

# JISC DEVELOPMENT PROGRAMMES

## Project Document Cover Sheet

### PROJECT PLAN

#### Project

<b>Project Acronym</b>	RepoMMan	<b>Project ID</b>	
<b>Project Title</b>	Repository Metadata and Management		
<b>Start Date</b>	June 2005	<b>End Date</b>	May 2007
<b>Lead Institution</b>	University of Hull		
<b>Project Director</b>	Ian Dolphin		
<b>Project Manager &amp; contact details</b>	Richard Green r.green@hull.ac.uk		
<b>Partner Institutions</b>			
<b>Project Web URL</b>	http://www.hull.ac.uk/esig/repomman		
<b>Programme Name (and number)</b>	Digital Repositories		
<b>Programme Manager</b>	Neil Jacobs		

#### Document

<b>Document Title</b>	Project Plan		
<b>Reporting Period</b>			
<b>Author(s) &amp; project role</b>	Richard Green (Project Manager)		
<b>Date</b>	30/08/05	<b>Filename</b>	projectplan-combo-11.rtf
<b>URL</b>			
<b>Access</b>	<input checked="" type="checkbox"/> Project and JISC internal		<input type="checkbox"/> General dissemination

#### Document History

Version	Date	Comments
1.0	July 2005	First submitted version
1.1	August 2005	Minor amendments suggested by NJ

## *Overview of Project*

### **1. Background**

From Callimachus to Dewey, the Library community has attempted to provide easy, or at least organised and rational, access to scarce resources. Whilst changes in printing and publishing have certainly modified the degree of scarcity, the artefacts a library houses remain necessarily limited. They are limited by physical bounds, by financial considerations, and frequently by the context in which they may be used.

By whatever shorthand the emerging “information age” is referred, it applies a fundamentally different set of parameters to issues surrounding academic and administrative publishing and access. The information age brings the challenge of organising access to abundant, rather than scarce, resources. In the current exploration and initial take-up of digital repositories by universities, this change of emphasis requires considered attention. Certain solutions, which applied in an earlier age of scarcity, may not be particularly suitable when set in the context of information abundance. Institutions must be prepared to combine the ability to learn from previous experience with an appropriate measure of challenging assumptions.

The growing interest in, and development of, a variety of local, regional and national repositories is one response to the abundance of digital materials. Much of the promise of institutional repository services, and a large part of the business case for such services, lies in their enabling the maximum use and re-use of rapidly growing digital asset collections. It is important to maintain the perspective, however, that development of institutional repositories forms part of an emerging and connected national (and potentially international) repository infrastructure. Given this perspective, and the significant number of institutional repository uses which may require interfaces to disparate systems, flexibility and support for interoperability standards and common specifications are not an optional extra, but essential criteria for a repository framework. This is likely to be further emphasised as the general movement towards Service Oriented Architectures within Higher and Further Educational Institutions gathers pace.

Technology-related projects have a disturbing tendency to seek information regarding user needs and requirements after the event of software development. The University of Hull has placed great emphasis on acting to reverse this. By a combination of traditional interviews and innovative web-based survey a considerable amount of user requirements data has been gathered for a range of purposes. The CREE Project survey, for example, which solicited detailed information regarding user search behaviour, obtained over 4,500 responses from the HE and FE community.

Whilst there is little shortage of technical and process-oriented obstacles to repository take-up and use, few feature as strongly in end-user comment as those surrounding the generation of metadata. Effective metadata underpins effective discovery, location and potential re-use. The creation of metadata, however, is both time consuming and laborious. This factor has stimulated the growth of a range of project and development activity aimed at the automation of metadata creation. Generally, these methods revolve around the extraction of key information from digital content itself. Although much of this activity might be classified as “R&D”, some of these methods are now escaping from the laboratory to the production environment.

Users of institutional systems should not need to repeatedly enter information regarding their role or preferences, particularly where this is already stored as part of an enterprise directory or portal deployment. Whilst this objective is frequently identified in business process redevelopment, it is less frequently applied to the creation of metadata. After authentication, applications should ideally access and communicate such information as

is required to provide a user with a seamless experience tailored to their need, role and preferences. Once stored, this information should be available to be consumed by other services, such as those underpinning an institutional portal, Virtual Research environment (VRE), Virtual Learning Environment (VLE), or a desktop application forming part of a Personal Learning Environment (PLE). By effectively “warehousing” person and role information from a variety of back-office systems in a portal profile or enterprise person directory, a potentially rich source of contextual metadata is created. This information may range from the simple name/email/organisational unit of the creator to enabling a choice between modules taught, potentially each with its own keyword profile. Applying this information to the creation of metadata after authentication to an institutional system such as a portal, VLE or PLE, by, for example, pre-population of editable fields, has enormous potential to both increase accuracy and decrease repetition in metadata creation.

## 2. Aims and Objectives

RepoMMan will:

- gather data supporting greater understanding of user needs, locally and potentially from a wider audience, requirements, processes and behaviour across a range of potential institutional repository uses. A particular focus will be on how users currently interact with systems and data that might be considered repositories in nature if not by name. The data gathered by these means at regular intervals during the lifecycle of RepoMMan will both underpin development, and form an essential component of the IDEAL project management process that we shall use. In addition it will provide a valuable resource for the Higher and Further Education community.
- take a combinatory approach to automated metadata creation. Where robust technology exists to extract descriptive metadata from simple digital objects (for example, office documents and certain types of digital image), RepoMMan will deploy and validate its use. This will be combined with a novel approach to the creation of contextual metadata, which will draw on the experience of the University of Hull institutional portal deployment.
- carefully evaluate available contextual information elements which might meaningfully be drawn together in this manner, and suggest a number of implementation routes based around the creation of a range of profiles, including role based “Personal Metadata Profiles”. RepoMMan will suggest implementation routes suited to institutions both with and without portal implementations.

## 3. Overall Approach

### *General*

The University of Hull has continued iteratively to develop a General Information Strategy, following its initial introduction as part of a JISC initiative in the late 1990s. The last such iteration, in the summer of 2004, identified the development of repository infrastructure as a critical strategic architectural element. Subsequent investigation and planning identified four overlapping repository development areas or strands:

- Learning objects

- Images
- Research artefacts and research outputs
- Meeting the needs of the Freedom of Information Act

RepoMMan will undertake investigative work across these four areas or strands, identify user requirements based on current and potential use in these areas, and validate the applicability of drawing contextual metadata from a range of institutional systems against the elements of common metadata schema. Detailed technical development work will provide a demonstrator in the specific area of research artefacts (shareable or private works in progress, notes, references, etc) and research outputs (for example, book chapters, conference papers, Electronic Theses and Dissertations (ETDs)). A further specific strand of technical development, building on user needs and process analysis, will investigate and establish interfaces between the research repository and a Collaborative and Learning Environment (C&LE) deployed for inter-institutional research collaboration. The Universities of East Anglia and Hull are currently deploying such an environment (the Sakai C&LE) to meet the collaborative needs of Humanities research under the JISC VRE Programme. The alignment of these two distinct activities will bring further substantial benefits for the community.

As may be inferred from the initial deployment priorities indicated above, key institutional criteria include considerable flexibility and support for standardised interfaces (preferably based around Web Services specifications). Despite the considerable strengths of DSpace, particularly as an ETD solution 'out of the box', lack of versioning together with questionable scalability effectively precluded its use. ePrints was similarly rejected due to the lack of proven flexibility for use with the wide range of institutional assets and scenarios identified and the technical platform. The considerable scalability offered by Fedora, together with ingest and export of information in standardised XML formats and documented Simple Object Access Protocol (SOAP) and Representational State Transfer (REST) interfaces at both object and repository level made it a logical choice as a basis for initial investigation and deployment. RepoMMan will validate this judgement providing a report on our experiences with Fedora after the first year of the project. Although Fedora presents a flexible repository framework, its successful deployment for any of the purposes indicated above relies on the provision of an equally flexible framework to support workflow. This will enable the repository framework to be adapted to meet the requirements of existing University processes, together with future needs highlighted by the user needs analysis and process mapping activities. RepoMMan will evaluate workflow frameworks supporting learning, research and administrative processes, and will validate this evaluation against a reference implementation based around research processes.

#### **Technical development strand**

An effective workflow engine will separate user experience from repository services, shielding the user from the complexity required to complete requests, and provide a simple but flexible task-based interface. In responding to user actions a workflow engine will coordinate requests with services defined in the workflow. Definition of the workflow processes needs to be complex enough to deal with the invocation of a number of different services, and make routing decisions based on the outcome of previous steps in the process.

Workflow issues have been recognized for some time as part of the articulation of Service Oriented Architecture. Central to this concept is the ability to address the orchestration of a number of discrete Web Services providing a coherent interface for the end user. These issues are currently being addressed by a number of standards development activities. Working on similar problems in a different domain space (e-Learning), the JISC ASSIS project identified the Oasis managed Web Services for Business Process Execution Language (WSBPEL) as an appropriate standard on which to base development activities.

The Fedora architecture has been designed to allow for individual repository functions to be called via the APIs. Both the Fedora Management API (API-M) and Access API (API-A) can be accessed using WSDL definitions over SOAP. The creation of a workflow engine can therefore use WSBPEL to define calls to one, or a number of, repository functions using the Web Services standards.

The adaptation and deployment of a workflow engine will of necessity adopt a layered model with separate tiers for presentation, Model-View-Controller (MVC) and process control. The presentation layer will be created as Java servlets, allowing deployment of the workflow engine on Java application servers, and JSR-168 portlets that can be used with any conformant portal framework or JSR-168 conformant container. The MVC layer will coordinate and dispatch requests and responses between the presentation and process control tiers. To reduce development effort and avoid unnecessary duplication of effort, the most likely implementation will use existing MVC functionality found in the Spring framework. Finally, the process control layer will, following the evaluation of available packages, use the WSBPEL runtime environment to call services and process responses according to the pre-defined workflow definitions.

Technical work around metadata population will focus in two areas. RepoMMan will conduct a summary investigation on the feasibility of deploying existing solutions to the extraction of metadata from simple objects. The implementation of pre-populating object entry forms with contextual metadata profiles, including the 'Personal Metadata Profile' will be provided via both JSR168/WSRP conformant portal framework, and with the Sakai Collaborative & Learning Environment. The core of this work will be based around personal information warehoused within a portal profile or Enterprise Directory, mapped to appropriate metadata schema.

The technical strand of RepoMMan will adopt a test-led approach to development. This ensures that the testing of software is an integrated part of the overall process and also leads to better conformance with standards for interoperability. Before programming activity takes place UML diagrams will be produced providing a full, documented understanding of both the problem and the proposed solution. The external evaluation of outcomes will be achieved where possible by releasing findings and tools to the community, especially the Fedora community, for review.

### **Research strand**

In considering the potential use and benefits of repositories within an institutional context it is important to recognise that many of the activities that will and can be undertaken within a repository already take place on an everyday basis. Users already interact with a range of data stores, even if they are not always aware of this or how the data is managed and/or structured behind the scenes. File stores, local library and archive collections, image collections, network resources etc are all accessed by users as part of their learning, teaching, research or administration activities. This existing use can help to inform the nature of how an institutional repository should be presented to users, in order to facilitate its take-up and use alongside existing services. An institutional repository also, of course, has the potential to offer additional functionality and services and it is essential to identify user requirements above and beyond what they can currently do to understand how such services could be implemented.

User requirements analysis will be undertaken to discover what stores of data and associated functionality are used. A local survey will be held, with the potential to be used with a wider audience, using established and successful techniques, deployed successfully by both the PORTAL and CREE projects, to gather data. This will be used to inform repository development, and specifically the implementation of research use

cases. The survey will be complemented by a series of detailed interviews with a cross-section of staff and students more closely to identify current and potential uses of repositories.

Metadata can take various forms, including technical metadata about the object itself, administrative metadata for contextual and/or local management purposes, and descriptive metadata describing the content. Manual generation of this metadata has revealed difficulties in ensuring that a full and accurate metadata record is stored with the object, limiting future use. There is increasing interest in automatic metadata generation, and in the use of metadata profiles that can be automatically attached to an object when it is deposited. The use of locally held information can offer a wide range of preset, and quality-assured, metadata and there is a need to investigate what requirements there are for this and how such profiles might be created.

The feasibility and requirements for metadata within preset personal metadata profiles will be investigated through extensions to the interviews carried out as part of the user requirements analysis and a functional requirements analysis of what would be required within such profiles. This will also include how acknowledged metadata standards might be utilised in this context. Specifically, the needs of those working in learning & teaching, research, and administration will be addressed, taking into account the multiple roles that users often have to adopt. The study will include consideration of how any data protection issues surrounding personal metadata will be dealt with.

The generation of any data or document automatically generates a range of data integrity factors that address the validity and authoritativeness of the data itself. All data has associated rights and the ongoing management of those rights is needed to ensure protection of usage; all data comes from somewhere and this provenance is key to a user being able to trust it for use in their study and/or work; and different data will have different levels of quality, and it is imperative that a user is aware and can be assured of the quality of what they are using. The user requirements analysis and the automatic generation of metadata profiles will raise issues in all three of these areas.

A literature review will be carried out toward the end of the project to ensure that the most up-to-date developments in DRM, provenance and QA can be taken on board. Specific emphasis will be given to the issues that have arisen in these areas from the user requirements analysis and investigation into personal metadata profiles. The literature review will inform the community on these issues and the project will carry out activity to investigate the application of possible solutions within the Fedora framework.

## 4. Project Outputs

ID	WP	Description
<b>Technical strand</b>		
D-D1	D1	Documentation listing available WSBPEL runtime environments, evaluation criteria and evaluation results
D-D2	D1	Deployment and documentation of WSBPEL runtime environment testbed
D-D3	D2	Selection of, and familiarity with, WSBPEL authoring tool
D-D4	D3	Iterative development of research user case
D-D5	D1	Java code and Spring configuration enabling integration between MVC and WSBPEL layers
D-D6	D1	Java servlets user interface
D-D7	D1	Java portlet user interface

ID	WP	Description
D-D8	D3	Report on experiences with Fedora in the first year of the project
D-D9	D4	Deployment of workflow engine in institutional uPortal framework
D-D10	D4	Deployment of workflow engine in collaborative environment
D-D11	D5	Report on investigation of methods to access user profile data from portal framework and other sources such as an enterprise directory
D-D12	D5	Implementation of methods to automatically populate metadata fields for users of both portal and collaborative environments
D-D13	D6	Report on feasibility of automatic extraction of object metadata
D-D14	D1	Completed workflow engine and Fedora integration with full QA
D-D15	D7	Full systems documentation including details of testing
D-D16	D7	Full systems documentation describing how tasks are completed
<b>Research strand</b>		
R-D1	R1	Criteria and toolkit for survey
R-D2	R1	Criteria and associated materials for research user interviews
R-D3	R1	Report on research user requirements survey data
R-D4	R1	Report on research user requirements interview data
R-D5	R2	Identification of feasibility and requirements for, and source of, core personal metadata profile
R-D6	R2	Identification of feasibility and requirements for, and source of, personal metadata profile for research users
R-D7	R1	Criteria and associated materials for admin & learner user interviews
R-D8	R2	Identification of feasibility and requirements for, and source of, personal metadata profile for learners
R-D9	R1	Report on admin & learner user requirements survey data
R-D10	R2	Identification of feasibility and requirements for, and source of, personal metadata profile for administration
R-D11	R2	Combined report on D5, D6, D8 and D10
R-D12	R1	Report on admin & learner user requirements interview data
R-D13	R3	DRM literature review examining issues raised by the user requirements analysis and metadata profile generation
R-D14	R1	Final collated report on user needs analysis identifying current repository usage, possible future usage and mapping of user repository process
R-D15	R3	Investigative report on the DRM implications of the issues raised by the user requirements analysis and metadata profile generation, with particular emphasis on the boundary of institutional and personal use. Identification of potential solutions.

## 5. Project Outcomes

RepoMMan will deliver significant benefit to two principle communities. The broad JISC and Higher Education community will particularly benefit from the research-based outputs of RepoMMan, together with the validation of workflow based web services approaches required by the further adoption approaches based around Service Oriented Architecture. Fedora specific aspects will benefit the more focussed community of universities evaluating or deploying Fedora as an institutional repository solution.

### *Particular benefits to JISC and HE*

- User requirements gathering methodologies and results will be applicable for use at other institutions, and assist them in assessing their current state of development and examination of local user requirements

- Repository use cases will be fed back to the community and will be grounded in existing user activity, rather than purely hypothetical repository uses.
- Particular emphasis will be given in the investigation and report on DRM issues to boundary issues between personal and institutional repositories. This will add to the body of research in this area to the general benefit of the community.
- The report on metadata generation covering specific requirements and addressing associated DRM issues will be fed into the continued discussion on this issue. This will be of particular relevance to those working in the context of an institutional portal or collaborative environment. The conclusions reached will also be of benefit to any institution developing or deploying an Enterprise Directory
- Further experience of Service Oriented Architectures, with a particular emphasis on coherent presentation of discrete services for the end user.
- Add to the growing body of experience in adopting or integrating generic workflow solutions to the needs of web services orchestration, thus contributing not only to requirements of the Repositories programme, but also the Distributed eLearning Programme (DEL), eLearning Framework (ELF) and Integrated Information Environment.

**Particular benefits to the Fedora community**

- Further, detailed investigations of how the Fedora framework can be integrated into other frameworks, such as, Spring.
- Experience and technical knowledge of how Fedora can be deployed in both an institutional portal framework and a collaborative environment
- A workflow engine addressing one of the recognised principle weaknesses of Fedora

## 6. Stakeholder Analysis

Stakeholder	Interest / stake	Importance
JISC and HE communities in general	Research based outputs	Medium
Other 'Digital Repositories' projects	Research based outputs	Medium
Fedora community	Integration and deployment of Fedora; workflow engine	High
Potential users (research staff, learners and administrative staff) at Hull	Use of project tools for automated metadata generation	High
Potential users (research staff, learners and administrative staff) elsewhere	Use of project tools for automated metadata generation	Medium

## 7. Risk Analysis

Risk	Probability (1-5)	Severity (1-5)	Score (P x S)	Action to Prevent/Manage Risk
Technical staff recruitment difficulties	3	3	9	Base work on in house skills/resources and student helpers

<b>Risk</b>	<b>Probability (1-5)</b>	<b>Severity (1-5)</b>	<b>Score (P x S)</b>	<b>Action to Prevent/Manage Risk</b>
Not enough user requirements data is collected to validate use cases	1	3	3	Ensure survey is widely taken up through targeted advertising, personal contact and departmental meetings Ensure an appropriate number of interviews take place across a representative sample of users
Data collected is too localised to Hull for wider use	1	5	5	Ensure data is gathered in a way that allows it to be extracted for generic use National basis for survey will ensure wider applicability
Data collected not detailed enough to develop use cases from or test environment within Fedora	3	3	9	Ensure an appropriate level of data is collected based on an assessment of requirements for the use cases  Run use cases past interviewees to ensure applicability and suitable depth
Implementation in Fedora is more problematic than thought	3	5	15	Ensure involvement with Fedora community to assist with any problems as they arise
Metadata generation work fails to provide a workable solution	3	1	3	Be prepared and able to adopt findings as they stand pending further investigation
External suppliers	N/A			
Legal	N/A			

## 8. Standards

<b>Name of standard or specification</b>	<b>Version</b>	<b>Notes</b>
Apache Axis		
JCP JSR168	1.0	Watching brief. Our development work will bear this in mind for possible future use when our tool is incorporated into the institutional portal

Name of standard or specification	Version	Notes
JCP JSR170	2.0	This will be reviewed to enable adherence as required and felt appropriate.
OAI-PMH	2.0	Watching brief so that storage of data can allow the use of this standard
OASIS WSBEPL	1.2	
OASIS WSRP	1.0	Watching brief. Our development work will bear this in mind for possible future use when our tool is incorporated into the institutional portal
OKI DR OSID		This will be reviewed to enable adherence as required and felt appropriate.
OMG UML	2.0	
SRW	1.1	
W3C SOAP	1.2	

We shall keep abreast of standards that a repository may use so that we can adopt them as required and useful.

## 9. Technical Development

RepoMMan will use the existing development skills of the team to build the tools and services coupled with Web Services technology to enable communication between the components. Standard object oriented design and programming techniques will be used, including UML, where appropriate. Systematic programming and testing methods will be employed.

## 10. Intellectual Property Rights

Software produced by the RepoMMan project will be released under the Educational Community Licence (ECL).

Fedora-related materials are covered by the Fedora licence at:  
<http://www.fedora.info/download/2.0/userdocs/distribution/license/license.html>

IPR in the content used will be determined by the IPR policy of the contributing organisation.

The project will consider the need for depositors' agreements under work package R3 (digital rights management).

The University of Hull will retain the IPR in reports and related documentation but grants JISC/HEFCE permission to make them freely available to the UK HE and FE communities.

## ***Project Resources***

### **11. Project Partners**

#### **Primary contractor:**

**The University of Hull**  
**e-Services Integration Group, Academic Services**  
Contact: Ian Dolphin i.dolphin@hull.ac.uk

#### **Subcontractors:**

**SC1. Richard Green, IT Consultant, 'The Nook' Barton Street, Barrow upon Humber DN19 7AR**  
Project management and aspects of research  
Contact: Richard Green r.green@hull.ac.uk

**SC2. Warwick Bailey, Icodeon Ltd, Studio 471, 48 Regent Street, Cambridge CB2 1FD**  
Technical consultant  
Contact: Warwick Bailey warwick@icodeon.com

### **12. Project Management**

The project management approach taken for RepoMMan closely follows the IDEAL (Initiating, Diagnosing, Evaluating, Acting, Learning) framework adapted from the Carnegie-Mellon Software Engineering Institute Capability Maturity Model (CMM). This development framework has been proven across a substantial number of projects, and is well suited to a project requiring the rapid iterative developments such as RepoMMan. Further details of the Capability Maturity Model and IDEAL framework are available from <http://www.sei.cmu.edu/cmm/>

RepoMMan will have a local management committee consisting of senior members of the project team and representatives of the local stakeholders.

#### **Project team:**

Ian Dolphin	Project Director	i.dolphin@hull.ac.uk	+44 1482 466841
Richard Green	Project Manager	r.green@hull.ac.uk	+44 7963 677730
Robert Sherratt	Technical lead	r.sherratt@hull.ac.uk	+44 1482 466834
Chris Awre	Repository specialist	c.awre@hull.ac.uk	+44 1482 465441
Simon Lamb	Technical developer	tba	
Warwick Bailey	Technical consultant	warwick@icodeon.com	+44 870 950 6582

The project manager will be working full-time on the project in management and research roles.

## 13. Programme Support

We would appreciate:

- information on any other JISC projects in other programmes using Fedora with which we should perhaps make contact
- a day meeting on IPR as related to digital repositories would probably be very useful
- a day meeting on Web Services and WSDL might be useful.

## 14. Budget

See Appendix A.

## ***Detailed Project Planning***

### **15. Workpackages**

See Appendix B.

### **16. Evaluation Plan**

<b>Timing</b>	<b>Factor to Evaluate</b>	<b>Questions to Address</b>	<b>Method(s)</b>	<b>Measure of Success</b>
> Nov 2005	[A] Survey	Is the survey a representative sample	Data analysis	Size of sample; range of respondents
> Sep 2006	[B] Usability of workflow engine	Does the software meet identified needs	Interview and focus groups	Positive responses over negative
> Dec 2006	[C] Population of personal metadata	Does software provide an acceptable level of metadata population	Retrieval testing Interview and focus groups	Successful retrieval rates Positive responses over negative
> March 2007	[D] Population of object metadata	Does software provide an acceptable level of metadata population	Retrieval testing Interview and focus groups	Successful retrieval rates Positive responses over negative
> April 2007	[E] Take-up	Is there evidence that RepoMMan's outputs are being taken up for institutional use	Feedback analysis	Number of enquiries Number of implementations (software) Number of page hits (DRM report)

## 17. Quality Plan

<b>Output</b>	D-D8 Report on experiences with Fedora in first year				
<b>Timing</b>	<b>Quality criteria</b>	<b>QA method(s)</b>	<b>Evidence of compliance</b>	<b>Quality responsibilities</b>	<b>Quality tools (if applicable)</b>
May 2006	FFP	Peer review	Letter	RG with ID, RS, CA & TD	

<b>Output</b>	D-D11 Report on extraction of personal metadata from portal etc				
<b>Timing</b>	<b>Quality criteria</b>	<b>QA method(s)</b>	<b>Evidence of compliance</b>	<b>Quality responsibilities</b>	<b>Quality tools (if applicable)</b>
Aug 2006	FFP	Peer review	Letter	RG	

<b>Output</b>	R-D11 Final report on contextual metadata				
<b>Timing</b>	<b>Quality criteria</b>	<b>QA method(s)</b>	<b>Evidence of compliance</b>	<b>Quality responsibilities</b>	<b>Quality tools (if applicable)</b>
Dec 2006	FFP	Peer review	Letter	RG with ID, RS	

<b>Output</b>	R-D14 Final report on User Needs Analysis				
<b>Timing</b>	<b>Quality criteria</b>	<b>QA method(s)</b>	<b>Evidence of compliance</b>	<b>Quality responsibilities</b>	<b>Quality tools (if applicable)</b>
Feb 2007	FFP	Peer review	Letter	RG	

<b>Output</b>	D-D13 Report on feasibility of automatic extraction of object metadata				
<b>Timing</b>	<b>Quality criteria</b>	<b>QA method(s)</b>	<b>Evidence of compliance</b>	<b>Quality responsibilities</b>	<b>Quality tools (if applicable)</b>
Mar 2007	FFP	Peer review	Letter	RG, RS	

<b>Output</b>	D-D14 Workflow engine				
<b>Timing</b>	<b>Quality criteria</b>	<b>QA method(s)</b>	<b>Evidence of compliance</b>	<b>Quality responsibilities</b>	<b>Quality tools (if applicable)</b>
Apr 2007	FFP	Unit testing	Testing documentation	RS, TD, WB	J-Unit

<b>Output</b>	R-D15 Investigative report on DRM implications				
<b>Timing</b>	<b>Quality criteria</b>	<b>QA method(s)</b>	<b>Evidence of compliance</b>	<b>Quality responsibilities</b>	<b>Quality tools (if applicable)</b>
May 2007	FFP	Peer review	Letter	RG with CA	

<b>Output</b>	D-D15 Systems documentation				
<b>Timing</b>	<b>Quality criteria</b>	<b>QA method(s)</b>	<b>Evidence of compliance</b>	<b>Quality responsibilities</b>	<b>Quality tools (if applicable)</b>
May 2007	FFP	Peer review	Letter	RG with RS & TD	

<b>Output</b>	D-D16 User documentation				
<b>Timing</b>	<b>Quality criteria</b>	<b>QA method(s)</b>	<b>Evidence of compliance</b>	<b>Quality responsibilities</b>	<b>Quality tools (if applicable)</b>
May 2007	FFP, usability	Focus group	Consensus	RG with RS & CA	
May 2007	FFP	Peer review	Letter	RG with RS & CA	

## 18. Dissemination Plan

<b>Timing</b>	<b>Dissemination Activity</b>	<b>Audience</b>	<b>Purpose</b>	<b>Key Message</b>
Jun 2005	A project website will be established during the first month of the project and updated regularly.	Community	Awareness Inform Engage Promote	Information about RepoMMan
As appropriate	Appropriate papers at conferences/meetings in the following areas: repositories, Fedora, information management, user behaviour, SOA, Web Services	Community E/stakeholders	Engage Promote	Information about RepoMMan
JISC calendar	Programme/cluster meetings	JISC E/stakeholders	Engage Promote	Sharing experience
As appropriate	Articles in appropriate journals, e.g., Ariadne, and at least one peer-reviewed publication in the field of information management	Community	Inform	Information about RepoMMan
As appropriate	Through the CETIS Metadata & DR SIG, Enterprise SIG, together with Fedora and broader Open Source communities, via conferences, meetings, and discussion lists	Community E/stakeholders	Awareness Inform Engage Promote	Information about RepoMMan
Twice yearly	Involvement in Community Source Week	Open Source Community	Engage Promote	Demonstrating development in progress of Open Source product

## 19. Exit/Sustainability Plan

This project will inform work over a three-year period to implement a repository framework at the University of Hull, and is based around core institutional objectives. The University of Hull undertakes to continue to disseminate output from both the research and technical project strands within the JISC, Sakai and uPortal Communities during the life of the project, and after project funding expires. This will build on Hull's active engagement with, and contribution to these communities.

Outputs from the project will continue to be used after the end of the project. The survey and interview criteria will be re-used as appropriate to support ongoing development of the repository. The use cases will continue to inform the repository development and will be amended, expanded and disseminated as required.

<b>Project Outputs</b>	<b>Action for Take-up &amp; Embedding</b>	<b>Action for Exit</b>
Survey criteria	Effective dissemination within JISC & HE	Ensure final version on project website
Interview criteria	Effective dissemination within JISC & HE	Ensure final version on project website
Use cases	Effective dissemination within JISC & HE	Ensure final version on project website
DRM report	Effective dissemination within JISC & HE	Ensure final version on project website

<b>Project Outputs</b>	<b>Why Sustainable</b>	<b>Scenarios for Taking Forward</b>	<b>Issues to Address</b>
Workflow engine and documentation	Need; addresses one of the principle weaknesses of Fedora	Software and documentation on project website for at least three years	Check that there were no unanticipated IPR issues

## Appendixes

### Appendix A. Project Budget

#### Project Plan Budget

	JISC Contribution Requested			Institution Contribution			Total
	YR1	YR2	YR3	YR1	YR2	YR3	
<b>Staff</b>							
Technical developer 1.0 fte							
Project director 15 d/y							
Domain specialist 0.1 fte							
Technical lead 0.1 fte							
Project manager 1.0 fte							
Technical consultant 18+7 d							
<b>Travel &amp; Subsistence</b>							
<b>Equipment</b>							
<b>Dissemination</b> activities							
<b>Evaluation</b> activities							
<b>Other</b>							
Consumables							
<b>Total</b>							
<b>Total requested from JISC</b>							

## Appendix B. Workpackages





Project duration: 24 months

Workpackage and activity	Earliest start date	Latest completion date	Outputs (clearly indicate deliverables & reports in bold)	Milestone	Responsibility
<b>YEAR 1</b>					
<b>WORKPACKAGE D1:</b> <u>Objective:</u> Development of three-tier workflow engine	Jun 2005	Apr 2007			
1. Develop evaluation criteria for WSBPEL runtime environment; research available candidates; evaluate against criteria			<b>D-D1: Documentation listing available WSBPEL runtime environments, evaluation criteria and evaluation results</b>	Sep 2005	ID, RS, TD, WB
2. Deploy and document adopted WSBPEL environment			<b>D-D2: Deployment and documentation of WSBPEL runtime environment</b>	Oct 2005	RS, TD
3. Develop integration mechanism between the Model View Controller and WSBPEL layers			<b>D-D5: Java code and Spring configuration enabling integration between MVC and WSBPEL tiers</b>	Feb 2006	TD, WB
4. Program Java servlet interface			<b>D-D6: Java servlet user interface</b>	Apr 2006	TD
5. Program Java portlet interface			<b>D-D7: Java portlet user interface</b>	Mar 2006	TD
6. Refine workflow engine; full QA			<b>D-D14: Completed workflow engine with accompanying QA</b>	Apr 2007	RS, TD, WB

WORKPACKAGE R1: <u>Objective:</u> User requirements analysis	Jun 2005	Feb 2007			
7. Develop criteria for on-line user survey			R-D1: Criteria and toolkit for survey	Aug 2005	ID, RG, RS, CA
8. Develop criteria for research user interviews			R-D2: Criteria and associated materials for research user interviews	Sep 2005	ID, RG, RS, CA
9. On-line survey; analyse and collate research user requirements survey data			R-D3: Report on research user requirements and survey data	Nov 2005	RG
10. Interviews; analyse and collate research user requirements interviews			R-D4: Report on research user requirements interview data	Jan 2006	RG
11. If necessary, develop criteria for learner & admin user interviews			(R-D7: Criteria and associated materials for learner and admin user interviews)	(Sep 2006)	ID, RG, RS, CA
12. If necessary, on-line survey; analyse and collate learner & admin user requirements survey data			(R-D9: Report on learner & admin user requirements and survey data)	(Nov 2006)	RG
13. If necessary, interviews; analyse and collate learner & admin user requirements interviews			(R-D12: Report on learner and admin user requirements interview data)	(Jan 2007)	RG
14. Collate all information into final user needs analysis for publication			R-D14: Final report on user needs analysis identifying current repository usage, possible future usage and mapping of user repository process	Feb 2007	RG

WORKPACKAGE D2:  <u>Objective</u> : Investigation of tools to author BPEL process	Oct 2005	Oct 2005			
15. Investigation of tools to author BPEL process			D-D3: Selection of, and familiarity with, WSBPEL authoring tool	Oct 2005	ID, RS, TD, WB

WORKPACKAGE D3:  <u>Objective:</u> Fedora evaluation	Nov 2005	May 2006			
16. Iterative development of software implementation based on research user requirements			D-D4: Iterative development of research use case	Nov 2005	RS, TD
17. Evaluate experiences with, and write summative report covering use of, Fedora during the first year. QA.			D-D8: Report on experiences with Fedora in project first year	May 2006	RG with ID, RS, CA & TD

<b>WORKPACKAGE R2:</b>	<b>Mar 2006</b>	<b>Dec 2006</b>			
<b>Objective:</b> Feasibility and requirements study of the use of contextual metadata for the identified institutional use cases					
18. From the user requirements analysis, investigate the requirements, source of and feasibility of extracting personal metadata			R-D5: Identification of feasibility and requirements for, and source of, core personal metadata profile	May 2006	ID, RG, RS
19. From the user requirements analysis, investigate the requirements, source of and feasibility of extracting research metadata			R-D6: Identification of feasibility and requirements for, and source of, personal metadata profile for research	Jul 2006	ID, RG, RS
20. From the user requirements analysis, investigate the requirements, source of and feasibility of extracting learning metadata			R-D8: Identification of feasibility and requirements for, and source of, personal metadata profile for learning	Sep 2006	ID, RG, RS
21. From the user requirements analysis, investigate the requirements, source of and feasibility of extracting admin metadata			R-D10: Identification of feasibility and requirements for, and source of, personal metadata profile for administration	Nov 2006	ID, RG, RS
22. Collate all above into single report with QA			R-D11: Combined report with QA	Dec 2006	RG

YEAR 2					
WORKPACKAGE D4: <u>Objective:</u> Workflow engine integration with institutional portal framework and collaborative environment	Jun 2006	Aug 2006			
23. Integrate workflow engine into uPortal framework			D-D9: Deployment of workflow engine in uPortal framework	Jun 2006	RS, TD
24. Integrate workflow engine into collaborative environment			D-D10: Deployment of workflow engine in collaborative environment	Aug 2006	RS, TD

WORKPACKAGE D5:  <b>Objective:</b> Implementation of metadata population from 'personal metadata profile'	Jun 2006	Nov 2006			
25. Investigate and report on methods to acquire user profile metadata from the portal and an enterprise directory. QA.			D-D11: Report on investigation of methods to access user profile data from portal framework and other sources such as an enterprise directory	Aug 2006	RS, TD, RG
26. Implement a system to automatically populate metadata fields from information located in the portal framework or collaborative environment			D-D12: Implementation of methods to automatically populate metadata fields for users of both portal and collaborative environments	Nov 2006	RS, TD

WORKPACKAGE D6:  <b>Objective:</b> Investigation of descriptive metadata extraction from objects	Dec 2006	Mar 2007			
27. Investigate and report on possible methods to automatically acquire object metadata. QA.			D-D13: Report on feasibility of automatic extraction of object metadata	Mar 2007	RS, RG

WORKPACKAGE R3:  <b>Objective:</b> Investigation into digital rights management issues	Dec 2006	May 2007			
28. Undertake DRM literature review in the light of the first 18 months' work.			R-D13: DRM literature review examining issues raised by the user requirements analysis and metadata profile generation	Jan 2007	RG, CA
29. Write report on the above with particular emphasis on the boundary of institutional and personal use. Identification of potential solutions. Full QA.			R-D15: Investigative report on the DRM implications of the issues raised by the user requirements analysis and metadata profile generation, with particular emphasis on the boundary of institutional and personal use. Identification of potential solutions.	May 2007	RG with CA

WORKPACKAGE D7:  <b>Objective:</b> Produce final versions of systems and user documentation	Apr 2007	May 2007			
30. Complete full systems documentation, including details of testing, for implemented work flow engine.			D-D14: Full systems documentation including details of testing	May 2007	RG with RS & TD
31. Complete full user documentation, including details of testing, for implemented work flow engine.			D-D15: Full user documentation describing how tasks are completed	May 2007	RG with RS & CA

Members of Project Team:

*ID Ian Dolphin*  
*RG Richard Green*  
*RS Robert Sherratt*  
*CA Chris Awre*  
*TD Technical developer*  
*WB Warwick Bailey (Icodeon)*