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BUREAU OF THE WORLD HERITAGE COMMITTEE

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Report on the development of the Information Management Systems Plan

SUMMARY

At its twenty-fourth session in Paris (June 2000), the World Heritage Bureau agreed that the strategy and budget for the Information Management System (IMS) needed to be discussed further. At that time the Secretariat had recruited a consultant to act as Senior Information Advisor (SIA) with the objective of producing, at the end of a three-month consultancy, a "Master Plan" for the implementation of an integrated information system for the World Heritage Centre. This report is extracted from the final report of the consultancy and describes the strategies adopted, outlines the scope of the proposed system, lists the activities to be undertaken and gives estimates of resources required.

Action required: The Bureau is invited to review the report and recommend that it and the indicative budget for 2001 be endorsed by the 24th session of the Committee

REPORT ON THE DEVELOPMENT

OF THE

INFORMATION MANAGEMENT SYSTEMS PLAN

EXECUTIVE SUMMARY

The World Heritage Convention is concerned with the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage considered to be of outstanding value to humanity. An implicit corollary to this is that **information** on World Heritage sites should also be preserved, protected and made available. This means that the management of information should be recognised as an essential and central activity in support of the implementation of the Convention. The World Heritage Centre was established to assure the day-to-day management of the Convention and act as the secretariat to the World Heritage Committee. It therefore needs to establish systems to ensure that the information is collected and managed in a consistent and co-ordinated manner and that methods used are cost-effective, efficient and appropriate to the tasks at hand, and to the available resources.

Since the Centre has very limited capacity for the implementation of information management systems, an **incremental** approach underlies all planning. The goal is that the capacity of the Centre will be built as systems are developed. The detailed plan presented herein addresses identified priority needs and is seen as being the first step in a long-term process. The plan is itself incremental, intended to provide identifiable benefits at intermediate points.

The planning strategy has two other elements. First, regarding the **information technology infrastructure,** the system will employ well-established, stable technologies with a Centre-wide strategy for the acquisition and use of all required equipment. Second, **organisational roles and responsibilities** for recording, quality assurance, processing and presentation of data need to be clearly defined and recognized.

A necessary condition for the Centre to move forward in implementing information management systems is that there is expertise in the Centre to guide the process on a continuing basis. Recruitment of one or more information systems professionals is recommended and also the building of partnerships with other organizations who have the required capabilities and experience.

The system planned will provide capabilities for the building and maintenance of an integrated base of data and for browsing and reporting by Centre staff. The data content to be included relates primarily to the management of site, State Party and international assistance information. The conceptual design allows for future expansion, i.e. in the longer term further developments will allow other types of data and information to be included, additional functionality to be provided, and system usage to be extended.

The plan is broken into three stages over a fourteen month time-frame.

Stage I: Design and consolidation (months 1-4)

- to produce detailed system specifications, to begin building capacity in the Centre and to make better use of existing information technology facilities

Stage II: Development and implementation (months 5-12)

- to acquire and install hardware, to develop, install and test the system, and to train users

Stage III: Operation and review (months 13-14)

- to review and assess system operation, and recommend further developments

The total expenditures estimated are $165,000, the bulk of which are for human resources. Only $20,000 is estimated for hardware on the assumption that the Centre has a regular operational budget line for replacement and upgrading of PC's for staff.

Investment in the development process is not without risk. In this case the risks relate mainly to the readiness of the Centre to use structured systems and to work through the process of change which is almost inevitable with the introduction of systems. Most Centre staff have intense operational time commitments to "get things done", leaving little opportunity for planning or assessment. To mitigate these risks, it is imperative that the whole process receives full management attention and support.

Contents

1 OVERVIEW

1.1 Introduction

The need to "streamline the management of information" in the World Heritage Centre was identified in the Auditors Report (1998). The Expert Group (1998) identified broad information management needs in a number of areas and laid out a phased implementation plan to put in place an integrated system, the first step of which was identification of requirements. This was intended to be the beginning of a step-wise development process in which the results of one step are used to define the detail of the next.

To implement certain of the recommendations of the 1998 meeting, in July 1999, the Centre reached an agreement with the European Space Agency (ESA) to undertake development of one or more prototypes to address some selected parts of the Centre's overall needs. The Expert Group met again in February 2000 to review the results of the first segment of ESA's work and the progress on the implementation of their recommendations as a whole. They reiterated the need for an information systems specialist to fully identify needs and to oversee the preparation of an overall plan for systems to meet those needs.

In May 2000 the Centre recruited a consultant to act as Senior Information Advisor (SIA) with the objective of producing, at the end of a three-month consultancy, a "Master Plan" for the implementation of an integrated information system. A contract for a Junior Information Officer was also established to provide support to the SIA and to the information technology needs of the Secretariat. The material presented here is extracted from the final report produced by the SIA.

1.2 Approach

The Centre itself has limited capacity for implementation of information management systems, both in terms of hardware and software, and in terms of skills and experience. Thus an incremental approach, including user consultation, is appropriate as it will allow for the required capacity building to be carried out in conjunction with the development steps.

The aim of the SIA consultancy was to complete the definition of requirements, and go somewhat into the System Design phase – to produce a conceptual level design. Conceptual database design presents a systematic organized view of an information system which is independent of the hardware and software that will be used to implement it. The approach has two main elements –

- The definition of data (information) in which the structure and relationships between the data elements are identified, and
- Processes (or functional analysis) in which the required functions required of the system are defined.

There are two aspects to considering application of systems to the operational processes of the Centre. The first, which is the primary focus for this work, is the way in which the processes relate to the building, maintenance and use of an integrated base of data. The second is looking at systems to support the processes themselves e.g. tracking events, audit trails of changes, etc. Priority has been given to the first since:

a) the requirement for an integrated base of data and information which will allow browsing and reporting is generally agreed to be a priority for the Centre, and

b) the processes themselves are not well defined and are subject to change.

This is in line with the recommendations made by the Expert Group (1998).

The requirements and conceptual design are based on consultations with WHC staff and principal stakeholder representatives, assisted by reports and recommendations of the "Expert Group" and preliminary work undertaken by the European Space Agency. Details are included in the report of the consultancy but emphasis in this document is on the systems planning.

1.3   Planning Strategy

There are three interlinked aspects to the plan – information technology, organisational considerations and functionality - and it is formulated with the following background strategy in each.

Information technology
In theory, the choice of Information Technology should be derived from an assessment of the needs for analysis, search and extraction, dissemination and archiving, and production of information outputs and products. Practical considerations must also be taken into account. The Centre cannot support, or afford, extensive "leading-edge" high techology IT infrastructure, nor is it essential. However it must also be recognised that investment is needed to build a stable infrastructure.

- Technology is a means to an end, not an end in itself
- Development effort and risk of failure will be minimized by employing well-established technologies
- Systems should be developed in the context of a Centre-wide information technology strategy
- Concomitant human resource development should be integral to all development stages

Organisational considerations
Organisational change is often inherent in the introduction of new information systems, both to deal with the possible introduction of new technology and to establish the "people and procedures" parts of the system as designed. It should be recognised that data structure, presentation, and content are all equally important but, in implementing information systems, different skills are required to ensure all three elements are dealt with effectively.

- Responsibilities for the provision of information technology infrastructure and services should be separated from responsibilities for data content

- Responsibility for the quality of data content must be defined
- Roles, responsibilities and procedures for originating and processing documents of various kinds must be defined
- Document structures that facilitate retrieval and archiving must be adopted (along with associated standards for key items such as dates, country and organisation names, site geographic locations, content keywording etc)

Functionality

It must be recognized that implementation of a system to serve all the information management needs of the Centre will not be a short-term undertaking. There are many processes and a spectrum of different types of data and information with varying requirements depending upon user perspectives. Furthermore, the requirements and priorities are likely to change over time, both as general Centre operations evolve and as user awareness of system capabilities increases.

- A phased approach will be taken to implementation of applications
- Development should expand from small-scale pilots and successes
- The implementation plan should include short-, medium-, and long-term objectives and deliverables
- The needs of stakeholders will be incorporated transparently through a continuing consultative process.

As stated above, the system plan focuses on the building and maintenance of an integrated base of data and provision of facilities to enable Centre staff to browse and retrieve information. This is a first step. In the longer term, it will be expanded in terms of the data content, the functionalities provided and the user community served.

2 INFORMATION MANAGEMENT SYSTEM PLAN

2.1 System Scope and Functionality

The primary focus of the system as envisaged is to establish and maintain an integrated base of data and information and to provide the capabilities for browsing and retrieval of information in a usable form.

As shown in Figure 1, this involves:

- entry of data and information into the system as they come into the Centre
- review of existing data and information and incorporation into the process where feasible
- assembly and integration into a database
- generation of results from browsing and retrieval
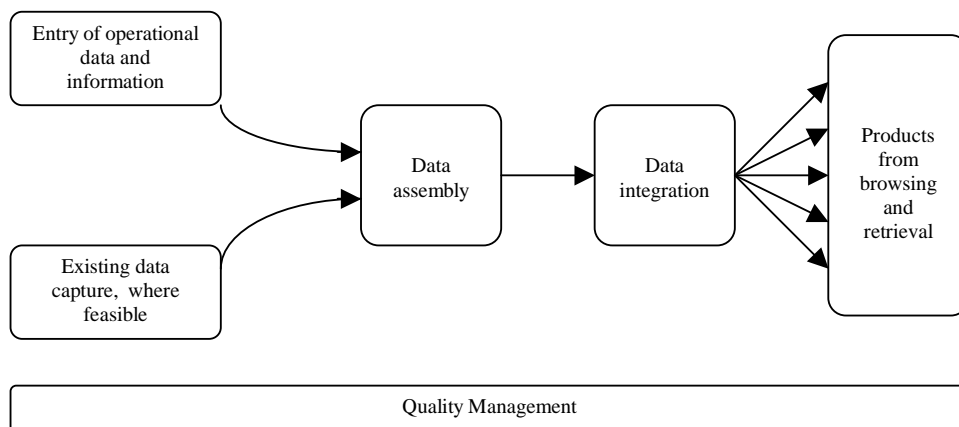- ensuring data quality throughout the functions.

Figure 1: Primary functions of the system

The overall structure of the integrated database is shown in Figure 2. The planned development is the first step of a long-term incremental process and a choice of what to include at the beginning has to be made. There are clearly some basic needs and some priorities which must be addressed. There is also a lack of detail in the definition of the information (and the process requirement) in some areas that would make it difficult to successfully deliver system capabilities in those areas and this is a factor in determining whether or not they are included in the scope of the system planned. However as the Centre defines requirements in these areas in the future, it is anticipated that the structure will still apply. Further planning and development will be needed but expansion of the system should be feasible. This is a design criterion which is in line with the overall strategy of providing functionality in a step-wise manner.

Processes

- Management of States Parties Information
- Global Strategy Implementation
- Management of the Tentative List
- Site Nomination and Inscription on the WHL
- Monitoring State of Conservation of Sites
- Management of the WH in Danger List
- Periodic Reporting
- Project Management (including Intl Assistance)
- Managing Statutory Documentation

Index Level Data requiring Data Model

Sructured Index Data and Metadata

Detail Level Data located through metadata and indexed storage

- Tentative Site Documents
- Site Nomination Files
- Advisory Body Evaluations
- State of Conservation Reports
- Regional State of WH Reports
- Statuatory Meeting Documents
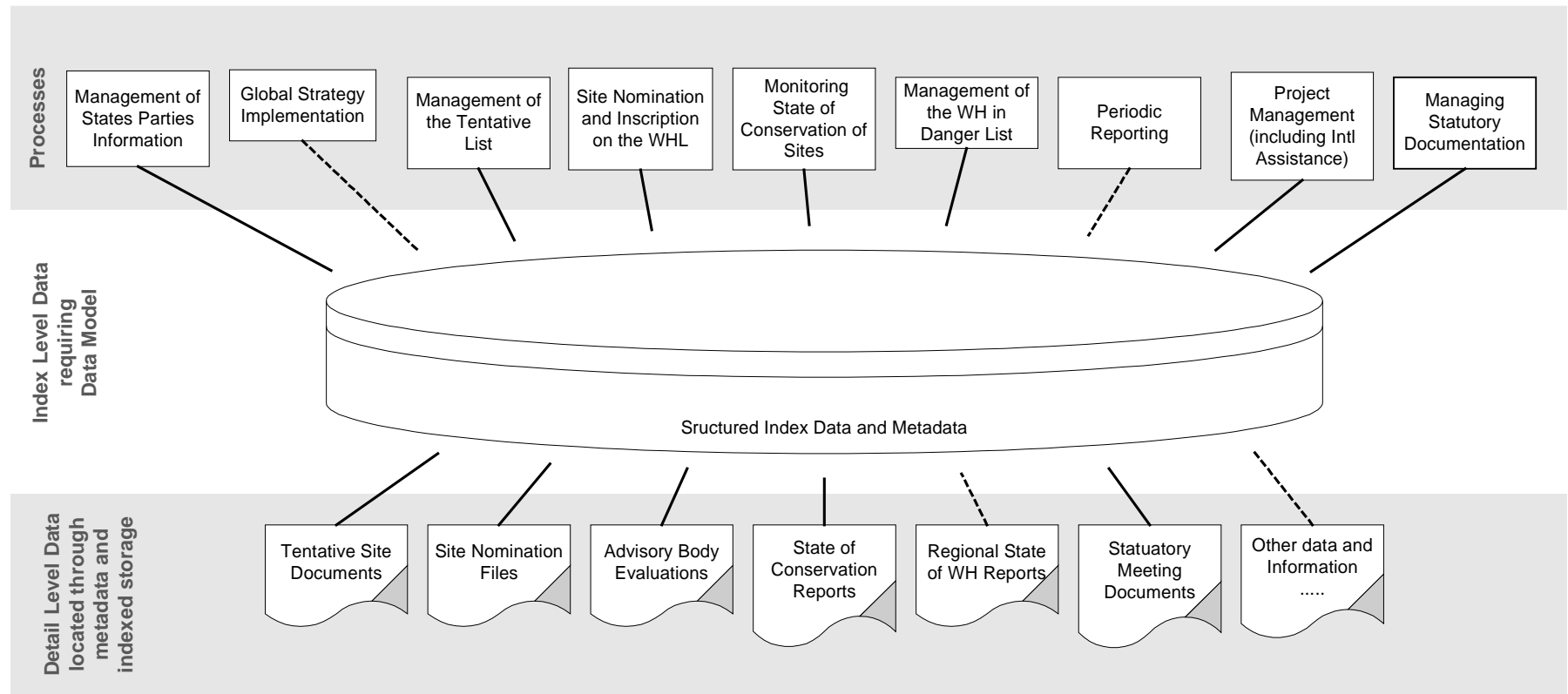- Other data and Information .....

Figure 2: WHC Processes and Data Structure

Note: The dotted lines indicate that the data and process requirements are not well-defined at this point.

2.2 Work Breakdown Schedule

The planning strategy outlined above considered three interlinked aspects – information technology, organizational considerations and application functionality. The proposed plan takes each of these into account and follows the strategies indicated for each.

The plan is broken into three stages:

>Stage I: Design and consolidation

>Stage II: Development and implementation

>Stage III: Operation and review

The activities required in each stage are described below, with an indication of the expected outputs. For Stage I, a more detailed list of tasks under each activity is given. Only the activity level is given for Stages II and III as the outputs from previous stages will refine those and define the tasks required i.e. the process is incremental.

However, there is a prerequisite to this – a stage "zero" – which is to put in place the required human resources to carry out the activities. The requirement for human resources is discussed in more detail below. Stage zero activities include the following:

- hire staff and/or consultants
- identify "partner organizations"
- identify strengths of partners and areas in which they can assist
- establish on-going relationships and cooperation
- pursue cooperation in carrying out the activities laid out in the following.

2.2.1 Stage I: Design and consolidation

Activity 1: Develop a full user and technical specification for the system envisaged in this report

- produce a physical database design
- develop detailed definitions of the data management functions (input, retrieval and update) to be provided, including sample user queries and description of interface
- consult with external stakeholders to ensure that the proposed system is not at odds with their views
- compile detailed specifications for hardware and software required
- identify possible areas for evolutionary development (see activity 2)

Activity 2: Incremental development (practical steps)

(Consideration should be given to undertaking one or more of the following tasks in concert with those in Activity 1)

- develop pilot Access databases for primary site data
- modify existing International Assistance database to meet identified requirements
- identify applications to improve general operations e.g. correspondence, mailing lists

- review Intranet structure[1] (providing information to Centre staff) and plan revisions to fit with system development and scope
- review Internet structure (providing information to the public) and plan revisions to fit with system development and scope

Activity 3: Endorsement and implementation of IT Strategy[2]

- adopt standards for hardware and software
- review and update (as required) the current inventory of hardware and software
- ensure that current equipment meets the standards identifying any requirements for upgrades and replacements
- establish on-going mechanisms (including financing) for maintenance and upgrade of IT facilities
- establish procedures for review and revision of standards
- ensure Centre staff are informed and aware of the standards and that they have input as changes are considered

Activity 4: Ensure that use of existing IT facilities is efficient and effective

- establish IT support service (help-desk function) within the Centre
- ensure that all staff have adequate basic training in the tools which they need to use to carry out their duties
- identify specific intermediate and advanced training applicable to tasks undertaken in the Centre
- establish procedures and good practices in the use of basic tools[3]
- ensure that staff have opportunities to share knowledge and experience (learning from each other)

Activity 5: Compilation and maintenance of a "manual of procedures"

(These tasks contribute to Activity 1 above)

- examine and document how the various types of information are currently handled
- identify areas where practices differ or are lacking
- identify and use appropriate standards, or guidelines, which can be used Centre-wide to make information more readily accessible and available
- confirm/define roles and responsibilities for the various data management functions to be carried out with each different type of information

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[1] Reviews of Intranet and Internet were begun by the Junior Information Officer and material is on file in the Centre.

[2] A draft IT strategy document has been produced during this consultancy. An equipment inventory was compiled from existing information.

[3] The Junior Information Officer produced draft notes for Centre staff on "good practices" in different areas.

These activities will produce the following outputs:

- detailed system specifications
- a detailed work plan for Stage II
- revised cost and time estimates for Stages II and III
- better use of existing IT facilities

2.2.2 Stages II and III

Activities in Stage II (Development and implementation) are:

- acquisition and installation of hardware and software and testing of all components
- delivery of appropriate training as required
- development of system according to specifications
- development of test plan and implementation schedule
- production of technical documentation and user guides as required
- installation and testing of system

The output of these activities will be a tested system ready for complete day-to-day operation.

Activities in Stage III (Operation and review) are:

- day to day system operations
- review of system functions and procedures
- assessment of operational benefits and identification of problems
- recommendations for modifications and future developments

These activities will produce as outputs:

- an assessment of the current status of information management in the Centre
- identified areas for enhancement and further development.

2.3 Human Resource Considerations

For the Centre to move forward in implementing efficient information management activities in any way, an absolute necessity is to ensure that there are the required skills available for the tasks. This is in fact a precursor to any of the activities above.

Apart from the recent consultancies (3 months each from a junior and senior consultant), the Centre has never had their own information systems professional staff. Clearly this kind of expertise is needed and must be provided in a continuous and consistent fashion. A sequence of different consultants, for instance, will not serve well as each will take time to understand the Centre and there will be no consistent vision.

Looking at the whole systems implementation process, from design to operation, there are several different types of skill required to carry out various functions. Delivery mechanisms to be considered include:

- recruitment of individuals to positions in the organization (with clearly defined roles and responsibilities)
- contracting out to commercial companies
- establishing contractual "partnerships" with other organizations who have the required capabilities.

The recommended approach is to use a mix of in-Centre staff and contractual arrangements. The former should provide support and overall direction initially, plus system administration with time; the latter could be used for specific design and development tasks. However the approach should remain flexible for the Centre to make optimum use of the skills and abilities of both individuals and organizations as they are identified.

Since continuity is important, consideration should be given to assigning the responsibility for the overall management of information systems implementation to a senior staff member in the Centre.

2.4 Resource Requirements and Timelines

The estimates of costs for the activities outlined are summarized in the following table.

	Human Resources	Hardware/Software	Total
Stage I (4 months)	8-10 person-months		$39,000
Stage II (8 months)	18-20 person-months	Server and licenses	$108,000
Stage III (2 months)	4 person-months		$18,000

Note that the totals do not include any allowance for upgrade and replacement of existing equipment, some of which is needed in the immediate future. There needs to be a regular operational budget line for this (estimated requirement $20K per annum).

The figures are based on the following:

Stage I

- estimated elapsed time – 4 months
- resources:
  - consultants – 2 staff in the Centre plus contracted expert advice
  - new PCs and possible upgrades

Note that it is anticipated that incremental development tasks (activity 2) may be initiated but will not be completed within the 4 months elapsed time.

Stage II

- estimated elapsed time – 8 months
- resources:
  - 2 consultants/staff in the Centre, plus contracted services (estimate, to be refined in Stage I)
  - NT server (to be confirmed), new PCs and possible upgrades
  - software license costs (estimate, to be refined in Stage I)

Note that the acquisition of an NT server is anticipated, assuming the Centre is able to put in place the necessary support (system administrator). The acquisition of a UNIX server is not recommended as a higher level of support tends to be needed. Likewise, in the choice of database management software, the costs are estimated based on the use of Access or the like. A package such as Oracle, while attractive, implies the need for a higher level of support which would be difficult for the Centre to provide.

Stage III

- estimated elapsed time – 2 months (for review), continuing operation
- resources:
  - 1-2 consultants/staff in the Centre, plus contracted expert advice
  - new PCs and possible upgrades

A chart showing timelines and indicating milestones is shown in Figure 3.

2.5 Risk Factors

Any system development activity faces possible pitfalls and must consider in advance how these can be anticipated and avoided. The table below indicates principal risk factors and possible mitigation strategies.

Risk factor	Mitigation strategy
Inadequate capabilities in the Centre to manage the implementation process	Identify people and institutions who can provide the spectrum of capabilities required Ensure steps taken to develop staff capacity in information management
Inadequate absorptive capacity in the Centre	Build staff skills and awareness
Centre staff expectations may be unrealistic	On-going consultation and dialogue e.g. through formation of small "working groups" for specific areas
Introduction of change	Identify tangible benefits that can be delivered in an incremental fashion

In general, the risks concern the readiness of the Centre to use structured systems and to work through the process of change. Most Centre staff have intense operational time commitments to "get things done", leaving little opportunity for planning or assessment. Even though improved information management will surely provide more productive time, it may be very difficult in the short term for officers and support staff to find time to participate in the development process and thus take ownership of the systems. To mitigate these risks, it is imperative that the whole process receives full management attention and support.

		YEAR 1												YEAR 2		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Further development - expansion of functionality, data content and user access
Stage I																
Activity 1		■	■	■	■											
Activity 2				■	■	■ *										
Activity 3		■	■	■	■											
Activity 4		■	■	■	■	■	■	■	■	■	■	■	■			
Activity 5		■	■	■	■	■	■	■	■	■	■	■	■			
Stage II						■	■	■ *	■	■	■ *	■	■ *			
Stage III														■	■	

Notes

Stage I: Design and consolidation
    Activity 1: Develop a full user and technical specification
    Activity 2: Incremental development
    Activity 3: Endorsement and implementation of IT Strategy
    Activity 4: Improving use of existing IT facilities
    Activity 5: Building a "manual of procedures"

Stage II: Development and implementation

* denotes completion of a development task i.e. some functionality implemented
    - at end of Activity 2
    - interim and final deliverables in Stage II

Stage III: Operation and review

Figure3: Timelines