General enquiries on this form should be made to:
Defra, Science Directorate, Management Support and Finance Team,
Telephone No. 020 7238 1612
E-mail: research.competitions@defra.gsi.gov.uk

SID 5 Research Project Final Report

- **Note**
  In line with the Freedom of Information Act 2000, Defra aims to place the results of its completed research projects in the public domain wherever possible. The SID 5 (Research Project Final Report) is designed to capture the information on the results and outputs of Defra-funded research in a format that is easily publishable through the Defra website. A SID 5 must be completed for all projects.
- This form is in Word format and the boxes may be expanded or reduced, as appropriate.
- **ACCESS TO INFORMATION**
  The information collected on this form will be stored electronically and may be sent to any part of Defra, or to individual researchers or organisations outside Defra for the purposes of reviewing the project. Defra may also disclose the information to any outside organisation acting as an agent authorised by Defra to process final research reports on its behalf. Defra intends to publish this form on its website, unless there are strong reasons not to, which fully comply with exemptions under the Environmental Information Regulations or the Freedom of Information Act 2000.
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Project identification

1. Defra Project code: FD 2323

2. Project title:
   Improving Data and Knowledge Management for Effective Integrated Flood and Coastal Erosion Risk Management

3. Contractor organisation(s):
   Haskoning UK Ltd
   Rightwell House
   Bretton
   Peterborough
   PE3 8DW

4. Total Defra project costs (agreed fixed price): £ 153,937.50

5. Project: start date ..... 25 October 2004

   end date ..... 28 April 2006

6. It is Defra's intention to publish this form.
Please confirm your agreement to do so..... **YES** ☒ **NO** ☐

(a) When preparing SID 5s contractors should bear in mind that Defra intends that they be made public. They should be written in a clear and concise manner and represent a full account of the research project which someone not closely associated with the project can follow.
Defra recognises that in a small minority of cases there may be information, such as intellectual property or commercially confidential data, used in or generated by the research project, which should not be disclosed. In these cases, such information should be detailed in a separate annex (not to be published) so that the SID 5 can be placed in the public domain. Where it is impossible to complete the Final Report without including references to any sensitive or confidential data, the information should be included and section (b) completed. NB: only in exceptional circumstances will Defra expect contractors to give a "No" answer.
In all cases, reasons for withholding information must be fully in line with exemptions under the Environmental Information Regulations or the Freedom of Information Act 2000.

(b) If you have answered NO, please explain why the Final report should not be released into public domain

Executive Summary

7. The executive summary must not exceed 2 sides in total of A4 and should be understandable to the intelligent non-scientist. It should cover the main objectives, methods and findings of the research, together with any other significant events and options for new work.

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

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.

FD2323\TR5 is the principal output of the project, capturing and presenting its key outcomes in form of guidance to support a more effective management of data and knowledge within FCERM. The guidance aims to support data and knowledge management, through:

- Developing a framework for objective-led data management
- Establishing links between data and business objectives
- Enabling data provenance;
- Characterising data consistency, quality and appropriateness;
- Providing a framework for data appraisal;
- Focusing on data users and suppliers of data and their interactions; and
- Improving data access and exchange

For data to translate effectively to knowledge, there is a need for obtaining data of sufficient form and quality, as well as maximising the use of the data through ensuring awareness of the data's existence, its sharing and re-use by the whole FCERM community.

Four technical reports (FD2323/TR1, TR2, TR3 and TR4, respectively Work Packages 1, 2, 3 and 4) describe the tools and techniques developed within this project. The good practice approaches and tools are expected to engineer a significant step-change in FCERM data and knowledge management. However, the benefits of this study are likely to be limited, without a culture change towards more willingness to share data and to enable data to be shared, through better and more consistent recording of information about data.

Issues were identified by the Project Team during the development of each Work Package as well as within meetings with managers, suppliers and users of FCERM data, information and knowledge. Many of these were noted in the Technical Reports (FD2323/TR1 to TR5). The most important ones are presented in the table below (as recommendations) that take the concepts and prototypes (applications) forward to realise their full potential.

Application	**Recommendations**
Ontology for FCERM data, information and knowledge	• As the ontology forms the foundations of the FCERM metadata schema and metadatabase, the knowledge management tool and the data appraisal framework, it is essential that ontology is progressed further first. • The data requirements and information flow charts should be enhanced and agreed by different functions within the FCERM business to fully understand the data needs and interactions. • Industry-wide consensus on subject vocabulary (information required) to create FCERM thesaurus/control terms.
FCERM metadata schema, metadatabase and its management	• Instil a culture within the FCERM industry of providing and maintaining metadata and associated quality information. • All future contracts should incorporate the requirement to provide metadata (using a pro forma). Retrospective metadata development should be considered for important FCERM data and develop a methodology to determine lengths to ascribe existing data with metadata. • Scope and design hardware/ software for the metadatabase with pilot studies and industry-wide involvement. This should be in a suitably robust environment to manage the envisaged size requirements and to meet organisations' IT policies and procurement practices.
Knowledge management tool for FCERM	• Populate and pilot the tool with further functions and activities according to the data requirement charts (FD2323/TR1) following enhancements and with involvement from industry. • Development into a desktop application, including specification and GIS element with consideration of FCERM organisations' policies on IT and hardware/software procurement, and control and management handled through the ISO19135 procedures..
Data and information appraisal framework and data quality flagging	• The data and information appraisal framework should be progressed into a computer-based and web-enabled tool • Industry-wide consensus on data quality flag categories in metadatabase, knowledge management tool and data appraisal tool.
Good practice guide	• The guidance should be made readily available to all managers, suppliers and users of FCERM data, information and knowledge.

The recommendations and, indeed, the entire project aim to:

- Instil objective-led management of data and information and disseminate its benefits;
- Instil a culture of healthy information access and sharing in the FCERM industry; and
- Disseminate generic tools for the whole FCERM industry.

Project Report to Defra

8. As a guide this report should be no longer than 20 sides of A4. This report is to provide Defra with details of the outputs of the research project for internal purposes; to meet the terms of the contract; and to allow Defra to publish details of the outputs to meet Environmental Information Regulation or Freedom of Information obligations. This short report to Defra does not preclude contractors from also seeking to publish a full, formal scientific report/paper in an appropriate scientific or other journal/publication. Indeed, Defra actively encourages such publications as part of the contract terms. The report to Defra should include:
   - the scientific objectives as set out in the contract;
   - the extent to which the objectives set out in the contract have been met;
   - details of methods used and the results obtained, including statistical analysis (if appropriate);
   - a discussion of the results and their reliability;
   - the main implications of the findings;
   - possible future work; and
   - any action resulting from the research (e.g. IP, Knowledge Transfer).

See Technical Reports FD2323\TR1-5 and FD2323 Project Record.

References to published material

9. This section should be used to record links (hypertext links where possible) or references to other published material generated by, or relating to this project.

FD2323\TR1: Improving Data and Knowledge Management for Effective Integrated Flood and Coastal Erosion Risk Management – Development of Ontology
FD2323\TR2: Improving Data and Knowledge Management for Effective Integrated Flood and Coastal Erosion Risk Management – Metadata Standard and Registry
FD2323/TR3: Improving Data and Knowledge Management for Effective Integrated Flood and Coastal Erosion Risk Management – Knowledge Management Tool
FD2323/TR4: Improving Data and Knowledge Management for Effective Integrated Flood and Coastal Erosion Risk Management – Appraisal of Value of Information and Data Management
FD2323/TR5: Improving Data and Knowledge Management for Effective Integrated Flood and Coastal Erosion Risk Management – A Guide to Good Practice