsible for the registry. It has the authority to host the registers and establish the policy for access. It is considered that the Metadata Registry is owned by the Environment Agency and is based on the ISO data dictionary as defined in ISO19115:2003 Annex B and as such will align to this as required.

4.3.2 Registry Manager

The Registry Manager is responsible for the day-to-day operation of the Registry. This includes:

- providing Registry access for Register Managers, Control Bodies, and Register Users;
- insuring that information about items in the Registers is readily available to users regarding those items that are valid, superseded, or retired; and
- Accepting proposals and forwarding them to all Register Managers.

It is envisaged that the Metadata Registry Manager would be appointed from within the FCERM community organisations and answerable to the Control Body (see 4.3.6)

4.3.3 Register Owner

The Register Owner is an organisation that:

- Establishes one or more registers;
- Has primary responsibility for the management, dissemination, and intellectual content of those registers; and
- May appoint another organisation to serve as the Register Manager.

4.3.4 Register Manager

The Register Manager is responsible for the administration of a register. This includes:

- Coordinating with other Register Managers, Submitting Organisations, related Control Body and Register Owner;
- Maintaining items within the register;
- Maintaining and publishing a List of Submitting Organisations;
- Distributing an information package containing a description of the register and how to submit proposals; and
- Providing periodic reports to the Register Owner.

4.3.5 Register User

A Register User is any person or organisation interested in accessing or influencing the content of a register.

4.3.6 Control Body

A Control Body is a group of technical experts (from within the FCERM) appointed by a Register Owner to decide on the acceptability of proposals for changes to the content of a register.

4.3.7 Submitting Organisation

A Submitting Organisation manages the submission of proposals for registration from within the respective communities or organisations. Proposed changes to the Register must meet the submission procedures established by the Register Owner.

4.3.8 Proposers

This group covers any stakeholders (e.g., government, industry, academia, and user groups) who submit a proposal to a submitting organisation. Figure 4.3.1 shows these relationships.

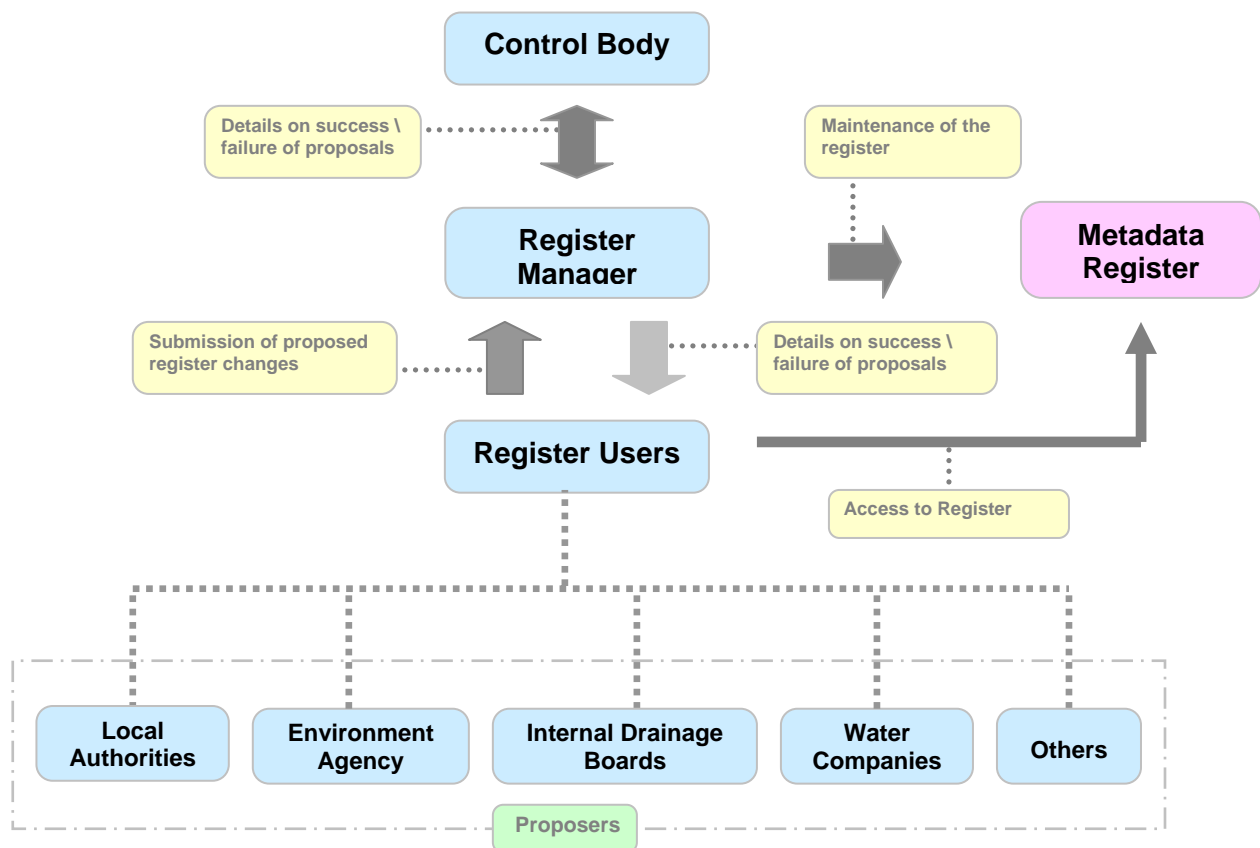


Figure 4.3.1 Registry Information Flow

4.4 Management of registers

4.4.1 Establishment of registers

Any recognised organisation can establish a register and in doing so, the following information shall be provided to the Registry Owner:

- Short description of the organisation (name, purpose, etc.);
- Point of Contact (POC);
- Register Manager and List of Submitting Organisations, Control Body; and
- Implementation of procedures for proposal approval and appeal process.

4.4.2 Processing of proposals

Submitting organisations may submit requests for addition, clarification, modification and retirement of registered items, these are done in the following ways.

Addition of registered items

Addition is the insertion into a register of an item that describes a concept not described by an item already in the register.

Clarification of registered items

Clarifications correct errors in spelling, punctuation, or grammar. A clarification shall not cause any substantive semantic change to a registered item. Otherwise it shall be treated as a modification. The Control Body shall handle editorial clarifications at their discretion. Approved clarifications shall be promulgated by the Register Manager, and shall be recorded in a note attached to a registered item as additional information

Super-session of registered items

Modification of an item is one that would result in a substantive semantic change and shall be effected by including a new item in the register with a new identifier and a more recent date. The original item shall remain in the register but shall include the date at which it was superseded, and a reference to the item that superseded it.

Retirement of registered items

The retirement of items shall be carried out by leaving the item in the register and by marking it retired and including the date of retirement.

4.4.3 Submission of proposals

The process for submitting proposals for registration of items of geographic information is as follows:

- Submitting organisations shall
 - (a) receive proposals for the registration of items of geographic information from proposers within their respective communities or organisations;
 - (b) ensure that all proposals are complete;
 - (c) forward to the appropriate Register Manager those proposals that have the support of the submitting organisation; and
 - (d) explain proposals to the Register Manager, if necessary.
- The Register Manager shall
 - (a) receive proposals from submitting organisations;
 - (b) review proposals for completeness;
 - (c) return proposals to the submitting organisation if incomplete; and
 - (d) co-ordinate proposals with other Register Managers within two calendar weeks
- The Register Manager shall use the following criteria to determine if the proposal is complete:
 - (a) the submitter is not a qualified submitting organisation;

- (b) the proposed item does not belong to an item class assigned to this Register Manager; and
- (c) the proposed item does not fall within the scope of the Register.

Submitting organisations may decide to withdraw a proposal at any time during the approval process.

4.4.4 Approval process

Submitting organisations may decide to withdraw a proposal at any time during the approval process.

- The Register Manager shall:
 - (d) change the proposal management *status* from 'pending' to 'final'; and
 - (e) change the proposal management *disposition* to 'withdrawn' and the value for *dateDisposed* to the current date.

- The Register Manager shall:
 - (f) if the proposal is for clarification or retirement of a register item, forward the proposal to the Control Body;
 - (g) if the proposal is for registration of a new item or modification of an existing register item:
 - 1) insert the new or superseding item into the register
 - 2) assign an *itemIdentifier* to the new or superseding item
 - 3) set the *status* of the item to 'notValid'; and
 - 4) forward the proposal to the Control Body.

- The Control Body shall:
 - (h) decide to accept the proposal without change, to accept the proposal subject to changes negotiated with the submitting organisation, or not to accept the proposal. Criteria for not accepting a proposal include:
 - 1) the specification of the item is incomplete or incomprehensible;
 - 2) an identical item already exists in the register or in another register of this registry;
 - 3) the proposed item does not belong to an item class included in this register;
 - 4) the proposed item does not fall within the scope of this Register; or
 - 5) the justification for the proposal is inadequate.
 - (i) inform the Register Manager of the decision, and the rationale for the decision, within a time limit specified by the register owner.

- The Register Manager shall:
 - (a) serve as point of contact if there is a need for negotiations between the submitting organisation and the Control Body regarding changes to the proposal that are specified by the Control Body as a condition of acceptance; and
 - (b) inform the submitting organisation of the results of processing a proposal.
 - (c) If the decision of the Control Body is positive, the Register Manager shall:
 - 1) complete the proposal management record with status set to 'final', disposition set to 'accepted', and *dateDisposed* to the current date;
 - 2) make approved changes to the content of the register item;
 - 3) if the proposal was an addition assign a number code from the pre-allocated block for their Register to the new item; and
 - 4) set the Register item status to 'valid', 'superseded', or 'retired', as appropriate.
 - (d) If the decision of the Control Body is negative:
 - 1) update the proposal management record by setting *status* to 'tentative', *disposition* to 'notAccepted', and *dateDisposed* to the current date;
 - 2) inform the submitting organisation of the deadline for appealing the decision of the Control Body.
 - (e) Disseminate the results of the approval process.
- Submitting organisations shall:
 - (a) negotiate with the Control Body with regard to changes to their proposal that are specified by the Control Body as a condition of acceptance; and
 - (b) make known within their respective countries or organisations the decisions taken on proposals by the Control Body as transmitted to them by the Register Manager.

4.4.5 Appeals

A submitting organisation may appeal to the register owner if it disagrees with the decision of a Control Body to reject a proposal for addition, clarification, modification, or retirement of an item in a register. An appeal shall contain at a minimum a description of the situation, a justification for the appeal, and a statement of the impact if the appeal is not successful.

- The submitting organisation shall:
 - (c) determine if the decision regarding a proposal for registration is acceptable; and
 - (d) if not, submit an appeal to the Register Manager.
If there is no appeal by the deadline for submitting an appeal, the Register Manager shall change the *status* of the proposal management record to 'final' and change the *dateDisposed* to the current date.
- The Register Manager shall:
 - (e) forward the appeal to the register owner.
- The register owner shall:
 - (f) process the appeal in conformance with its established procedures;
 - (g) decide whether to accept or reject the appeal; and
 - (h) return the result to the Register Manager.
- The Register Manager shall:
 - (i) update the proposal management record fields *disposition* and *dateDisposed*;
 - (j) update the register item *status*; and
 - (k) provide the results of the decision to the Control Body and to the submitting organisation.
- The Submitting Organisation shall:
 - (l) make the results of the appeal known within their organisation.

4.5 Registry for FCERM input

Having established the method for maintaining the register itself, the various elements need to be identified and managed. Figure 4.5.1 illustrates this relationship. The two areas considered to be managed under the FCERM programme are the inclusion of new elements to the metadata standard and to the code list (Table 4.5.1). The details are given in Appendix C. It has already been seen through the development of the metadata standard that elements have needed to be included to capture additional information on the 'objects' being described to address quality and accuracy. Due to the reliance of the Knowledge Management Tool on the links within the metadata and to specific lists under certain elements, in particular the keywords and the 'Information required', the ISO 19135 is seen as the method to address this. Careful thoughts in the management of adding temporal datasets to the metadatabase need to be made especially with respect to whether the data is a single updated entry or multiple entries, e.g. annual beach profiles.

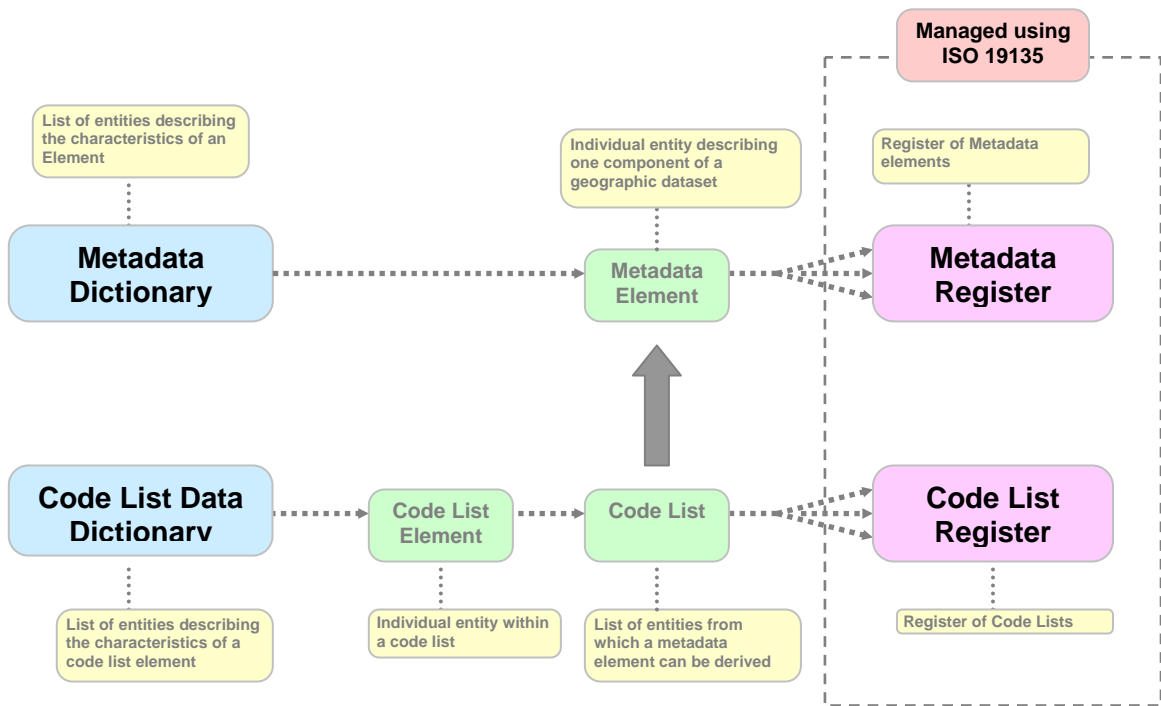


Figure 4.5.1 Relationship of Dictionaries to the Register

Previous sections have shown how the register can be managed making any additions or removals from the system universally known, thus any FCERM organisation has the ability to add new tasks to the Tool and request the need to add new keywords or 'Information required' to the system.

Table 4.5.1 Code List register

ID	Name	Short Name	Definition	Source	Source name
1	B.5.21 MD ObligationCode	<i>tblOblig</i>	Obligation of the Element or entity	ISO19115	B.5.21 MD ObligationCode
2	Table3 Dataset Language	<i>tblLang</i>	Codes for the representation of names of languages	ISO 639-2	
3	Table 4 Topic Category	<i>tblTpcat</i>		ISO19115	MD_TopicCategoryCode (B5.27)
4	Table 5 Information Required	<i>tblInfRec</i>	Descriptions FCERM Information Areas	FCERM	
5	Table 6 Vertical Unit of Measure	<i>tblVerUnt</i>	Vertical measurement unit	ISO/TS-19103 & ISO19115	UomLength(B4.3)
6	Table 7 Vertical Datum	<i>tblVertDat</i>	Parameters describing the gravity-related height to earth	ISO19115	SC_VerticalDatum (B4.9)
7	Table 8 Spatial Reference System	<i>tblSpatRef</i>	Description of Spatial reference systems used in the dataset	ISO19115	
8	Table 9 Spatial Representation Type	<i>tblSpatTyp</i>	Method used to spatially represent geographic information	ISO19115	MD_SpatialRepresentationTypeCode (B5.26)
9	Table 10 Presentation Types	<i>tblPrsForm</i>	Mode in which the Data is presented	ISO19115	CI_PresentationFormCode(B5.4.)
10	Table 11 Supply Media	<i>tblMedCode</i>	Name of the Medium on which the resource was received	ISO19115	MD_MediumNameCode (B5.2)
11	Table 12 Frequency Update	<i>tblMaintFreq</i>	Frequency with which changes and additions are made to the after the initial dataset has been completed	ISO19115	MD+Maintenance FrequencyCode (B5.18)
12	Table 13 Use\ Constraint Restrictions	<i>tblUseCons</i>	Constraints applied to assure the protection of privacy, of Intellectual Property, and any special restrictions or limitations or warnings on using the data.	ISO19115	MD_RestrictionCode (B5.24)
13	Table 14 Accuracy	<i>tblAcuracy</i>	The Quantitative assessment of the datasets accuracy	FCERM	
14	Table 15 Extent	<i>tblextent</i>	Description of the spatial coverage of datasets.	ISO3166-1\ ISO3166-2 and FCERM	

5. Data specification

This project has aimed to create a metadata standard suitable to capture all data types resulting from work, studies and surveys carried out within the FCERM industry. It is therefore proposed that the FCERM business approaches a point in the near future, where a metadata proforma is completed in all contracts, in which data collection, storage and dissemination forms a part. This will then accompany the data, document the provenance and quality and will be logged for entry into the metadatabase. The Registry Manager, as discussed in Section 3 of this document, will control the management of this entry. The proforma is set out in Appendix B, and will be submitted as an excel spreadsheet for ease of completion.

To ensure compliance with this request the following text will be added to FCERM project contracts and will be made one of the deliverables of the project. The requirement to provide metadata with the data and/or documents within a FCERM project will be written within the 'Presentation of Data' section of the contract document.

"All data and/or resulting deliverables collected or emanating under this contract will be suitably described on the metadata proforma supplied with the contract material and will be logged with both the named contracting body and also the nominated FCERM Registry Manager."

6. Future considerations

This study has explored the suitability of establishing an ISO 19115 and 19135 compliant standard for managing FCERM data types and has provided wording to capture the collection of new data within the FCERM industry thus making it more accessible. The work carried out in this project has also shown that with some careful consideration of the metadata elements the data can be described to provide the practitioner with quality and accuracy information.

A 'proof of concept' metadatabase has been built to show how the system would work, in this test case this database has been built in Access. However it is recognised that, for a system large enough to cover the needs of the FCERM industry, this would need to be built in a more robust environment such as Oracle, MS SQL Server or comparable system.

The work has shown that, as with any system or scheme, the value in the return is a function of the input. It is recognised that the metadata standard described includes a number of elements, which may appear unnecessary to the data provider but are invaluable to the user and to the potential linkages to other metadata systems. The importance of providing a compliant system is therefore paramount to the future function of any new working practice and as such a culture change within the community. Secondly for the metadatabase to be successful it will need careful management through the establishment of a Control Body to oversee the database and subsequent allocation of a Registry Manager/s as prescribed in the ISO 19135 standard. This management is particularly relevant when linkages and interactions between the FCERM metadatabase with other databases, an issue of current debate within the data holding community and is presently being investigated form a number of initiatives all of which are at proposal stage, and also the Knowledge Management Tool developed in Work Package 3 (FD2323\TR3).

Experience has shown that buy-in at all levels of the industry will be required to make the changes happen. The starting point will be the requirement of the metadata to be provided with each deliverable, this is at the 'grass roots' level and will need training or at least some discussion on the need for metadata. The following table goes through the steps to ensure that the most cost effective system is put in place.

Table 6.1 highlights the resource input required to implement a fully functional metadata system with linkage potential. The size of the task is considerable and needs careful planning in order to prevent the system from becoming too overbearing, this can be reduced by forming a partnership between involving one FCERM organisation, their IT department and contractor/consultant to scope a test case.

Table 6.1 Stages to Implementation, actions for Contractors/ Consultant and FCERM community.

Stage Number	Action by Contractor/Consultant	Action by FCERM
Stage 1	Produce metadata proforma and guidance to ISO19115 standard. Provide training and guidance to procurement departments and contractors	Ensure suitable wording in all new FCERM contracts. Overhead to FCERM to ensure compliance Allocate Control Body and Registry Manager
Stage 2	Provide assistance or capability to build database on suitable platform	To provide details on FCERM limitations due to IT policy. Will have implications on whether industry standard or bespoke system is required.
	Assist, if required in the provision of procurement for chosen system	Provide details on procurement system with various FCERM organisations Time and cost implications to manage policies and procedures.
	Population of the metadatabase if required	Allocate sufficient resources to populate the metadatabase, firstly inputting new data collections, secondly the most used historic datasets then back datasets.
Stage 3 Linkage with other databases	Assistance on data sharing experiences in other industries	Understanding of existing data agreements within FCERM Awareness of different data agreements with different groups i.e. public data v private data.
Stage 4 Implementation	Assistance with access issues to other databases	As above, links will need to be made with other IT groups to ensure compatibility.
	It is recognised that Industry is currently able to deliver the whole system as detailed in Stages 2 & 3. The system described up to Stage 3 is standard work, Stage 3 is under investigation by a number of groups and will be available following pilot schemes being planned within other marine initiatives in 2006.	The FCERM community needs to decide on how far the links need to be especially with other organisations. Stages 1 - 3 all require commitment from FCERM to allocate time and resources (staff and hardware/software) to implement the system. The scope of works is in the gift of FCERM especially on data capture and archive. The nature and extent of the historic data is unknown.

References

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International Standard Organisation, 2003, *ISO 19115:2003(E) Geographic information - Metadata*

Appendix A

The FCERM Schema

Appendix A. The FCERM Schema

The chosen schema is detailed in the following tables, these provide detail of the overall system in Table 1, Table 2 describes any elements which have been elaborated to cover the needs of the FCERM schema and Tables 3-15 provide information on the dropdown lists (these are referenced in Table 1 & 2), All tables have remarks, comments or descriptions of the elements they are detailing and also provide reference to the origin of the element, all UK GEMINI elements are also linked to the ISO 19115 element from where they derive.

The elements to be used to record metadata the geographic datasets are shown in Table 1 which details:

The element;

- Whether it is mandatory (M), in which case a value must be provided, optional (O), or (CM) conditional/mandatory, its multiplicity - single valued (1) or multi-valued (N);
- The source or basis for the element inclusion;
- The Data type or derivative to reflect use within the standard, note that 'free text' indicates that no restrictions are placed on the content of the field.

The numbers of elements used to describe each data type or item of information will vary according to their content, however to enable the proposed metadata schema to be compatible with other systems a minimum number of elements must be described, these are known as the mandatory fields. The entry form highlights (by way of colour coding) those elements which must be entered and submission of the form is precluded until the required boxes are complete. It is recognised that this task will, at the beginning, be large, however the benefits of locating a well described dataset will outweigh the time taken to input data in the long run and will become a valuable asset to the FCERM community.

Table 1. Metadata elements for geographic datasets

Element number	Element name	Element Description	Obligation	Number of occurrences	Data Type/Domain	Source	Short Name
1	Title	Name given to the dataset (N.B. this should not be the digital filename)	M	1	Free Text	UK GEMINI ISO 19115 360	<i>resTitle</i>
2	Alternative title	Short name, other name, acronym or alternative language title by which the cited information is known e.g. SSSI for Sites of Special Scientific Interest etc	O	N	Free Text	UK GEMINI ISO 19115 361	<i>resAltTitle</i>
3	Dataset language	Language(s) used in the dataset e.g. ENG for English.	M	N	Free Text (see Table 3)	UK GEMINI ISO 19115 39	<i>dataLang</i>
4	Abstract	Brief narrative summary of the dataset This should be a clear statement of the content of the dataset and give details on what, how, why, where and when, not general background information	M	1	Free Text	UK GEMINI ISO 19115 25	<i>idAbs</i>
5	Topic category	Main theme(s) of the dataset e.g. environment or oceans.	M	N	Class/Code list (see Table 4)	UK GEMINI ISO 19115 41	<i>tpCat</i>
6	Subject*	Topic of the content of the dataset - typically it will be expressed as keywords or key phrases or classification codes that describe the main subject of the dataset. Other terms may also be added, however it is recommended best practice to select a value from a controlled vocabulary/ thesaurus).	M	N	Free Text (see Table 5, 6a - 6o in Table 2)	UK GEMINI ISO 19115 53	<i>Keyword</i>
7	Date	Time period covered by the content of the dataset (N.B. not its creation or publication date)	O	N	Class (see Table 2 Elements 7a -7b for domain reference)	ISO 19115 351	<i>exTemp</i>
8	Dataset reference date	Reference date for the dataset (Notional date of 'publication' of the dataset, rather than the actual date of the currency of the data)	M	1	Date format DD/MM/YYYY	UK GEMINI ISO 19115 362	<i>ResRefdatae</i>
9	Originator	Person or organisation having primary responsibility for the intellectual content of the data	O	N	Free Text	UK GEMINI ISO 19115 29	<i>idPoC</i>
10	Lineage	Information about the events or source data used in the construction of the dataset. Dataset history i.e. how the dataset was created or any processes used to create the dataset. Could include the scale of capture and how the digital dataset was created	O	1	Free Text	UK GEMINI ISO 19115 83	<i>Statement</i>
11	West bounding coordinate	Western most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1	Real (WGS84 Decimal Degrees)	UK GEMINI ISO 19115 344	<i>westBL</i>

Element number	Element name	Element Description	Obligation	Number of occurrences	Data Type/Domain	Source	Short Name
12	East bounding coordinate	Eastern most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1	Real (WGS84 Decimal Degrees)	UK GEMINI ISO 19115 345	<i>eastBL</i>
13	North bounding coordinate	Northern most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)	M	1	Real (WGS84 Decimal Degrees)	UK GEMINI ISO 19115 347	<i>northBL</i>
14	South bounding coordinate	Southern most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)	M	1	Real (WGS84 Decimal Degrees)	UK GEMINI ISO 19115 346	<i>southBL</i>
15	Extent*	Extent of dataset by subdivision of country by Government Regions, Authorities and Environment Agency Regions, Districts	M	N	Class - (See Tables 15a -15d)	UK GEMINI ISO 19115 349	<i>GeoDec</i>
16	Vertical extent information*	Vertical domain of the dataset - to include lowest vertical extent, highest vertical extent, vertical units and the origin from which the elevation values are measured	O	N	Class and Free Text (see Table 2, Elements 16a - 16d)	UK GEMINI ISO 19115 354	<i>VertExtent</i>
17	Spatial reference system	Name or description of the system of spatial referencing, whether by coordinates or geographic identifiers, used in the dataset e.g. National Grid of Great Britain, Regional Sea.	M	1	Class/Code list- (see Table 8)	UK GEMINI ISO 19115 187	<i>refSysId</i>
18	Spatial resolution	Measure of the granularity of the data (in metres) For data captured in the field, it will be the precision to which the data is captured. For image data, it will be the resolution of the image. For data taken from maps, it will be the positional accuracy of the map	O	1	Real	UK GEMINI ISO 19115 61	<i>scaleDist</i>
19	Spatial representation type	Method used to represent the spatial aspect of the data e.g. vector, grid.	O	N	Enumerated Class/Code list - (see Table 9)	UK GEMINI ISO 19115 37	<i>spatRpType</i>
20	Presentation type	Mode in which the data is represented e.g. digital map, digital table etc	O	N	Enumerated list/Code list - (see Table 10)	UK GEMINI ISO 19115 368	<i>presForm</i>
21	Data format	Format in which the digital data can be provided e.g. ArcView Shapefile.	M	N	Free Text	UK GEMINI ISO 19115 284	<i>geoObjType</i>
22	Supply media	Type of media in which the data can be supplied e.g. CD or online.	O	N	Enumerated list/Code list - (see Table 11)	UK GEMINI ISO 19115 292	<i>medName</i>
23	Distributor*	Details of the organisation(s) from which the resource can be obtained	M	N	Class - (see Table 2 element 23a -23g for domain reference)	UK GEMINI ISO 19115 279	<i>Distributor</i>

Element number	Element name	Element Description	Obligation	Number of occurrences	Data Type/Domain	Source	Short Name
24	Frequency of update	Frequency with which modifications and deletions are made to the data after it is first produced - revision regime of the dataset	M	1	Enumerated list/Code list - (see Table 12)	UK GEMINI ISO 19115 143	<i>maintFreq</i>
25	Access constraint	Restrictions and legal prerequisites for the access of the data e.g. copyright, license etc	O	N	Enumerated list/Code list - (see Table 13)	UK GEMINI ISO 19115 70	<i>accessConst</i>
26	Use constraints	Restrictions and legal restraints on using the data - as above	O	N	Enumerated list/Code list - (see Table 13)	UK GEMINI ISO 19115 71	<i>useConst</i>
27	Additional information source	Source of further information about the dataset - may include a reference (e.g. URL) to external information	O	1	Free Text	UK GEMINI ISO 19115 46	<i>supplInfo</i>
28	Online resource	Information about the online sources from which the resource can be obtained - may be a URL	O	N	Free Text	UK GEMINI ISO 19115 277	<i>onLineSrc</i>
29	Browse graphic	Graphic that illustrates the data - this may be the address, or a pointer to, a picture or a sample of the data	O	N	Free Text	UK GEMINI ISO 19115 31	<i>graphOver</i>
30	Date of update of metadata	Date on which the metadata was last changed - this is the date at which the metadata can be considered current, rather than the dataset itself	M	1	Single Date DD/MM/YYYY	UK GEMINI ISO 19115 09	<i>mdDateSt</i>
31	Metadata standard name	Name of the metadata standard (including profile name) used	O	1	Free Text	UK GEMINI ISO 19115 10	<i>mdSName</i>
32	Metadata standard version	Version (profile) of the metadata standard used	O	1	Free Text	UK GEMINI ISO 19115 11	<i>mdStanVer</i>
33	Accuracy	Quantitative description of dataset	M	N	Class/Free text (see Table 2 Elements 33a -33b for domain reference)	ISO 19115 (created within this metadata schema)	<i>dqDatAcc</i>
34	Qualitative Data Quality Information*	Qualitative quality information	M	N	Class/Free text (see Table 2- Elements 34a -34o for domain reference)	ISO 19115 99	<i>DQElement</i>

* Additional mandatory elements to be used should this element be selected (see Table 2: Additional Metadata elements for geographic datasets).

Table 2. Additional Metadata elements for geographic datasets

Table 2 provides further detail on Elements which have been identified as having specific requirements for the FCERM schema.

Element number	Element name	Element Description	Obligation	Number of occurrences	Domain	Source	Short Name
6a - 6e	Keywords Category 1 - 5	Information required list, in the form of keyword or phrase as predefined by the project team	M (All 5 are mandatory)	1	Pre defined list (see table 5)	UK GEMINI ISO 19115 53	<i>keyword</i>
6f - 6J	Keywords user defined 1-5	Topic of the content of the dataset - it will be expressed as keywords or key phrases that describe the main subject of the database	M (All 5 are mandatory)	1	Free Text	UK GEMINI ISO 19115 53	<i>keyword</i>
6k - 6o	Keywords user defined 6-10	Topic of the content of the dataset - it will be expressed as keywords or key phrases that describe the main subject of the database	O	1	Free Text	UK GEMINI ISO 19115 53	<i>keyword</i>
7a	Start Date	The start Date and (or time) for the content of the dataset. The Time element for this field is optional and dependent on the dataset in question.	M	1	Single Date and \ optional Time DD/MM/YYYY HH/MM	ISO 19115 351	<i>exSpat</i>
7b	End Date	The End Date and (or time) for the content of the dataset. The Time element for this field is optional and dependent on the dataset in question.	M	1	Single Date and \ optional Time DD/MM/YYYY HH/MM	ISO 19115 351	<i>exSpat</i>
15a	Extent Government National \Regional	Extent of dataset by subdivision of country using Governmental Regions Table	M	1	Class list (see table 15)	ISO 19115 348	<i>geold</i>
15b	Extent Government Local	Extent of dataset by subdivision of country using Governmental Local Authorities Table	M	1	Class list (see table 15)	ISO 19115 348	<i>geold</i>
15c	Extent Environment Agency Regional	Extent of dataset by subdivision of country using Environment Agency Regions Table	M	1	Class list (see table 15)	ISO 19115 348	<i>geold</i>
15d	Extent Environment Agency Local	Extent of dataset by subdivision of country using Environment Agency Local Table	M	1	Class list (see table 15)	ISO 19115 348	<i>geold</i>
16a	Minimum Vertical Value	Lowest vertical extent contained in the dataset	C/M Only Mandatory if the dataset contains Vertical Information	1	Real	UK GEMINI ISO 19115 354	<i>verMinVAI</i>
16b	Maximum Vertical Value	Highest vertical extent contained in the dataset	C/M Only Mandatory if the dataset contains Vertical	1	Real	UK GEMINI ISO 19115 354	<i>verMaxVAI</i>

Element number	Element name	Element Description	Obligation	Number of occurrences	Domain	Source	Short Name
			Information				
16c	Unit of measure	Vertical units used for vertical extent information Examples: metres, feet, millimetres, hectopascals	C/M Only Mandatory if the dataset contains Vertical Information	1	Free Text (see Table 6)	ISO/TS 19103 ISO19115 357	<i>vertUoM</i>
16d	Vertical Datum	Provides information about the origin from which the maximum and minimum elevation values are measured	C/M Only Mandatory if the dataset contains Vertical Information	1	Free Text (see Table 7)	ISO 19111 ISO19115 358	<i>vertDatum</i>
23a	Distributor Contact Title	Role or position of the responsible person	M	1	Free Text	UK GEMINI ISO 19115 377	<i>rpPosName</i>
23b	Name of Distributor	Name of organisation supplying the dataset	M	1	Free Text	UK GEMINI ISO 19115 376	<i>rpOrgnName</i>
23c	Postal address of distributor	Postal address of distributor	O	1	Free Text	UK GEMINI ISO 19115 378	<i>rpCntlInfo</i>
23d	Tel No of distributor	Telephone number by which individuals can talk to the organisation or individual	O	1	Free Text	UK GEMINI ISO 19115 408	<i>voiceNum</i>
23e	Fax No of distributor	Fax no which individuals can use to contact the organisation or individual	O	1	Free Text	UK GEMINI ISO 19115 409	<i>faxNum</i>
23f	Email address of distributor	Email address which individuals can use to contact the organisation or individual	O	1	Free Text	UK GEMINI ISO 19115 386	<i>eMailAdd</i>
23g	Web address of distributor	Distributing organisation's World Wide Web (WWW) address	O	1	Free Text	UK GEMINI ISO 19115 397	<i>linkage</i>
33a	Accuracy	Broad brush view of the Quality of the dataset (1 - 5 categories)	M	1	Pre defined list rank 1-5 (see table 14)	Created as per ISO 19115	<i>dqAccCode</i>
33b	Quantitative Data Quality Explanation	Brief explanation of Assessment choice	M	1	Free Text	Created as per ISO 19115	<i>dqAccDesc</i>
34a	Data Quality Method Description	Brief Description of Evaluation Method	O	1	Free Text	ISO 19115 102	<i>measDesc</i>
34b	Date Quality was Assessed	Date or range of dates which data evaluation method was applied	O	1	Class/Duration of period DD/MM/YYYY	ISO 19115 106	<i>measDatetm</i>
34c	Data Quality Title of	Name by which cited resource is known	O	1	Free Text	ISO 19115 360	<i>resTtle</i>

Element number	Element name	Element Description	Obligation	Number of occurrences	Domain	Source	Short Name
	Procedure						
34d	Data Quality Procedure Date	Reference date for the cited resource	O	1	Duration of period DD/MM/YYYY	ISO 19115 362	resRefDate
34e	Data Quality Procedure Edition	Version of cited resource	O	1	Free Text	ISO 19115 363	resEd
34f	Data Quality Procedure Edition Date	Date of Edition	O	1	Duration of period DD/MM/YYYY	ISO 19115 364	resEdDate
34g	Data Quality Procedure Organisation name	Evaluators Organisation name	C/M. If a recognised evaluation procedure is used then object is mandatory only if 34h or 34i are null	1	Free Text	ISO 19115 376	rpOrgnName
34h	Data Quality Procedure Individual Name	Evaluators name	C/M If a recognised evaluation procedure is used then object is mandatory only if 34g or 34i are null	1	Free Text	ISO 19115 375	rpIndName
34i	Data Quality Procedure Position Name	Evaluators position title	C/M If a recognised evaluation procedure is used then object is mandatory only if 34h or 34g are null	1	Free Text	ISO 19115 377	rpPosName
34j	Evaluators Address	Evaluators postal address	O	1	Free Text	ISO 19115 378	rpCntInfo
34k	Evaluators Phone Number	Evaluators phone number	O	1	Free Text	ISO 19115 408	voiceNum
34l	Evaluators Fax Number	Evaluators Fax number	O	1	Free Text	ISO 19115 409	faxNum
34m	Evaluators Email	Evaluators email address	O	1	Free Text	ISO 19115 386	eMailAdd
34n	Data Quality Procedure Result	Indication of the conformance result where 0 = fail and 1 = pass	C/M	1	Boolean - 1 =yes 0 = no	ISO 19115 132	conPass
34o	Data Quality Procedure Explanation of Result	Explanation of the meaning of the conformance of the result	C/M	1	Free Text	ISO 19115 131	conExpl

Tables 1 and 2 have indicated that for some of the elements pre-determined lists are available for the user to choose from. These are either widely recognised and the source is given, or specific to this schema. The following tables describe the contents of the elements that have associated drop down lists the elements not detailed have free text fields. Tables 1 and 2 show the origin of these elements and the detail provided in Tables 3 to 15 is taken directly from UK GEMINI and ISO 19115, unless otherwise stated, thus making the FCERM schema compatible and interoperable with other metadata schemas.

Table 3. Dataset Language

The selection of dataset language is made from a controlled vocabulary as defined in the ISO 639-2 and represents the commonly used values from the UK.

ID	Code	Area
1	Cornish	COR
2	English	ENG
3	Gaelic (Scottish)	SCO
4	Gallic (Irish)	GLE
5	Welsh	WEL or CYM

Table 4. Topic Category

This element is defined in the ISO 19115, which provides a set list as follows:

ID	Name	Domain Code	Definition
1	Farming	1	rearing of animals and/or cultivation of plants Examples: agriculture, irrigation, aquaculture, plantations, herding, pests and diseases affecting crops and livestock
2	Biota	2	flora and/or fauna in natural environment Examples: wildlife, vegetation, biological sciences, ecology, wilderness, sealife, wetlands, habitat
3	boundaries	3	legal land descriptions Examples: political and administrative boundaries
4	climatology\Meteorology\Atmosphere	4	processes and phenomena of the atmosphere Examples: cloud cover, weather, climate, atmospheric conditions, climate change, precipitation
5	Economy	5	economic activities, conditions and employment Examples: production, labour, revenue, commerce, industry, tourism & ecotourism, forestry, fisheries, commercial or subsistence hunting, exploration and resource exploitation including minerals, oil & gas
6	Elevation	6	height above or below sea level Examples: altitude, bathymetry, digital elevation models, slope, derived products
7	environment	7	environmental resources, protection and conservation Examples: environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, landscape

ID	Name	Domain Code	Definition
8	geoscientific Information	8	information pertaining to earth sciences Examples: geophysical features & processes, geology, minerals, sciences dealing with the composition, structure & Rock origin, earthquake risk, volcanic activity, landslides, gravity information, soils, permafrost
9	Health	9	health, health services, human ecology, and safety Examples: disease and illness, factors affecting health, hygiene, substance abuse, mental and physical health, health services
10	imagery\ BaseMaps\ EarthCover	10	base maps Examples: land cover, topographic maps, imagery, unclassified images, annotations
11	intelligence \ Military	11	military bases, structures, activities Examples: barracks, training grounds, military transportation, information collection
12	inlandWaters	12	inland water features, drainage systems and their characteristics Examples: rivers and glaciers, salt lakes, water utilization plans, dams, currents, floods, water quality, hydrographic charts
13	Location	13	positional information and services Examples: addresses, geodetic networks, control points, postal zones and services, place names
14	Oceans	14	features and characteristics of salt water bodies(excluding inland waters)Examples: tides, tidal waves, coastal information, reefs
15	planning\Cadastre	15	information used for appropriate actions for future use of the land Examples: land use maps, zoning maps, cadastral surveys, land ownership
16	Society	16	characteristics of society and cultures Examples: settlements, anthropology, archaeology, education, traditional beliefs, manners and customs, demographic data, recreational areas & activities, social impact, assessments, crime & justice, census info
17	Structure	17	man-made construction Examples: buildings, museums, churches, factories, housing, monuments, shops, towers
18	transportation	18	means and aids for conveying persons and/or goods Examples: roads, airports/airstrips, shipping routes, tunnels, nautical charts, vehicle or vessel location, aeronautical charts, railways
19	utilities\Communication	19	energy, water & waste systems & communications infrastructure & services Examples-hydroelectricity, geothermal, solar & nuclear sources of energy, water purification & distribution, sewage collection & disposal, electricity & gas distribution, Data communication

Table 5. Subject - Information Required and Keywords

The subject element is derived from ISO 19115-53 which allows numerous keywords to be used to describe the object (datasets, documents etc). For the FCERM schema up to 15 keywords can be attributed to the 'object', the first 5 are selected from a dropdown list, this forms the link to Work Package 1 and the Tool (Work Package 3). The remaining 10 are free text. It is recognised that a tight control on these keywords is maintained to ensure that misspellings etc. do not filter into the system. To ensure that there is synergy with the Tool, overall management is to be carried out under ISO 19135.

ID	Information Required	Information Required ID
1	No Value	0
2	Environment information	1
3	Standard of defence	2
4	Hydrology	3
5	Asset condition	4
6	Flood/erosion damage	5
7	Cost of defence	6
8	Actual standard of defence	7
9	Probability/extent of flooding	8
10	Emergency response capability	9
11	Population geography	10
12	Flood prediction	11
13	Operation of system	12
14	Geomorphology	13
15	Watercourse system	14
16	Coastal evolution	15
17	Development sewer plans	16
18	Road drainage	17
19	Land drainage	18
20	Sewerage system	19
21	Physical environment	20
22	Historic flood events	21
23	Climate change	22
24	Probability/extent of erosion	23
25	Cost of Assets	24

Table 6. Vertical Unit of Measure

This Class is documented fully in ISO /TS19103

ID	Unit
1	Fathoms
2	Feet
3	Miles
4	Metres
5	Kilometres
6	Nautical Miles
7	Yards

Table 7. Vertical Datum

Set of Parameters describing the relation of gravity-related heights to earth. Fully documented in ISO 19111.

ID	NAME	REMARKS
1	Chart Datum	Chart Datum is the plane below which all depths are published on a navigational chart. It is also the plane to which all tidal heights are referred, so by adding the tidal height to the charted depth, the true depth of water is determined. By international agreement Chart Datum is defined as a level so low that the tide will not frequently fall below it. In the United Kingdom, this level is normally approximately the level of Lowest Astronomical Tide
2	European Vertical Reference Frame 2000	Realised by geopotential numbers and normal heights of the United European Levelling Network.
3	Mean Sea Level (MSL)	m _{sl} has geographic and temporal components. Users are advised to not use this generic vertical datum but to define specific instances of m _{sl} based on knowledge of these components; for instance 'm _{sl} at xxx during 19yy'.
4	Ordnance Datum Newlyn	Ordnance Survey of Great Britain's specified local vertical datum
5	Sea Level	An unspecified local vertical datum

Table 8. Spatial Reference System

The table is defined in the UK GEMINI and ISO 19115 187 as an enumerated class.

ID	Domain Code	Definition
1	1	National Grid of Great Britain
2	2	Irish Grid
3	3	Irish Transverse Mercator
4	4	WGS84
5	11	postcode
6	12	parish
7	13	ward
8	14	electoral constituency
9	15	census area
10	16	local authority (county/unitary/district/borough)
11	17	region
12	18	country
13	19	Health Authority area
14	20	travel-to-work area
15	21	other area type

Table 9. Spatial Representation Type

The table is from UK GEMINI and ISO 19115 37

ID	Name	Domain Code	Definition
1	Grid	2	grid data is used to represent geographic data
2	stereoModel	5	three-dimensional view formed by the intersecting homologous rays of an overlapping pair of images
3	textTable	3	textual or tabular data is used to represent geographic data
4	tin	4	triangulated irregular network
5	vector	1	vector data is used to represent geographic data
6	video	6	scene from a video recording

Table 10. Presentation Types

This Element is defined in UK GEMINI and ISO 19115 368

ID	Name	Domain Code	Definition
1	documentDigital	1	digital representation of a primarily textual item (can contain illustrations also)
2	documentHardcopy	2	representation of a primarily textual item (can contain illustrations also) on paper, photographic material, or other media
3	imageDigital	3	likeness of natural or man-made features, objects, and activities acquired through the sensing of visual or any other segment of the electromagnetic spectrum by sensors, such as thermal infrared, and high resolution radar and stored in digital format
4	climatology\Meteorology\Atmosphere	4	processes and phenomena of the atmosphere Examples: cloud cover, weather, climate, atmospheric conditions, climate change, precipitation
5	mapDigital	5	map represented in raster or vector form
6	mapHardcopy	6	map printed on paper, photographic material, or other media for use directly by the human user
7	modelDigital	7	multi-dimensional digital representation of a feature, process, etc.
8	modelHardcopy	8	3-dimensional, physical model
9	profileDigital	9	vertical cross-section in digital form
10	profileHardcopy	10	vertical cross-section printed on paper, etc.
11	tableDigital	11	digital representation of facts or figures systematically displayed, especially in columns
12	tableHardcopy	12	representation of facts or figures systematically displayed, especially in columns, printed on paper, photographic material, or other media
13	videoDigital	13	digital video recording
14	videoHardcopy	14	video recording on film

Table 11. Supply Media

The table is defined UK GEMINI and ISO 19115 292

ID	Name	Domain Code	Definition
1	cdRom	1	read-only optical disk
2	dvd	2	digital versatile disk
3	dvdRom	3	digital versatile disk, read only
4	3halfInchFloppy	4	3.5 inch magnetic disk
5	5quarterInchFloppy	5	5.25 inch magnetic disk
6	7trackTape	6	7 track magnetic tape
7	9trackTape	7	9 track magnetic tape
8	3480Cartridge	8	3480 cartridge tape drive
9	3490Cartridge	9	3490 cartridge tape drive
10	3580Cartridge	10	3580 cartridge tape drive
11	4mmCartridgeTape	11	4 millimetre magnetic tape
12	8mmCartridgeTape	12	8 millimetre magnetic tape
13	1quarterInchCartridgeTape	13	0.25 inch magnetic tape
14	digitalLinearTape	14	half inch cartridge streaming tape drive
15	onLine	15	direct computer linkage
16	satellite	16	linkage through a satellite communication system
17	telephoneLink	17	communication through a telephone network
18	hardcopy	18	pamphlet or leaflet giving descriptive information

Table 12. Frequency of Update

The table is defined in UK GEMINI and ISO 19115 143

ID	Value	Domain Code	Definition
1	continual	1	data is repeatedly and frequently updated
2	daily	2	data is updated each day
3	weekly	3	data is updated on a weekly basis
4	fortnightly	4	data is updated every two weeks
5	monthly	5	data is updated each month
7	quarterly	6	data is updated every three months
8	biannually	7	data is updated twice each year
9	annually	8	data is updated every year
10	asNeeded	9	data is updated as deemed necessary
11	irregular	10	data is updated in intervals that are uneven in duration

ID	Value	Domain Code	Definition
12	notPlanned	11	there are no plans to update the data
13	unknown	12	frequency of maintenance for the data is not known

Table 13. Use/Constraint Restrictions

The table is defined UK GEMINI and ISO 19115 70 & 71

ID	Value	Domain	Definition
1	Copyright	1	exclusive right to the publication, production, or sale of the rights to a literary, dramatic, musical, or artistic work, or to the use of a commercial print or label, granted by law for specified periods to an author, composer, artist, distributor
2	intellectualPropertyRights	6	rights to financial benefit from and control of distribution of non-tangible property that is a result of creativity
3	license	5	formal permission to do something
4	Other Restrictions	8	limitation not listed
5	patent	2	government has granted exclusive right to make, sell, use or license an invention or discovery
6	patentPending	3	produced or sold information awaiting a patent
7	Restricted	7	withheld from general circulation or disclosure
8	Trademark	4	a name, symbol, or other device identifying a product, officially registered and legally restricted to the use of the owner or manufacturer

Table 14. Accuracy

This table has been derived to meet the qualitative accuracy requirements of the project as developed within FD2323TR4 and is used in the assessment of fitness for purpose or need to gather more information. This element is used in the Tool to rank metadata returns by accuracy.

Code	Definition	Explanation
1	Best of Breed	No better available, unlikely to be improved on in near future
2	Data with known deficiencies	To be replaced as soon as third parties re-issue
3	Gross assumptions	Not made up but deduced by the project team from experience or related literature/data sources
4	Heroic assumptions	No data sources available or yet found; data based on purely educated guess
5	Unknown	Accuracy unspecified

Table 15. Extent

The table was included to assist in defining the Government and Environment Agency Regional and Local Extent descriptions in textual format. The ScaleLocationsScaleID field, represents the scale at which the values occur: 0 = No Value, 1 = National Level, 2 = Regional Government descriptions, 3 = Local Government descriptions, 4 = Environment Agency Region descriptions and 5 = Environment Agency Local descriptions. The ISO_3166_2 Column represents the equivalent ISO 3166-2 GB Counties extent code for the area. The ISO_Regional Column represents the equivalent ISO 3166-2 regional Subdivision code (GB Countries). The ISO_3166_1 column represents the equivalent ISO 3166-1 extent code for world countries. This Element is found in Uk GEMINI and IOS 19115 349 as an enumerated class (geographicIdentifier) and is formed of a data type whose instances form a list of named literal values. It is worth noting that the multiple choices made from this table when entering the metadata are only a function of the FCERM user group and in order to remain ISO compliant only the relevant ISO code will be used when transferring metadata for example if the ISO 3166-2 code is the default if this is not available then it defaults to ISO 3166-2 - regional and then to ISO 3166-1.

ScalelocationsID	ScalelocationsTitle	ScalelocationsScaleID	ScalelocationsLinkID	ISO_3166_2	ISO_Regional	ISO_3166_1
0	No Value	0	0	NA	NA	GB
1	National	1	1	NA	NA	GB
2	East of England	2	1	NA	ENG	GB
3	East Midlands	2	1	NA	ENG	GB
4	London	2	1	GB-LND	ENG	GB
5	North West	2	1	NA	ENG	GB
6	North East	2	1	NA	ENG	GB
7	South West	2	1	NA	ENG	GB
8	South East	2	1	NA	ENG	GB
9	West Midlands	2	1	NA	ENG	GB
10	Yorkshire and the Humber	2	1	GB-YOR	ENG	GB
11	Wales	2	1	NA	WLS	GB
12	Abertawe - Swansea	3	11	GB-SWA	WLS	GB
13	Adur District	3	8	GB-WSX	ENG	GB
14	Allerdale District	3	5	GB-CMA	ENG	GB
15	Alnwick District	3	6	GB-NBL	ENG	GB
16	Amber Valley District	3	3	GB-DBY	ENG	GB
17	Arun District	3	8	GB-WSX	ENG	GB
18	Ashfield District	3	3	GB-NTT	ENG	GB
19	Ashford District	3	8	GB-KEN	ENG	GB
20	Aylesbury Vale District	3	8	GB-BKM	ENG	GB
21	Babergh District	3	2	GB-SFK	ENG	GB
22	Barking And Dagenham London Borough	3	4	GB-BDG	ENG	GB
23	Barnet London Borough	3	4	GB-BNE	ENG	GB
24	Barnsley District	3	10	GB-BNS	ENG	GB
25	Barrow-In-Furness District	3	5	GB-CMA	ENG	GB
26	Basildon District	3	2	GB-ESS	ENG	GB
27	Basingstoke And Deane District	3	8	GB-HAM	ENG	GB
28	Bassetlaw District	3	3	GB-NTT	ENG	GB
29	Bath & North East Somerset	3	7	GB-BAS	ENG	GB
30	Bedford District	3	2	GB-BRD	ENG	GB
31	Berwick-Upon-Tweed District	3	6	GB-NBL	ENG	GB

ScalelocationsID	ScalelocationsTitle	ScalelocationsScaleID	ScalelocationsLinkID	ISO_3166_2	ISO_Regional	ISO_3166_1
32	Bexley London Borough	3	4	GB-BEX	ENG	GB
33	Birmingham District	3	9	GB-BIR	ENG	GB
34	Blaby District	3	3	GB-LEC	ENG	GB
35	Blackburn	3	5	GB-BBD	ENG	GB
36	Blackpool	3	5	GB-BPL	ENG	GB
37	Blaenau Gwent - Blaenau Gwent	3	11	GB-BGW	WLS	GB
38	Blyth Valley District	3	6	GB-NBL	ENG	GB
39	Bolsover District	3	3	GB-DBY	ENG	GB
40	Bolton District	3	5	GB-BOL	ENG	GB
41	Boston District	3	3	GB-LIN	ENG	GB
42	Bournemouth	3	7	GB-BMH	ENG	GB
43	Bradford District	3	10	GB-BRD	ENG	GB
44	Braintree District	3	2	GB-BRC	ENG	GB
45	Braknell Forest	3	8	GB-BRC	ENG	GB
46	Breckland District	3	2	GB-NFK	ENG	GB
47	Brent London Borough	3	4	GB-BEN	ENG	GB
48	Brentwood District	3	2	GB-ESS	ENG	GB
49	Bridgnorth District	3	9	GB-SHR	ENG	GB
50	Brighton & Hove	3	8	GB-BNH	ENG	GB
51	Bro Morgannwg - The Vale Of Glamorgan	3	11	GB-VGL	WLS	GB
52	Broadland District	3	2	GB-NFK	ENG	GB
53	Broadland District (Det)	3	4	GB-NFK	ENG	GB
54	Bromley London Borough	3	4	GB-BRY	ENG	GB
55	Bromsgrove District	3	9	GB-WOR	ENG	GB
56	Broxbourne District	3	2	GB-HEF	ENG	GB
57	Broxtowe District	3	3	GB-NTT	ENG	GB
58	Burnley District	3	5	GB-LAN	ENG	GB
59	Bury District	3	5	GB-BUR	ENG	GB
60	Caerdydd - Cardiff	3	11	GB-CRF	WLS	GB
61	Caerffili - Caerphilly	3	11	GB-CAY	WLS	GB
62	Calderdale District	3	10	GB-CLD	ENG	GB
63	Cambridge District	3	2	GB-CAM	ENG	GB
64	Camden London Borough	3	4	GB-CMD	ENG	GB
65	Cannock Chase District	3	9	GB-STS	ENG	GB
66	Canterbury District	3	8	GB-KEN	ENG	GB
67	Caradon District	3	7	GB-CON	ENG	GB
68	Carlisle District	3	5	GB-CMA	ENG	GB
69	Carrick District	3	7	GB-CON	ENG	GB
70	Casnewydd - Newport	3	11	GB-NWP	WLS	GB
71	Castell-Nedd Port Talbot - Neath Port Talbot	3	11	GB-NTL	WLS	GB
72	Castle Morpeth District	3	6	GB-NBL	ENG	GB
73	Castle Point District	3	2	GB-ESS	ENG	GB
74	Charnwood District	3	3	GB-LEC	ENG	GB
75	Chelmsford District	3	2	GB-ESS	ENG	GB
76	Cheltenham District	3	7	GB-GLS	ENG	GB
77	Cherwell District	3	8	GB-OXF	ENG	GB
78	Chester District	3	5	GB-CHS	ENG	GB
79	Chesterfield District	3	3	GB-DBY	ENG	GB
80	Chester-Le-Street District	3	6	GB-DUR	ENG	GB
81	Chichester District	3	8	GB-ESX	ENG	GB
82	Chiltern District	3	8	GB-BKM	ENG	GB
83	Chorley District	3	5	GB-LAN	ENG	GB
84	Christchurch District	3	7	GB-DOR	ENG	GB
85	City And County Of The City Of London London Bor	3	4	GB-LND	ENG	GB
86	City Of Bristol	3	7	GB-BST	ENG	GB

ScalelocationsID	ScalelocationsTitle	ScalelocationsScaleID	ScalelocationsLinkID	ISO_3166_2	ISO_Regional	ISO_3166_1
87	City Of Derby	3	3	GB-DER	ENG	GB
88	City Of Kingston Upon Hull	3	10	GB-KHL	ENG	GB
89	City Of Leicester	3	3	GB-LCE	ENG	GB
90	City Of Nottingham	3	3	GB-NGM	ENG	GB
91	City Of Plymouth	3	7	GB-PLY	ENG	GB
92	City Of Stoke-On-Trent	3	9	GB-STE	ENG	GB
93	City Of Westminster London Borough	3	4	GB-WSM	ENG	GB
94	Colchester District	3	2	GB-ESS	ENG	GB
95	Congleton District	3	5	GB-CHS	ENG	GB
96	Conwy	3	11	GB-CWY	WLS	GB
97	Copeland District	3	5	GB-CMA	ENG	GB
98	Corby District	3	3	GB-NTH	ENG	GB
99	Cotswold District	3	7	GB-GLS	ENG	GB
100	County Of Herefordshire	3	9	GB-HER	ENG	GB
101	Coventry District	3	9	GB-COV	ENG	GB
102	Craven District	3	10	GB-NYK	ENG	GB
103	Crawley District	3	8	GB-WSX	ENG	GB
104	Crewe And Nantwich District	3	5	GB-CHS	ENG	GB
105	Croydon London Borough	3	4	GB-CRY	ENG	GB
106	Dacorum District	3	2	GB-HRT	ENG	GB
107	Darlington	3	6	GB-DAL	ENG	GB
108	Dartford District	3	8	GB-KEN	ENG	GB
109	Daventry District	3	3	GB-NTH	ENG	GB
110	Derbyshire Dales District	3	3	GB-DBY	ENG	GB
111	Derwentside District	3	6	GB-DUR	ENG	GB
112	Doncaster District	3	10	GB-DNC	ENG	GB
113	Dover District	3	8	GB-KEN	ENG	GB
114	Dudley District	3	9	GB-DUD	ENG	GB
115	Durham District	3	6	GB-DUR	ENG	GB
116	Ealing London Borough	3	4	GB-EAL	ENG	GB
117	Easington District	3	6	GB-DUR	ENG	GB
118	East Cambridgeshire District	3	2	GB-CAM	ENG	GB
119	East Devon District	3	7	GB-DEV	ENG	GB
120	East Dorset District	3	7	GB-DOR	ENG	GB
121	East Hampshire District	3	8	GB-HAM	ENG	GB
122	East Hertfordshire District	3	2	GB-HRT	ENG	GB
123	East Lindsey District	3	3	GB-LIN	ENG	GB
124	East Northamptonshire District	3	3	GB-NTH	ENG	GB
125	East Riding Of Yorkshire	3	10	GB-YOR	ENG	GB
126	East Staffordshire District	3	9	GB-STS	ENG	GB
127	Eastbourne District	3	8	GB-ESX	ENG	GB
128	Eastleigh District	3	8	GB-HAM	ENG	GB
129	Eden District	3	5	GB-CMA	ENG	GB
130	Ellesmere Port And Neston District	3	5	GB-CHS	ENG	GB
131	Elmbridge District	3	8	GB-SRY	ENG	GB
132	Enfield London Borough	3	4	GB-ENF	ENG	GB
133	Epping Forest District	3	2	GB-ESS	ENG	GB
134	Epsom And Ewell District	3	8	GB-SRY	ENG	GB
135	Erewash District	3	3	GB-DBY	ENG	GB
136	Exeter City	3	7	GB-DEV	ENG	GB
137	Fareham District	3	8	GB-HAM	ENG	GB
138	Fenland District	3	2	GB-CAM	ENG	GB

ScalelocationsID	ScalelocationsTitle	ScalelocationsScaleID	ScalelocationsLinkID	ISO_3166_2	ISO_Regional	ISO_3166_1
139	Forest Heath District	3	2	GB-SFK	ENG	GB
140	Forest Of Dean District	3	7	GB-GLS	ENG	GB
141	Fylde District	3	5	GB-LAN	ENG	GB
142	Gateshead District	3	6	GB-GAT	ENG	GB
143	Gedling District	3	3	GB-NTT	ENG	GB
144	Gloucester District	3	7	GB-GLS	ENG	GB
145	Gosport District	3	8	GB-HAM	ENG	GB
146	Gravesham District	3	8	GB-KEN	ENG	GB
147	Great Yarmouth District	3	2	GB-NFK	ENG	GB
148	Greenwich London Borough	3	4	GB-GRE	ENG	GB
149	Guildford District	3	8	GB-SRY	ENG	GB
150	Gwynedd - Gwynedd	3	11	GB-GWN	WLS	GB
151	Hackney London Borough	3	4	GB-HCK	ENG	GB
152	Hambleton District	3	10	GB-NFK	ENG	GB
153	Hammersmith And Fulham London Borough	3	4	GB-HMF	ENG	GB
154	Harborough District	3	3	GB-LEC	ENG	GB
155	Haringey London Borough	3	4	GB-HRY	ENG	GB
156	Harlow District	3	2	GB-ESS	ENG	GB
157	Harrogate District	3	10	GB-NYK	ENG	GB
158	Harrow London Borough	3	4	GB-HRW	ENG	GB
159	Hart District	3	8	GB-HAM	ENG	GB
160	Hartlepool	3	6	GB-HPL	ENG	GB
161	Hastings District	3	8	GB-ESX	ENG	GB
162	Havant District	3	8	GB-HAM	ENG	GB
163	Havering London Borough	3	4	GB-HAV	ENG	GB
164	Hertsmere District	3	2	GB-HRT	ENG	GB
165	High Peak District	3	3	GB-DBY	ENG	GB
166	Hillingdon London Borough	3	4	GB-HIL	ENG	GB
167	Hinckley And Bosworth District	3	3	GB-LEC	ENG	GB
168	Horsham District	3	8	GB-WSX	ENG	GB
169	Hounslow London Borough	3	4	GB-HNS	ENG	GB
170	Huntingdonshire District	3	2	GB-CAM	ENG	GB
171	Hyndburn District	3	5	GB-LAN	ENG	GB
172	Ipswich District	3	2	GB-SFX	ENG	GB
173	Isle Of Wight	3	8	GB-IOW	ENG	GB
174	Islington London Borough	3	4	GB-ISL	ENG	GB
175	Kennet District	3	7	GB-WIL	ENG	GB
176	Kensington And Chelsea London Borough	3	4	GB-KEC	ENG	GB
177	Kerrier District	3	7	GB-CON	ENG	GB
178	Kettering District	3	3	GB-NTH	ENG	GB
179	King'S Lynn And West Norfolk District	3	2	GB-NFK	ENG	GB
180	Kingston Upon Thames London Borough	3	4	GB-KTT	ENG	GB
181	Kirklees District	3	10	GB-KIR	ENG	GB
182	Knowsley District	3	5	GB-KWL	ENG	GB
183	Lambeth London Borough	3	4	GB-LBH	ENG	GB
184	Lancaster District	3	5	GB-LAN	ENG	GB
185	Leeds District	3	10	GB-LDS	ENG	GB
186	Lewes District	3	8	GB-ESX	ENG	GB
187	Lewisham London Borough	3	4	GB-LEW	ENG	GB
188	Lichfield District	3	9	GB-STS	ENG	GB

ScalelocationsID	ScalelocationsTitle	ScalelocationsScaleID	ScalelocationsLinkID	ISO_3166_2	ISO_Regional	ISO_3166_1
189	Lincoln City District	3	3	GB-LIN	ENG	GB
190	Liverpool District	3	5	GB-LIV	ENG	GB
191	Luton	3	2	GB-LUT	ENG	GB
192	Macclesfield District	3	5	GB-CHS	ENG	GB
193	Maidstone District	3	8	GB-KEN	ENG	GB
194	Maldon District	3	2	GB-ESS	ENG	GB
195	Malvern Hills District	3	9	GB-WOR	ENG	GB
196	Manchester District	3	5	GB-MAN	ENG	GB
197	Mansfield District	3	3	GB-NTT	ENG	GB
198	Medway	3	8	GB-MDW	ENG	GB
199	Melton District	3	3	GB-LEC	ENG	GB
200	Mendip District	3	7	GB-SOM	ENG	GB
201	Merthyr Tudful - Merthyr Tydfil	3	11	GB-MTU	WLS	GB
202	Merton London Borough	3	4	GB-MRT	ENG	GB
203	Mid Bedfordshire District	3	2	GB-BDF	ENG	GB
204	Mid Devon District	3	7	GB-DEV	ENG	GB
205	Mid Suffolk District	3	2	GB-SFK	ENG	GB
206	Mid Sussex District	3	8	GB-WSX	ENG	GB
207	Middlesbrough	3	6	GB-MDB	ENG	GB
208	Milton Keynes	3	8	GB-MIK	ENG	GB
209	Mole Valley District	3	8	GB-SRY	ENG	GB
210	New Forest District	3	8	GB-HAM	ENG	GB
211	Newark And Sherwood District	3	3	GB-NTT	ENG	GB
212	Newbury	3	8	GB-WBK	ENG	GB
213	Newcastle Upon Tyne District	3	6	GB-NET	ENG	GB
214	Newcastle-Under-Lyme District	3	9	GB-STS	ENG	GB
215	Newham London Borough	3	4	GB-NWM	ENG	GB
216	North Cornwall District	3	7	GB-CON	ENG	GB
217	North Devon District	3	7	GB-DEV	ENG	GB
218	North Dorset District	3	7	GB-DOR	ENG	GB
219	North East Derbyshire District	3	3	GB-DBY	ENG	GB
220	North East Lincolnshire	3	10	GB-NEL	ENG	GB
221	North Hertfordshire District	3	2	GB-HRT	ENG	GB
222	North Kesteven District	3	3	GB-LIN	ENG	GB
223	North Lincolnshire	3	10	GB-NLN	ENG	GB
224	North Norfolk District	3	2	GB-NFK	ENG	GB
225	North Shropshire District	3	9	GB-SHR	ENG	GB
226	North Tyneside District	3	6	GB-NTY	ENG	GB
227	North Warwickshire District	3	9	GB-WAR	ENG	GB
228	North West Leicestershire District	3	3	GB-LEC	ENG	GB
229	North West Somerset	3	7	GB-SOM	ENG	GB
230	North Wiltshire District	3	7	GB-WIL	ENG	GB
231	Northampton District	3	3	GB-NTH	ENG	GB
232	Norwich District	3	2	GB-CHS	ENG	GB
233	Nuneaton And Bedworth District	3	9	GB-WAR	ENG	GB
234	Oadby And Wigston District	3	3	GB-LEC	ENG	GB
235	Oldham District	3	5	GB-OLD	ENG	GB
236	Oswestry District	3	9	GB-SHR	ENG	GB
237	Oxford District	3	8	GB-OXF	ENG	GB
238	Pendle District	3	5	GB-LAN	ENG	GB
239	Penwith District	3	7	GB-CON	ENG	GB
240	Pen-Y-Bont Ar Ogwr - Bridgend	3	11	GB-BGE	WLS	GB
241	Peterborough City	3	2	GB-PTE	ENG	GB

ScalelocationsID	ScalelocationsTitle	ScalelocationsScaleID	ScalelocationsLinkID	ISO_3166_2	ISO_Regional	ISO_3166_1
242	Poole	3	7	GB-POL	ENG	GB
243	Portsmouth	3	8	GB-POR	ENG	GB
244	Powys - Powys	3	11	GB-POW	WLS	GB
245	Preston District	3	5	GB-LAN	ENG	GB
246	Purbeck District	3	7	GB-DOR	ENG	GB
247	Reading	3	8	GB-RDG	ENG	GB
248	Redbridge London Borough	3	4	GB-RDB	ENG	GB
249	Redcar & Cleveland	3	6	GB-RCC	ENG	GB
250	Redditch District	3	9	GB-WOR	ENG	GB
251	Reigate And Banstead District	3	8	GB-SRY	ENG	GB
252	Restormel District	3	7	GB-CON	ENG	GB
253	Rhonda, Cynon, Taf - Rhondda, Cynon	3	11	GB-RCL	WLS	GB
254	Ribble Valley District	3	5	GB-LAN	ENG	GB
255	Richmond Upon Thames London Borough	3	4	GB-RIC	ENG	GB
256	Richmondshire District	3	10	GB-NYK	ENG	GB
257	Rochdale District	3	5	GB-RCH	ENG	GB
258	Rochford District	3	2	GB-ESS	ENG	GB
259	Rossendale District	3	5	GB-LAN	ENG	GB
260	Rother District	3	8	GB-ESX	ENG	GB
261	Rotherham District	3	10	GB-ROT	ENG	GB
262	Rugby District	3	9	GB-WAR	ENG	GB
263	Runcorn	3	5	GB-CHS	ENG	GB
264	Runnymede District	3	8	GB-SRY	ENG	GB
265	Rushcliffe District	3	3	GB-NTT	ENG	GB
266	Rushmoor District	3	8	GB-HAM	ENG	GB
267	Rutland	3	3	GB-RUT	ENG	GB
268	Ryedale District	3	10	GB-NYK	ENG	GB
269	Salford District	3	5	GB-SLF	ENG	GB
270	Salisbury District	3	7	GB-WIL	ENG	GB
271	Sandwell District	3	9	GB-SAW	ENG	GB
272	Scarborough District	3	10	GB-NYK	ENG	GB
273	Sedgefield District	3	6	GB-DUR	ENG	GB
274	Sedgemoor District	3	7	GB-SOM	ENG	GB
275	Sefton District	3	5	GB-SFT	ENG	GB
276	Selby District	3	10	GB-NYK	ENG	GB
277	Sevenoaks District	3	8	GB-KEN	ENG	GB
278	Sheffield District	3	10	GB-SHF	ENG	GB
279	Shepway District	3	8	GB-KEN	ENG	GB
280	Shrewsbury And Atcham District	3	9	GB-SHR	ENG	GB
281	Sir Benfro - Pembrokeshire	3	11	GB-BNF	WLS	GB
282	Sir Ceredigion - Ceredigion	3	11	GB-CGN	WLS	GB
283	Sir Ddinbych - Denbighshire	3	11	GB-DEN	WLS	GB
284	Sir Fynwy - Monmouthshire	3	11	GB-MON	WLS	GB
285	Sir Gaerfyrddin - Carmarthenshire	3	11	GB-CMN	WLS	GB
286	Sir Y Fflint - Flintshire	3	11	GB-FLN	WLS	GB
287	Sir Ynys Mon - Isle Of Anglesey	3	11	GB-AGY	WLS	GB
288	Slough	3	8	GB-SLG	ENG	GB
289	Solihull District	3	9	GB-SOL	ENG	GB
290	South Bedfordshire District	3	2	GB-BDF	ENG	GB
291	South Bucks District	3	8	GB-BKS	ENG	GB
292	South Cambridgeshire District	3	2	GB-CAM	ENG	GB
293	South Derbyshire District	3	3	GB-DBY	ENG	GB
294	South Gloucestershire	3	7	GB-SGC	ENG	GB

ScalelocationsID	ScalelocationsTitle	ScalelocationsScaleID	ScalelocationsLinkID	ISO_3166_2	ISO_Regional	ISO_3166_1
295	South Hams District	3	7	GB-DEV	ENG	GB
296	South Holland District	3	3	GB-LIN	ENG	GB
297	South Kesteven District	3	3	GB-LIN	ENG	GB
298	South Lakeland District	3	5	GB-CMA	ENG	GB
299	South Norfolk District	3	2	GB-NFK	ENG	GB
300	South Northamptonshire District	3	3	GB-NTH	ENG	GB
301	South Oxfordshire District	3	8	GB-OXF	ENG	GB
302	South Ribble District	3	5	GB-LAN	ENG	GB
303	South Shropshire District	3	9	GB-SHS	ENG	GB
304	South Somerset District	3	7	GB-SOM	ENG	GB
305	South Staffordshire District	3	9	GB-STA	ENG	GB
306	South Tyneside District	3	6	GB-STY	ENG	GB
307	Southampton	3	8	GB-STH	ENG	GB
308	Southend-On-Sea	3	2	GB-ESS	ENG	GB
309	Southwark London Borough	3	4	GB-SWK	ENG	GB
310	Spelthorne District	3	8	GB-SRY	ENG	GB
311	St Albans District	3	2	GB-HRT	ENG	GB
312	St Edmundsbury District	3	2	GB-SFK	ENG	GB
313	St Helens District	3	5	GB-SHN	ENG	GB
314	Stafford District	3	9	GB-STS	ENG	GB
315	Staffordshire Moorlands District	3	9	GB-STS	ENG	GB
316	Stevenage District	3	2	GB-HRT	ENG	GB
317	Stockport District	3	5	GB-SKP	ENG	GB
318	Stockton-On-Tees	3	6	GB-STT	ENG	GB
319	Stratford-On-Avon District	3	9	GB-WAR	ENG	GB
320	Stroud District	3	7	GB-GLS	ENG	GB
321	Suffolk Coastal District	3	2	GB-SFK	ENG	GB
322	Sunderland District	3	6	GB-SND	ENG	GB
323	Surrey Heath District	3	8	GB-SRY	ENG	GB
324	Sutton London Borough	3	4	GB-STN	ENG	GB
325	Swale District	3	8	GB-KEN	ENG	GB
326	Tameside District	3	5	GB-TAM	ENG	GB
327	Tamworth District	3	9	GB-STS	ENG	GB
328	Tandridge District	3	8	GB-SRY	ENG	GB
329	Taunton Deane District	3	7	GB-SOM	ENG	GB
330	Teesdale District	3	6	GB-DUR	ENG	GB
331	Teignbridge District	3	7	GB-DEV	ENG	GB
332	Tendring District	3	2	GB-ESS	ENG	GB
333	Test Valley District	3	8	GB-HAM	ENG	GB
334	Tewkesbury District	3	7	GB-GLS	ENG	GB
335	Thamesdown	3	7	GB-WIL	ENG	GB
336	Thanet District	3	8	GB-KEN	ENG	GB
337	Three Rivers District	3	2	GB-HRT	ENG	GB
338	Thurrock	3	2	GB-THR	ENG	GB
339	Tonbridge And Malling District	3	8	GB-KEN	ENG	GB
340	Torbay	3	7	GB-TOB	ENG	GB
341	Tor-Faen - Torfaen	3	11	GB-TOF	WLS	GB
342	Torridge District	3	7	GB-DEV	ENG	GB
343	Tower Hamlets London Borough	3	4	GB-TWH	ENG	GB
344	Trafford District	3	5	GB-TRF	ENG	GB
345	Tunbridge Wells District	3	8	GB-KRN	ENG	GB
346	Tynedale District	3	6	GB-NBL	ENG	GB

ScalelocationsID	ScalelocationsTitle	ScalelocationsScaleID	ScalelocationsLinkID	ISO_3166_2	ISO_Regional	ISO_3166_1
347	Utlesford District	3	2	GB-ESS	ENG	GB
348	Vale Of White Horse District	3	8	GB-OXF	ENG	GB
349	Vale Royal District	3	5	GB-CHS	ENG	GB
350	Wakefield District	3	10	GB-WKF	ENG	GB
351	Walsall District	3	9	GB-WLL	ENG	GB
352	Waltham Forest London Borough	3	4	GB-WFT	ENG	GB
353	Wandsworth London Borough	3	4	GB-WND	ENG	GB
354	Wansbeck District	3	6	GB-NBL	ENG	GB
355	Warrington	3	5	GB-WRT	ENG	GB
356	Warwick District	3	9	GB-WAR	ENG	GB
357	Watford District	3	2	GB-HRT	ENG	GB
358	Waveney District	3	2	GB-SFK	ENG	GB
359	Waverley District	3	8	GB-SRY	ENG	GB
360	Wealden District	3	8	GB-ESX	ENG	GB
361	Wear Valley District	3	6	GB-DUR	ENG	GB
362	Wellingborough District	3	3	GB-NTH	ENG	GB
363	Welwyn Hatfield District	3	2	GB-HRT	ENG	GB
364	West Devon District	3	7	GB-DEV	ENG	GB
365	West Dorset District	3	7	GB-DOR	ENG	GB
366	West Lancashire District	3	5	GB-LAN	ENG	GB
367	West Lindsey District	3	3	GB-LIN	ENG	GB
368	West Oxfordshire District	3	8	GB-OXF	ENG	GB
369	West Somerset District	3	7	GB-SOM	ENG	GB
370	West Wiltshire District	3	7	GB-WIL	ENG	GB
371	Weymouth And Portland District	3	7	GB-DOR	ENG	GB
372	Wigan District	3	5	GB-WGN	ENG	GB
373	Winchester District	3	8	GB-HAM	ENG	GB
374	Windsor & Maidenhead	3	8	GB-WNM	ENG	GB
375	Wirral District	3	5	GB-WRL	ENG	GB
376	Woking District	3	8	GB-SRY	ENG	GB
377	Wokingham	3	8	GB-WOK	ENG	GB
378	Wolverhampton District	3	9	GB-WLV	ENG	GB
379	Worcester District	3	9	GB-WOR	ENG	GB
380	Worthing District	3	8	GB-WSX	ENG	GB
381	Wreccsam - Wrexham	3	11	GB-WRX	WLS	GB
382	Wrekin	3	9	GB-SHR	ENG	GB
383	Wychavon District	3	9	GB-WOR	ENG	GB
384	Wycombe District	3	8	GB-BKM	ENG	GB
385	Wyre District	3	5	GB-LAN	ENG	GB
386	Wyre Forest District	3	9	GB-WOR	ENG	GB
387	York	3	10	GB-YOR	ENG	GB
388	EA - Anglian	4	1	NA	ENG	GB
389	EA - Midlands	4	1	NA	ENG	GB
390	EA - North East	4	1	NA	ENG	GB
391	EA - North West	4	1	NA	ENG	GB
392	EA - South West	4	1	NA	ENG	GB
393	EA - Southern	4	1	NA	ENG	GB
394	EA - Thames	4	1	NA	ENG	GB
395	EA - Wales	4	1	NA	WLS	GB
396	Anglian - Central	5	388	NA	ENG	GB
397	Anglian - Eastern	5	388	NA	ENG	GB
398	Anglian - Northern	5	388	NA	ENG	GB
399	Midlands - Lower Severn	5	389	NA	ENG	GB
400	Midlands - Lower Trent	5	389	NA	ENG	GB

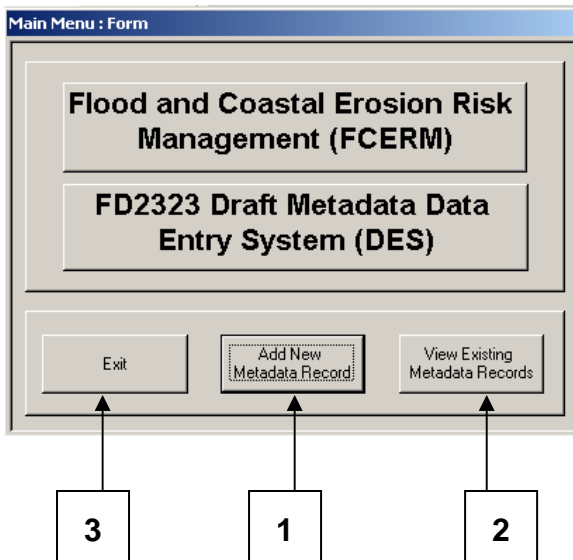
ScalelocationsID	ScalelocationsTitle	ScalelocationsScaleID	ScalelocationsLinkID	ISO_3166_2	ISO_Regional	ISO_3166_1
401	Midlands - Upper Severn	5	389	NA	ENG	GB
402	Midlands - Upper Trent	5	389	NA	ENG	GB
403	North East - Dales	5	390	NA	ENG	GB
404	North East - Northumbria	5	390	NA	ENG	GB
405	North East - Ridings	5	390	NA	ENG	GB
406	North West - Central	5	391	NA	ENG	GB
407	North West - Northern	5	391	NA	ENG	GB
408	North West - Southern	5	391	NA	ENG	GB
409	South West - Cornwall	5	392	GB-CON	ENG	GB
410	South West - Devon	5	392	GB-DEV	ENG	GB
411	South West - North Wessex	5	392	NA	ENG	GB
412	South West - South Wessex	5	392	NA	ENG	GB
413	Southern - Hampshire & Isle of Wight	5	393	GB-IOW	ENG	GB
414	Southern - Kent	5	393	GB-KEN	ENG	GB
415	Southern - Sussex	5	393	NA	ENG	GB
416	Thames - North East	5	394	NA	ENG	GB
417	Thames - South East	5	394	NA	ENG	GB
418	Thames - West	5	394	NA	ENG	GB
419	Wales - Northern	5	395	NA	WLS	GB
420	Wales - South East	5	395	NA	WLS	GB
421	Wales - South West	5	395	NA	WLS	GB

Appendix B

Step by Step Guide to FCERM
Metadatabase Proof of Concept

Appendix B. Step by Step Guide to FCERM Metadatabase Proof of Concept

The Main Menu



This is the menu screen that will flash-up when the user first opens the Metadatabase file - *"FD2323_Metadata_Database"*

It is from here that the user can choose whether or not to:

- 1) Add new data,
- 2) View \modify existing data or,
- 3) Exit the database altogether.

Metadata Entry

This section of the database also allows the user to add new Metadata documents to the system. To enter this Section of the database the user simply clicks on *"Add New Metadata Record"* button in the main menu. This then adds a new record to the underlying metadatabase and opens the first of the data entry forms, from here the user can start to enter new metadata documents.

1b) Form 1 - General Information

- 1) Metadata Record ID - this is unique reference to the metadata record that is entered and is generated automatically when a user starts to enter a new record.
- 2) Mandatory Metadata Field - This is emphasised by a red label. The user must enter these fields before continuing.
- 3) Optional Metadata Field - This is a normal grey label. The user has the option of entering these fields (although they should be completed if possible)
- 4) A Dropdown Combo Box - The user has pre-defined list of options to chose from.
- 5) A Free Text Box - The user can write whatever they want about regarding the theme, as long as they stick to the themes format (As defined in Table 1).
- 6) Exit button - Exits the form and returns to Main Menu.
- 7) Next button -Checks the content of the form to ensure that all mandatory fields have been entered and opens the next form.

1c) Form 2 - Extents

- 8) Form Header - Informs the user which metadata record they are entering, by displaying the Metadata ID and Dataset Name). This is displayed on every data entry form from 2 onward.
- 9) Extent fields - These are dropdown lists used to specify where the dataset inquest lies in relation to Government Regions & Authorities and Environment Agency Regions and Districts.
- 10) Bounding Box - Co-ordinates outlining the extents of the dataset in WGS84 Decimal Degrees.
- 11) Back button - Allows the user to return to the previous form.

1d) Form 3 - Additional Extents

- 12) Check Box - When checked it activates additional metadata fields.
- 13) Conditional/Mandatory Fields - These are only mandatory once they have been activated by a check box.
- 14) Vertical Extents Information - Only mandatory if activated, i.e. if the data set has vertical information
- 15) Temporal Extents Information - Only mandatory if activated, i.e. if the data set has temporal/time series information.

1d) Form 4 - Spatial Reference Information

- 16) Spatial Resolution - This field is dependent on the data source: a) If the data was captured in the field then the precision to which the data is captured e.g. 10 cm b) For image data it will be the resolution of the the image e.g 25 cm (each pixel = 25cm on the ground) c) For data taken from maps it will be the positional accuracy of the map e.g. 1:10 000 cm (1 cm on the map = 10 000 cm on the ground).

1e) Form 5 - Distribution Information

- 17) Distribution Information - Contact details of the organisation from which resource can be obtained.

1f) Form 6 - Keywords

18) Category Keywords - These are the Information Required Keywords as defined in the Ontology Flow Charts. These play an important role in linking the Metadata to the Knowledge Information search tool. Hence these have been pre defined by the project team.

19) Specific Keywords - Drop down list of keywords describing the dataset. The first five are mandatory and must be completed.

20) Specific Keywords - 6 to 10 as 19 except these are optional.

21) The Add New Keyword to Dropdown List button - Allows the user to add new keywords to the list.

22) Exit Button - This allows the user to exit the Add Keywords Form and return to the Keywords form

23) Save button - Save the new keyword to the list and returns to the keywords form.

1g) Form 6b - Add Keywords

1h) Form 7 - Use Restrictions

24) Restriction Constraints Information - Details on the type of use and access constraints the data has as well as as a brief description of the constraint.

1h) Form 8 - Data Quality

- 25) Quantitative Data Quality Assessment - A broad overview ranking of the data 1=good, 5=bad. Includes an explanation of the above assesment.
- 26) Qualitative Data Quality Assessment - A description of and Assessment methodology used to assess the data including the result of that assesment and the details of the person or organisation that undertook it.

1h) Form 9 - Data Format

- 27) Data format and supply - Includes information on the a) Type of format that the data is presented in e.g. Digital hardcopy etc. b) The format in which the data can be provided c) The type of media in which the data can be supplied e.g. CD, Paper, Floppydisk etc. d) The representation type of any spatial data e.g. vector, grid,tin etc.

1h) Form 10 - Metadata Information

28) Metadata information - Including information on a) The frequency of data updates. b) The date of the last metadata update. c) The name of the metadata standard e.g. UK GEMINI. d) The Version of that standard.

1h) Form 11 - Additional Information

29) Additional information - Includes information on a) addition information sources for the data b) Information about the online source from which the data can be obtained c) The Name and file path of any available thumbnail graphic for the data

30) Save Current Record button - Saves the current metadata record

31) Add New Record button - Saves the current record and starts a new one.

32) Exit button - Exits the database

1i) The Status Bar

33) The Status Bar - Gives a brief description of the metadata field when the field is selected on any form.

Metadata Viewing and Modifying

This section of the database also allows the user to view Metadata documents to the system. To enter this section of the database the user clicks “View Existing Metadata Records” button in the main menu. This opens the Full Metadata form.

2a) Full Metadata form

Draft Metadata Data Entry System (DES)

Metadata ID: []

Subject Type: Chondria Behaviour Statement

Observation file: []

Initial language: []

Abstract: []

Topic: []

Date of data: []

Date of release date: []

Originator: []

Lineage: []

Presentation type: []

Data format: []

Supply media: []

Spatial representation type: []

Access constraint: []

User Constraints: []

Additional information source: []

Online resource: []

Browse graphic: []

Frequency of update: []

Date of update of metadata: []

Metadata standard name: []

Metadata standard version: []

Categories:

- Category 1: []
- Category 2: []
- Category 3: []
- Category 4: []
- Category 5: []

KeyWords:

- Keyword1: []
- Keyword2: []
- Keyword3: []
- Keyword4: []
- Keyword5: []
- Keyword6: []
- Keyword7: []
- Keyword8: []
- Keyword9: []
- Keyword10: []

Qualitative Data Quality Assessment: []

Data Quality Evaluation Method Description: []

Data Quality Procedure:

- Data Quality Date Quality was assessed: []
- Data Quality Procedure Title: []
- Data Quality Procedure Date: []
- Data Quality Procedure Editor: []
- Data Quality Procedure Edition Date: []
- Data Quality Procedure Institution Name: []
- Data Quality Procedure Organisation Name: []
- Data Quality Procedure Project Name: []
- Data Quality Procedure Address: []
- Data Quality Procedure Phone: []
- Data Quality Procedure Fax: []
- Data Quality Procedure Email: []
- Data Quality Procedure URL: []

Return to Main Menu

34) Record Selectors - Move between metadata records

35) The return to Main Menu button - Returns user to main menu.

36) To modify a record the user simply selects a field on the “Full Metadata Form” and edits.

Appendix C

Metadata Dictionary Overview

Appendix C. Metadata Dictionary Overview

Introduction

This metadata dictionary describes the characteristics of the data elements used in the register of metadata elements. The dictionary is specified as a hierarchy to establish relationships and an Organisation for the information. The elements within the metadata dictionary are defined by seven attributes (those attributes are listed below and are based on those specified in ISO/IEC 11179-3 for the description of data element concepts, i.e. data elements without representation).

Name

A label assigned to a data entity or to a data element.

Short name

Short names are unique within this International Standard and may be used with the Extensible Markup Language (XML) and ISO 8879 (SGML) or other similar implementation techniques. A naming convention similar to that used to create the longer entity and element names was used to create the short names.

NOTE Implementation using SGML and XML is not mandatory; other implementation methods may be accommodated

Definition

The **metadata** entity/element description.

Obligation/Condition

General

This is a descriptor indicating whether a metadata entity or metadata element shall always be documented or sometimes be documented (i.e. contains value(s)). This descriptor may have the following values: M (mandatory), C (conditional), or O (optional).

Mandatory (M)

The metadata entity or metadata element shall be documented.

Conditional (C)

Specifies an electronically manageable condition under which at least one metadata entity or a metadata element is mandatory. 'Conditional' is used for one of the three following possibilities:

- (a) Expressing a choice between two or more options. At least one option is mandatory and must be documented.
- (b) Documenting a metadata entity or a metadata element if another element has been documented.
- (c) Documenting a metadata element if a specific value for another metadata element has been documented. To facilitate reading by humans, the specific value is used in plain text (for example: table in clause B.2, row 6 "C/ hierarchy LevelCode is not equal to 'dataset?'"). However, the code shall be used to verify the condition in an electronic user interface.
- (d) If the answer to the condition is positive, then the metadata entity or the metadata element shall be mandatory.

Optional (O)

The metadata entity or the metadata element may be documented or may not be documented. Optional metadata entities and optional metadata elements have been defined to provide a guide to those looking to fully document their data. (Use of this common set of defined elements will help promote interoperability among geographic data users and producers world-wide.) If an optional entity is not used, the elements contained within that entity (including mandatory elements) will also not be used. Optional entities may have mandatory elements; those elements only become mandatory if the optional entity is used.

Maximum occurrence

Specifies the maximum number of instances the metadata entity or the metadata element may have. Single occurrences are shown by "1"; repeating occurrences are represented by "N". Fixed number occurrences other than one are allowed, and will be represented by the corresponding number (i.e., "2", "3"...etc).

Data type

Specifies a set of distinct values for representing the metadata elements; for example, integer, real, string, DateTime, and Boolean. The data type attribute is also used to define metadata entities, stereotypes, and metadata associations.

NOTE Data types are defined in ISO 19103.

Domain

For a metadata element, the domain specifies the values allowed or the use of free text. "Free text" indicates that no restrictions are placed on the content of the field. Integer-based codes shall be used to represent values for domains containing codelists.

Data Dictionary for Metadata Register

ID	Name	Short Name	Definition	Obligation/Condition	Data type	Max. occ.	Comment
1	Metadata element identifier		Linguistically independent sequence of characters capable of uniquely and permanently identifying an item within a register	001	003	1	
2	Name		Single or multi word designation assigned to a data element	001	002	1	Free text
3	Short Name		Short form suitable for use in an implementation method such as XML or SGML. NOTE other methods may be used	002	002	N	Free text
4	Definition		Statement that expresses the essential nature of a data element and permits its differentiation from all other data elements	001	002	1	Free text
5	Condition		Electronically manageable condition under which at least one data entity or a data element is mandatory	003	002	1	Free text Notes: 1. If the answer to the condition is positive, then the data entity or the data element shall be mandatory. 2. 'Conditional' is used for one of the three following possibilities: - Expressing a choice between two or more options. At least one option is mandatory and must be documented. - Documenting a data entity or a data element if another element has been documented. 3. Documenting a data element if a specific value for another data element has been documented.

ID	Name	Short Name	Definition	Obligation/Condition	Data type	Max. occ.	Comment
6	Representation Layout		Layout of characters in data element values expressed by a character string representation	003	002	1	Free text Examples: 1. The layout format for date could be "MM/DD/YYYY" in USA, while the format "YYYY/MM/DD" is used in Canada. 2. A flight number has an international recognized code of 2 alphabetical characters followed by 3 integers therefore the Representation layout is AA999 Note: If the attribute 'form of representation' is 'code' the use of this attribute is recommended if the code representation has to have a specific structure or layout.
7	Non-enumerated domain		Rule for determining the permissible values of a data element non-enumerated domain	002	002	1	Free text Example: 1. A data element named: 'Number of employees' may contain values which are integers, equal or greater than zero. 2. Data element 'radio frequency' has a domain which ranges from 3 KHz-300 GHz and conforms to IEC50-specifications.
8	Obligation		Descriptor indicating whether a metadata entity or metadata element shall always be documented or sometimes be documented (i.e. contains value)	001	003	1	See code list "B.5.21 MD_ObligationCode" from ISO 19115
9	Maximum Occurrences		Maximum number of instances the data entity or the data element may have	001	002	1	N or any integer
10	Parent Entity Identifier		Item identifier of the data entity under which a data element appears	001	002		
11	Predecessor Item		Item identifier of the item replaced by this item	002	002		
12	Representation form code		Identification of the form of representation for the data element	001	003	1	See code list "Representation forms "
13	Data Type		A set of distinct values for representing the data element value	001	003	1	See code list "Data types"
14	Maximum size		Maximum number of storage units (of the corresponding datatype) to represent the data element value	002	003	1	

ID	Name	Short Name	Definition	Obligation/Condition	Data type	Max. occ.	Comment
15	Minimum size		Minimum number of storage units (of the corresponding datatype) to represent the data element value	002	003	1	
16	Codelist identifier		Sequence of characters capable of uniquely and permanently identify a code list within a register	002	002	1	
17	Context		Designation or description of the application environment or discipline in which a name is applied or originates from	001	002	1	Free text Notes: <ul style="list-style-type: none"> ▪ Specify the IS where the element comes from ▪ Extensions: profile name from a National Body or a Liaison Organisation
18	Responsible Organisation		The Organisation or unit within an Organisation that is responsible for the contents of the mandatory attributes by which the data element is specified	001	14		Free text Example: name of the National Body or the Liaison Organisation
19	Registration status code		A designation of the position in the registration life-cycle of a data element	001	003		See code list "Item status"
20	Comments		Remarks on the data element	002	003	1	Free text

Code lists used in the register of metadata elements

Note The following code lists are based on ISO/IEC 11179-3 and ISO/IEC 11179-6

Data types

ID	Name	Domain code	Definition
	Data type code	DatatypeCd	Datatype of element or entity
1	Class	001	Descriptor of a set of objects that share the same attributes, operations, methods, relationships, and behavior
2	CharacterString	002	Sequence of alphanumeric characters
3	Integer	003	
4	Date/time	021	Date format (YYYY-MM-DD) and, if needed time format (-HH-MM:SS)
5	Boolean	022	
6	Real	023	

Representation Forms Code List

ID	Name	Domain code	Definition
	Representation form		Name or description of the form of representation for the data element
1	Quantitative value	001	
2	Code	002	Example 1: For the data element named: 'country of origin code' this attribute contains: 'code'.
3	Text	003	Example 2: For the data element: 'product description' this attribute contains: 'text'.
4	Icon	004	Example 3: For the data element: 'weight of consignment' this attribute contains: 'quantitative value'.
5	Other	000	

Data Dictionary for Code List Register

ID	Name	Short Name	Definition	Obligation/ Condition3	Data type4	Max. occ.	Comment
	Value identification Group		Set of elements capable of identify a value within a specified code list	001	001	1	Lines 1 -3
	Code list identifier Group		Set of elements capable of identify a code list within a specified context	001	001	1	Lines 1 - 2
1	Source identification		Sequence of characters capable of uniquely and permanently identifying the document where comes from the code list	001	002	1	Example: ISO 19115
2	Code list identifier		Linguistically independent sequence of characters capable of uniquely and permanently identifying a code list inside a source	001	003	1	
3	Value identifier		Unique identifier of the registered value inside the code list	001	14	1	
	Value description		Set of elements used to describe the registered value	001	001	N	Lines 4 - 13
	Value period validity		Period of validity of the registered value description	001	001	1	Lines 4 - 5 Note: Max occurrence is "N" because a same value may have different descriptions in a time period, but only one at a specific date
4	Value beginning date		First day of the period of validity of the registered value description	001	021	1	For an element coming from an IS, this field is completed with the publication date of the IS
5	Value ending date		Last day of the period of validity of the registered value description	002	021	1	This field is completed only when a description becomes obsolete or is replaced by a modified description
	Textual description group		Set of textual elements used to describe the registered value	001	001	N	Lines 6 -13 Note: Max occurrence is "N" because a same item may have more than one linguistic equivalency description
	Language description		Identification of the human language used in describing a registered value	001	001	1	Lines 6-8
6	Language code		Code of the human language used to describe the registered value in a specific language	001	002	1	• In accordance with ISO 639-2/B (bibliographic three-alpha-digit code):

ID	Name	Short Name	Definition	Obligation/Condition3	Data type4	Max. occ.	Comment
							• For the registered items coming from an ISO standard, use "eng" ("English") as value per default
7	Country code		Identifier of the country of the human language used to describe the registered value in a specific language	002	003	1	• In accordance with ISO 3166-1 & 2
8	Character set coding code		Identifier of the character set coding standard used to describe the registered value in a specific language	002	003	1	• See code list "B.5.21 MD_CharacterSetCode" from ISO/DIS 19115
	Textual data elements		Description of the textual attributes of the registered value	001	001	1	Lines 9 - 10
9	Value Name		Single or multi word designation assigned to a value	001	002	1	Free text Value per default: name from the IS
10	Value Definition		Statement that expresses the essential nature of a data element and permits its differentiation from all other data elements	001	002	1	Free text
	Administrative information		Attributes that describe management and control aspects of a data element	001	001	1	Lines 11 - 13
11	Registration status code		A designation of the position in the registration life-cycle of a data element	001	03		See code list "Item Status"
12	Responsible Organisation		The Organisation or unit within an Organisation that is responsible for the contents of the mandatory attributes by which the data element is specified	001	14		Free text Notes: • Name of the National Body or the Liaison Organisation
13	Comments		Remarks on the data element	002	003	1	Free text

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