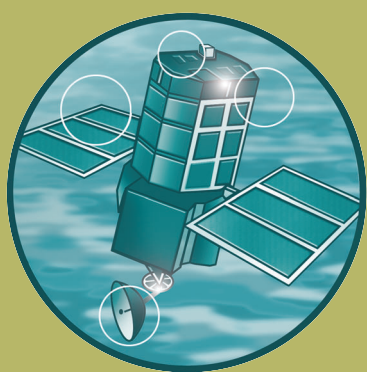


Improving Data and Knowledge Management for Effective Integrated FCERM

Knowledge Management Tool

R&D Technical Report FD2323/TR3



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 3 Knowledge Management Tool

Final Report

R&D Technical Report FD2323/TR3

Produced: September 2007

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Statement of use

This is the final report of work package 3 from FD2323 'improving data and knowledge management for effective integrated FCERM.' It explains and illustrates the development of a knowledge management tool to support the ontology (FD2323/TR1) by providing an interactive link between management objectives, tasks within these and available information. 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\TR3) develops a knowledge management tool to provide an interactive link between management objectives and relevant available information, and to help connect the users and suppliers of data.

The first part of the study looked at applying available techniques and good practices to improve information access and exchange within the FCERM community. This involved a scoping exercise, which concentrated on designing a mechanism for the dissemination of the developed Ontology (FD2323\TR1), providing an understanding of the functions of organisations, individuals, information and data required within FCERM. This resulted in the concept of a web-enabled knowledge management tool that would aid anyone at any level

(national, regional or local) within the decision-making hierarchy to understand the links between position, responsibility and data need.

The Ontology data and information requirement charts were translated into a single amalgamated form from which a concept diagram was evolved. This diagram gave the basis for the design of the Knowledge Management Tool and formed linkages with two databases; one within the Tool and the other to the prototype metadata database constructed in Work Package 2 (FD2323\TR2), to which the queries were sent. Case studies were used to populate, test and evaluate the Tool. These enabled the flow of information and task allocation to be challenged together with the identification of gaps in both the system and methodology. Data quality flags, developed in Work Package 4 (FD2323\TR4), were also incorporated into the Tool.

The outcome is a Knowledge Management Tool that is web-enabled allowing ease of use and widespread access. The features of the proven application enable users to:

- Access through different entry levels depending on the responsibility of the individual or level of the enquiry – through national, regions or areas of the Environment Agency, as well as regional and local authority areas;
- Assist individuals at different levels to query with set tasks and return a list of information from an information source, such as the metadata database. Further examination of the metadata database will provide detail on the information itself or associated data.
- Rank the information required for each query thus identifying whether 'key' information is missing;
- Filter available data using keywords to refine returns;
- Assess if available data is fit for purpose via the use of data quality flags;
- Identify who else may benefit from data being collected, both internal to the organisation and external, and so potential joint funding sources;
- Provide a link to other organisations that might have an indirect interest in the activity, such as English Nature, RSPB, emergency services; and
- Identify the need for data collection.

It is recommended that the overall control and management should be handled through the ISO 19135 standard, provided within FD2323\TR2. A user guide is provided, and this is also available as an interactive 'help' on the Tool itself, which walks the user through the various pages.

Implementation of the Tool will require the full population of the activities identified in the data requirement charts (FD2323\TR1) by practitioners within the FCERM community. Consideration will have to be given to the FCERM organisations' policies on IT and hardware/software procurement, as will the need to find suitable resources to conduct the necessary tasks. The successful use of this tool will require a culture of healthy information access and sharing in FCERM and the adoption of consistent recording of metadata for all FCERM related data as recommended by Work package 2 (see FD2323\TR2).

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1. Introduction

1.1 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 3) describes the work carried out to develop a web-enabled knowledge management tool for improved access to relevant FCERM information.

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.

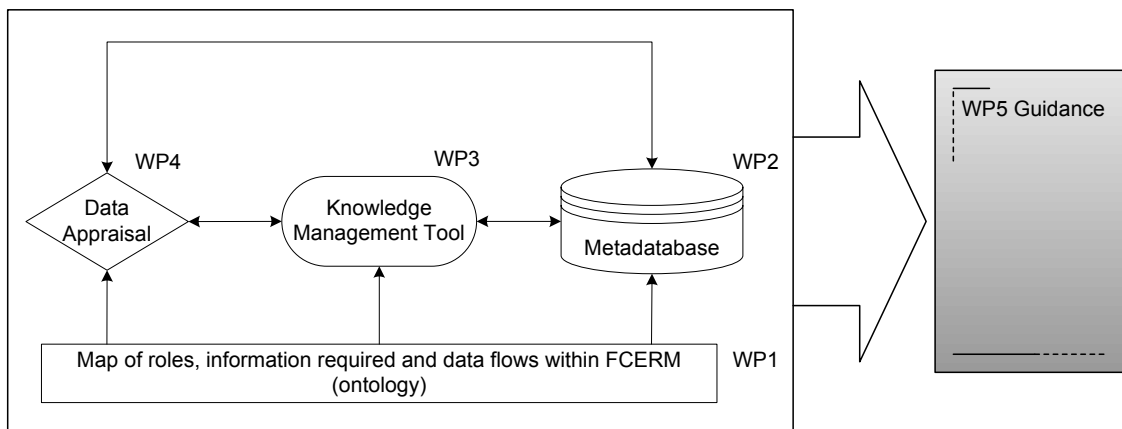


Figure 1.2.1 Overview of FD2323 Work Packages and links

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 3

The objectives of Work Package 3 are:

- To develop a best practice concept for a Tool to improve information access and exchange within the FCERM community
- To develop through the use of typical FCERM data, a web-enabled Tool to show proof of the concept for best practice in information access and exchange, using the ontology, metadatabase and data appraisal frameworks developed within other Work Packages of this project, and provide supporting documentation.

Previous work has identified the need for a Knowledge Management Tool to support access to and exchange of available information within the FCERM community. Within the original scope, it had been suggested that this

dissemination could be achieved through the use of a Geographical Information System (GIS). It is recognised that GIS would form an integral part of the framework to assist with the choice of geographical location by interfacing with the metadatabase in the future. However, at this “proof of concept” stage, this integration was assessed as of a lower importance due to licensing and cost implications associated with providing a multi-user GIS server based system. Since the system (Knowledge Management Tool) would not be holding data, it was decided to develop a web-based application, which has the advantage of being readily available to all and is essentially system independent.

Information about the best practice technology, tools and techniques was identified in the development of Ontology in FD2323\TR1. This part of the study also provided an understanding of the functions of organisations, individuals, information and data within the FCERM. The data and information requirement flow charts and fountains developed within the Ontology have formed the basis of the web-enabled Tool. To aid the process of establishing and testing the Tool, a number of case studies have been used. These were augmented with additional studies to assist with testing the system to aid with decision making, especially with respect to quality issues of data. These issues were raised in FD2323\TR4 and retrieved information described by the various elements in the FCERM metadata schema as defined in FD2323\TR2.

The case studies used included:

- Shoreline Management Plan - North West Coast Cell 11 (Population and development)
- Catchment Flood Management Plan - Ancholme and Grimsby (Population and development)
- Rural - Flood Defence Scheme (Evaluation)
- Urban - Sewerage System (Evaluation)

2. Tool development

2.1 Scope for choice of tool

In order to improve the applicability of new techniques to FCERM knowledge management, a web-enabled Tool was developed to aid anyone at any level within the decision making hierarchy to understand the links between position, responsibility and data need. It was therefore proposed to create a multi-layer Tool based on two groupings; the Environment Agency with detail of region, catchment area and coastal management cell (or sub-cells) and for the wider community Government regions and Local Planning Authorities boundaries. In the design of concept it was decided that the search area (hence the area descriptions previously given) would be through text to allow the user to define his/her area of interest; search by polygon (i.e. GIS functionality) is considered to be a future application. It was anticipated that the flow of the query would flow through from national, regional, local and individual responsibilities and would offer lines of communication both within Defra/Environment Agency and those with whom they interact, such as Internal Drainage Boards (IDBs), Water Industry, Local Authorities, English Nature, emergency services and other members of the FCERM community. In addition it was anticipated that the Tool would also indicate what information is required and what is available at each level and would then link to the metadatabase. The careful choice of elements within the metadata schema in conjunction with Work Package 4 have enabled the quality of the data to be provided, however the decision of whether the data is suitable or sufficient for a particular task/question is that of the user. The data found in the search would be able to be ranked and filtered according to keywords and data quality flags (Section 2.6).

The resultant features would provide an integrated Tool that would enable the user to:

- Access the Tool through different entry levels depending on the responsibility of the individual or level of the enquiry - through national/regional or local need.
- Identify data gaps through returns.
- Prioritise the information required for each query thus identifying whether 'key' information is missing.
- Identify who else may benefit from data being collected, including internal to the organisation, external, and potential joint funding sources.
- Provide a link to other organisations that might have an indirect interest in the activity i.e. English Nature, RSPB, emergency services.
- Identify need for data collection.
- Assist individuals at different levels to query a task and return a list of information from the metadatabase. Further examination of the metadatabase will provide detail on the information itself or associated data.

2.2 Development of concept

In FD2323\TR1 flow charts (Figures 5.1.2, 5.1.3, 5.1.4 and 5.1.5) were produced for each of the five organisations identified as key players in the FCERM community. These identified the main activities conducted by each and the information required in carrying out those activities. These flow charts were taken as the basis for the development of the Tool in order to fulfil the scope identified in the previous section. This resulted in an amalgamation of the Ontology flow charts to identify the similar practice between the identified organisations and discover the commonalities between them.

The amalgamated chart defined the levels of information used within the FCERM community in the delivery of their tasks. In order to address the different levels of responsibilities and hence their information requirements, an additional layer to the flow chart was needed. This layer covered the area of responsibility of the individual carrying out the task at National, Regional or Local level. Table 2.2.1 details the structure required in the Tool to mirror the needs identified in the Ontology flow charts and the additional layers to make the system work.

Table 2.2.1 Tool structure

1	Organisation	Environment Agency, Local Authority etc.
2	Geographic filter	National, regional, local
3	Activity	e.g. operate flood defence
4	Sub Activity	e.g. Create a SMP document
5	Task	what are you trying to do
6	Information required	linked to keywords in metadatabase for return of query

The detail of the structure is as follows:

1. Organisation - one of the FCERM operating bodies;
2. Geographic filter - covers the users area of responsibility i.e. interest at National, Regional or Local level;
3. Activity - undertaken by the user at a level determined at layer 2, taken from the Ontology flow charts;
4. Sub-activity - a sub set of Activity as this may be different according to responsibility;
5. Task - this details the actual job to be carried out;
6. Information required - as identified in the Ontology flow charts and is linked to the Task to be carried out, also acts as the link between the Tool and the metadatabase to recover the datasets/information available.

Figure 2.2.1 provides detail of the concept diagram.

FD2323 Concept Systems Diagram V3

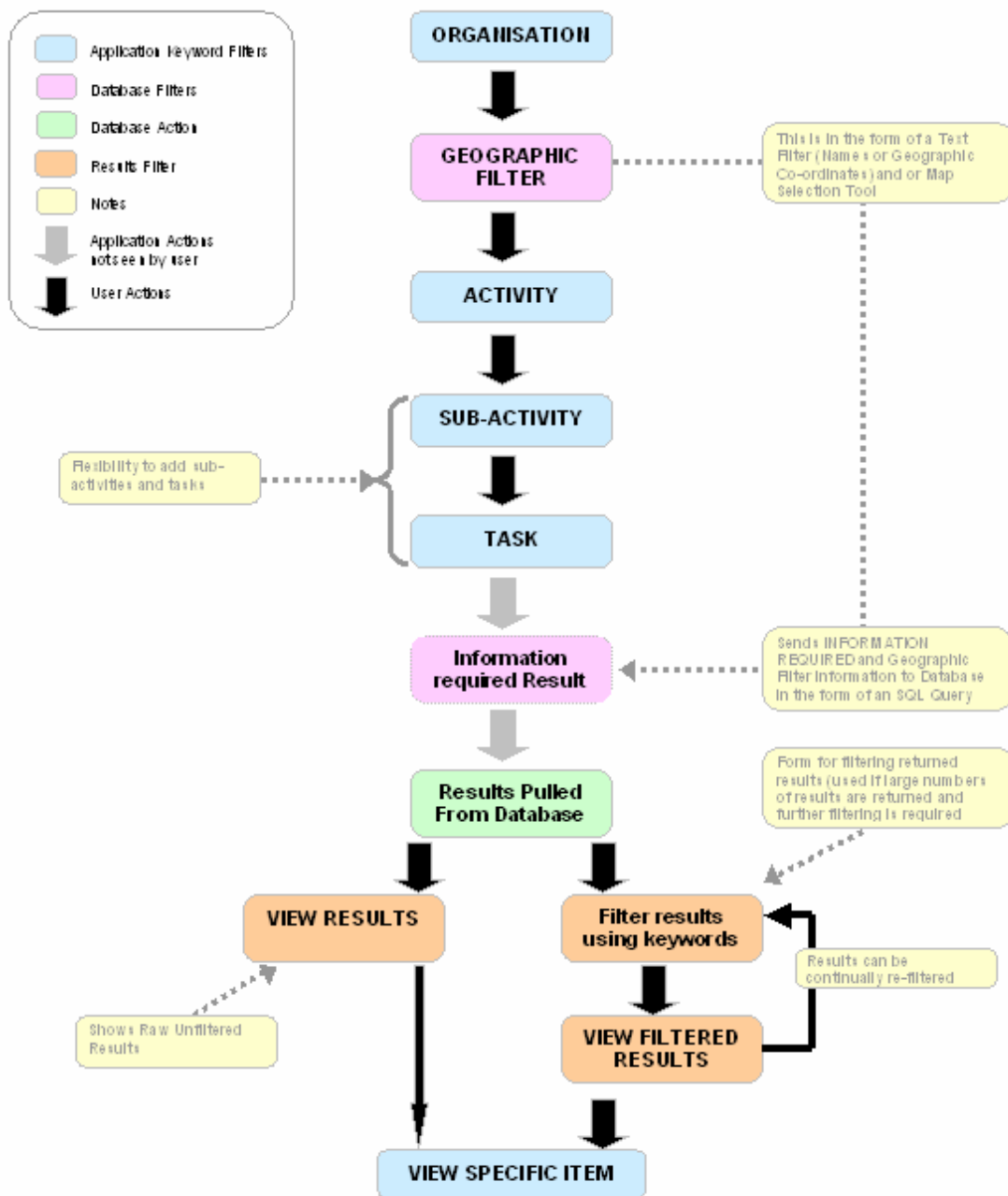


Figure 2.21 Concept systems diagram

The concept systems diagram shows the route through the system designed on the Ontology flow charts and highlights the levels of entry, user input and links within the Tool and to the metadatabase. For the purpose of this project the Tool was made as a web-based application with SQL queries being made to the metadatabase built in Access (see FD2323\TR2).

The Tool (application) filters are provided as fixed entries within the Tool and for the user to make his/her choice from a provided drop-down list; these have been directly transferred from the Ontology flow charts. The choices given in the Organisation and Activity level are fixed and can only be altered, added to or deleted by the System Manager as described in FD2323\TR2 (under ISO 19135). The user has the ability to add sub-activities and tasks, however, the removal of these requires System Management input.

In order to return information from the metadatabase there are two points at which the user must interact with the Tool. The first is the choice of area of interest, i.e. location at National, Regional and Local scale; the second is required if the user is creating a new task, at which point he/she is requested to attach up to 5 'Information required' categories to the task.

The search is carried out on the Geographic filter and 'Information required' categories via a SQL query to the database. The results retrieved from the database can then be viewed or filtered using associated key words. At this point and due to the management issues associated with key word lists the linkage has been made through the 'Information required' as the list is more controllable for the 'proof of concept'.

Figure 2.2.2 shows the application flow diagram between the Tool and the metadata database indicating the lines of updating (a management activity) and reading (a passive activity), which also forms the retrieval process.

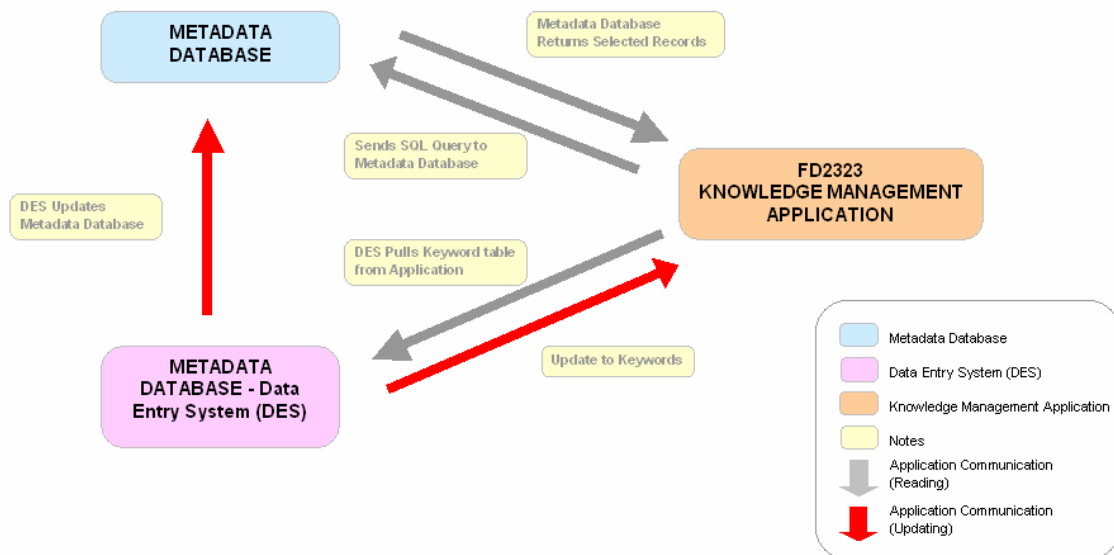


Figure 2.2.2 Application flow diagram

2.3 Concept tool design and functionality

Once the concept systems diagram had been created it was possible to start taking the system from paper to screen. For the purposes of demonstrating 'proof of concept' a straightforward combination of MS Access databases and ASP code was used, along with small amounts of JavaScript (back functions, navigation etc.). It must be noted at this stage that the Tool has been designed as a management aid and not as a data search engine, thus results provide the user with a combination of data/information and knowledge with which he/she can use to assist in answering their query or achieving their task.

Key functionality that was identified for the web based Tool included:

- Ability to select location/scale by either Government or Environment Agency classified local/regional areas;
- Capability to add new sub-activities and tasks;
- Provide some ranking of results;
- Provide some information of availability of datasets;
- Be able to move upwards through the Tool to find other interested parties in types of information required.

Appendix B covers the databases and associated tables used, followed by a brief technical walkthrough of the key pages explaining what the web Tool is doing. To assist users' access to the Tool, instructions of its installation are provided in Appendix C.

2.4 Development of tool using case studies

2.4.1 Choice of case study

In order to populate and develop the design of the Tool structure, two case studies were worked up. The Shoreline Management Plan (SMP) for Liverpool Bay was used as the main test case study. This was chosen to test the ability of the structure of the Tool to capture generic activities within the Environment Agency and Local Authorities;

- 'Develop policies and regulate activities alongside, in on and over watercourse' (Figure 5.1.2 in FD2323\TR1); and
- 'Develop policies and regulate development' for the Local Authority (Figure 5.1.4 in FD2323\TR1).

This was based on the process of developing policy through the establishment of the SMP and was used as it encompassed one of the main policy documents required in the coastal regions of the Environment Agency. The SMP study formed the initial population of the Tool. In order to test the population of the system further, another test case was used to check that the structure set up would accommodate the needs of the user from a different perspective. The second case study looked at the development of a Catchment Flood Management Plan (CFMP) for Ancholme and Grimsby by the Environment Agency (see Section 2.4.3).

2.4.2 SMP case study

The study was based on the process of producing a SMP for the Cell 11 region of the North West Coast covering the coastal area from Great Ormes Head to Formby Point (sub-cell 11a) and Formby Point to River Wyre (sub-cell 11b). The study followed the steps required to complete the plan as detailed in the guidance document (Defra, 2004). The requirements of the document are detailed in Figure 2.4.1.

The structure of the case study was defined by following through from the entry route of the SMP guidance document. The relationships defined within the Ontology (FD2323\TR1) were used to define the Activities detailed above and the SMP guidance identified the need to breakdown the Activity to a number of sub-activities. Following this thinking a spreadsheet was designed which mirrored the concept diagram and enabled the population of the necessary fields. The formulation of a SMP is overarching and time consuming and therefore to make best use of the study the work was concentrated on one aspect of the SMP process. A copy of the spreadsheet is given in Appendix A.

With this in mind one sub-activity was identified; that of 'Coastal Defence Management Planning (i.e. develop SMP policy)'. Due to the size of the sub-activity a further level was required to cover the requirements of the activity, to this end a second sub-activity level was added to assist in defining the scope of work. This level was an addition to the Ontology flow chart and gave the opportunity for the Activity level to be broken down into more manageable activities if required.

At this point the Ontology flow charts then describe the 'Information required' to assist the user in carrying out their duties, however it was identified that a link was needed between this level and the Activity level which is user defined. This led to the addition of the Task layer, see Table 1, and in the case study four Tasks were identified.

These Tasks were constructed from the sub-activities as a 'need to do', such as carry out an assessment, create a baseline or identify actions, and in doing so also gave an indication of the type of information required to conduct that Task. This led back to the 'Information required' categories identified in FD2323\TR1. Having already determined that this would act as the link between the Knowledge Management Tool and the metadatabase (FD2323\TR2), a predetermined list taken from the ontology was used and suitable categories were attached to each Task created.

The relationships between Activity, Task and 'Information required' are shown in the following flow diagrams (see Figures 2.4.2 and 2.4.3). These show how the development of a SMP via either the Environment Agency or the Local Authority route requires the same information, but also with the addition of the sub-activity and Task level recreates the information gathered in FD2323\TR1.

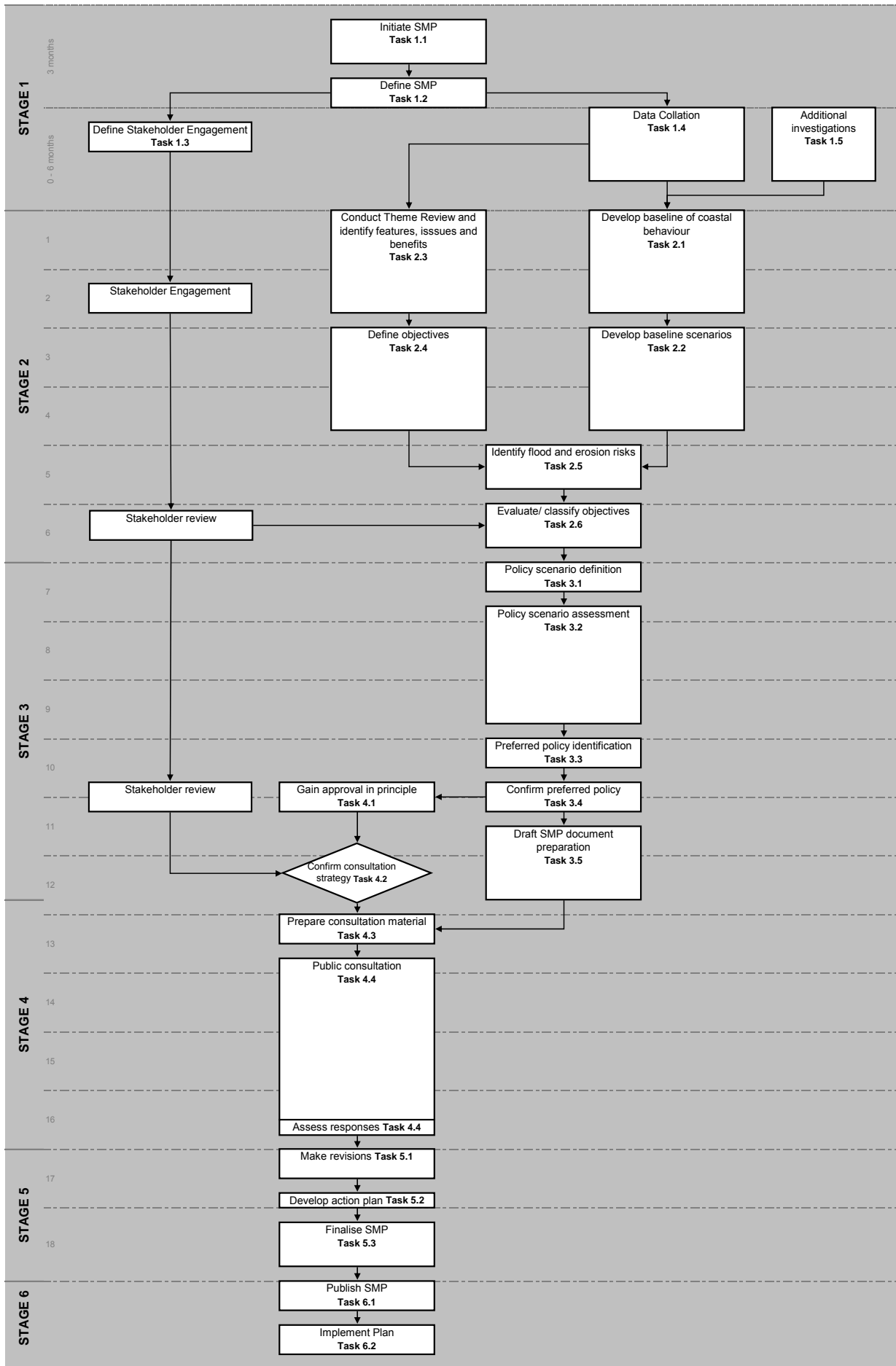


Figure 2.4.1 Extract from SMP Guidance document

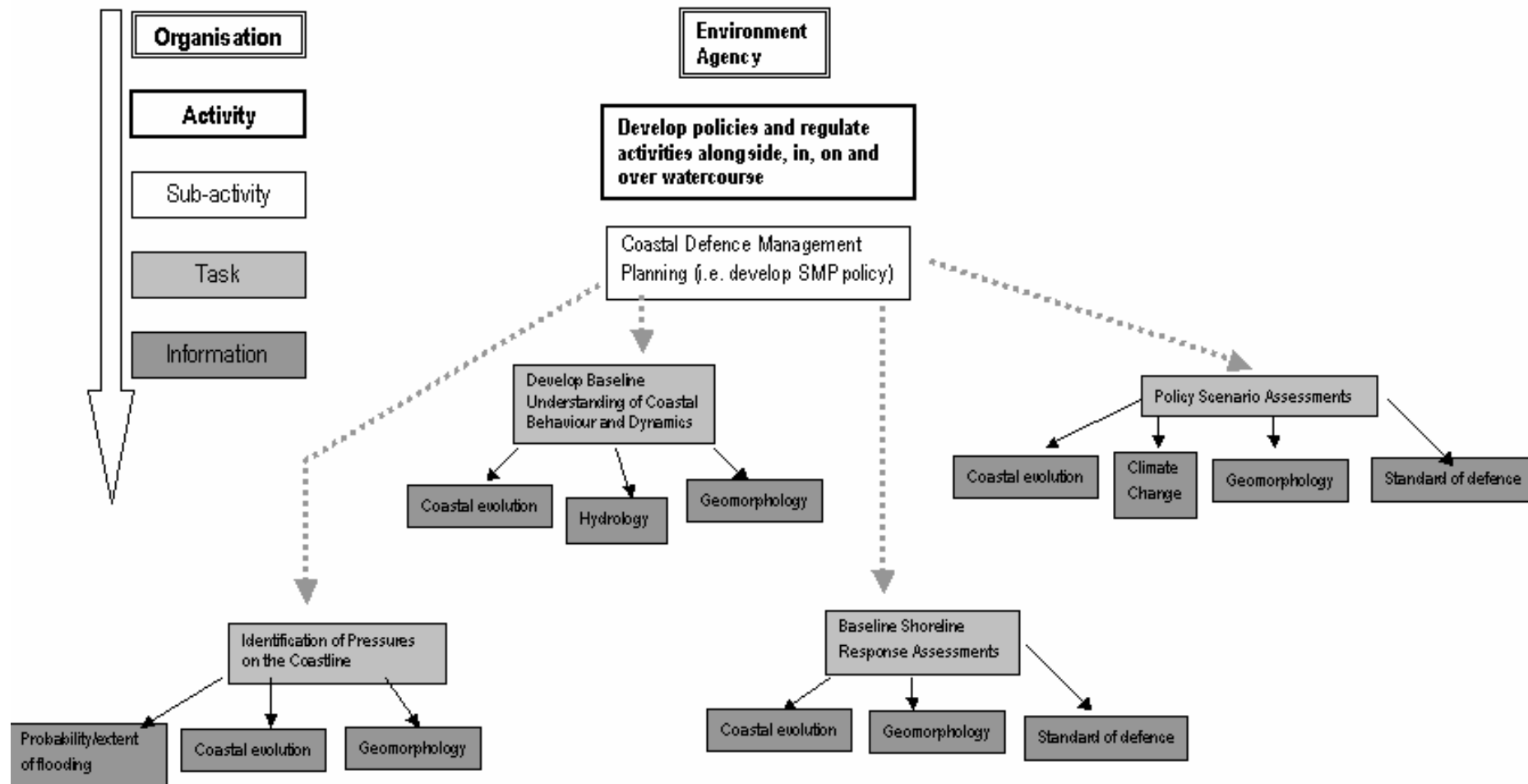


Figure 2.4.2 SMP case study for Environment Agency

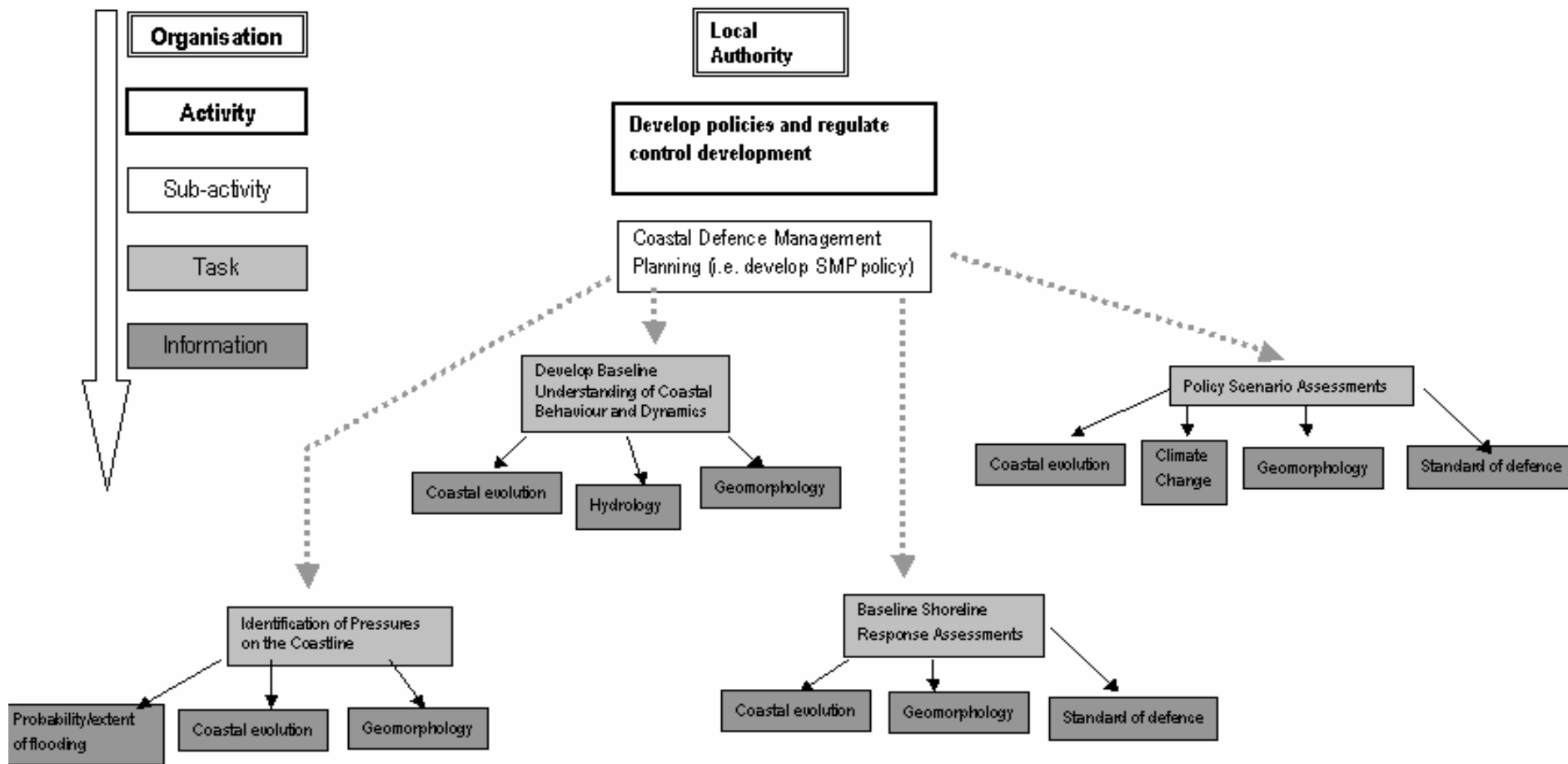


Figure 2.4.3. SMP case study for Local Authority

2.4.3 CFMP case study

As with the SMP, the guidance provided for carrying out a CFMP is well defined, as shown in Figure 2.4.4 (taken from Defra, Environment Agency, Welsh Assembly Government, 2005).

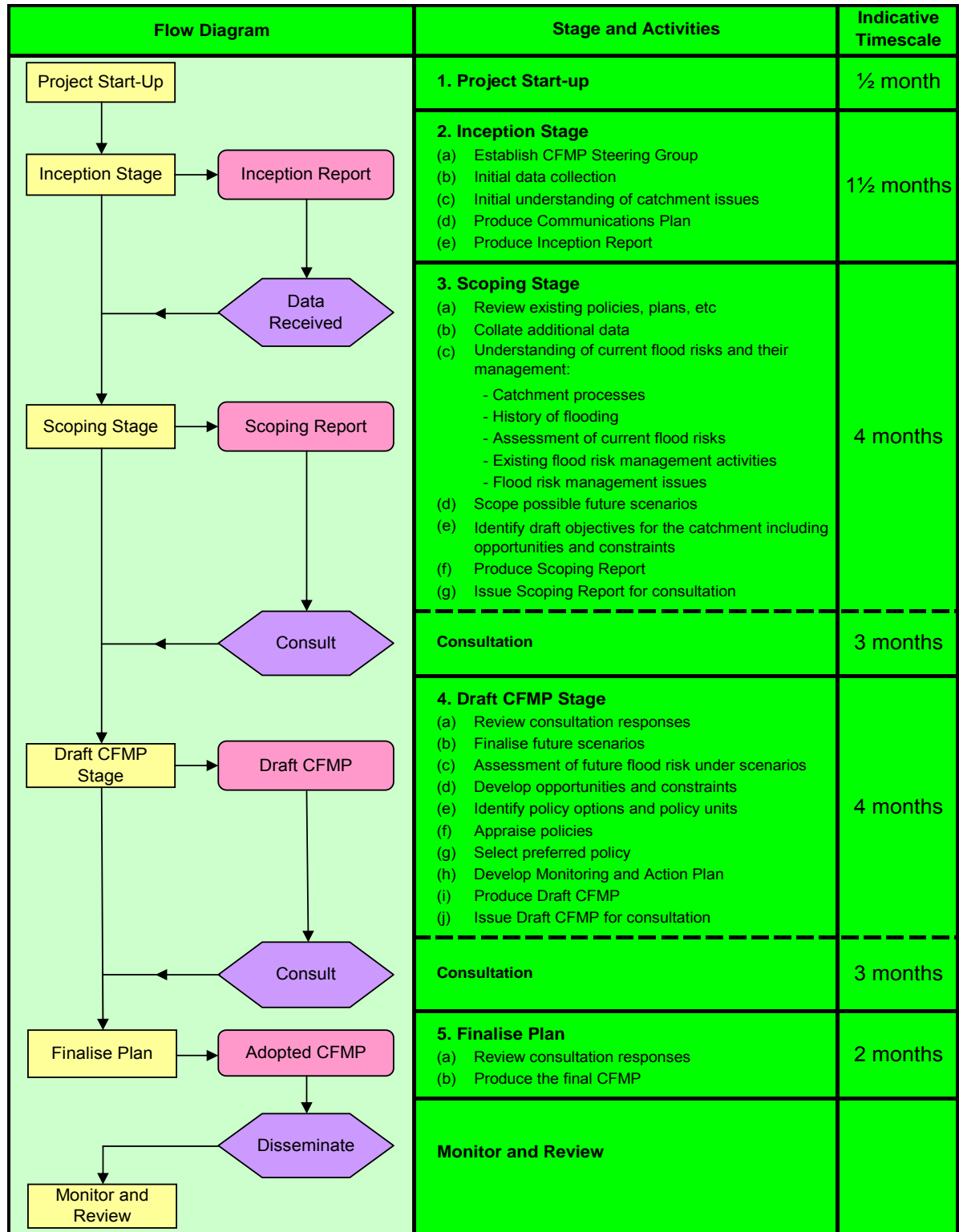


Figure 2.4.4 Outline of approach for Catchment Flood Management Planning

The approach for developing a CFMP comprises of 4 stages, Figure 2.4.4. For this case study, it was decided to follow through one of the steps of the Inception Stage, 'Gain initial understanding of catchment issues.' As with the SMP it was identified that there were more layers between 'Activity' and 'Information Required' than shown in the FD2323\TR1 Ontology flow charts, thus requiring the addition of sub-activities. In this case study the sub-activity identified i.e. 'Development of a CFMP,' still provided too broad a remit to fully describe the work required to obtain the users result, therefore a second sub-activity level was created e.g. 'Gain initial understanding of catchment issues' (see Figure 2.4.5).

Within the sub-activity level, a number of Tasks were identified to establish what one would need to do. In this case study the 'Initial understanding of catchment issues' sub-activity and the associated Tasks are listed in Box 3.3 in 'CFMP Processes and Procedures Guidance Volume II' (2005) and includes 'Identify known significant flood risk/problem areas through the catchment (arising from all sources of flooding)' as one of the Tasks.

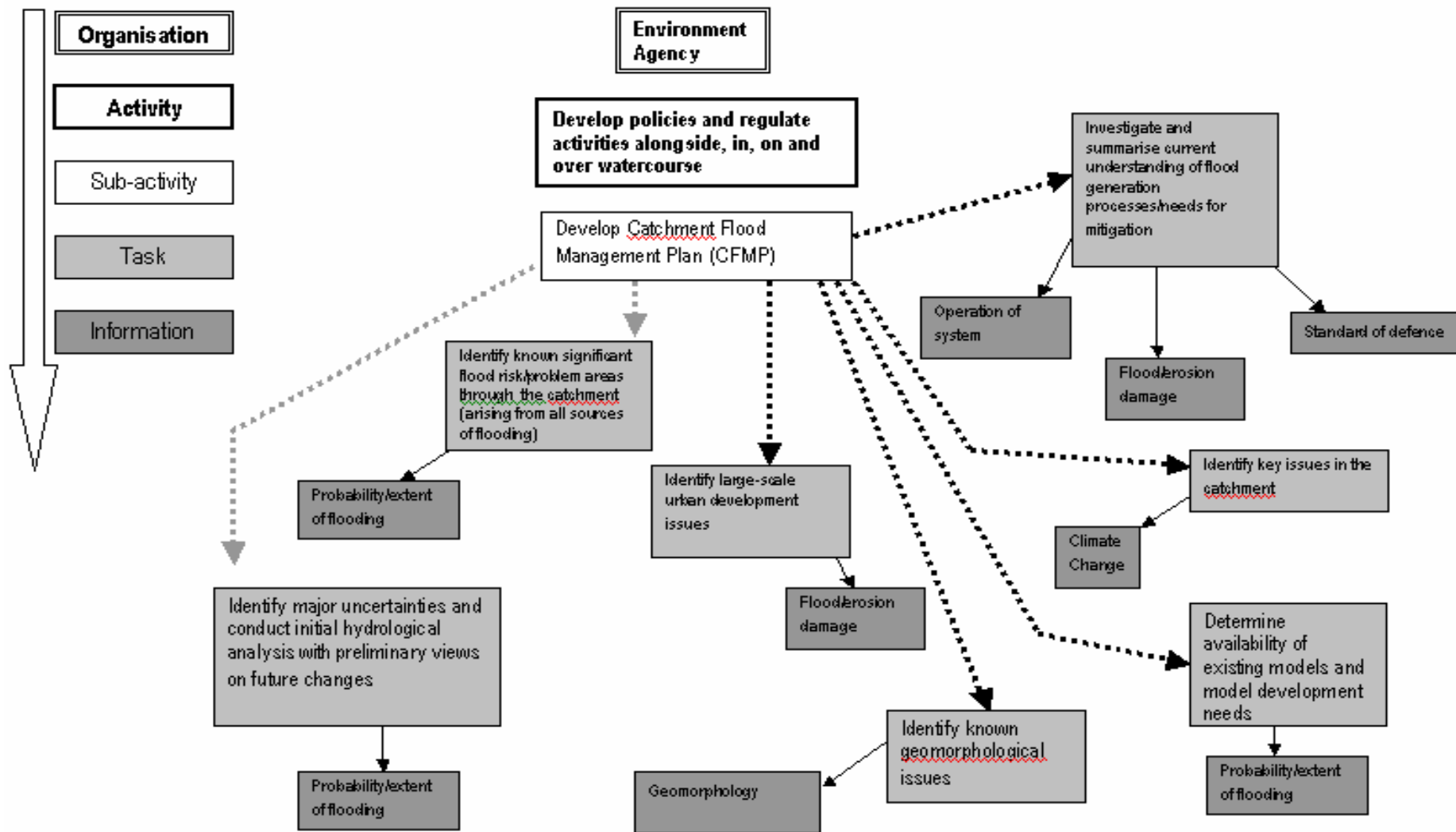


Figure 2.4.5 CFMP case study for Environment Agency

2.4.4 Changes in Tool design from case study work

During the association of 'Information required' categories to the identified Tasks it became apparent that of the 16 categories determined during the Ontology work in FD2323\TR1, some of the original groups could be amalgamated while some new ones were needed. The most notable of these being 'Climate change,' which had originally been identified in the 'Data-required' level in FD2323\TR1. Table 2.4.1 shows the initial list with the relationships between 'Activity' and 'Information required' for all FCERM communities taken from FD2323\TR1, the additions to the list are given in Table 3 following the case study work for the SMP and CFMP.

Table 2.4.1 Information required sources

Organisation	Activity	Information Required
Environment Agency	Develop policies and regulate activities alongside, in, on and over the watercourse	Standard of defence
Environment Agency	Develop policies and regulate activities alongside, in, on and over the watercourse	Flood/erosion damage
Environment Agency	Develop policies and regulate activities alongside, in, on and over the watercourse	Probability/extent of flooding
Environment Agency	Develop policies and regulate activities alongside, in, on and over the watercourse	Operation of system
Environment Agency	Flood response	Emergency response capability
Environment Agency	Flood warning - decision making and dissemination	Probability/extent of flooding
Environment Agency	Flood warning - decision making and dissemination	Population Geography
Environment Agency	Flood warning - decision making and dissemination	Flood predictions
Environment Agency	Flood warning - decision making and dissemination	Flood records
Environment Agency	Improve flood defences	Environment information
Environment Agency	Improve flood defences	Flood/erosion damage
Environment Agency	Improve flood defences	Cost of defence
Environment Agency	Improve flood defences	Probability/extent of flooding
Environment Agency	Maintain and repair flood defences	Environment information
Environment Agency	Maintain and repair flood defences	Asset condition
Environment Agency	Maintain and repair flood defences	Actual standard of defence
Environment Agency	Monitor and forecast conditions	Hydrology
Environment Agency	Operate flood defences	Hydrology
Environment Agency	Operate flood defences	Flood predictions
Environment Agency	Operate flood defences	Operation of system
Internal Drainage Board	Develop policies and regulate activities alongside, in, on and over watercourses	Standard of defence
Internal Drainage Board	Develop policies and regulate activities alongside, in, on and over watercourses	Flood/erosion damage
Internal Drainage Board	Develop policies and regulate activities alongside, in, on and over watercourses	Probability/extent of flooding
Internal Drainage Board	Improve flood defences	Environment information
Internal Drainage Board	Improve flood defences	Flood/erosion damage
Internal Drainage Board	Improve flood defences	Cost of defence

Organisation	Activity	Information Required
Internal Drainage Board	Improve flood defences	Probability/extent of flooding
Internal Drainage Board	Maintain and repair flood defences	Environment information
Internal Drainage Board	Maintain and repair flood defences	Standard of defence
Internal Drainage Board	Maintain and repair flood defences	Asset condition
Internal Drainage Board	Maintain and repair flood defences	Actual standard of defence
Internal Drainage Board	Operate flood defences (including emergency flood response)	Hydrology
Internal Drainage Board	Operate flood defences (including emergency flood response)	Emergency response capability
Internal Drainage Board	Operate flood defences (including emergency flood response)	Flood predictions
Internal Drainage Board	Operate flood defences (including emergency flood response)	Operation of system
Local Authority	Develop policies and control development	Probability/extent of flooding
Local Authority	Develop policies and control development	Watercourse system
Local Authority	Develop policies and control development	Coastal evolution
Local Authority	Evacuation response	Probability/extent of flooding
Local Authority	Evacuation response	Emergency response capability
Local Authority	Evacuation response	Population Geography
Local Authority	Evacuation response	Flood predictions
Local Authority	Improve ordinary watercourses	Environment information
Local Authority	Improve ordinary watercourses	Flood/erosion damage
Local Authority	Improve ordinary watercourses	Cost of defence
Local Authority	Improve ordinary watercourses	Probability/extent of flooding
Local Authority	Maintain road gullies	Environment information
Local Authority	Maintain road gullies	Road Drainage
Local Authority	Maintain, improve and construct coastal protection	Environment information
Local Authority	Maintain, improve and construct coastal protection	Standard of defence
Local Authority	Maintain, improve and construct coastal protection	Hydrology
Local Authority	Maintain, improve and construct coastal protection	Asset condition
Local Authority	Maintain, improve and construct coastal protection	Flood/erosion damage
Local Authority	Maintain, improve and construct coastal protection	Probability/extent of erosion
Local Authority	Maintain, improve and construct coastal protection	Geomorphology
Local Authority	Operate and maintain existing ordinary watercourses	Environment information
Local Authority	Operate and maintain existing ordinary watercourses	Standard of defence
Local Authority	Operate and maintain existing ordinary watercourses	Hydrology
Local Authority	Operate and maintain existing ordinary watercourses	Asset condition

Organisation	Activity	Information Required
Local Authority	Operate and maintain existing ordinary watercourses	Actual standard of defence
Local Authority	Operate and maintain existing ordinary watercourses	Flood predictions
Local Authority	Operate and maintain existing ordinary watercourses	Land Drainage
Local Authority	Prepare dissemination plans	Probability/extent of flooding
Local Authority	Prepare dissemination plans	Emergency response capability
Local Authority	Prepare dissemination plans	Population Geography
Local Authority	Prepare dissemination plans	Flood predictions
Riparian/Land Owners/Occupiers	Build defences/coastal protection	Environment information
Riparian/Land Owners/Occupiers	Build defences/coastal protection	Hydrology
Riparian/Land Owners/Occupiers	Build defences/coastal protection	Flood/erosion damage
Riparian/Land Owners/Occupiers	Build defences/coastal protection	Cost of defence
Riparian/Land Owners/Occupiers	Build defences/coastal protection	Geomorphology
Riparian/Land Owners/Occupiers	Maintain capacity of watercourses and accept flows	Environment information
Riparian/Land Owners/Occupiers	Maintain capacity of watercourses and accept flows	Standard of defence
Riparian/Land Owners/Occupiers	Maintain capacity of watercourses and accept flows	Asset condition
Riparian/Land Owners/Occupiers	Maintain capacity of watercourses and accept flows	Actual standard of defence
Riparian/Land Owners/Occupiers	Maintain capacity of watercourses and accept flows	Watercourse system
Water Industry	Inspect and maintain reservoirs	Asset condition
Water Industry	Inspect and maintain reservoirs	Probability/extent of flooding
Water Industry	Minimise impact of development on existing sewer system	Sewerage system
Water Industry	Minimise impact of development on existing sewer system	Development of sewer plans
Water Industry	Monitor groundwater levels	Hydrology
Water Industry	Monitor groundwater levels	Physical Environment
Water Industry	Provide, improve & extend assets & services (soft) that can accommodate set levels of loading without causing flooding	Environment information
Water Industry	Provide, improve & extend assets & services (soft) that can accommodate set levels of loading without causing flooding	Probability/extent of flooding
Water Industry	Provide, improve & extend assets & services (soft) that can accommodate set levels of loading without causing flooding	Watercourse system
Water Industry	Provide, improve & extend assets & services (soft) that can accommodate set levels of loading without causing flooding	Cost of assets
Water Industry	Provide, improve & extend assets & services (soft) that can accommodate set levels of loading without causing flooding	Flood/erosion damage

Organisation	Activity	Information Required
Water Industry	Cleanse & maintain assets that can accommodate set levels of loading without causing flooding	Flood predictions
Water Industry	Cleanse & maintain assets that can accommodate set levels of loading without causing flooding	Land drainage
Water Industry	Cleanse & maintain assets that can accommodate set levels of loading without causing flooding	Road drainage
Water Industry	Cleanse & maintain assets that can accommodate set levels of loading without causing flooding	Standard of defence
Water Industry	Cleanse & maintain assets that can accommodate set levels of loading without causing flooding	Environment information
Water Industry	Cleanse & maintain assets that can accommodate set levels of loading without causing flooding	Hydrology
Water Industry	Cleanse & maintain assets that can accommodate set levels of loading without causing flooding	Asset condition
Water Industry	Cleanse & maintain assets that can accommodate set levels of loading without causing flooding	Watercourse system

Table 2.4.2 Additional information required categories

Organisation	Activity	Information Required
Environment Agency	Develop policies and regulate activities alongside, in, on and over the watercourse	Climate Change
Local Authority	Develop policies and control development	Climate Change

2.5 Evaluation of tool using case studies

Having used SMP and CFMP case studies to assist with the design and population of the Tool, two different case studies were used to evaluate the system. A rural and an urban case study were chosen as these areas are being focussed upon in the Government's new flood and coastal erosion risk management strategy 'Making Space for Water'. The rural case study was used to test the system with special emphasis on the use of the 'Information required' categories, while the urban case study looked particularly at an Activity carried out by two organisations requiring similar information. A brief description of each case study has been provided to assist in understanding the issues to be answered or addressed through the use of the Tool, Appendix D.

2.5.1 Rural case study

The study looked at the rehabilitation of a flood defence scheme which has reached the end of the 30-year life design. The scheme, originally provided river flood embankments, improved arterial drainage network and flapped outfalls to the river, and serves a benefit area of 1000ha. There are now signs

of structural weakness in the embankment, some deterioration of the arterial system, and reduced storage capacity in the internal drainage system when the flaps are closed during high river levels.

Many of those farming the land have intensified the grassland or switched to arable cropping as a result of the original scheme, and have complained about increased flooding in low-lying areas and general decline in drainage standards. The farmers are therefore seeking the rehabilitation option, arguing that the area will revert to its previous boggy condition, much of it suited only for summer grazing, unless some protection is forth coming.

In contrast, the local Wildlife Trust argues that the conditions that favoured the original agricultural scheme now no longer prevail, and therefore rehabilitation is not justified. The Trust sees scope for reversion to wet grassland, with payments to farmers for adopting land management practices which enhance environmental quality. The scheme falls within an Environmentally Sensitive Area. Some farmers support the wetland option, but many are concerned that a return to a wetland condition will be irreversible from an agricultural viewpoint.

The remit of the Environment Agency for this area is to 'Improve flood defences' and therefore the user was looking to obtain information to assist in making the decision from a cost benefit analysis of continued protection.

The structure of the case study was defined by following through from the entry route of the FD2323\TR1 for the Environment Agency. Figure 2.5.1 shows the flow diagram associated with the case study which was drawn up using the Ontology flow charts as the basis for translating the case study into the Tool. Figure 5.5.2 demonstrates the results from the Tool.

The work identified the need for a sub-activity entitled 'Determine justification for the continued provision of flood defences' to cover the need of the question under the Activity 'Improve flood defences', which was added to the Tool. From here the Task, 'To identify cost/benefit options' was established and the following 'Information required' categories chosen from the predetermined list (see Tables 2.4.1 and 2.4.2):

- Cost of defence
- Flood damage
- Probability/extent of flooding
- Environment information

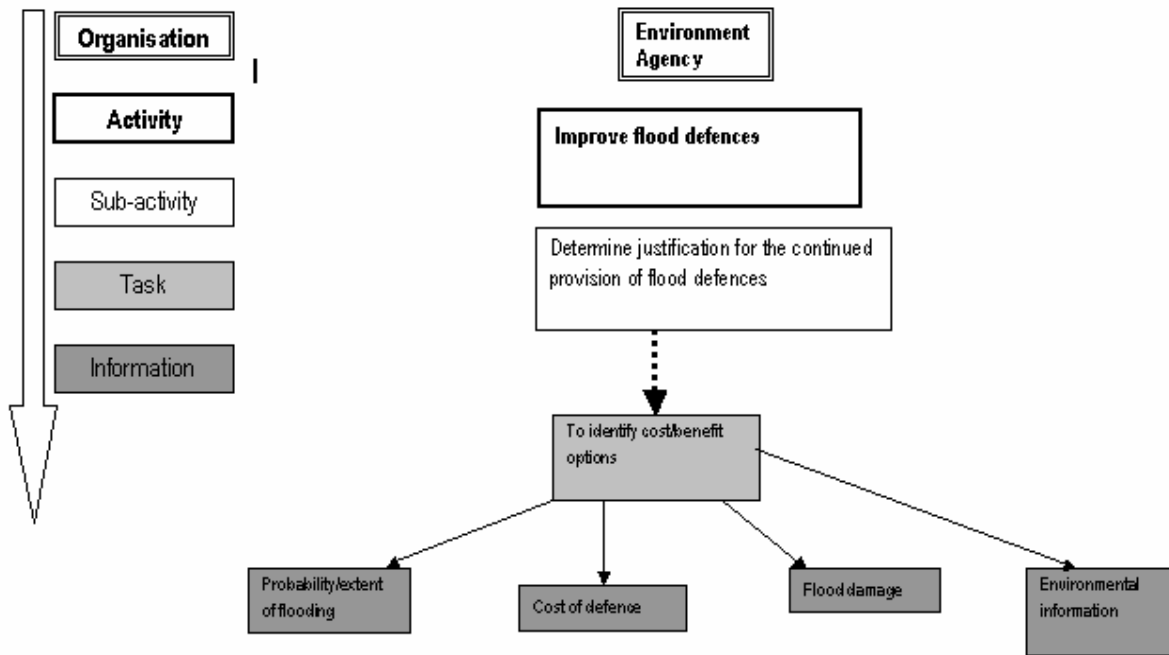


Figure 2.5.1 Rural case study for Environment Agency

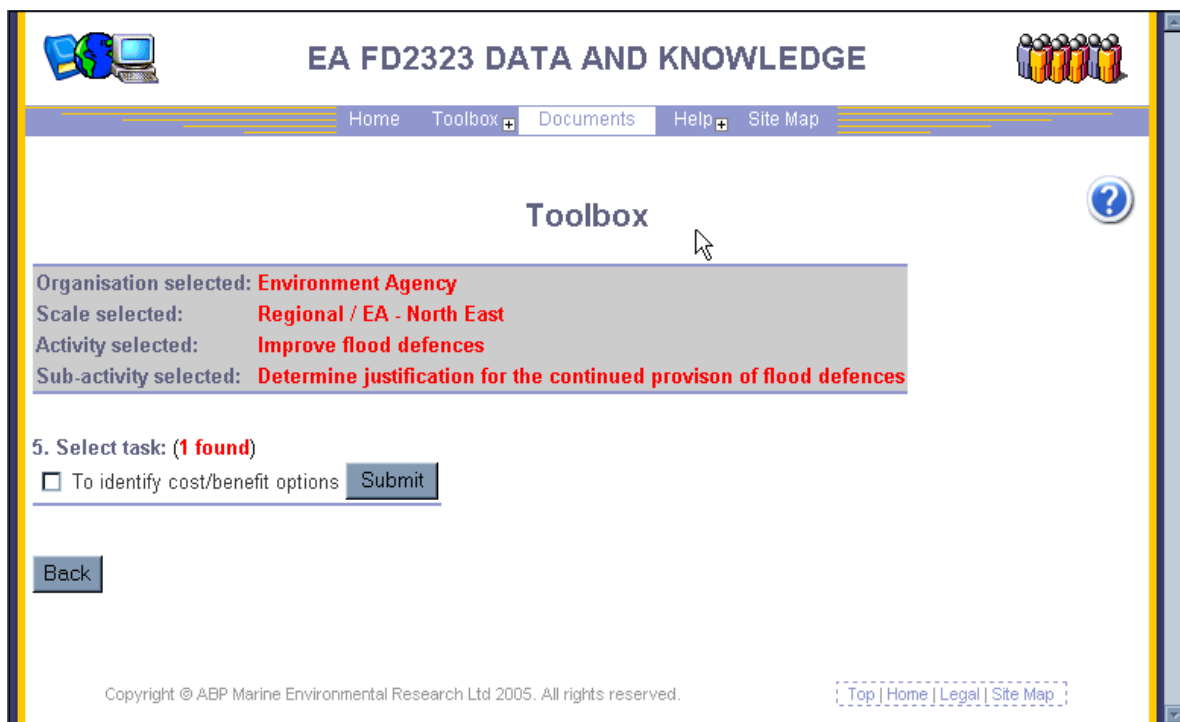


Figure 2.5.2 Tool return for rural case study (Environment Agency)

In defining the 'Information required' categories it was found that it was useful to consider the types of data that would be useful under each category heading. It was also found that these varied under the 'Information required' heading depending on what level the user entered the Tool at i.e. National, Regional or Local. Under each category, a list of data, which would be ideally used in the

determination of the problem, was drawn up. This covered local items such as land type, land use and value, historical use and management practices. On a more regional level, regional plans, Regional Farm Business Survey data and Regional Environmentally Sensitive Area documents are valuable to the process. This list was extracted from documents supplied and for each data source a list of associated keywords was drawn up to search for the specified documents in the metadatabase.

Outcome

This case study therefore proved that the flow diagram could be translated into and be returned by the Tool (Figure 2.5.2), but also highlighted the additional need to attach keywords as well as 'Information required' categories to the Tasks. To this point the Tool returned items from the metadatabase and sorted on the 'Information required' categories, with the retrieved documents/data/information being ranked by titled and date. The addition of keywords provides a further filtering option on the returned items and was added to the Tool facilities following this case study.

The Tool in its present form is reliant on the 'Information required' categories being as 'fixed' as possible. Therefore it is recommended that a review of the needs of the activities, sub-activities and tasks to cover the main topics of interest under the FCERM umbrella for each organisation. This will assist in the production of a definitive list (or as close as possible) of 'Information required' categories (see FD2323\TR2) on which a thesaurus can be written and aid the user/manager to attach the most relevant category to the Task.

2.5.2 Urban case study

This case study was chosen to test the structure of the Tool to capture specific activity within both a Local Authority and the Water Industry based on the need to determine how drainage within development should be managed so as to prevent future flooding. The drainage provided in development may connect to the sewer system, there is a need to interact with the activities of the sewerage undertaker to 'Provide, improve and extend assets and services (soft) that can accommodate set levels of loading without causing flooding' and to 'Minimise impact of developments on existing sewer system' (Figures 2.5.3 and 2.5.4). This is a strategic activity and does not require solutions to specific problems. The main activity is to demonstrate the capacity of the sewer system and its vulnerability to future changes in urbanisation and future flood risk. Therefore, the 'Information required' is about the probability/extent of flooding of the sewer system and maintenance of current emission levels from the sewer system to the environment. The sewer system performs independently of the river system

The study looked at the needs of the Local Authority and sewerage undertaker to work together to manage flood risk within the urban area and to establish policies and standards for the provision of drainage within developments that will have at worst a neutral impact. The sewerage undertaker has a defined programme of work within the combined sewer system to fulfil its obligations regarding all known flooding problems and also to ensure satisfactory environmental impact. Consequently the performance of the sewer system may

currently be considered to be satisfactory. Therefore, the policy objectives are to ensure that current sewer system performance is not prejudiced by inappropriate development and drainage design. In addition there is a need to consider the adaptations required to cater for climate change.

Due to the multiple responsibilities, it is necessary for the local authority and the sewerage undertaker to co-operate to minimise the cost of sewerage provision and the management of excess flows during extreme events. This requires the most cost effective way of providing required capacity within the sewer system, or reducing flows by means of disconnection/source control to be identified.

The case study sought to define a benchmark standard which must be maintained into the future by using current emission levels from the sewer system model (flooding, treatment and CSO). The study looks at the potential for increased urbanisation, (ad hoc and planned) and climate change to increase inputs and hence emissions. The questions to be addressed therefore included the establishment of policies to define these standards.

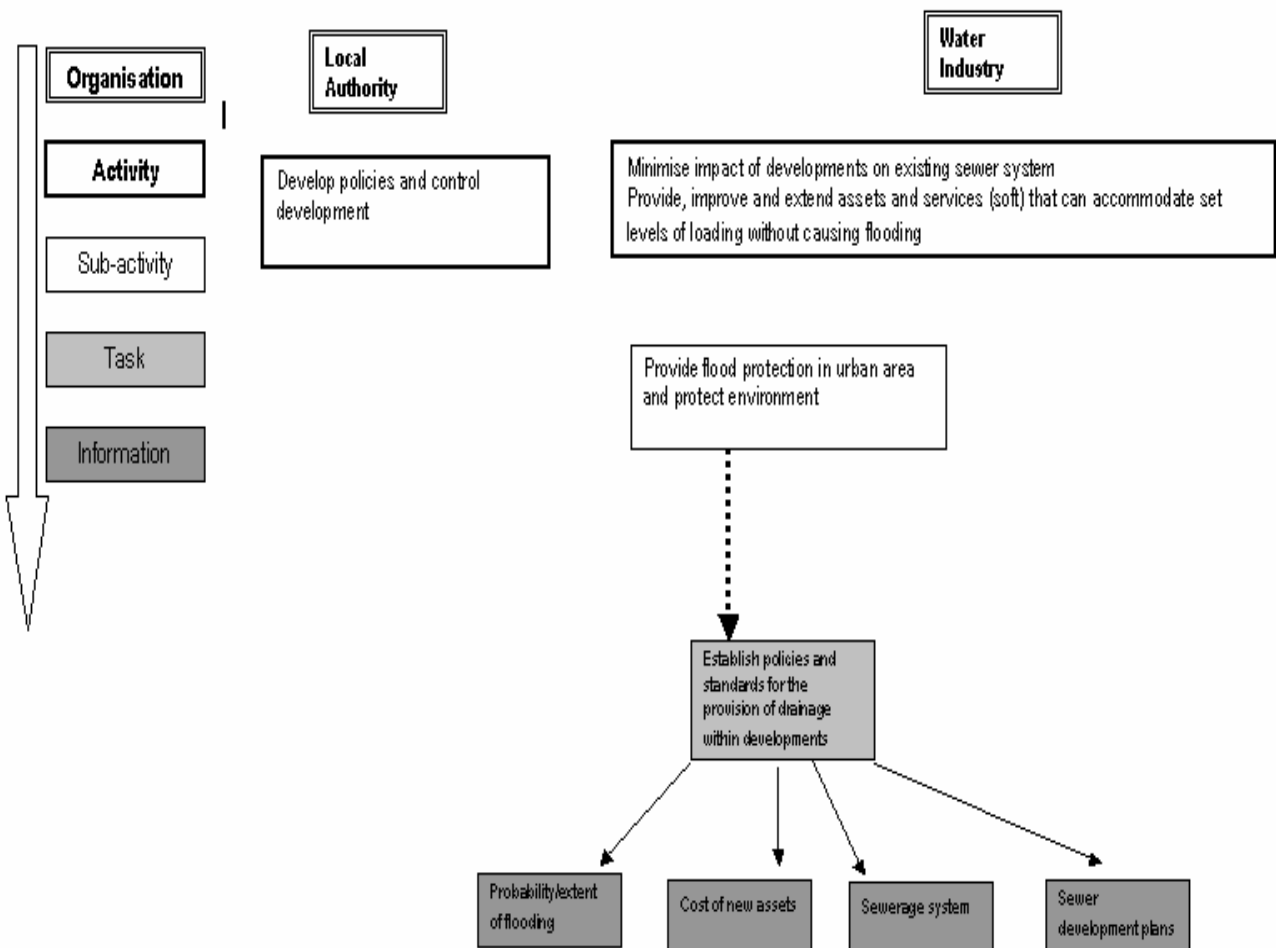


Figure 2.5.3 Urban case study for Local Authority and Water Industry

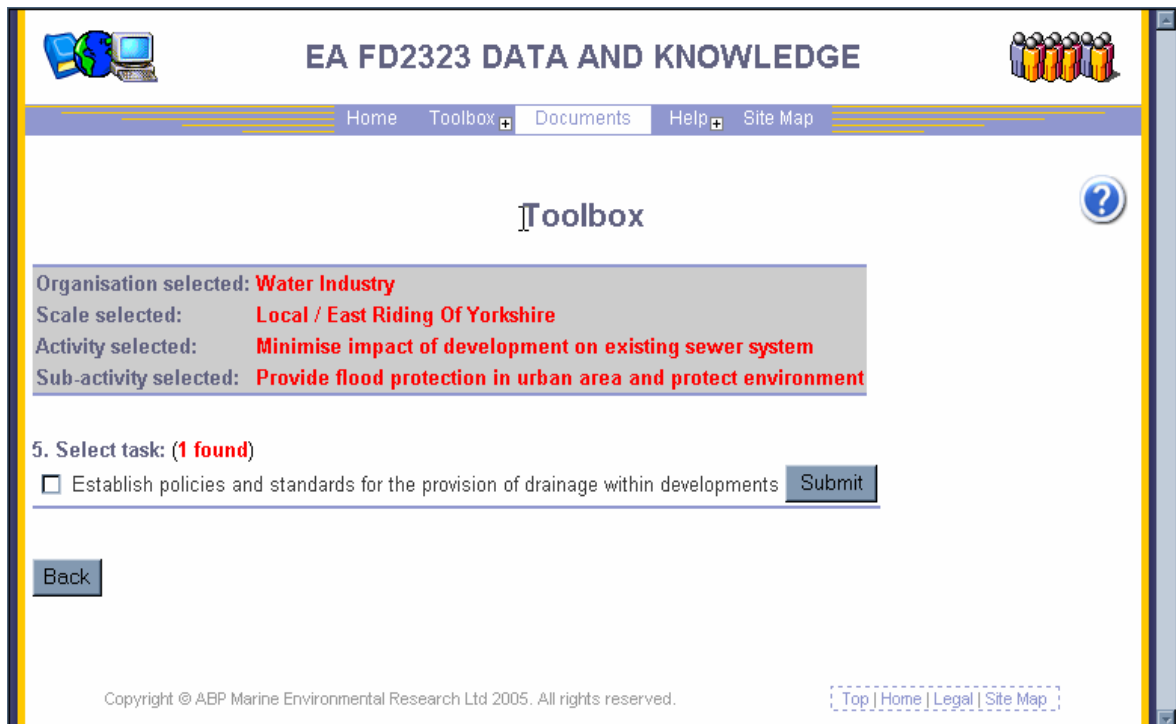


Figure 2.5.4 Tool return for urban case study (Water Industry)

Outcome

This case study tested the concept of the same Activity being carried out by two different FCERM communities. This led to the need to address who, from other FCERM community members as well as those outside the immediate users, might also require the same information/data or document to carry out their own work. This relationship was illustrated in FD2323\TR1 particularly in the “information fountain” diagrams showing the linkage of ‘Information requirements’ to users, thus within the Tool it was decided to mirror this linkage at the same level. Figure 2.5.5 shows how the Tool has integrated these relationships, and has addressed not only the elements that already exist as Activities and sub-activities required by FCERM organisations but also other organisations through the ‘Information required’ categories.



Finding Other Interested Parties Based On Information Required Categories

Information category selected: **Climate change**

[Back](#)

Organisations and associated activities from the web tool that may provide or use similar information

Organisation	Activities	Sub-activities
Environment Agency	Develop policies & regulate activities alongside, in, on & over the watercourse	Coastal Defence Management Planning (i.e. develop SMP policy)
Local Authority	Develop policies & control development	Coastal Defence Management Planning (i.e. develop SMP policy)

Organisations that may provide or use similar information

Countryside Council for Wales
English Nature
Environment Agency
Local Authority
Ministry of Defence
Research Bodies
RSPB
Met Office

Figure 2.5.5 Example of Interaction with Other Interested Parties

2.6 Development of tool for quality flagging

Work carried out in Work Package 4 (outputs in FD2323\TR4) looked at establishing a data appraisal framework; the foundation of this was based on a system of data quality scores and flags. To assist in the process of making the information available to the user it was decided to adapt the Knowledge Management Tool. This part of the study looked at ways to accommodate the needs of the framework within the Tool by utilising the links between the user Tasks and the returns from the metadatabase. The case studies are detailed in FD2323\TR4.

The data quality scores and flags covered the following attributes:

- Accuracy
- Competence
- Age
- Temporal duration
- Spatial resolution
- Temporal resolution.

Work was conducted to assess the quality requirements against the existing elements within the metadatabase (see FD2323\TR2) and how to best display and rank the returns in the Tool. Up to this point the information retrieved from the metadatabase was limited as shown in Figure 2.6.1. The information displayed provided the user with a certain amount of information on the item held within the metadatabase through linkages from the Tool to the specific elements within the metadatabase.

The screenshot shows the 'EA FD2323 DATA AND KNOWLEDGE' Toolbox interface. At the top, there is a navigation bar with links for Home, Toolbox, Documents, Help, and Site Map. The main content area is titled 'Toolbox' and contains the following information:

- Organisation selected:** Environment Agency
- Scale selected:** Regional / EA - North West
- Activity selected:** Develop policies & regulate activities alongside, in, on & over the watercourse
- Sub-activity selected:** Coastal Defence Management Planning (i.e. develop SMP policy)
- Task selected:** Identification of Pressures on the Coastline

Search results summary:

- Number of results:** 2
- Information required used in search:** «Probability/extent of flooding» «Geomorphology» «Coastal evolution»
- Additional Information required used in search:** «Physical environment»
- Additional keywords used in search:** «Shoreline Behaviour»

Buttons for 'Reset' and 'Back' are present. A warning message states: 'Find other interested parties - warning you will reset the toolbox'. The sort order is set to 'Rank ↓ (default)'. Below this are buttons for 'Title ↑', 'Title ↓', 'Date ↓', 'Date ↑', and 'Print list →'.

Metadata available:

Item 1:

- Title: Futurecoast
- Alternative Title: Cliff behaviour assessment
- Date Created: 10/1/2002
- Abstract: Assessment of the nature of coastal cliff behaviour
- Distributor: Defra
- Qualitative Data Quality: 2
- Relevance Ranking: 2(«Geomorphology»«Coastal evolution»)
- [More Details](#)

Item 2:

- Title: Futurecoast
- Alternative Title: Shoreline Behaviour Statements
- Date Created: 10/1/2002
- Abstract: Consists of three elements: 1. Coastal Behaviour Statement. 2. Assessment of shoreline behaviour. 3. Local-scale Shoreline Response Statements
- Distributor: Defra
- Qualitative Data Quality: 2
- Relevance Ranking: 2(«Geomorphology»«Coastal evolution»)
- [More Details](#)

Figure 2.6.1 Details of tool return display

The requirement to address the quality issues of the data/documents/information held within the metadatabase meant that the return needed revision firstly to display the required results and secondly offer a ranking facility. The detail about the ranking is given in Appendix B, however, Figure 2.6.2 shows how these revisions have been made in the Tool for illustration, which include ranking by accuracy, age and length of record. Reference to particular elements of the FCERM metadata schema (developed in Work Package 2, FD2323\TR2) are described in Appendix D.

The screenshot displays the 'EA FD2323 DATA AND KNOWLEDGE' Toolbox interface. At the top, there is a navigation bar with links for Home, Toolbox, Documents, Help, and Site Map. The main content area is titled 'Toolbox' and contains several sections:

- Search Filters:** A grey box lists the selected criteria: Organisation (Environment Agency), Scale (Regional / EA - North West), Activity (Develop policies & regulate activities alongside, in, on & over the watercourse), Sub-activity (Coastal Defence Management Planning (i.e. develop SMP policy)), and Task (Identification of Pressures on the Coastline).
- Search Results Summary:** Shows 6 results. Information used in search includes «Probability/extent of flooding», «Geomorphology», and «Coastal evolution». Additional information used includes «Physical environment». Additional keywords used include «Shoreline Behaviour».
- Buttons:** 'Back' and 'Reset' buttons are present.
- Warning:** A red warning message states: 'Find other interested parties - warning you will reset the toolbox'.
- Sorting:** Results are sorted by 'Accuracy ↓ (default)'. A table below shows sorting options: Age, Temporal Duration, Relevance Ranking, Title, and Print list.
- Metadata available:** A section showing details for a document:
 - Title: Procedural Guidance for Production of SMPs
 - Alternative Title:
 - Abstract: This document was developed to establish the most appropriate, best practice methodologies to deliver the SMP's in accordance with the 2001 SMP Guidance. This document is supplementary to the 2001 SMP Guidance.
 - Distributor: Defra
 - Accuracy: 2 - Data with known deficiencies
 - Reason For Decision On Accuracy: Broad Scale datasets assembled at a national level
 - Age Of Data: <5 years old
 - Spatial Resolution:
 - Temporal Duration: <5 years Start: 01/05/2003 End: 01/05/2003
 - Relevance Ranking: 2(«Probability/extent of flooding»«Geomorphology»)
 - More Details
- Next Document Metadata:**
 - Title: Futurecoast
 - Alternative Title: Cliff behaviour assessment

Figure 2.6.2 Tool returns showing quality scores and flags

3. Key issues

Throughout the development of the Tool discussion has taken place over the use of keywords as the search mechanism in the metadatabase and as previously stated for the 'proof of concept' this was not the route taken. However it is recognised that any further development of the Tool would need to address this and therefore Work Package 2 (FD2323\TR2) has sought to establish an ISO 19135 compliant register, which will manage the use of a thesaurus to ensure continuity in the use of keywords in both the Tool and the metadatabase.

The importance of following standards has become apparent during the Tool development both in the design of the web base interaction and in the database from which the material is retrieved. The metadatabase is described in FD2323\TR2, however it is essential that the two systems are maintained in parallel and therefore the management issues and the subsequent training of those populating the Tool and metadatabase will need to be addressed.

During the design and implementation of the Tool a number of observations were made which would enhance any future system, these are given in Table 3.1.

Table 3.1 Considerations for the implementation of the Tool

Item	Pros	Cons
Keywords, extents and 'Information required' are stored as text not numerically in the metadatabase in order to comply with the ISO standards.	<ul style="list-style-type: none"> ▪ Makes the database independent of linked list tables when exporting ▪ Use Integrated Public Set Vocabulary (IPSV) 	<ul style="list-style-type: none"> ▪ A traditional database structure would use look-up tables. ▪ The web-tool currently uses numerically based query
Functionality to edit and remove tasks, sub-activities and keyword associations would assist the management of the structure.	<ul style="list-style-type: none"> ▪ Improve non-technical front-end management of the web tool 	<ul style="list-style-type: none"> ▪ Requires careful management to maintain integrity of the database
It is envisaged that if new organisations or activities were required, that this would be a technical level update directly applied to the database.	<ul style="list-style-type: none"> ▪ Minimises loss of structure to the web-tool system 	<ul style="list-style-type: none"> ▪ Requires specialist input ▪ Requires management level knowledge about organisations/activities
On the scale selection page where there is a blank GIS box, this would be where the system could be integrated with an online GIS application making choice of location a graphical interface	<ul style="list-style-type: none"> ▪ Provide an easy to use GIS WYSIWYG interface 	<ul style="list-style-type: none"> ▪ Cost of interfacing the functionality ▪ A requirement of having the extents of all regions and local areas (Government and EA) - to enable level specific documents to be returned on a search
If the step from sub-activity to task was too generic it was thought that a further sub-activity level could be incorporated.	<ul style="list-style-type: none"> ▪ Help the user find appropriate tasks 	<ul style="list-style-type: none"> ▪ Makes the system more complex and involves more steps ▪ The system has to be flexible, so the extra level is not mandatory
The case studies have demonstrated that the 'Information required' list is not quite complete. For maximum benefit to the whole system this should be addressed across all organisations/ activities before population	<ul style="list-style-type: none"> ▪ Provide a sound base framework for the tool ▪ Establish an understanding how the system works across different organisations/ activities 	<ul style="list-style-type: none"> ▪ Requires co-ordinating input from all organisations at the appropriate level for all activities identified in the Ontology responsibility tables
Further thought is required about the use of 'Information required' and keywords in the web-tool.	<ul style="list-style-type: none"> ▪ The 'Information required' list is perceived to be fixed, which provides a known constant in the system ▪ The current system links closely with the Ontology responsibility tables ▪ There may be merit in focusing on a keyword system that may facilitate querying other external systems ▪ A link between 'Information required' and keywords has been established already to tailor the keyword list for filtering results 	<ul style="list-style-type: none"> ▪ The 'Information required' list is perceived to be fixed ▪ Long keyword queries could be detrimental to system performance
Keyword list will require close management	<ul style="list-style-type: none"> ▪ Enable consistency, by minimising repetitive entries through spelling errors etc. 	<ul style="list-style-type: none"> ▪ May require creation and ongoing maintenance of a glossary/thesaurus
Relevance of the detail provided in the return	<ul style="list-style-type: none"> ▪ List provided gives user information on the data type, the list could be longer but would need to be fixed following consultation with users 	<ul style="list-style-type: none"> ▪ Different tags to the metadata could be used, list must be limited to length that is suitable, danger of repeating metadata

4. Conclusions and recommendations

4.1 Conclusions

The report demonstrates how the information gathered in the Ontology part of the project (FD2323\TR1) has been translated, through the use of case studies, into a 'proof of concept' web-enabled Tool. The Knowledge Management Tool enables users, within the FCERM community, to search through a metadatabase for data or information they may need to carry out particular tasks at any level (National, Regional or Local), check that the quality of the available data is suitable for their purposes and identify other users who may be interested in the information. It tracks all stages of an inquiry and details these on all screens, the details provided can also be used to show what information is not available, i.e. those documents, data etc. which have been highlighted as 'Information required' when the sub-activity or task was originally set. The Tool has been designed to retrieve datasets from the metadatabase through the use of the 'Information required' categories. It is therefore important that this is a concise fixed list, which is not allowed to become too large as it would impair the use of the Tool. Following additional development within Work Package 4 (FD2323\TR4), the resulting system includes data quality flagging that provides an indication of confidence in the information accessed by users.

This Tool therefore has a high potential to improve access to and sharing of FCERM information, improve efficiencies in and encourage joined-up data collection and reduce redundancies and wastage of FCERM resources.

4.2 Recommendations

Following the successful testing of the concept Knowledge Management Tool, it is recommended that proper consideration is given to a staged approach to the development of the tool for the FCERM business. The following measured steps would be necessary with a review carried out in between to confirm the case for continuing.

- Scoping and development of a specification for the software/hardware and associated processes to enable a full scale web-enabled FCERM Knowledge Management Tool.
- The development of the tool using particular pilot areas, ensuring within this that full functionality, access and links are addressed.
- Wider population and adoption by the FCERM community

The successful delivery of the tool will require the development and population of the FCERM metadatabase or a similar information source. A culture of data sharing and responsible data management and updating of the metadatabase will also be required.

For the Tool demonstrated in this project to be fully implemented, it will need the consideration of the requirements of the FCERM community IT policies, hardware and software rules. It must be noted that much of the technology

used in this Tool would be upgraded and improved upon in a fully live version. This will strengthen the functionality of the tool in several areas, for example, the ability to remember user sessions and improved robust database performance.

The case studies highlight the need to review the use of keywords as the main link between the Tool and metadatabase, the addition of a recognised thesaurus is recommended in future forms of the system.

The system will require the framework to be constructed in an acceptable form and will need to be populated by practitioners in conjunction with the metadatabase management. The cost of resources and time to enter the data will be an overhead, however many of the tasks are common across a number of organisations and so the upload of data could be widely spread, once the system was fully integrated. The decision to make the Tool available on the web means that access is available to many users, both within and external to the FCERM community, thus reducing the need for duplicate hosting of the Tool database and inconsistency of information held.

On consideration of the issues detailed above putting a cost to the system, at this stage, is very difficult. It is therefore recommended that one FCERM organisation is taken as the test bed on which the IT and population issues are addressed. The most cost effective way of conducting this activity would be through a partnership between the test organisation, their IT department and a suitable external company who would liaise with the practitioners to facilitate the process and thus reduce their time commitment. As a guide the time required to work through the SMP case study, within the context of this project, was two man days including training.

5. References

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Appendices

Appendix A

Example of Spreadsheet

Appendix A. Example of Spreadsheet

SMP Case Study Notes

* = Futurecoast dataset

** = Scale of 1 to 5, with 1 = best quality

*** = See Information require sheet for ID legend

Activity	Sub-Activity	Sub-Activity Level 2	Tasks	Information Required	Data	Keyword 1	Keyword 2	Keyword 3	Keyword 4	Keyword 5	Keyword 6	Keyword 7	Keyword 8	Keyword 9	Keyword 10				
Develop policies and regulate activities alongside, in, on and over the watercourse	Coastal Defence Management Planning (i.e. develop SMP policy)	Coastal Process Analysis	Identification of Pressures on the Coastline	Coastal evolution	Shoreline Behaviour Statements *	Coastal Behaviour	Shoreline Behaviour	Shoreline Response	Past Evolution	Future evolution	Unconstrained behaviour	Shoreline characteristics	Shoreline Controls	Shoreline linkages	Geomorphology				
				Geomorphology	Intertidal / Foreshore Geomorphology *	Intertidal	Classification	Geomorphology	rock platform	mud	shingle	sand and shingle	boulders / loose rocks	sand					
					Backshore Geomorphology *	Backshore	Classification	Geomorphology	Cliffs	Slopes	Beach Ridges	Dunes	Lowland	Lagoon					
			Probability/extent of flooding	EA Indicative Coastal Floodplain Mapping *	Tidal Flood Plain	Flood plain mapping	1:200 year flood event	Coastal Flooding	Flood risk										
			Develop Baseline Understanding of Coastal Behaviour and Dynamics	Coastal evolution	Historical Mapping	Ordnance Survey	Coastal Change	Mapping	Shoreline Position	MHW	MLW	Shoreline behaviour							
					Anecdotal Evidence	Documented evidence	Personnel accounts	Records	Local knowledge										
					Holocene Evidence	Holocene	Long term	Coastal Change	Past 10,000 years	Coastal Evolution									
					Beach Profiles	Beach Morphology	Survey Data	Beach Monitoring	Cross shore profile	Intertidal zone	Volumetric change	Beach erosion	Beach accretion	Beach level change	Shoreline behaviour				
					Aerial Photography	Oblique Aerials	Vertical aerial	Monitoring	Airborne survey	Coastal change									
					Topographic Surveys	Elevation data	Survey Data	Monitoring	Spot Heights										
					Bathymetric Surveys	Sea bed	Survey Data	Monitoring	Hydrographic Office	Bed level data	Cross sections	Side scan sonar	echo sounder	Multi beam	Remote sensing				
					Satellite Imagery	Remote sensing	Earth Observation	Monitoring											
					Ecological Surveys	Ecology	Survey Data	Monitoring	Benthic Ecology	Terrestrial Ecology									
					Defence Data	Coastal Defences	Coastal Structures	Flood Defences	Coast Protection	Sea Defence	Defence Survey								
					Intertidal / Foreshore Geomorphology *	Intertidal	Classification	Geomorphology	rock platform	mud	shingle	sand and shingle	boulders / loose rocks	sand					
					Backshore Geomorphology *	Backshore	Classification	Geomorphology	Cliffs	Slopes	Beach Ridges	Dunes	Lowland	Lagoon					
					Onshore Geology *	Solid Geology	British Geological Survey (BGS)	Drift Geology	Bedrock	Quaternary Deposits									
					Offshore Geology *	Solid Geology	British Geological Survey (BGS)	Offshore deposits	Bedrock	Geology									
					Physical Controls Dataset *	Controls	Linkages	Shoreline Evolution	Geological controls	Physical Controls	Sediment transport linkages	Human intervention							
					OS Mapping	Ordnance Survey	Base mapping	Coastline	Topography	Communication									
					Hydrology	Tidal Flow Data	Tidal Flows	Flow Speeds	Current Speeds	Tidal Ellipses	Tidal Regime	Tidal residuals							
			Tidal Height Data	Tidal Height		Tidal Range	MHWS	MLWS	MHWN	MLWN	MSL								
			Wave Data	Wave height		Wave period	Wave length	Significant wave height	Wave regime	wave modelling	wave prediction	wave records	Wave climate						

Appendix B

Concept tool design and functionality

Appendix B. Concept tool design and functionality

B1 Databases

Within the web Tool two databases have been used:

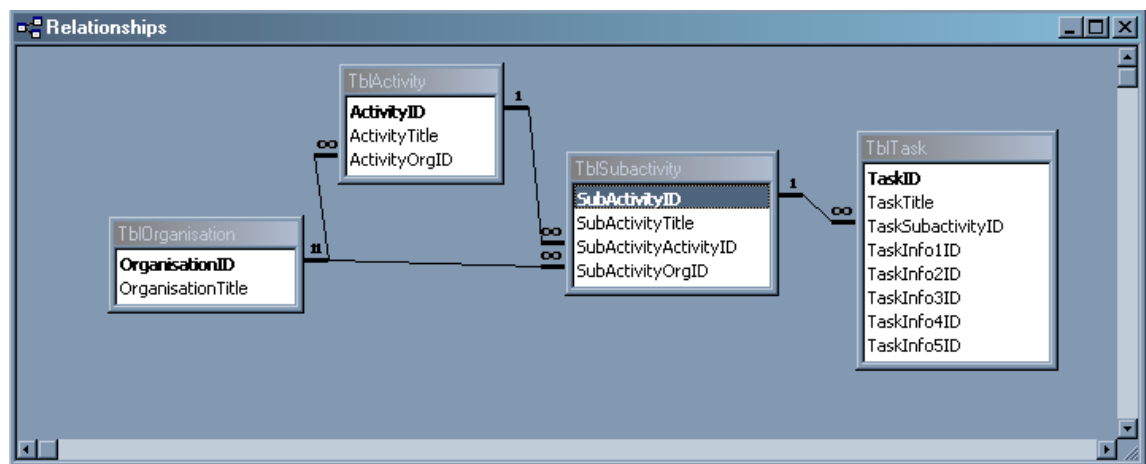
- Framework.mdb
- Metadatabase.mdb

The first is used to provide the structure of the web Tool using information extracted from the Ontology tables and the second database is the metadatabase, which the web Tool queries to find results. The tables used in the web Tool are discussed below.

B1.1 Framework.mdb

Overview

This database and its associated tables represent the responsibility flow charts from the Ontology report. The tables are linked in such a way to maintain the flow from organisation down through to task level. This then provides additional functionality of the toolbox by drill upwards, allowing the user to find other organisations and activities that require the same types of information.



TblOrganisation

This table contains a list of all organisations used in the Ontology responsibility flow charts. The table is at the top of the flow process through the toolbox and the structure is summarised below:

Field Name	Data type	Description
OrganisationID	AutoNumber	Primary key and organisation ID
OrganisationTitle	Text	Organisation name

OrganisationID	OrganisationTitle
1	Environment Agency
2	Local Authority
3	Internal Drainage Board
4	Water Industry
5	Riparian/Land Owners/Occupiers

TblActivity

This table contains all the activities and associated organisation IDs as outlined in the responsibility flow charts. The table structure is as follows:

Field Name	Data type	Description
ActivityID	AutoNumber	Primary key and Activity ID
ActivityTitle	Text	Activity Title
ActivityOrgID	Number	Associated Organisation ID

ActivityID	ActivityTitle	ActivityOrgID
1	Develop policies & regulate activities alongside, in, on & over the watercourse	1
2	Maintain and repair flood defences	1
3	Operate flood defences	1
4	Improve flood defences	1
5	Flood response	1
6	Flood warning - decision making & dissemination	1
7	Monitor & forecast conditions	1
8	Improve ordinary watercourses	2
9	Operate & maintain existing ordinary watercourses	2
10	Maintain, improve & construct coastal protection	2
11	Develop policies & control development	2
12	Maintain road gullies	2
13	Prepare dissemination plans	2
14	Evacuation response	2
15	Develop policies & regulate activities alongside, in, on & over watercourses	3
16	Maintain & repair flood defences	3
17	Improve flood defences	3
18	Operate flood defences (including emergency flood response)	3
19	Provide, improve and extend assets & services (soft) that can accommodate set levels of loading without causing flooding	4
20	Cleanse and maintain assets that can accommodate set levels of loading without causing flooding	4
21	Minimise impact of development on existing sewer system	4
22	Inspect and maintain reservoirs	4
23	Monitor groundwater levels	4
24	Maintain capacity of watercourses and accept flows	5
26	Build defences/coastal protection	5

TblSubactivity

This sub-activity table is the first of two updateable tables in the database. The authorised user enters the sub-activity title and the other fields are populated automatically through the choices they made. The structure is below:

Field Name	Data type	Description
SubactivityID	AutoNumber	Primary key and Subactivity ID
SubactivityTitle	Text	Subactivity Title
SubactivityActivityID	Number	Associated Activity ID
SubactivityOrgID	Number	Associated Organisation ID

TblTask

The task table is the other table that can be updated by authorised users. A task can be added to a selected sub-activity, with up to five related information required categories assigned to a single task. The table structure is as follows:

Field Name	Data type	Description
TaskID	AutoNumber	Primary key and Task ID
TaskTitle	Text	Task Title
TaskSubactivityID	Number	Associated Subactivity ID
TaskInfo1ID	Number	Information required 1 ID
TaskInfo2ID	Number	Information required 2 ID
TaskInfo3ID	Number	Information required 3 ID
TaskInfo4ID	Number	Information required 4 ID
TaskInfo5ID	Number	Information required 5 ID

TblOthergroups

This table has been added to initially help the user find other parties that may be interested in different information required categories. The data is derived from the Ontology fountain diagrams. The table structure is below:

Field Name	Data type	Description
OthergroupsID	AutoNumber	Other interested groups Key and ID
OthergroupsTitle	Text	Other interested groups title
OthergroupsInforeqID	Number	Other interested groups associated information required ID values from the metadata information required table in the metadatabase

TblIRKWlink

This table (not shown in the relationships diagram) has been added to demonstrate how keywords can be linked to 'Information required' categories. This then allows a tailored list of keywords to be produced for filtering depending on the task/'Information required' categories selected. The table structure is as follows:

Field Name	Data type	Description
IRKWlinkID	AutoNumber	Information required/keyword link Key
IRKWlinkInforeqID	Number	Information required ID
IRKWlinkKeywordID	Number	Keyword ID

B1.2 Metadatabase.mdb

Overview

This database is the location of all of the results for the web Tool and it also has a couple of other tables used by the web Tool to maintain consistency through the system. Please refer to the metadatabase standards report for more detail on the tables.

Metadata keywords

The keywords table is controlled and added to within the metadata environment, and the data in the table are used to populate a drop-down list in the web Tool. The keywords are used as filters to help reduce the initial number of metadata results. The table structure is below:

Field Name	Data type	Description
KeywordsKey	AutoNumber	Primary key and keyword ID
KeywordsTitle	Text	Keyword Title

Metadata information required

This table contains the list of 'Information required' categories derived from the Ontology responsibility flow charts. The table is used in the web Tool to populate drop-down lists when adding new tasks and also when drilling back up through the Tool to find other interested parties. The table structure is below:

Field Name	Data type	Description
Information Required	Text	Information required title
Information Required ID	Number	Information required ID

Scalelocations

The locations table is essentially a list of local and regional categories for both Government and the Environment Agency. All options have a unique ID allowing linkage through the Tool. This table has a column which links local areas to associated regions and also connects to the ScaleDescriptions table. The data are used in drop-down lists to allow the user to specify a geographical area of interest at a specific level. The table structure is as follows:

Field Name	Data type	Description
ScalelocationsID	AutoNumber	Primary key and Location ID
ScalelocationsTitle	Text	Location Title
ScalelocationsScaleID	Number	Location description level ID
ScalelocationsLinkID	Number	'Next level up' location ID (i.e. associated regional value for a local location)

ScaleDescriptions

This table contains basic information about the location categories and the information is used to show the user what they have selected whilst in the web Tool. The table structure is below:

Field Name	Data type	Description
ScaleDescriptionsID	AutoNumber	Primary key and Scale ID
ScaleDescriptionsTitle	Text	Scale (national, regional) title
ScaleDescriptionsOrgTitle	Text	Relevant organisation to scale (i.e. Gov or EA)

Metadata

The metadata table is the key table in this database and is the source of all results for the web Tool. The table is explained in detail in the metadata standards report (FD2323\TR2).

B2 Technical walk through

B2.1 Creation of a query (Toolbox.asp, toolbox1.asp and toolbox2.asp)

The user is taken through a sequence of selection steps in the following order:

A	Organisation	populated from framework.mdb
B	Scale	populated from metadatabase.mdb
C	Activity - determined by decision A	populated from framework.mdb
D	Sub-activity - determined by decision C	populated from framework.mdb
E	Task - determined by decision D	populated from framework.mdb

As the user progresses through the steps, the decisions are stored for the final query to the metadatabase.

At the point when the user selects a task there is now group of information ready to send in the database results query. These data include:

- Scale information - this is structured as follows:

User choice	Hidden value 1	Hidden value 2
Local	Associated regional value (e.g. choose Sefton District and include North West)	National
Regional	National	-
National	-	-

- Information required - this is stored in hidden fields and is related to the task selected by the user.

The query sent can be summarised as follows:

Return all metadata WHERE any scale value is matched AND any information required value is matched in the metadatabase.

B2.2 Results summary (results.asp)

Once the user has submitted a task selection they are taken to a summary results page. This page tells the user how many results were found based on the query explained above and you now have three choices:

- Show results -
This takes you to a display results page.
- Search with additional information required categories -
This shows a scrollable list of all 'Information required' categories (called from the metadatabase), which allows the user to widen the search. When the data is submitted the query is extended to include this new selection and keep the existing data on task and scale selected. The user is returned to the same summary results page to allow them to access the keyword filter.
- Filter results using keywords –
If the user wants to reduce the amount of results found, they can select keywords from a scrollable list (called from the metadata database and filtered by the 'Information required' categories selected (NB. The content of the keyword list is dependent on the linking of keywords to 'Information required' process). The new query to the database will now be:

Return all metadata WHERE any scale value is matched AND any information required value is matched AND any keyword is matched in the metadatabase.

When the user submits the selection they are taken to a display results page.

B2.3 Display results (results1.asp and results2.asp)

The final step of the process is to view the results with some summary information where the ranking concept derived from the appraisal framework in FD2323\TR4 takes effect. The default ranking is by the accuracy of the record and is ranked in descending order with values shown in the table below:

Value	Description
1	Best of Breed
2	Data with known deficiencies
3	Gross assumptions
4	Heroic assumptions
5	Unknown

Other ranking options available include sorting by age of record, temporal duration and title. There is also an informative relevance ranking, which is based on the number of matches between information required associated with a task and information required attached to a given record. The more matches the higher the ranking.

All ranking was achieved by firstly creating a disconnected record set and then dynamically attaching new fields with the relevant values, this allows the addition of new calculated fields, which then facilitates sorting of the record set. The table below highlights where the main ranking components originated.

Ranking value	Fields used	Calculation
Accuracy (descending in quality)	<ul style="list-style-type: none"> Quantitative Data Quality Assessment 	None
Age of record (ascending, youngest first)	<ul style="list-style-type: none"> End Temporal Extent Information 	(Today's date - end temporal value) NB (ranked in days, displayed as <5 years old, 5 - 15 years old, 15 - 50 years old, >50 years old)
Temporal duration (descending, longest first)	<ul style="list-style-type: none"> Start Temporal Extent Information End Temporal Extent Information 	(End temporal value- start temporal value) (NB ranked in seconds, displayed as <5 years, 5 - 15 years, 15 - 50 years, >50 years)
Title (ascending)	<ul style="list-style-type: none"> Title 	None

There is a button called 'print list' to view the results on a single flat page, also a link present to take the user to the find other interested parties' page.

B2.4 Find other interested parties (users.asp and users1.asp)

This facility allows the user to select an information required category and find other organisations that may either provide or use the same type of data. Once the user makes a selection from the list (called from the metadatabase), they are taken to second page (users1.asp) that displays two tables of results. The first table contains data pulled from the web Tool itself (framework database) and goes backwards from task to organisation. The second table contains data returned from a static list of interested parties based on information required (framework database), which was derived from the Ontology fountain diagrams.

B2.5 Adding new sub-activities and tasks (addsubactivity.asp and addtask.asp)

One requirement of the web Tool was to have functionality available to expand upon the data already extracted from the Ontology responsibility flow charts was decided to only allow authorised users to add new sub-activities and tasks, but not to allow access to the activities and organisation levels, to preserve the higher-level integrity of the web Tool.

Once the user is logged in to either the add task or sub-activity page they are taken through a sequence of selection steps as follows:

Add sub-activity (addsubactivity.asp)		Add task(addtask.asp)	
		D	Organisation
A	Select organisation	E	Activity
B	Select activity	F	Sub-activity
C	Create new sub-activity	G	Create new task
	▼		▼
	Record added		Record added

	▼		▼
	Add another sub-activity for this activity - Loop back to C		Add another task for this sub-activity - loop back to G
	Add task for this activity - switch over to F		Add another task for different sub-activity (same activity) - loop back to F
	Select another organisation - Back to A		Add another task for different activity - loop back to E
			Select another organisation - Back to D

The system allows the user to cross from the add sub-activity page to the add task page and the organisation and activity selection is transferred, allowing the user to come in further down the selection process without starting again. It is possible for the user to use the add task page independently of the add sub-activity page.

B2.6 Linking keywords to 'information required' categories (addkeywords.asp)

To help the user filtering the results by keyword, it is possible to link keywords to a given 'Information required' category. This means if you search under a given task ('Information required' categories), then you will have a selected list of keywords available on the toolbox results page.

Once the user is logged in they can select an 'Information required' category, which then displays a list of keywords already associated with that category and also a scrollable and selectable list of available keywords that are not associated. The user can then select a keyword from the list and link it to the 'Information required' category, and the two lists are updated to reflect the change.

Appendix C

Setting up a Demonstration of the
Tool from the CD

Appendix C. Setting up a Demonstration of the Tool from the CD

Requirements

- **A web server capable of running ASP.**
Windows based IIS is highly recommended as this provides automatic ASP code support. However Apache can be used, but extra ASP plug-ins would be required (if not already installed).
- **MS Access '97 or higher**
Although the database supplied was built in '97 format, there is no embedded code present, so it should open in any version of MS Access.
- **A web browser**
The Tool was mainly tested in IE 6, however, some checks were made in Mozilla/Netscape and it should work fine using these browsers.

Steps (Assuming internal installation)

1. Find someone who deals with websites and using IIS (or Apache)
2. Establish where the website is going to be hosted.
3. Copy the entire folder from the CD-ROM to this area (the site was built using relative links).
4. Create a new virtual folder under IIS called 'fd2323' and point it to the fd2323 folder. So for example during construction and testing the web path was 'http://abpr120/fd2323/'. Please remember to allow read and write permissions. If you are not allowed write permissions then this will definitely affect where the databases sit.
5. The next key task is to establish where the databases will go. This is very dependant on what is allowed in the web area. Many external hosts have specific database folders (due to write permissions), but internally this may not matter. The easiest option is keep the databases where they are within the 'fd2323\data\' folder. This only works if you could set write permissions in step 4. If not, then you need to move the databases to the approved databases folder, which needs write permissions. Also remember to remove any file read-only properties from the databases (as it came from a CD-ROM). The easiest way is to right click the whole fd2323 folder and check the read-only option is not selected.
6. The final step is to now link the website to the databases. If you have not had to move the databases and the virtual folder was set up as in step 4, then the Tool should work now using the default connection paths. If the databases were moved then the connection strings need to be changed to reflect the new location. All database connections across the site are

controlled from two connection strings sat in the 'fd2323\connections\' folder, one for each database. The files are called ConnFramework.asp and ConnMetadata.asp and can be opened in notepad. Tips: a 'at the beginning of a line means it is a comment and is ignored by the server. An alternative disabled demonstration connection string is supplied, which uses an actual file path to get to the database. If the databases had to be moved, then edit this path and remove the 'at the beginning of the line to enable it, also remember to put ' in front of the other string in the line above to disable that one.

Please note if the Tool does not work properly or at all then check:

- The connection strings are right
- The databases are not read-only and are sat in a folder with write permissions

Appendix D

User Guidance for Tool

Appendix D. User Guidance for Tool

An Overview of the System

Previous sections have described the proposed framework for the online application, which has been designed to be readily available and which is system independent. This part of the document provides the user with a guidance manual to navigate through the tool and also details the additions that can be made by the user following the necessary data entry routes. The description is provided through a series of screen shots with associated text.

Overview of Tool

On opening the Tool page you are presented with a tool bar offering the following headings:

- Home
- Toolbox
- Methodology
- Help
- Sitemap

Each heading has a drop-down list enabling the user to make their choice. Currently the following are available:

- Home
- Toolbox
 - Enter toolbox
 - Add sub-activities
 - Add tasks
 - Link keywords
 - Find further interested parties
- Documents
 - Associated reports
- Help
 - Entering the toolbox
 - Add new sub-activity
 - Add new task
 - Link keywords to information required
 - Find further interested parties
- Site map
- Legal Statement

The screenshot shows the top navigation bar with 'Home', 'Toolbox', 'Documents', 'Help', and 'Site Map'. The 'Toolbox' menu is open, listing options: 'Enter Toolbox', 'Add Sub-activities', 'Add Tasks', 'Link Keywords', 'Find Other', and 'Interested Parties'. The main content area is titled 'Introduction/Overview' and contains a paragraph about integrated flood and coastal erosion risk management (FCERM) and a bulleted list of three points.

The screenshot shows the top navigation bar with 'Home', 'Toolbox', 'Documents', 'Help', and 'Site Map'. The 'Help' menu is open, listing options: 'Entering the Toolbox', 'Add New Sub-activity', 'Add New Task', 'Link Keywords to Information Required', 'Finding Other', and 'Interested Parties'. The main content area is titled 'Introduction/overview' and contains a paragraph about integrated flood and coastal erosion risk management, a bulleted list of four points, and a sentence: 'It also raised the following key issues:'.

** The help can also be accessed via the blue 'question mark' on the top right of the toolbox pages.

Entering Toolbox

On entering the toolbox you are presented with a drop-down list with the selection of 5 organisations you can enter under, namely:

- Environment Agency
- Internal Drainage Board
- Local Authority
- Riparian/Land owners/Occupiers
- Water Industry

Having chosen your entry route then click on the 'submit' button.

The next step allows you to choose the scale of your search, whether you are looking at a problem from a national, regional or local perspective. The region and local levels are split according to Environment Agency or Local Authority and drop-down lists are provided for the user to define your area. It must be noted that provision has been made to add a link to a Geographical Information System (GIS) that would enable the area of interest to be defined on a map,

thus removing the need to describe the area in text format. A snap shot showing the EA region North West highlighted is given below.

EA FD2323 DATA AND KNOWLEDGE

Home | Toolbox | Documents | Help | Site Map

Toolbox

Organisation selected: **Environment Agency**

2. Select Scale, Either

1. National:

2. or Regional (Gov):

3. or Regional (EA):

4. or Local (Gov):


5. or Local (EA):

- EA - Anglian
- EA - Midlands
- EA - North East
- EA - North West**
- EA - South West
- EA - Southern
- EA - Thames


GIS Graphical User Interface

The screen also displays your selections to date, i.e. Organisation selected: Environment Agency to help you follow your path through the tool.

Once submitting your scale of interest, which will filter your results (see SMP case study) you are then invited to select an Activity, this is a predetermined list amalgamated from the Ontology flow charts. The list has been filtered according to the organisation you have entered as, for example the first screen shot shows the choice for the Environment Agency while the second shows those for the Water Industry.




EA FD2323 DATA AND KNOWLEDGE



Home Toolbox Documents Help Site Map

Toolbox



Organisation selected: **Environment Agency**
 Scale selected: **Regional / EA - North West**

3. Select Activity: (7 Found)

Develop policies & regulate activities alongside, in, on & over the watercourse

Develop policies & regulate activities alongside, in, on & over the watercourse

Flood response

Flood warning - decision making & dissemination


Improve flood defences

Maintain & repair flood defences


Monitor & forecast conditions

Operate flood defences

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EA FD2323 DATA AND KNOWLEDGE



Home Toolbox Documents Help Site Map

Toolbox



Organisation selected: **Water Industry**
 Scale selected: **Regional / EA - North West**

3. Select Activity: (5 Found)

Cleanse & maintain assets that can accommodate set levels of loading without causing flooding

Cleanse & maintain assets that can accommodate set levels of loading without causing flooding

Inspect & maintain reservoirs

Minimise impact of development on existing sewer system

Monitor groundwater levels

Provide, improve & extend assets & services (soft) that can accommodate set levels of loading without causing flooding

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In using the Environment Agency as the organisation and using the case studies the Activity chosen was that highlighted. On submitting this choice, a further list of sub-activities for selection is provided.

EA FD2323 DATA AND KNOWLEDGE

Home | Toolbox | Documents | Help | Site Map

Toolbox

Organisation selected: **Environment Agency**
Scale selected: **Regional / EA - North West**
Activity selected: **Develop policies & regulate activities alongside, in, on & over the watercourse**


4. Select Sub-activity: (2 found)

- Coastal Defence Management Planning (i.e. develop SMP policy)
- Coastal Defence Management Planning (i.e. develop SMP policy)
- Develop Catchment Flood Management Plan (CFMP)

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Practitioners with recognised expertise in the work involved have defined the sub-activities through the use of the case studies and they are written to capture the stages in any activity the organisation may need to address.

The sub-activity highlighted in this example is that of 'Coastal Defence Management Planning (i.e. develop SMP policy)'. This selection leads to a number of pre-defined tasks which have also been defined from the needs associated with the sub-activity and are designed to help refine the search when the request is sent to the metadatabase. A list of tasks then is presented to the user for further selection. In this scenario a tick box is supplied and on selecting the task the submit button needs to be activated and pulls up another series of choices.



EA FD2323 DATA AND KNOWLEDGE


Home Toolbox Documents Help Site Map

Toolbox

Organisation selected: **Environment Agency**
 Scale selected: **Regional / EA - North West**
 Activity selected: **Develop policies & regulate activities alongside, in, on & over the watercourse**
 Sub-activity selected: **Coastal Defence Management Planning (i.e. develop SMP policy)**

5. Select task: **(4 found)**

<input type="checkbox"/> Baseline Shoreline Response Assessments	<input type="button" value="Submit"/>
<input type="checkbox"/> Develop Baseline Understanding of Coastal Behaviour and Dynamics	<input type="button" value="Submit"/>
<input checked="" type="checkbox"/> Identification of Pressures on the Coastline	<input type="button" value="Submit"/>
<input type="checkbox"/> Policy Scenario Assessments	<input type="button" value="Submit"/>



EA FD2323 DATA AND KNOWLEDGE

Home Toolbox Documents Help Site Map

Toolbox

Organisation selected: **Environment Agency**
 Scale selected: **Regional / EA - North West**
 Activity selected: **Develop policies & regulate activities alongside, in, on & over the watercourse**
 Sub-activity selected: **Coastal Defence Management Planning (i.e. develop SMP policy)**
 Task selected: **Identification of Pressures on the Coastline**

Number of results: **25**

Information required used in search: **«Probability/extent of flooding» «Geomorphology» «Coastal evolution»**

➔ Show results:

➔ Search with additional information required categories:

➔ Filter results using keywords:

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Your selection of choices through the tool continue to be displayed at the top of the page, you now have an indication of the number of results you have pulled back under the selections you have made. In the example the number of results is 25. At this point you are also informed of the 'Information required' categories used within the search, these link back to the Ontology flow charts and are when defining a task under a sub-activity to aid the search criteria. In developing the tasks the creator is required to assign a number of 'Information

required' categories from the pre-defined list, see sections on 'Add new sub-activity', 'Add new task' and 'Link keywords to information required'.

At this point you have three options:

1. To show the results
2. To search with additional 'Information required' categories, and
3. To filter results using keywords.

To see the results, click on the 'Go' button, this gives up the following display.



The screenshot shows the 'EA FD2323 DATA AND KNOWLEDGE' website interface. The main navigation bar includes 'Home', 'Toolbox', 'Documents', 'Help', and 'Site Map'. The 'Toolbox' section is active, displaying the following search criteria:

- Organisation selected: **Environment Agency**
- Scale selected: **Regional / EA - North West**
- Activity selected: **Develop policies & regulate activities alongside, in, on & over the watercourse**
- Sub-activity selected: **Coastal Defence Management Planning (i.e. develop SMP policy)**
- Task selected: **Identification of Pressures on the Coastline**

Search results summary:

- Number of results: **25**
- Information required used in search: **«Probability/extent of flooding» «Geomorphology» «Coastal evolution»**

Buttons: **Back**, **Reset**

Warning: **Find other interested parties - warning you will reset the toolbox**

Sort used on results: **Accuracy ↓ (default)**

Sort options: **Age**, **Temporal Duration**, **Relevance Ranking**, **Title**, **Print list**

Metadata available:

Title: Procedural Guidance for Production of SMPs
Alternative Title:
Abstract: This document was developed to establish the most appropriate, best practice methodologies to deliver the SMP's in accordance with the 2001 SMP Guidance. This document is supplementary to the 2001 SMP Guidance.
Distributor: Defra

Accuracy: 2 - Data with known deficiencies
Reason For Decision On Accuracy: Broad Scale datasets assembled at a national level
Age Of Data: <5 years old
Spatial Resolution:
Temporal Duration: <5 years **Start:** 01/05/2003 **End:** 01/05/2003
Relevance Ranking: 2(«Probability/extent of flooding»«Geomorphology»)

[More Details](#)

Title: Futurecoast
Alternative Title: Cliff behaviour assessment
Abstract: Assessment of the nature of coastal cliff behaviour
Distributor: Defra

Accuracy: 2 - Data with known deficiencies
Reason For Decision On Accuracy: Broad Scale datasets assembled at a national level

The 25 results are displayed first by descending accuracy; the age, temporal duration and title can also be used to sort the results. The accuracy is a value attributed to the record through the process covered in the appraisal framework covered in FD2323\TR4. The age of data is calculated based on the end temporal extent of the record and the current date. The temporal duration is

calculated by subtracting the start temporal extent from the end temporal extent. A relevance ranking is also included, this is included as an informative ranking based on the number of returns the record has with relation to the number of 'Information required' categories originally tagged. In the example above the ranking for the top record is 2 and the 'Information required' categories that the result is found under are listed. The information provided here also highlights where datasets are not returned that you might have expected, thus requiring a more detailed search or action to recover, or gather that information.

The descriptors provide an extract from the metadatabase and display the following information:

- Title (metadata element No. 1)
- Alternative Title (metadata element No. 2)
- Abstract (metadata element No.4)
- Distributor (metadata element No.23)
-
- Accuracy (metadata element No.33a)
- Reason for decision on accuracy (metadata element No.33b)
- Age of data (based on metadata element No.7b)
- Spatial resolution (metadata element No.18)
- Temporal duration (based on metadata elements No.7a and No.7b)
- Relevance ranking (provides a rank against matches against original search criteria)

The user can then assess the results and action as required, either by printing, contacting the distributor, contracting new surveys etc.

When choosing 'the search with additional 'Information required' categories', the user is presented with a tick list to amend the metadatabase search. This page is shown below. The user can tick any number of 'Information required' categories that you think are relevant to the task you are addressing.

TOOLBOX

Organisation selected: **Environment Agency**
 Scale selected: **Regional / EA - North West**
 Activity selected: **Develop policies & regulate activities alongside, in, on & over the watercourse**
 Sub-activity selected: **Coastal Defence Management Planning (i.e. develop SMP policy)**
 Task selected: **Identification of Pressures on the Coastline**

Number of results: **25**
 Information required used in search: **«Probability/extent of flooding» «Geomorphology» «Coastal evolution»**

→ Show results:

Available information required categories:

Flood/erosion damage	<input type="checkbox"/>
Geomorphology	<input type="checkbox"/>
Historic flood events	<input type="checkbox"/>
Hydrology	<input type="checkbox"/>
Land drainage	<input type="checkbox"/>
Operation of system	<input type="checkbox"/>
Physical environment	<input checked="" type="checkbox"/>
Population geography	<input type="checkbox"/>
Probability/extent of erosion	<input type="checkbox"/>
Probability/extent of flooding	<input type="checkbox"/>
Road drainage	<input type="checkbox"/>
Sewerage system	<input type="checkbox"/>

→ Show results:

→ Filter results using keywords:

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On clicking 'Go' you will be presented with a revised page that details your choices and again gives you the option to:

1. To show the results
2. To search with additional 'Information required' categories, and
3. To filter results using keywords

At this point it is useful to look at the 'Number of results' and, in this case, the additional search has returned one further result. When showing the results it can be seen that with the addition of an extra 'Information required' category an further result has been returned, this was not found under the original search as the data had not been linked to a the 'Information required' for the particular Task being addressed.



Toolbox



Organisation selected: **Environment Agency**
Scale selected: **Regional / EA - North West**
Activity selected: **Develop policies & regulate activities alongside, in, on & over the watercourse**
Sub-activity selected: **Coastal Defence Management Planning (i.e. develop SMP policy)**
Task selected: **Identification of Pressures on the Coastline**

Number of results: **26**
Information required used in search: **«Probability/extent of flooding» «Geomorphology» «Coastal evolution»**
Additional Information required used in search: **«Physical environment»**

[Back](#) [Reset](#)

➔ Show results: [Go](#)

➔ Search with additional information required categories: [Go](#)

➔ Filter results using keywords: [Go](#)

If you have returned a large number of results the search can be refined by filtering using the keywords, to do this a click on the 'Go' button associated with the 'Filter results using keywords' and as for the previous search, a tick list of pre-defined keywords is provided. If any keywords used are specific to the information within the metadatabase the number of results will be reduced to reflect the more relevant information to your search. An example page is given below.

Toolbox



Organisation selected: **Environment Agency**
Scale selected: **Regional / EA - North West**
Activity selected: **Develop policies & regulate activities alongside, in, on & over the watercourse**
Sub-activity selected: **Coastal Defence Management Planning (i.e. develop SMP policy)**
Task selected: **Identification of Pressures on the Coastline**

Number of results: **26**
Information required used in search: **«Probability/extent of flooding» «Geomorphology» «Coastal evolution»**
Additional Information required used in search: **«Physical environment»**

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→ Show results: [Go](#)

Available keyword filters:

population	<input type="checkbox"/>
Rating curves	<input type="checkbox"/>
river flow	<input type="checkbox"/>
Rock Platform	<input type="checkbox"/>
Rural	<input type="checkbox"/>
Sand	<input type="checkbox"/>
Sand And Shingle	<input type="checkbox"/>
Shingle	<input type="checkbox"/>
Shoreline Behaviour	<input checked="" type="checkbox"/>
Shoreline Characteristics	<input type="checkbox"/>
Shoreline controls	<input type="checkbox"/>
Shoreline Linkages	<input type="checkbox"/>
Shoreline Response	<input type="checkbox"/>
Slopes	<input type="checkbox"/>

→ Show results: [Go](#) [Clear selection](#)

→ Search with additional information required categories: [Go](#)

[Back](#) [Reset](#)

The result of this filter has been to reduce the number of results and so provide you with a more concise list for your consideration. This keyword filter can be carried out at any time once the Task has been selected, as can the additional 'Information required' filter to help you capture data sets/ documents etc. outside those originally associated with the task.

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Toolbox

Organisation selected: **Environment Agency**
 Scale selected: **Regional / EA - North West**
 Activity selected: **Develop policies & regulate activities alongside, in, on & over the watercourse**
 Sub-activity selected: **Coastal Defence Management Planning (i.e. develop SMP policy)**
 Task selected: **Identification of Pressures on the Coastline**

Number of results: **6**
 Information required used in search: **«Probability/extent of flooding» «Geomorphology» «Coastal evolution»**
 Additional Information required used in search: **«Physical environment»**
 Additional keywords used in search: **«Shoreline Behaviour»**

Find other interested parties - **warning you will reset the toolbox**

Sort used on results: **Accuracy ↓ (default)**

Age	Temporal Duration	Relevance Ranking	Title	Print list
-----	-------------------	-------------------	-------	------------

Metadata available:

Title: Procedural Guidance for Production of SMPs
 Alternative Title:
 Abstract: This document was developed to establish the most appropriate, best practice methodologies to deliver the SMP's in accordance with the 2001 SMP Guidance. This document is supplementary to the 2001 SMP Guidance.
 Distributor: Defra

 Accuracy: 2 - Data with known deficiencies
 Reason For Decision On Accuracy: Broad Scale datasets assembled at a national level
 Age Of Data: <5 years old
 Spatial Resolution:
 Temporal Duration: <5 years Start: 01/05/2003 End: 01/05/2003
 Relevance Ranking: 2(«Probability/extent of flooding»«Geomorphology»)
[More Details](#)

Title: Futurecoast
 Alternative Title: Cliff behaviour assessment

Add new sub-activity to the Toolbox

Three areas of the Tool are password protected, these are the actions that enable additional information to be input and as development has progressed it has become apparent that this activity will need careful management.

On entering this page you will firstly be asked for a User ID and login, this access will be restricted due to the requirement to update the Tool and metadatabase in parallel to ensure the linkages are maintained.

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Home | **Toolbox** | Documents | Help | Site Map

Enter Toolbox
Add Subactivities
Add Tasks
Link Keywords
Find Other
Interested Parties

Add New Sub-Activity To The Toolbox

Please login to access this part of the site

User ID:

Password:

Login

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On clicking 'Login' you will then be asked through a drop-down list which organisation you wish to enter as, on pressing the 'submit' button you will then be given a drop-down list of activities for your sub-task to fit under. On submitting your choice you will be able to add in free text your sub-activity.

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Home | **Toolbox** | Methodology | Help | Site Map

Add New Sub-Activity To The Toolbox

Organisation selected: **Water Industry**

Activity selected: **Minimise impact of development on existing sewer system**

Existing sub-activities

Provide flood protection in urban area and protect environment

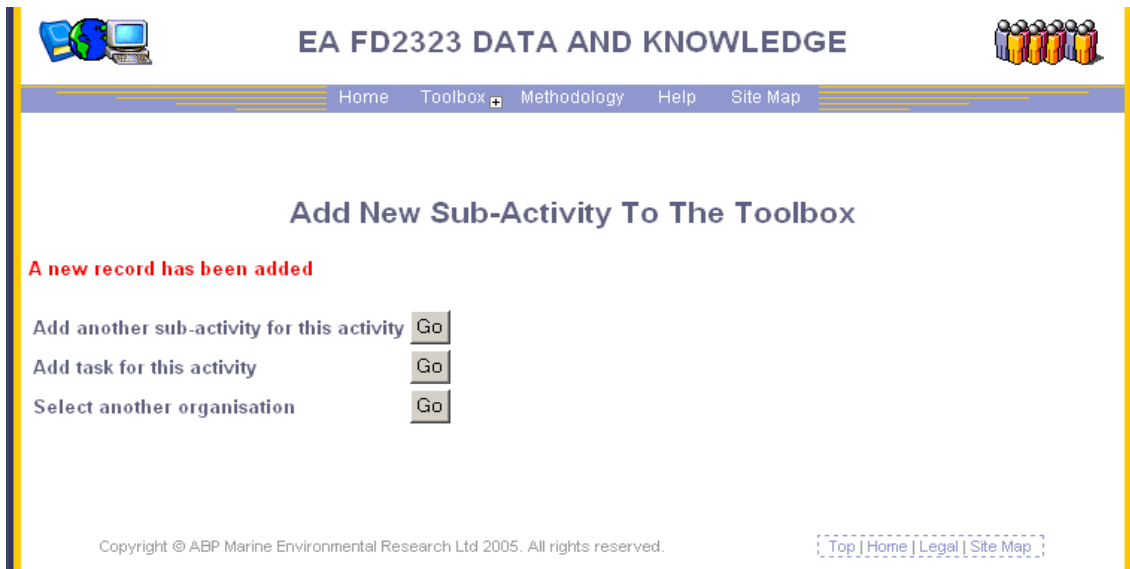
3. Add Sub-Activity

Provide guidance on standards for new development

Back | Insert Record

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On 'Insert record', you will then see the following page, which offers you three choices:



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Add New Sub-Activity To The Toolbox

A new record has been added

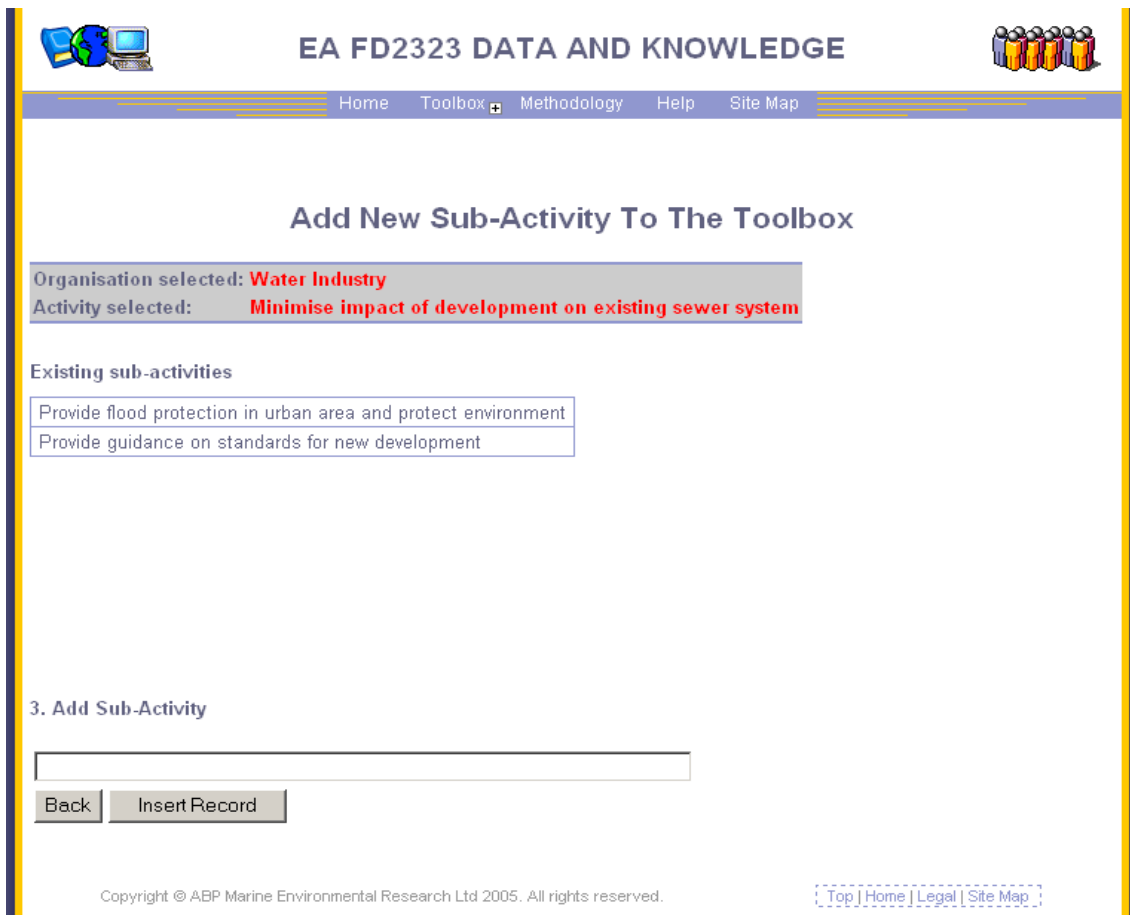
Add another sub-activity for this activity

Add task for this activity

Select another organisation

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On selection of 'Add another sub-activity for this activity' you will then have the opportunity to add another sub-activity, and you are also shown the on you have previously added.



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Add New Sub-Activity To The Toolbox

Organisation selected: **Water Industry**

Activity selected: **Minimise impact of development on existing sewer system**

Existing sub-activities

- Provide flood protection in urban area and protect environment
- Provide guidance on standards for new development

3. Add Sub-Activity

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Or you can add a Task to the sub-activity you have just created or to any existing ones under your selected activity.

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Add New Task To The Toolbox

Organisation selected: **Environment Agency**
Activity selected: **Minimise impact of development on existing sewer system**

3. Select Sub-Activity

Provide flood protection in urban area and protect environment
Provide flood protection in urban area and protect environment
Provide guidance on standards for new development

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On choosing the sub-activity you will then be able to add an associated Task, this will need to have some 'Information required' categories attached to enable results to be returned.

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Add New Task To The Toolbox

This sub-activity has no tasks assigned

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4. Add New Task - **please make at least one information required selection**

Task title:

Information required:

Information required:

Information required:

Information required:

Information required:

[Back](#) [Insert Record](#)

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On 'Insert record' the new Task will be saved and other options will be given to you. All choices require you to follow the same routes as you have already followed.

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Add New Task To The Toolbox

A new record has been added

Add another task for this sub-activity

Add another task for different sub-activity (same activity)

Add another task for different activity

Select another organisation

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Add new task to the Toolbox

Adding another Task is also password protected as mentioned previously the 'Login' page is similar to that for adding a new sub-activity,

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Add To The Toolbox

Please login to access this part of the site

User ID:

Password:

Enter Toolbox
Add Sub-activities
Add Tasks
Link Keywords
Find Other
Interested Parties

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On logging in you are asked which organisation you are entering under, and then which activity you wish to address, these are all offered as drop-down lists as before. Then you are asked to choose from the list of sub-activities already defined. As with all queries a history of your actions is recorded at the top of the page.



Add New Task To The Toolbox

Organisation selected: **Environment Agency**
Activity selected: **Develop policies & regulate activities alongside, in, on & over the watercourse**
Sub-activity selected: **Develop Catchment Flood Management Plan (CFMP)**

Existing tasks:

Determine availability of existing models and model development needs
Identify key environmental issues in the catchment
Identify known geomorphological issues
Identify known significant flood risk/problem areas through the catchment (arising from all sources of flooding)
Identify large-scale urban development issues
Identify major uncertainties and conduct initial hydrological analysis with preliminary views on future changes
Investigate and summarise current understanding of flood generation processes/needs for mitigation

4. Add New Task - please make at least one information required selection

Task title:

Information required:


Information required:

Information required:

Information required:

Information required:

Having added a new Task and associated 'Information required' categories the record is stored and you are presented with further options as shown in the next screen shot.



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Add New Task To The Toolbox

A new record has been added

Add another task for this sub-activity

Add another task for different sub-activity (same activity)


Add another task for different activity

Select another organisation

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Link keywords to 'Information required' categories in the Toolbox

Linking keywords is also password protected as mentioned previously the 'Login' page is similar to that for adding a new sub-activity or task. Linking keywords to 'Information required' categories makes keywords available for filtering results in the main tool.



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Linking Keywords to Information Required Categories

Please login to access this part of the site

User ID:

Password:

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On clicking 'Login' you will then be asked through a drop-down list which 'Information required' category you wish to link keywords to.

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Linking Keywords To Information Required Categories

Select An Information Required Category:

- Actual standard of defence
- Asset condition
- Climate change
- Coastal evolution
- Cost of assets
- Cost of defence
- Development sewer plans
- Emergency response capability
- Environment information
- Flood prediction
- Flood/erosion damage
- Geomorphology
- Historic flood events
- Hydrology
- Land drainage
- Operation of system
- Physical environment
- Population geography
- Probability/extent of erosion
- Probability/extent of flooding
- Road drainage
- Sewerage system
- Standard of defence
- Watercourse system

Submit

On choosing a category and pressing the 'submit' button you will then be given two further lists.

1. Existing keywords - A list of keywords already associated with the 'Information required' category selected.
2. Available keywords - A list of keywords available to link to the 'Information required' category selected.

You can then select a keyword from the second list and link it to the selected 'Information required' category. On linking the keyword both lists are then refreshed to reflect the changes.

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Linking Keywords To Information Required Categories

Info Required category selected: **Probability/extent of flooding**

Existing keywords:

«1:200 Year Flood Event» «2001 Guidance» «2005 Guidance» «Agriculture» «Boundary» «Canals» «Catchment» «Coastal Erosion» «Coastal Flooding» «Cows» «Digital» «Drainage» «Elevation» «Extreme Tide Levels» «Flood Areas» «Flood Envelope» «Flood Extent» «Flood Map» «Flood Plain Mapping» «Flood Register» «Flood Risk» «Flood Warning» «Flood Watch» «Flood Zone» «Flooding Incident» «Fluvial» «Historic Event» «Historic Flood Map» «Historic Flooding» «Historic Floods» «Land Drainage» «Land Type» «Land Use» «Large scale» «Main River» «Mapping» «Models» «Plans» «Return Periods» «Section 105» «Section 24(5)» «Severe» «Sub-Catchment» «Survey Data» «Terrain» «Tidal Flood Plains» «Topography» «Urban Areas» «Water Levels» «Watercourses»

Available keywords:

- Admiralty Charts
- Advance
- Airborne Survey
- Annual Sediment Transport
- aquifers
- Areas Of Major Change
- Areas Of Negative Relief
- Areas Of Positive Relief
- Assessment of Shoreline Behaviour
- Back Of Beach

Link Keyword

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Finding other interested parties based on 'Information required' categories

A further element of the Tool was to follow through the flow of information as described in the Ontology document. This has been achieved by interrogating the 'Information required' categories to find what other organisation might either have the data/information/knowledge that you want or who might want the data/information/knowledge that you have. This option can be accessed at various points within the Tool but will always re-set the Tool after use.

An example of the display is given below; the screen provides a sliding list of the 'Information required' categories.



Finding Other Interested Parties Based On Information Required Categories

Select an information required category:

- Actual standard of defence
- Asset condition
- Climate change
- Coastal evolution
- Cost of defence
- Development sewer plans
- Emergency response capability
- Environment information
- Flood prediction
- Flood/erosion damage
- Geomorphology
- Historic flood events
- Hydrology
- Land drainage
- Operation of system
- Physical environment
- Population geography
- Probability/extent of erosion
- Probability/extent of flooding
- Road drainage

On selecting one and submitting you will be provided with the following page which details those organisations within the Tool who have activities and sub-activities and through which route the information may be found together with organisations with a similar interest. These are shown through a scrolling list.



Finding Other Interested Parties Based On Information Required Categories

Information category selected: **Environment information**

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Organisations and associated activities from the web tool that may provide or use similar information

Organisation	Activities	Sub-activities
Environment Agency	Develop policies & regulate activities alongside, in, on & over the watercourse	Develop Catchment Flood Management Plan (CFMP)
Environment Agency	Improve flood defences	Determine justification for the continued provision of flood defences
Local Authority	Improve ordinary watercourses	Determine justification for the continued provision of flood defences

Organisations that may provide or use similar information

Countryside Council for Wales
DEFRA
English Heritage
English Nature
Environment Agency
Forestry Commission
Internal Drainage Boards
Local Authority
Ministry of Defence
National Farmers Union

PB 12527/17

**Ergon House
Horseferry Road
London SW1P 2AL**

www.defra.gov.uk

