



## Project Document Cover Sheet

Project Information			
<b>Project Acronym</b>	Minibix		
<b>Project Title</b>	Minibix		
<b>Start Date</b>	2007-03-01	<b>End Date</b>	2008-03-31
<b>Lead Institution</b>	University of Cambridge		
<b>Project Director</b>	John Norman		
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<b>Partner Institutions</b>	University of Southampton Scottish Qualifications Authority (SQA)		
<b>Project Web URL</b>	<a href="http://qtitools.caret.cam.ac.uk/index.php?option=com_content&amp;task=category&amp;sectionid=4&amp;id=39&amp;Itemid=32">http://qtitools.caret.cam.ac.uk/index.php?option=com_content&amp;task=category&amp;sectionid=4&amp;id=39&amp;Itemid=32</a>		
<b>Programme Name (and number)</b>	<i>JISC Capital Programme (e-Learning), JISC Circular 4/06</i>		
<b>Programme Manager</b>	Myles Danson		

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1	2007-05-02	Draft prepared for JISC Programme Manager

# Overview of Project

## 1. Background

The University of Cambridge has played a significant role in the development of the IMS Question and Test Interoperability (QTI) specification. The University has been a member of the IMS Global Learning Consortium (IMS) since 2001, most recently under the new brand name of the University of Cambridge Local Examinations Syndicate (UCLES), *Cambridge Assessment*.

In 2003, work started on a collaboration between UCLES and the Centre for Applied Research in Educational Technologies (CARET) on an online system for the management and delivery of an experimental admissions test that is taken by applicants to certain undergraduate courses at the time of interview. The test is called the "Thinking Skills for Admissions" test (TSA) and was investigated as part of the recent JISC case studies in the use of e-Assessment project (see <http://kn.open.ac.uk/public/index.cfm?wpid=4927>).

Through the TSA project CARET developed a system for the administration of a dual-mode online and paper delivery system which is currently in its third year of operational use. The test is taken over a period of several months, with the majority of candidates sitting the on-screen version during December of each year. This requires there to be multiple versions (or 'forms') of the test available each year and hence a large supporting item bank.

The item bank system that CARET developed to support TSA represented the first prototype of a system for QTI-based item banking, in other words "item banking in XML" (IBIX). The scope of the tool was restricted to managing the simple multi-choice format questions used in the TSA test and only supports QTI version 1. This prototype item bank came to be known as "Minibix". Although operational in its support of TSA the tool is too limited to be used widely and the current technical approach (based on XSLT and dbxml for storage) needs to be updated.

In parallel, work on the QTI specification itself has advanced with Cambridge Assessment and later CARET supporting the work of Steve Lay as co-chair of the IMS QTI project team. JISC also funded the PyAssess project, carried out at Cambridge Assessment during 2005, which has provided some common libraries for handling QTI version 2 content using the Python programming language. PyAssess was used to demonstrate the use of web services for performing response processing at the JISC/CETIS Conference in November 2005. The PyAssess project also provided an opportunity for the work on the QTI migration script (itself written in Python) to be updated and distributed. This work is now supported by CARET through the QTI Tools website (<http://qtitools.caret.cam.ac.uk/>) which also hosts Graham Smith's seminal work on implementing QTI version 2 using the Java programming language. The migration script is in active use across the community and has already been evaluated for use in converting the Electrical and Electronic Engineering Assessment Network (e3an) item bank to QTI version 2.

## 2. Aims and Objectives

We will take the Minibix system and develop it to meet JISC's requirements for a QTI v2-based item banking system capable of supporting both high-stakes private item banks (like the one used for the TSA test) and low-stakes item banks for sharing questions suitable for formative assessment. The JISC requirements are summarised in the list of required features below:

- Discovery, deposit, and retrieval of QTI 2.1 items
- Usage tracking and item tagging by users
- Item validation workflow
- The management of item pools
- The creation by users of item sets for retrieval
- The use of RQP for item retrieval
- Provision of a means for the Item Authoring Tool to add and update items using a simple API (eg HTTP POST and PUT using packaged items)

- Retrieval of items and sets using IMS Content Packaging specification v1.2<sup>1</sup>
- Discovery using standard query mechanisms (eg SRU/SQL)
- Pre-viewing of items (eg using R2Q2 toolkit)
- Easily deployable and configurable on a range of platforms

The development work will be carried out in CARET during the first phase of the project (March 2007 to September 2007). The project will draw on additional use cases supplied by the SQA for private banks and Southampton University for public banks (drawing on experience with e3an). During the second phase (October 2007 to March 2008) the team at Southampton will carry out a case study of the use of Minibix for e3an and CARET will document their experiences in using the item bank to support TSA.

The system will be developed in Java using a three-layered approach providing outputs in the form of Java class libraries, a web-application exposing a set of web-services and a thin user interface application for the demonstrator. We will make use of existing Java class libraries where possible and build on an existing storage engine through a standard interface.

The resulting system will be available as an open source demonstrator with documentation enabling further development at each of the three levels by the JISC community and beyond. The project will document and demonstrate a set of services suitable for the integration of item banking systems with authoring and delivery systems (in collaboration with the companion projects in the JISC programme).

### 3. Overall Approach

#### Scope

The requirements listed above will be turned into user stories for implementation by drawing on the experience of the e3an team at Southampton, the SQA and also internally from the team at CARET that supports the existing TSA item bank. The SQA have already carried out much of the domain scoping required as part of the SPAID project and the resulting use cases will be used as a starting point. We will cross check our requirements with the work of UK-CDR (<http://www.ukcdr.manchester.ac.uk/dissemination/other/>).

The user stories will be prioritized for implementation and these priorities will be periodically reviewed throughout the project to ensure that the scope of the demonstrator and other software deliverables is the best possible match for the required outcomes given the fixed amount of development resource.

The application will be based on IMS QTI v2.1, IMS Content Packaging v1.2 and it will support metadata bound using both IMS LRM and IEEE LOM bindings. We will investigate the use of RQP for item retrieval but, at the time of writing, we do not believe that this protocol offers appropriate support. RQP does provide a possible extension point for adding a cloning engine to the item bank but this is beyond the scope of the project. We will investigate both SRU and OAI-PHM for exposing query interfaces and supporting metadata harvesting. We will use RSS for providing information about changes to the item bank and to support validation workflows (i.e., exposing individual feeds of outstanding tasks to individuals and reports to item bank managers). The CATS system (<http://www.assessmentbanks.info/>) will be investigated as a possible method for validating the approach to metadata harvesting.

On-screen previewing of items in the bank could be enhanced by linking an external engine through RQP, by talking directly to the R2Q2 rendering and response processing services or, more likely, by direct inclusion of the appropriate class libraries into the application.

The QTI specification identifies test construction as a separate process from both delivery and item banking, though it is more commonly integrated with the latter. Although largely out of scope for this project, we will create a minimal implementation allowing simple test construction according to basic criteria such as topic coverage and test size. More complex tests that use the advanced features available in QTI 2.1 will remain out of scope, as will the preparation of printed test forms.

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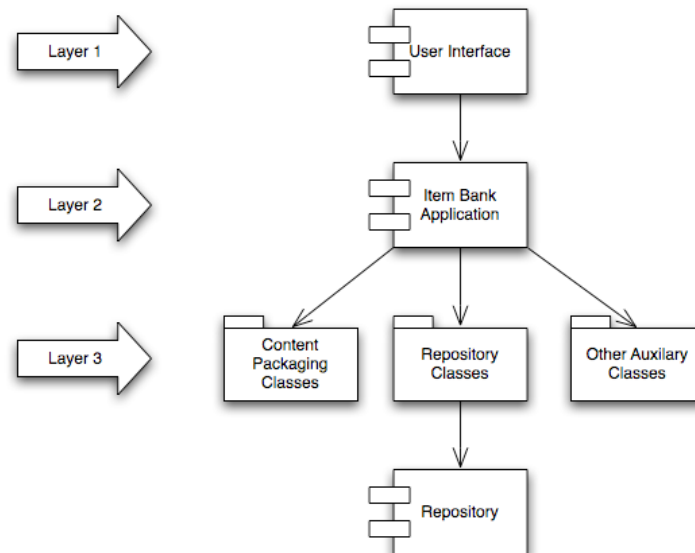
<sup>1</sup> IMS Content Packaging Specification <http://www.imsproject.org/content/packaging/>

The upload of results information and data analysis is outside the scope of the project. We will work with the SQA to provide the appropriate interfaces to enable these supporting tools to work with the item bank in future.

Authentication and authorization will be achieved by simple username and password over HTTP to encourage the use of a range of existing tools to access the item bank. We will provide an integration point for using an optional LDAP directory service for user information. Integration with Shibboleth is out of scope of this project.

### **Technical Approach**

We will implement the required item banking system using a three-layered approach:



Layer 1 is a thin user interface for the application. The objective for this layer is to ensure basic end-user functions of the item bank application are exposed through a simple web interface without the need for additional tools. We will develop this interface to W3C standards (XHTML 1.0) and WAI AA conformance. Presentation will be implemented using CSS allowing the user interface to be re-skinned to suit local needs.

Layer 2 forms the core of the item bank application, including authentication and authorization. It will expose a web-service interface that supports the full functionality of the application in a machine-machine form suitable for the user interface layer, and other client applications, to *consume*. During phase 2 of the project this interface will be refined following feedback from the authoring and delivery projects. The implementation of this layer will also help inform the service analysis report (D14 below). We envisage that this web-service layer will have a fairly coarse-grained document-style interface.

Layer 2 will also expose interfaces to support the search and retrieval of items through externally defined protocols such as SRU and appropriate RESTful approaches to viewing the contents of the repository, these might include WebDAV for content retrieval and RSS for providing user-orientated views of changes to the banks to support workflow.

Layer 3 constitutes a set of packaged java classes providing functions common to a wider range of assessment applications. For example, classes to represent IMS content packages with methods supporting the storage and retrieval of assessment information will be required by all three projects in the assessment part of the programme. We plan to work with the AsDel and AQuRate projects to develop a common technical architecture that will allow us to share some of the development cost of these classes.

Classes in layer 3 will avoid cross dependencies with application specific classes. For an example of this approach, and a potential starting point for classes required to handle IMS content packages and LOM metadata records, see the Reload project source distribution.

Where possible we will build layer 3 and layer 2 code on the existing SPAID toolkit.

## 4. Project Outputs

### **Milestones**

<b>Milestone</b>	<b>Date</b>	<b>Description</b>
M1	31/3/07	Project Infrastructure Complete
M2	1/10/07	Phase 1 Complete (Development Phase)
M3	31/3/08	Phase 2 Complete (Testing and Integration Phase)

### **Deliverables**

<b>Deliverable</b>	<b>Milestone</b>	<b>Description</b>
D01	M1	Collaboration plan to cover shared working practices with authoring and delivery projects where appropriate
D02	M1	Open source license for release of project source code agreed with JISC, delivery and authoring project teams.
D03	M1	Project Plan
D04	M1	Project overview document for JISC website
D05	M1	Project website including web-log for weekly project progress updates. Output to be maintained by the lead institution for 3 years after project end date.
D06	M1	Source code repository and bug-tracking system allowing public registration to encourage community contributions, maintained by the lead institution for 3 years after project end date.
D07	M2	Project Update Report, including financial statement
<i>D08-D-11 will be delivered at milestone M2 and updated at M3 as required</i>		
D08	M2/M3	Online demonstrator of Minibix on project website
D09	M2/M3	Downloadable installer for demonstrator available from project website.
D10	M2/M3	System administrators guide to installing and using Minibix.
D11	M2/M3	Minibix user guide.
D12	M3	Source code for libraries used in demonstrator with integrated unit tests, programmer-level documentation (e.g., through javadoc) and accompanying overview documentation.
D13	M3	Web-service API and documentation aimed at developers wishing to integrate other tools or to develop their own user-interface layer.
D14	M3	Service analysis report detailing relationship of implemented services to existing frameworks, recommendations for future service-orientated work and e-Framework contributions where appropriate.
D15	M3	e3an case study report from team at Southampton dealing

Deliverable	Milestone	Description
		following the trial implementation of Minibix in a low-stakes context.
D16	M3	TSA case study report from team at Cambridge following the trial implementation of Minibix as a replacement for existing high-stakes item banking tool
D17	M3	Final Report to JISC, including financial statement, recommendations for future work and lessons learned reports.

## 5. Project Outcomes

This development will make a significant contribution to the process of kick-starting the uptake of QTI version 2. By allowing item banks to behave in a similar way to learning object repositories it will also encourage the reuse of assessment content. In collaboration with AsDel and AQuRate we anticipate that a basic set of java-based tools for developing assessment systems will become available and will be used by other developers as exemplar code or as a starting point for the development of future assessment systems. In particular, the Minibix system should provide a suitable replacement for the existing e3an system and a starting point for the TSA item bank.

## 6. Stakeholder Analysis

Stakeholder	Interest / stake	Importance
University of Cambridge	Contribution of improved open source assessment tools suitable for use with Sakai system used as an institutional VLE/VRE	High
Cambridge Assessment	Require a replacement for the existing TSA item bank system	Medium/High
SQA	SQA is currently looking to develop an open source standards based item banking system and can see the potential for the Minibix system to form a part of an enhanced operational system	Medium
University of Southampton	Keen to experiment with QTIv2 based approaches to publishing the e3an item bank	Medium
JISC HE/FE Community	Desire interoperability of assessment systems and systems with the capabilities described by the QTIv2 specification - want to "kick-start" QTIv2 within their community. Keen to identify emerging assessment services for the e-Framework.	High
Assessment software developers, IMS community	Want to see exemplar QTIv2 code that they can use to inform their own developments or as a starting point for new products and services	Medium

## 7. Risk Analysis

<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>
Staffing: discontinuity of staffing causes breaks in project development	1	4	4	The development will be spread across a number of staff within CARET. This team approach reduces the chances of discontinuities due to staff changes
External suppliers: consultants are unable to deliver expected contribution to the project	2	2	4	External suppliers form only a small part of the proposed work programme. Replacement resource could be found amongst the three lead institutions for AQuRate, Minibix and AQuRate where necessary.
Organisational: Poor collaboration results in incompatible or disjoint assessment tools across the programme	3	4	12	We have already met with the leaders of the other projects and are currently circulating a collaboration agreement for approval across the three projects. A joint advisory group to oversee the combined work programme will help ensure good co-ordination.
Organisational: Open source codebase fails to foster an ongoing development community	4	3	12	In practice, most open source projects fail to attract enough support to become sustainable in the long term. We will actively seek opportunities to embed the project outputs into larger projects (e.g., Sakai). Requests for open source Java code implementing QTI are common within the developer community and we have chosen our technical approach to capitalize on this.
Organisational: Assessment strand projects fail to agree on project advisory group plan.	3	1	3	Provision has been made in the budget for project specific evaluation to be carried out by external consultants (Graham Smith and Steve Jeyes have offered to do this) should it prove impossible to agree on a shared advisory group.

<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>
Technical: scope too large results in project outputs that do not meet requirements	3	3	9	There are a large number of documented use cases for item bank systems, implementing them all in a small project such as this will be impossible. We'll use an agile approach to allow us to actively manage the scope to ensure that the project outputs achieve maximum utility at each release.
Legal: Failure to agree on appropriate licensing hampers cross-utilisation of code bases and fails to meet institutional goals for follow-up activities	4	4	16	In practice, failure to agree on suitable ownership and licensing of software is a common problem hampering the exploitation of project outputs in cross-institutional initiatives. We have placed top-most priority on getting this issue agreed with partner projects at the start to ensure that the development takes place on a firm footing using a license that provides few, if any limits on future exploitation.

## 8. Standards

<b>Name of standard or specification</b>	<b>Version</b>	<b>Notes</b>
IMS Question and Test Interoperability (QTI)	2.1	This is the main standard that the project will be using for question storage, though storage of questions in other formats (including opaque formats) will also be supported.
IMS Content Packaging	1.2	QTI now requires Content Packaging for interchange
IMS LRM	1.2.1	Still the most widely used metadata binding within content packages.
IEEE LOM	1.0	We may provide a LOM binding of metadata within packages if analysis of use cases suggests that this is necessary for interoperability.
OAI-PMH	TBD	To be evaluated
SRU	TBD	To be evaluated
RSS	2.0	As a method of exposing changing views of the item bank content
JSR-170	TBD	To be evaluated as storage interface for the item bank
LDAP	TBD	To provide simple interface to authentication and user/group management

## 9. Technical Development

We will maintain source code in a subversion source code repository to aid collaboration and release management. We will use the JIRA system for issue tracking during the project. CARET already runs both of these tools for a number of projects and will extend the access control mechanism to support a wider community during the first month of the project.

It is proposed to use an iterative development method with a tight release-schedule, with updates of the code modules being released at the end of each calendar month throughout the project. In order to control regression and to help facilitate the coding of the requirements themselves a test-driven development approach will be taken. The tests themselves will be made available as part of the distribution and will form the detailed documentation of the module requirements. The tests will also enable others to update the modules for their own purposes with confidence, something that is notoriously hard to do with open source software that has not adopted a rigorous approach to testing.

## 10. Intellectual Property Rights

Project outputs will be the property of University of Cambridge, those developed in collaboration with AQuRate and AsDel will be shared, or assigned as appropriate. All source outputs will be licensed under an open MIT or Apache-style license. We believe that it is important to release code under a license that allows both commercial and non-commercial uses to encourage suppliers to integrate with or build on the project outputs. Compatibility with the licenses used by the companion projects is essential and this forms a significant part of the collaboration agreement currently under review by the lead institutions.

We may draw on code already developed under similar license by Graham Smith, or by Steve Lay and also from the R2Q2 project subject to licensing negotiations currently taking place.

## *Project Resources*

### 11. Project Partners

The following individuals have been identified as contributors to the project and suitable consultancy contracts will be drawn up to cover their expenses, and those of their teams where appropriate. Given the relatively small size of these commitments a consortium agreement is not recommended.

#### ***Hugh Davis, University of Southampton e3an Team Leader***

Hugh Davis is the Director of Education with responsibility for eLearning Strategy at the University of Southampton and heads the Learning Technology Research Group within Electronics and Computer Science. He will head the e3an team at Southampton where the original project consortium was based under the leadership of Dr Su White.

#### ***Mhairi McAlpine, Scottish Qualifications Authority SQA Advisor***

Mhairi McAlpine is a Project Manager in the Computer Assisted Assessment Team at SQA. She will be responsible for contributing use cases and assisting with testing of the Minibix system.

#### ***Dr Graham Smith, CAL Consultant***

Graham will assist with the evaluation of the system, including the preparation of content to provide test data sets.

#### ***Partner Projects: AsDel and AQuRate***

It is worth noting that a collaboration agreement is being sought with the other two assessment projects funded under the same JISC call to cover issues of shared interest, in particular licensing of code, co-ordination of management and facilitation of an over-arching advisory group. The partners are currently considering a consortium agreement for this purpose.

## 12. Project Management

Day-to-day project management will be undertaken by Steve Lay, CARET. Steve works under the direction of John Norman, CARET Director. Steve Lay will be the main point of contact with the JISC Programme Manager. Project management will be co-ordinated with the partner projects, through a Joint Management Committee which will meet on a regular basis (initially weekly) through telephone/virtual meetings. Details of project management activities are given in WP1 below and in Appendix B.

Technical development will be carried out by the CARET development team, in association with the project partners listed above. Full contact details for all CARET staff members are given on the CARET website, see <http://www.caret.cam.ac.uk/contact/people/index.html>. Given the iterative nature of the project work will be allocated within the team at each stage as appropriate.

## 13. Programme Support

CARET is willing to extend existing source code repository and collaboration tools (such as the JIRA system for issue tracking) to the partner projects and to ensure that these remain open to foster an open source community within the JISC HE/FE sector and internationally. However, the desirability of a programme-wide or even community wide system to help support such activity would no doubt be of some benefit.

## 14. Budget

There are no planned changes to the budget since the proposal was submitted, details are given in Appendix A.

## *Detailed Project Planning*

## 15. Workpackages

Further details of workpackages are given in Appendix B.

### ***WP1: Project Management and Reporting***

WP1 starts at the beginning of the project and runs throughout the project.

The project manager will work with JISC and the project manager(s) of the companion assessment authoring and assessment delivery projects to develop a collaboration plan to cover issues of shared working practice (D01) and to agree a suitable open source license to ensure that the main project deliverables are compatible with each other (D02). A three-way start-up meeting is envisaged.

The project manager will submit the project plan to JISC (D04) and provide the project description for the JISC website (D04).

CARET infrastructure team will re-configure the existing QTI Tools website to enable its use as the main project website and the project manager will start the weekly project progress updates (D05). They will also extend CARET's existing code repository and bug-tracking systems to allow easy registration of external developers for full participation in the project, including registering developers from partner institutions and those associated with the companion projects (D06).

The project manager will submit an update report at M2 and a final report at M3, including financial statements generated by the CARET Financial Officer (D07 and D17).

### ***WP2: Project Advisory Group & Evaluation***

It is strongly recommended that an advisory group be created to advise all three assessment projects. The project advisory group will be formed at the start of the project and be available to provide advice and guidance throughout the life of the project.

The advisory group will meet at the start of the project, around milestone M1 and then meet again at the end of phases 1 and 2 (M2 and M3 respectively).

Meetings will be co-ordinated with Assessment SIG or conference activities where possible to encourage attendance and reduce costs. Demonstrations of the tools produced by the three projects will be an integral part of the meetings at M2 and M3. The advisory group will also review drafts of the other M3 deliverables and, in particular, provide input into the recommendations for future work at this stage.

### ***WP3: Software Development***

The software development team will commence work at the start of the project and work producing the main project deliverables in phases 1 and 2 (M2 and M3 respectively).

The project manager will co-ordinate input from the TSA Team, the team at Southampton and the SQA Advisor to formulate the use cases and requirements into a format suitable for prioritization and management of the software development process.

At the end of phase 1 the online demonstrator (D08), installer (D09), system administrators guide (D10) and user guide (D11) will all be distributed as beta versions ready for evaluation by the case study teams during phase 2.

During phase 2 the software development team will provide support to the case study and integration teams, modifying and updating the released toolset in response to feedback culminating in the final release of the toolset at the end of the phase (D08-D11). The team will also work on the source-level documentation (D12) and the web-service API (D13) for release at the end of the project and contribute to the integration team's work on service analysis.

### ***WP4: Integration***

The integration team will start work during phase 2 and be a shared activity with the two companion projects. The team will work with the development teams to refine the APIs offered by the tools across all three projects. They will document their findings in a service analysis report (D14) published at the end of the project which will include the high-level functional specification and technical architecture model employed across the combined project outputs as well as identifying gaps for future work.

The integration team will submit findings documented in D14 to the e-Framework as appropriate.

### ***WP5: e3an trial***

During phase 2, the team at Southampton will take the beta release of Minibix and evaluate its use for managing the e3an item bank reporting back to the software development team and providing input to the integration team.

The team at Southampton will prepare a case study report detailing their findings (D15) including a review of issues encountered with the tool, the associated specifications and any recommendations for improvement (including those acted on during the project).

### ***WP6: Thinking Skills for Admissions Trial***

During phase 2, the TSA team at CARET/Cambridge Assessment will take the beta release of Minibix and evaluate its use for managing the high-stakes Thinking Skills for Admissions item bank.

The teams findings will be reported in a case study as per WP4 (D16).

### ***WP7: Dissemination & Programme Activities***

The project manager will attend the CETIS Assessment SIG meetings (typically 3-4 per year) to report on progress while also providing an opportunity for face-to-face meetings with project partners and the managers of the companion projects.

We anticipate that a more significant set of workshop sessions should also be planned for to target users, implementers and tool developers separately. This would be best run as a combined activity with the companion projects and will be undertaken as part of the project team's duties to the overall programme dissemination plan.

The project manager undertakes to disseminate the findings to the IMS consortium's own development process, in particular their planned activity in the area of web services for assessment.

## 16. Evaluation Plan

Timing	Factor to Evaluate	Questions to Address	Method(s)	Measure of Success
Phase 1	System Scope	Is the system scope functionally useful?	Comparison with SQA/SPAID and UKCDR use cases	Plan caters for at least stated core requirements
Phase 2	Minibix system	Is Minibix suitable for item bank implementation?	e3an and TSA case studies based on mini implementation projects	Positive result from proof of concept implementations
Phase 2	Ease of use as a platform for community	Can Minibix be built, installed and run by others?	SQA to evaluate software through testing	SQA are able to download and test software
Phase 1+2	Project direction	Are Minibix and the partner projects AsDel and AQuRate progressing in a way useful to the stakeholders?	Project advisory group	Stakeholder interest in follow up work, implementation plans etc.

## 17. Quality Plan

Output	Minibix Software System				
Timing	Quality criteria	QA method(s)	Evidence of compliance	Quality responsibilities	Quality tools (if applicable)
Phases 1+2	Code works to specification and is well structured	Test first development to capture and encode requirements	Code base builds and passes software tests	Project Manager	JUnit for Java source

## 18. Dissemination Plan

Timing	Dissemination Activity	Audience	Purpose	Key Message
Start Phase 1	Advisory Group Meeting	Stakeholder representatives	Review of project plans	Tell us if we are going in the right direction

<b>Timing</b>	<b>Dissemination Activity</b>	<b>Audience</b>	<b>Purpose</b>	<b>Key Message</b>
Phase 1	Technical meeting	Partner projects	Exchange of detailed plans and discussion of technical approaches	This is how we propose to implement the system
End Phase 1	Advisory Group Meeting	Stakeholder representatives	Check direction, review beta-tools and formulate future plans	Tools are now ready for testing and evaluation. Where do we go next?
End Phase 2	Advisory Group Meeting	Stakeholder representatives	Review outputs, action future plans	Outputs are now ready for use.
Phase 1+2	Technical Demonstrations	CETIS Assessment SIG	Demonstrate tools to wider community	Tools are available for future development and implementation
End Phase 1	Technical Demonstration	IMS Community	Widen open source community	Java-based tools for building QTI v2 now available
Throughout	Project Website/Blog	Project watchers across whole community	Regular updates on progress and management of expectations	Project is active and progressing against planned schedule

## 19. Exit and Sustainability Plans

<b>Project Outputs</b>	<b>Action for Take-up &amp; Embedding</b>	<b>Action for Exit</b>
Service Models	Submitted to e-Framework, promotion through accessible technical demonstrators and documentation and appropriate talks/conference papers	Maintenance plan for distribution channel, identifying champions for future promotion (e.g., other implementers, standard or specification bodies such as IMS GLC)
Minibix system	Implementation in e3an and TSA, associated contributions to Sakai platform	Maintenance plan for distribution of deliverables and tools for community building. Identification of future stakeholders and plan for appropriate contributions to support maintenance and/or subsequent development.

<b>Project Outputs</b>	<b>Action for Take-up &amp; Embedding</b>	<b>Action for Exit</b>
Knowledge and experience gained during development	Documentation on project website and associated blog - contribution to external forums.	In practice, maintaining the knowledge and skills gained during short-term projects is an ongoing problem for all institutions. Plans for maintaining a community need to be made long before the project comes to an end if discontinuities are to be addressed. Follow-up plan needs to be implemented at exit.

<b>Project Outputs</b>	<b>Why Sustainable</b>	<b>Scenarios for Taking Forward</b>	<b>Issues to Address</b>
Minibix system	Potential to become embedded into ongoing projects within stakeholder institutions	Continued development of system to support future stakeholder projects	Possible fragmentation of stakeholder community due to diverging pressures/requirements of individual implementations
Service interfaces	Potential interface to multiple delivery/authoring solutions	Adoption through standard or specification body	Appropriate body to promote work, geographic scope.



## Appendix B. Workpackages

<b>WORKPACKAGES</b>	<b>Month</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>
<b>1: Project Management and Reporting</b>		X	X	X	X	X	X	X	X	X	X	X	X	X
<b>2: Project Advisory Group</b>		X	X	X	X	X	X	X	X	X	X	X	X	X
<b>3: Software Development</b>			X	X	X	X	X	X	X	X	X	X	X	X
<b>4: Integration</b>								X	X	X	X	X	X	X
<b>5: e3an Trial</b>								X	X	X	X	X	X	X
<b>6: TSA Trial</b>								X	X	X	X	X	X	X
<b>7: Dissemination &amp; Programme Activities</b>			X	X	X	X	X	X	X	X	X	X	X	X

Project start date: 01-03-2007

Project completion date: 31-03-2007

Duration: 13 months

Note that in the workpackage summary that follows below the milestones are identified as:

**M01:** 2007-04-01 (End of startup phase)

**M02:** 2007-10-01 (End of Phase I)

**M03:** 2008-04-01 (End of Phase II)

Workpackage and activity	Earliest start date	Latest completion date	Outputs (clearly indicate deliverables & reports in bold)	Milestone	Responsibility
YEAR 1 (13 months)					
<b>WORKPACKAGE 1: Project Management and Reporting</b>  <i>Objective: Ensure that the project is well managed and that reporting relationships are maintained</i>	2007-03-01	2008-03-31			
1. Prepare Collaboration plan in association with partner projects			<b>D01: Collaboration Plan</b>	<b>M01</b>	Project Manager
2. Agree an open source license with contributors, JISC and partner projects where appropriate			<b>D02: Open Source License</b>	<b>M01</b>	Project Manager
3. Prepare a project plan for JISC			<b>D03: Project Plan</b>	<b>M01</b>	Project Manager, CARET Financial Officer
4. Prepare a project overview for JISC website			<b>D04: Project Overview</b>	<b>M01</b>	Project Manager
5. Create a project website with associated project blog			<b>D05: Project Website (+blog)</b>	<b>M01</b>	Project Manger, CARET Infrastructure team
6. Create a source code repository and an issue tracking system for the project.			<b>D06: Source Code Repository + Tools</b>	<b>M01</b>	Project Manager, CARET Infrastructure team

7. Prepare a project update report, including a financial statement			D07: Project Update Report	M02	Project Manager, CARET Financial Officer
8. Prepare final report, including a financial statement			D17: Final Report	M03	Project Manager, CARET Financial Officer
<b>WORKPACKAGE 2: Project Advisory Group and Evaluation</b>  <u>Objective:</u> to ensure that stakeholder communities are kept updated on project activities and to identify follow up activities	2007-03-01	2008-03-31			
9. Create schedule of meetings in association with partner projects if an advisory group is feasible				M01	Project Manager, Partner Projects
<b>WORKPACKAGE 3: Software Development</b>  <u>Objective:</u> to deliver the Minibix item banking system	2007-04-01	2008-03-31			
10. Software development, including continuous use case collection and prioritization, to be delivered in beta form at M02 and final form at M03			D08: Online Demonstrator D09: Downloadable Installer D10: Installation Guide D11: User Guide	M02 + M03	Project Manager, Software Development Team
11. Document source code at source level and write integrated tests			D12: Source code and documentation	M03	Software Development Team
12. Identify and add integration points for services to authoring and delivery tools			D13: Web-service API and documentation	M03	Software Development Team

<b>WORKPACKAGE 4: Integration</b>	2007-10-01	2008-03-31			
<u>Objective:</u> to ensure that service boundaries are exposed to the wider community					
13. Prepare a service analysis report for inclusion in e-Framework and distribution to assessment community, for example, through the FREMA semantic wiki			D14: Service-analysis report	<b>M03</b>	Integration team
<b>WORKPACKAGE 5: e3an Trial</b>	2007-10-01	2008-03-31			
<u>Objective:</u> to evaluate the use of Minibix in a low-stakes/formative context					
14. Evaluate Minibix beta release as a tool for managing the e3an item bank			D15: e3an Case Study Report	<b>M03</b>	e3an Team
<b>WORKPACKAGE 6:TSA Trial</b>	2007-10-01	2008-03-31			
<u>Objective:</u> to evaluate the use of Minibix in a high-stakes summative context					
15. Evaluate Minibix beta release as a tool for managing the TSA item bank			D16: TSA Case Study Report	<b>M03</b>	TSA Team
<b>WORKPACKAGE 7: Dissemination and Programme Activities</b>	2007-03-01	2008-03-31			
<u>Objective:</u> to ensure that the JISC community, and relevant national and international groups are made aware of the project and its findings					
16. Attending JISC programme meetings, CETIS Assessment SIG and other relevant dissemination activities, including maintaining up-to-date information on the project website			There are no specific deliverables identified for this workpackage		Project Manager

