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The operational requirement for a medium to large-scale system — the experience of the new English heritage record of scheduled monuments

Nigel Clubb
(English Heritage, Fortress House, Saville Row, London)

14.1 Introduction

The operational requirement (OR) is almost certainly the central element in the process of specifying, procuring and implementing an information technology project. Another paper in this volume, (see chapter 13) sets out the overall framework of procurement within which the OR plays a part, a framework which begins with an analysis of what is required and ends with an implemented system. This paper describes the evolution of the OR for the new English Heritage Record of Scheduled Monuments (RSM) project and describes the documentation issued to suppliers to enable them to decide whether and how to present formal proposals for the supply of the system.

14.2 Background

The background to the RSM and its predecessor, the Scheduled Ancient Monument (SAM) record is well documented elsewhere, including the first eight years of computer operation (Booth 1989), the issues involved in vocabulary control (Chadburn 1988) and the related computer-based mapping system (Clubb 1988).

The major development in the English Heritage Records Office are being introduced in connection with the Monuments Protection Programme — a review and evaluation of information on monuments so that those of national importance can be identified and recommended to the Secretary of State for scheduling. Two additional objectives of the programme are to ensure that the records of scheduled monuments (SMs) are compiled in ways which will help those engaged in case-work at EH and improve the information provided to owners and occupiers of SMs and all those concerned with consent procedures.

14.3 The purpose of the operational requirement

The role of the OR has been defined as an invitation to potential suppliers to submit proposals of the way in which their products and/or services can be used to meet the task specified (CCTA 1989). It describes the job needing to be done, not the means of achieving it. Its intention is to draw the best of the computing industry and serves three main detailed purposes:

1. Potential suppliers can judge the investing effort in bidding for proposals
2. It provides the client with a basis for evaluation and short-listing of suppliers,
3. By acting as a definitive reference point, it ensures fair competition.

It is also an important point of reference for a Post-Implementation Review once the system is implemented.

14.4 The place of the operational requirement in the procurement process

The issue of an OR is a major landmark in the development of a computer application. Activities such as the analysis of existing systems, functional specification and financial approvals should be safely behind. Subsequently, once the OR has been agreed and issued, the primary procurement issues are the actual selection of a supplier and negotiations on the specific services to be provided.

The two main documents prepared during the procurement process are the OR and the Memoranda of Agreement, (MoA). The OR states the client's need while the MoA is a joint client/supplier document and records an agreed solution to the requirement as a basis for tendering procedures. The MoA is a quasi-legalistic response to the OR and effectively incorporates it in total as the primary technical document. A sound MoA is dependent on a sound OR.

14.5 Towards the draft of the operational requirement

In the development of a complex system, the process of evolving an OR may extend over a period of some months. So far as the English Heritage RSM was concerned, the period between preliminary analysis in 1987 and the issue of the OR was nearly two years. The evolution proceeded in parallel with a review of scheduling procedures inspired by MPP including an analysis of the functions and data concerned.

14.6 Analysis of current systems

The initial analysis looked at the existing SAM Record itself and the way it is built up through the scheduling process with subsequent reports by Field Monument Wardens and others updating the record and providing monument management information. This record was originally run on Superfile software held on a Comart CP1542 multi-user micro-computer subsequently upgraded to a 286 processor with data entry and editing carried out on a number of 286

and 386 micro-computers. The old Comart has latterly been used for archive purposes only.

The report also looked at related data flows and processes in the case-work carried out on scheduled monuments, in particular;

1. The process of scheduling
2. Scheduled monument consent procedures
3. Monument damage procedures
4. Metal detector agreements
5. Various grants procedures, including grants for preservation, management, interpretation, recording and rescue

14.7 Preliminary analysis of functions and data

A first report (unpublished) by DWH Associates Ltd, consultants to English Heritage on the computing project, introduced the concept of the 'life cycle' of a monument from its initial identification through the full sum of events which affect it. The report also established that the data categories and flows pertaining to geographical (constraint) areas or land parcels on the ground, such as locational data and management, do not have a one-to-one relationship to items of archaeology. As examples, an archaeological item may extend over a number of constraint areas on the ground and a constraint area may have a number, (or only part of one or many), archaeological items within it. This part of the model was subsequently found to have further complications.

14.8 Functional specification

The specification presented a 'scenario' which related the life-cycle of a scheduled monument to the scheduling cycle itself. The specification also introduced the concept of a third record of the monument within the model, i.e. the monument as scheduled and representing the statutory schedule requiring a specific scheduled monument record. This is in addition to the constraint area record and the archaeological record referred to above all three records having a many to many relationship.

The 'scenario' set out provided for a considerable degree of office automation in the scheduling procedures themselves which establish scheduled monuments in the system. The system was recommended for integration with the working practices of the scheduling Field Workers and Inspectors and their administrative support staff.

14.9 The content of the RSM operational requirement

14.9.1 Introduction

The contents of the RSM OR are set out in Annex A. The introduction was concerned with the objectives of English Heritage, particularly with regard to SMs, the organisation of the Records Office which was to manage the project, the background to MPP and details of existing records and procedures. It set out the project objectives and scope, data and activity analysis showing a 'core' of information necessary for all functions and the 'life cycle' of a monument as defined by the activities of English Heritage. The cycle was initiated by the process of scheduling and once scheduled the subsequent 'life' of the monument was interspersed with 'case history events', examples being a regular visit by a Field Monument Warden, an SM consent or a Management Agreement.

14.9.2 Existing facilities and systems

A section of the OR described existing computer-based and manual systems in more detail. For MPP, data was being captured by Field Workers using Compaq Portable III micro-computers running MS DOS with interim Superfile systems enabling them to organise their data into SM records, Constraint Area records and Archaeological Item records.

Superfile documents were transferred to English Heritage Headquarters and processed to generate the necessary documentation for the scheduling activity. The main operational activities in the scheduling process were manual systems, including card index systems to facilitate progress monitoring and management of the activity.

The primary flow of data on SMs was to the long-established SAM record built up through the regular visits and reports by Field Monument Wardens. In the interim period pending the introduction of the RSM, this had become a record of 'old monument stock', ie. pre-MPP. Since the SAM record could not cater for the size or the complexity of the new MPP records, newly added MPP schedulings were stored in the SM/Constraint Area/Archaeological item format used by MPP Field Workers to generate the scheduling documentation.

There was a clear need to provide a cross-reference between the existing monument stock and the newly scheduled monuments, both as an interim system and, following the transfer of the existing stock to the new computing environment, until such time as the 'old monument stock' had been reviewed.

14.9.3 Outline of required system

The primary requirement was to provide a data store for information in respect of SMs established through the scheduling process and subsequently maintained and updated as a result of site visits by Field Monument Wardens.

A basic precept was that the RSM be integrated with the working practices of English Heritage. It was to provide for the automation of scheduling procedures, including preliminary consultations, the preparation of reports for English Heritage committees, submission to the Department for the Environment and the final notifications of agreed schedulings to owner, occupiers and other authorities.

The use of the system was to be essentially interactive with data captures either by submission from the field on magnetic tape or through screen input. Actions relating to the scheduling process were to be initiated by the input of trigger data or identified by particular combinations of data.

14.9.4 Processing requirements

The requirements were based on a rate of scheduling of monuments rising up to 4,000 a year with a maximum of 400 entering the system and being submitted to English Heritage committees and the Department of the Environment (DoE) per month.

Response times were to be based on entering or editing data via screen appearing virtually instantaneous and 5 seconds to locate and display a monument based on a keyed reference.

14.9.5 Advice and instructions to suppliers

Other areas of advice to potential suppliers included the relationship between English Heritage and systems of the Royal Commission on the Historic Monuments of England (RCHME) and the consequent mandatory requirement for Oracle software and DEC hardware. Suppliers were invited to consider the use of UNIX/ULTRIX as the basic operating environment. The ability to transfer data from the interim Superfile software was a mandatory requirement.

Suppliers were invited to submit a complete solution to the requirement with hardware and software as a complete package, or as a collaborative solution, e.g. a principal organisation developing and supporting the application software with another supplying the hardware *etc.* However, English Heritage expected to have a single point of contact for all maintenance and support after installation and implementation, regardless of whether the solution was complete or collaborative.

The OR also specified three levels of testing related to payments;

Functional Acceptance Testing To test individual functions in accordance with agreed specifications

System Reliability Testing Performance reliability testing based on a performance reliability level of 95% over a period of working days.

Full Load Testing Based on a number of demands on the system and on system files and transaction rates of agreed levels.

Subsequently a fourth level of testing was introduced to ensure the integration of all hardware and software components.

14.10 Format of proposals

Suppliers were instructed to submit their proposals in the format set out in Annex B.

14.11 Supporting annexes with technical documentation

The real body of the OR was to be found in the technical documentation in the supporting annexes. These included the structure and data categories of the existing and interim computer systems and the standard relating to the site specific records agreed for the transfer of data between English Heritage, RCHME and county-based Sites and Monuments Records.

The processing requirements were shown in three annexes dealing with logical specifications, data models and descriptions of the basic scheduling and other processes from 1 to 40.

Fig. 14.1 shows the outline of the architecture for SM related systems. The top level Data Flow Diagram (Figure 14.2) shows the systems to support the RSM. This was supported by 14 other diagrams as part of the logical specification of the processing requirements. Fig. 14.3 represents just one of these, dealing with the submission of scheduling proposals to DoE.

The descriptions of the 40 processes went into considerable detail about each process. Annex 3 shows process 28 relating to the drafting of documentation to the DoE.

14.12 Conclusions

The success of an OR can be judged by the success or otherwise of the system as finally implemented and this latter aspect may form the basis of a subsequent paper.

The OR was sent to six suppliers of whom five chose to submit proposals. The evaluation team judged that two of the proposals were below standard in terms of understanding of the requirement, that one proposal was satisfactory and that two were strong proposals. Successful MoA discussions were concluded with the suppliers submitting the best proposals and two competitive tenders received within the English Heritage available budget. At that preliminary step towards implementation, the OR appears to have succeeded in its objectives.

Annex A: contents of the operational requirement for the record of Scheduled Monuments computer system

1. Introduction
   - (a) English Heritage
   - (b) Ancient Monuments and Historic Areas
   - (c) The Records Office
   - (d) Background to the project
   - (e) Project objective and scope
2. Existing facilities and systems
   - (a) Overview
   - (b) Field data capture
   - (c) Scheduling procedures
   - (d) Records Office Interim Systems
   - (e) Referencing and indexing records
   - (f) Map records systems
   - (g) Information collection
   - (h) Data transfer format
3. Outline of required system
   - (a) Overview
   - (b) Location and users
   - (c) Processing requirements
   - (d) Response times
4. Points in respect of requirements
5. Points in respect of procurement

6. Stages of approval
7. Instructions to suppliers
8. Format of proposals

Annex A: Interim systems
- (a) Interim data storage systems
- (b) SAM text record
- (c) Referencing and Cross-referencing system

Annex B: Map Records System
Annex C: Data Transfer Standard
Annex D: Processing requirements : Logical Specifications
Annex E: Processing requirements : Data Models
Annex F: Processing requirements : Basic Processes

Annex B: Format of Proposals Required From Suppliers

1. Management Summary
2. General description of proposed solution
3. Computing
4. Application system
5. Loading/sizing summary
6. Level of service required
7. Supporting services
   - (a) Maintenance
   - (b) Training
   - (c) Documentation
8. Development and implementation
9. Estimate of real costs
10. Commercial policies

Process 28: Draft DoE Documents

28.1 This Process supports the activity in Elementary Function Description A5.1.

28.2 The process is run on demand. On entry to the process the operator is prompted for Schedulings, Deschedulings or both. The process identifies the appropriate records (i.e. those for which Approval AMAC and Approval HBMC are both Y and the date Submitted to DoE is blank) in the category or categories chosen and sets up a batch job to run out of prime working time. The operator will be able to override this if necessary and request immediate processing.

28.3 For Schedulings the process produces a draft minute to the DoE listing all proposed Schedulings and emergency B schedulings (but not Emergency A and C). The list is sorted into County order and then by scheduling status within County. The format for each record on the list is monument Number, Monument name, AA file Reference and Number of Objections (if any).

28.4 For Deschedulings the process produces a draft minute to the DoE listing all proposed deschedulings. The list is sorted into County order. The format for each record on the list is Monument Number, Old County Number (if any), Monument Name, AA file Reference and Reason for Descheduling (from Scheduled Monument Management Statement).

28.5 For every proposal included in such lists the date of the draft minute (intended date of dispatch to DoE) is recorded against date Submitted to DoE.

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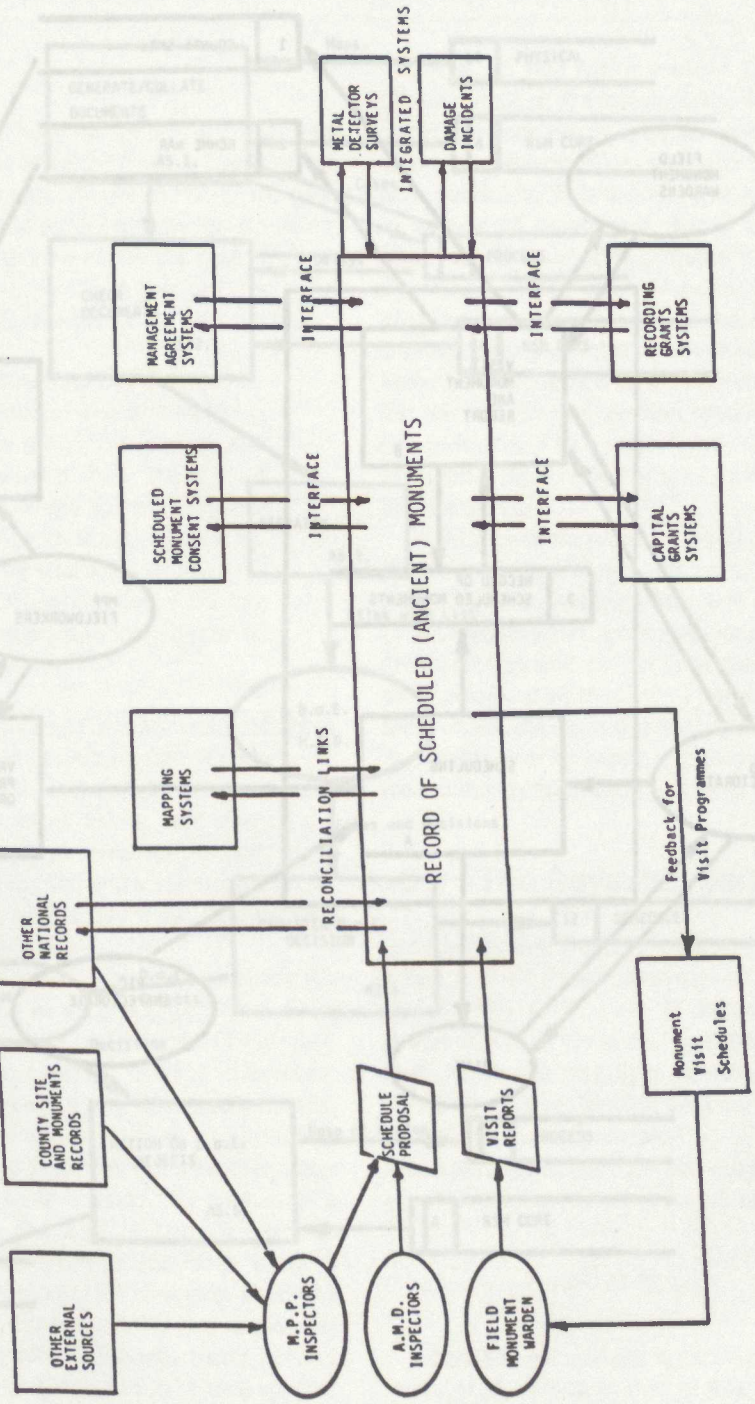

Figure 14.1: Outline of architecture for scheduled ancient monument systems

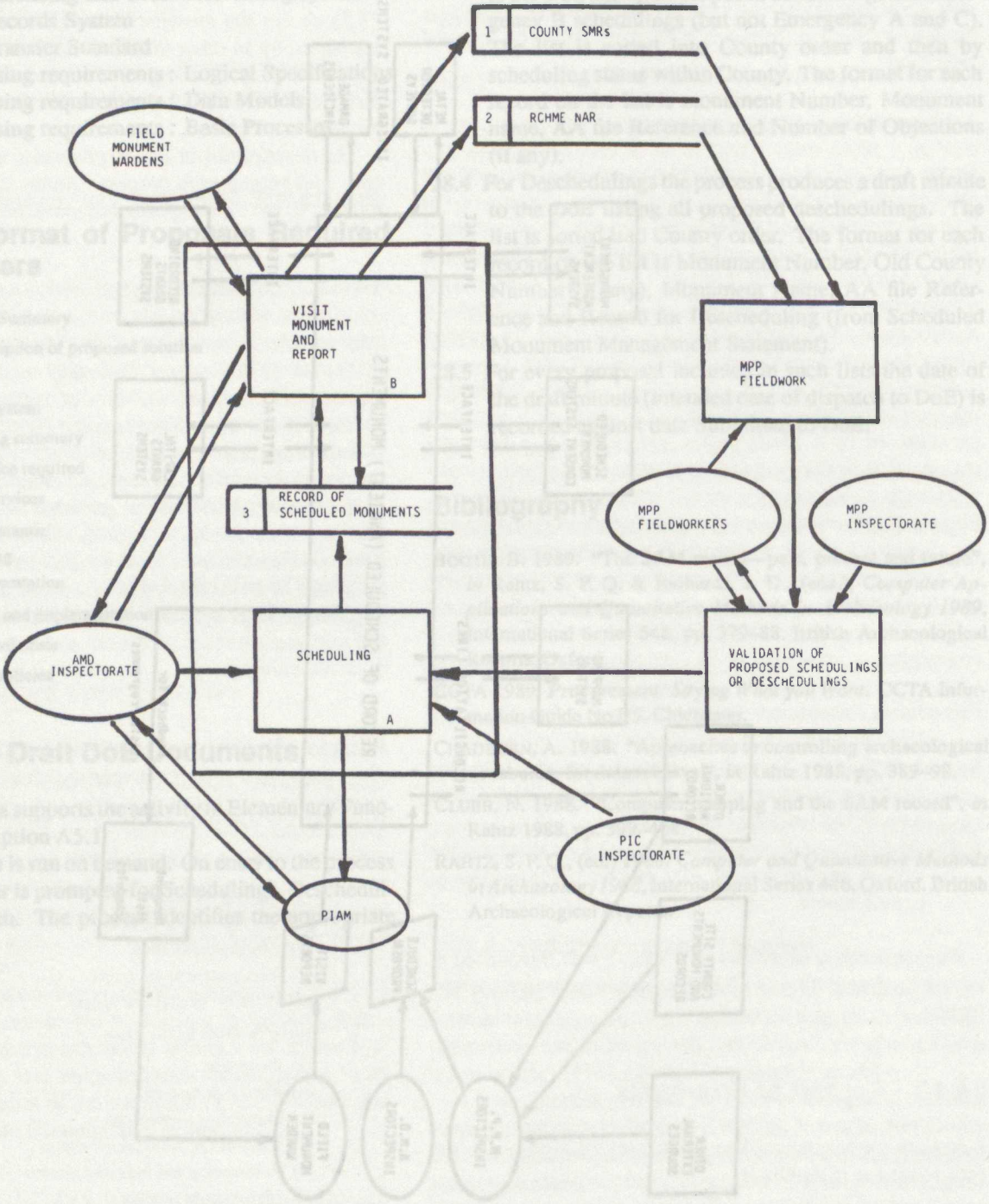

Figure 14.2: Top level DFD: systems to support record of scheduled monuments

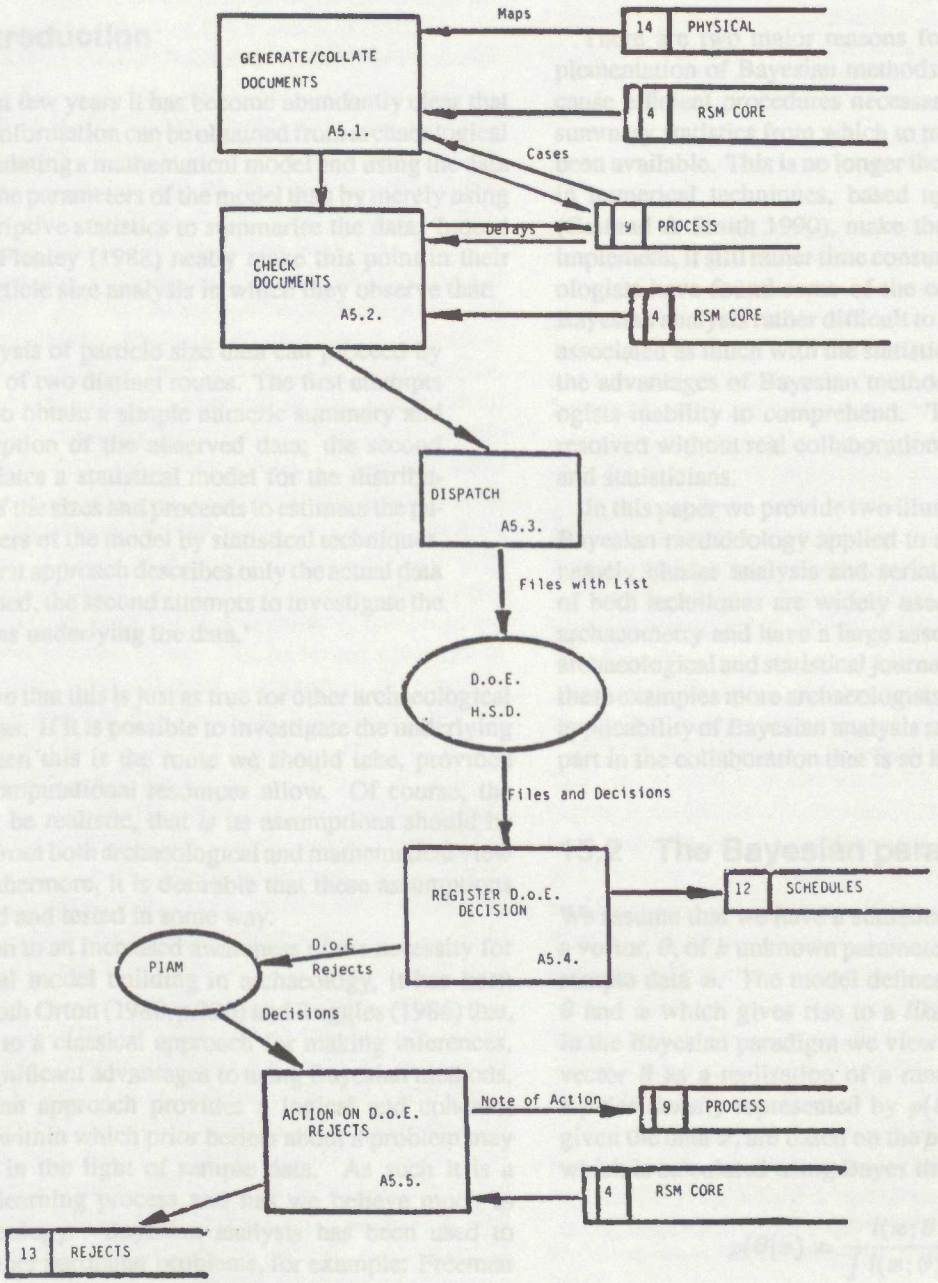

Figure 14.3: Submit proposals to the Department of the Environment