

E-Learning Proposal Cover Sheet

Cover Sheet for Proposals (All sections must be completed)	JISC Capital Programme
----------------------------------------------------------------------	-------------------------------

Name of Capital Programme: e-Learning			
Bid for Call: (Please tick ONE BOX ONLY, as appropriate)			
Supporting lifelong learning			
<input type="checkbox"/>	Call I – HE in FE	<input type="checkbox"/>	
Technical developments to support learning and teaching			
<input type="checkbox"/>	Call II – Assessment a) Item Authoring Tool b) Item Bank Software <input checked="" type="checkbox"/> c) Assessment Delivery Tool	Call IV – Admissions demonstrators a) structured personal profiles, course entry profiles and pre-assessment; b) improving applicant feedback; c) accreditation of prior experiential learning; d) e-portfolio based admissions.	<input type="checkbox"/>
<input type="checkbox"/>	Call III – Technology supported learning environments	Call V – Course description and discovery	<input type="checkbox"/>
Call VI – Course validation			
Call VII – Domain maps			
Name of Lead Institution:		University of Southampton	
Name of Proposed Project:		ASDEL: Assessment Delivery Engine for QTIv2 questions	
Name(s) of Project Partner(s):			
Full Contact Details for Primary Contact:			
Name:	Dr Gary Wills		
Position:	Lecturer		
Email:	gbw@ecs.soton.ac.uk		
Address:	School of Electronics and Computer Science University of Southampton Highfield Southampton SO17 1BJ		
Tel:	023 8059 2831		
Fax:	023 8059 3218		
Length of Project:		13 months	
Project Start Date:		Project End Date:	
1 March 2007		31 March 2008	

Total Funding Requested from JISC: £99,894		
Funding Broken Down over Financial Years (April – March):		
Apr06 – Mar07	Apr07 – Mar08	Apr08 – Mar09
£9,113	£90,781	
Total Institutional Contributions: £115,165		
Percentage Contributions over the Life of the Project:	JISC 46.5%	PARTNERS 53.5%
Outline Project Description		
<p>In this project we aim to build an assessment delivery engine to the IMS Question and Test Interoperability version 2.1 specifications that can be deployed as a stand-alone web application or as part of a SOA enabled VLE.</p> <p>The engine will provide for: delivery of an assessment consisting of an assembly of QTI items, scheduling of assessments against users and groups, delivery of items using a web interface, including marking and feedback, and a Web service API for retrieving assessment results. In the second phase, the project will integrate with the other projects in this call on item banking and item authoring to provide a demonstrator, and will contribute to its evaluation and the evaluation of the project and its integration with the other projects under the Assessment call.</p>		
I have looked at the example FOI form at Appendix A and included an FOI form in the attached bid (Tick Box)	YES <input checked="" type="checkbox"/>	NO
I have read the Circular and associated Terms and Conditions of Grant at Appendix B (Tick Box)	YES <input checked="" type="checkbox"/>	NO

ASDEL: Assessment Delivery Engine for QTIv2 questions

1 INTRODUCTION

- At last year's JISC/CETIS conference it was recommended that the community needed to 'kick start' the use of the IMS Question and Test Interoperability version 2 (QTIv2) specifications¹. At this meeting it was felt that in order to achieve this, there needed to be a robust set of tools and services that conformed to the QTIv2 specification. R2Q2 is a recently funded JISC project that successfully implemented a rendering and response engine for a single question (also termed an item), for which there are sixteen types described in the specification and implemented in R2Q2. While this is useful it does not implement the whole of the specification regarding a test process. The specification detailed how a test is to be presented to candidates, the order of the questions, the time allowed etc.

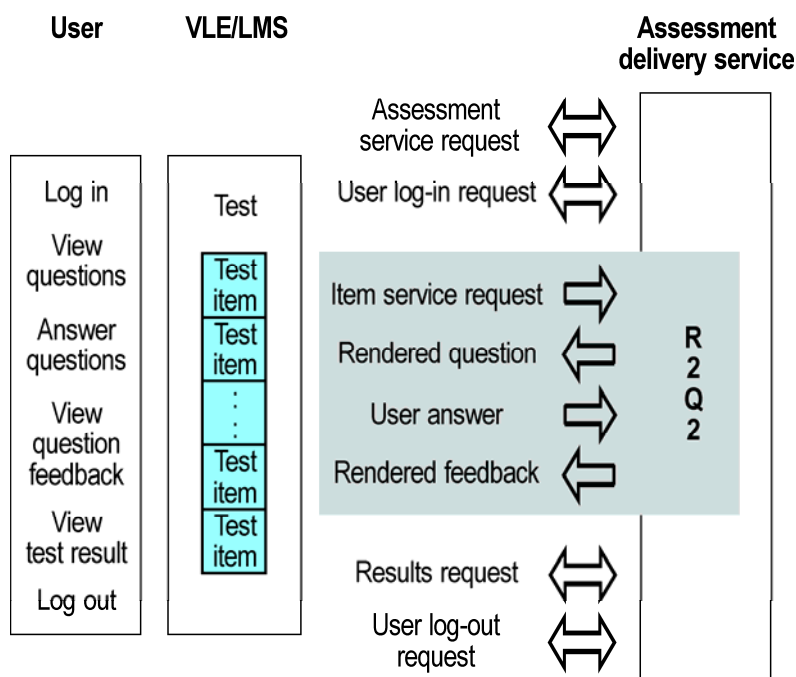


Figure 1. Overview of the test process.

- Formative assessment aims to provide appropriate feedback to learners, helping them gauge more accurately their understanding of the material set. It is also used as a learning activity in its own right to form understanding/knowledge. It is something lecturers/teachers would love to do more of but do not have the time to develop, set, and then mark as often as they like. A formative e-assessment system allows lecturers/teachers to develop and set the work once, allows the learner to take the formative test at a time and place of their convenience, possibly as often as they like, obtain meaningful feedback, and see how well they are progressing in their understanding of the material. McAlpine: (2002, p6)² also suggests that formative assessment can be used by learners to "*highlight areas of further study and hence improve future performance*". Steve Draper³ distinguishes different types of feedback, highlighting the issue that although a system may provide feedback, its level and quality is still down to the author.

¹ <http://www.imsglobal.org/question/>

² Mhairi McAlpine: (2002) Principles of Assessment, *Bluepaper Number 1*CAA Centre, University of Luton, February.

³ STEPHEN W. DRAPER (2005) FEEDBACK, A TECHNICAL MEMO DEPARTMENT OF PSYCHOLOGY, UNIVERSITY OF GLASGOW, 10 APRIL 2005: <HTTP://WWW.PSY.GLA.AC.UK/~STEVE/FEEDBACK.HTML>

- 3 The JISC funded reference model for assessment, FREMA, has developed a number of Service Usage Models (SUMs) on assessment, one of which is for summative assessment. This identifies the services required for a complete summative process including many of the administrative functions. Any implementation of e-assessment, if it is to support flexible and tailored assessment for non-traditional and workplace learners as well as those in higher education, needs to provide for both summative and formative assessment. The overall process of taking a test is shown in Figure 1. While the process focuses on formative assessment, it still meets the core requirements of the summative SUM.
- 4 In this project we aim to build a test engine to the IMS Question and Test Interoperability version 2.1 specifications that can be deployed as a stand-alone web application or as part of a SOA enabled VLE.
- 5 The project will be developed in two phases. The first is the technical development of the engine in accordance with the IMS specification and based on the IMS schema. It will provide for: delivery of an assessment consisting of an assembly of QTI items, scheduling of assessments against users and groups, delivery of items using a web interface, including marking and feedback, and a Web service API for retrieving assessment results. The second phase will integrate with the other projects in this call on item banking (and existing item banks funded by JISC, for instance e3AN, SPAID) and item authoring, use existing outputs from JISC projects (JoinIn) to provide user and group information, and support projects that may be funded under the April 2007 circular. Details of both phases are described in section 2.

2 PROJECT DESCRIPTION

- 6 The aim of this project is to provide a test engine to comply completely with the IMS QTIv2.1 specification, to integrate with the other JISC funded project from this call on item banking and item authoring, and to support projects that may be funded under the April 2007 circular. While not required for this implementation, the software will be developed to be extensible with a view to support future provision for sequencing and adaptive logic in assessments and other future enhancements. The project will be developed in two phases.

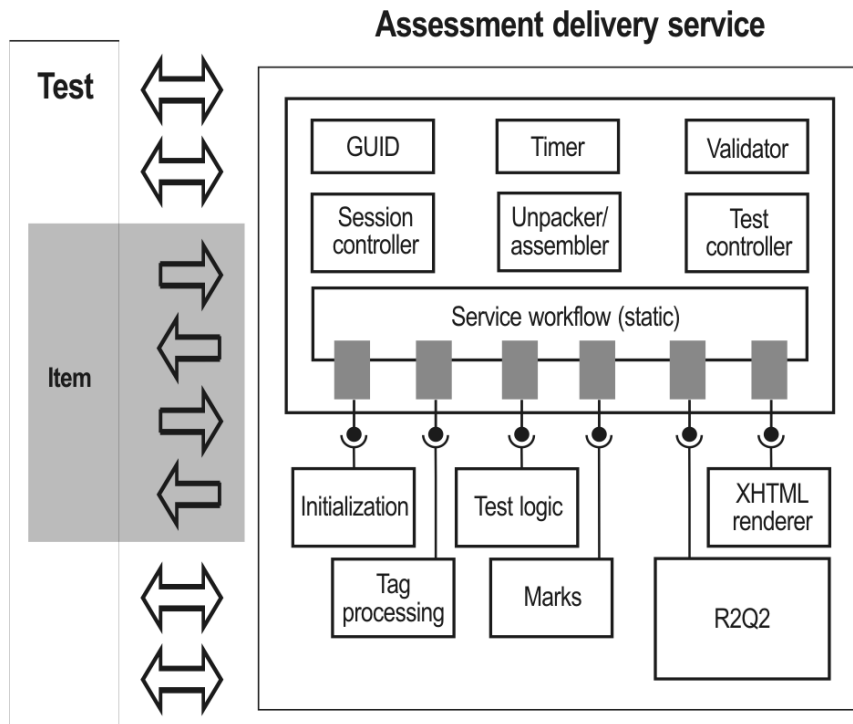


Figure 2. Architecture for the Assessment Delivery system.

- 7 We will liaise with the two other projects involved in the Assessment call II of the e-Learning Programme to agree collaboration and form a Projects Steering Group. While initial discussion have taken place with other consortiums who may bid under the Item Authoring (Kingston) and Item Banking (Cambridge) calls, this bid is not reliant on those specific consortia being successful.

- 8 Phase 1 is the technical development of the engine in accordance with the IMS QTIv2.1 specification and in accordance with the JISC e-framework approach of using web services in a Service Oriented Architecture (see Figure 2). The engine will take in a test either in the form of a QTIv2 schema or as an IMS Content Package. If the test arrives as a Content Package the engine will unpack and assemble the items into an assessment. In either case, the engine will import any additional material (images, videos, etc) required by the test, and it will then process the xml and deliver the test as scheduled to the candidate via a Web interface. Feedback will be given to the candidate and the marks processed in accordance with the schema sent to the engine. The results can be retrieved through the engine API.
- 9 Throughout Phase 1 we will ensure liaison and coordination with the Item Authoring and Item Banking projects. At the end of Phase 1 we will have a 'Show and Tell' event, possibly at a CETIS Assessment SIG.
- 10 Phase 2 will integrate the deliverables from the Item Authoring and Item Banking projects, and produce an integrated demonstrator. At the end of Phase 2 we will provide a second 'Show and Tell' of the integrative demonstrator to a wider JISC audience.
- 11 In Phase 2 we also intend to use existing outputs from JISC projects (such as JoinIn) to provide user and group information. As part of this phase the project will include the use of standards to ensure integration, such as IMS Enterprise Services Specification 1.0 for group information, and search and retrieval of questions from item banks using SRU/CQL and RQP. Finally, this phase will provide support for projects that may be funded under the April 2007 circular. The work package descriptions provide further details.

2.1 Project Management

- 12 Project management will take place at three distinct levels of direction and responsibility.
- 13 **Projects Steering Group.** At the highest level, a Projects Steering Group will be established with the two other projects involved in the Assessment call II of the e-Learning Programme, comprising the three Principal Investigators, the three project managers, and those members of the project teams and co-investigators as may be required at particular times. It is intended that the Steering Group will meet at the start of the project, half-way through Phase 1, at the end of Phase 1/start of Phase 2, half-way through Phase 2, and at the end of Phase 2.
- 14 The start of the project will require the steering group to develop an agreed project plan. In particular, the issues that will need to be discussed include:
 - From Figure 4 (dashed boxes and lines) it can be seen that a Test Construction tool is not part of this call. This is an indispensable element of Phase 2. Therefore an elementary tool needs to be developed by the three successful projects to be available at the start of Phase 2. Within our project we plan to have a number of reference tests developed and these would inform the development of any elementary test construction tool.
 - Achievement of interoperability for WP5 will need to be supported by all three projects using a common code repository, common tools (e.g. xml parsing), and common test scenarios.
 - Evaluation of Phase 2 requires an integrated demonstrator and a coordinated set of evaluation activities, which might range from usability evaluations to field trials.
- 15 **Project Management group.** Within the Assessment Delivery project, a Project Management group will meet monthly, comprising the investigators, the project manager, and the project technical team.
- 16 **The Project Technical team** will have weekly project meetings chaired by the project manager and involving any investigators as required. These monthly and weekly meetings will monitor progress against objectives, consider and decide upon project plan adjustments, and make recommendations to the Projects Steering Group as necessary.
- 17 The project will be located within the **Learning Technologies Group at Southampton**. It will retain a senior researcher (Soton RF) to manage the project day to day, to organize the liaison with the wider community, to arrange the dissemination, and to take responsibility for reporting. The project will employ two programmers (one RF, one RA) to work on implementation. The Southampton Team successfully implemented the Rendering and Response engine for QTIv2 question types (R2Q2).
- 18 We have made provision for consultancy input to the project:
 - **e-Services Integration at Hull** will provide consultancy to the project in the form of the time of Robert Sherratt & Dr Steve Jeyes, who have experience in such projects at the steering and technical implementation level. Their input to the FREMA project was invaluable, and we will exploit their skills and experience in a similar way.

- **Dr Graham Smith** and **Dr Steve Lay** have been closely involved with QTI for many years, and will provide expertise in both the QTI standard and in the implementation of assessment systems.

2.2 Work plan and Deliverables

- 19 The project comprises five work packages (W1-W5) and nine deliverables (D1-D9). The deliverables are described in the work package that creates them. Phase 1 is represented by WP1-3 and Phase 2 by WP4-5. The work plan is reflected in the Gantt chart of Figure 3.

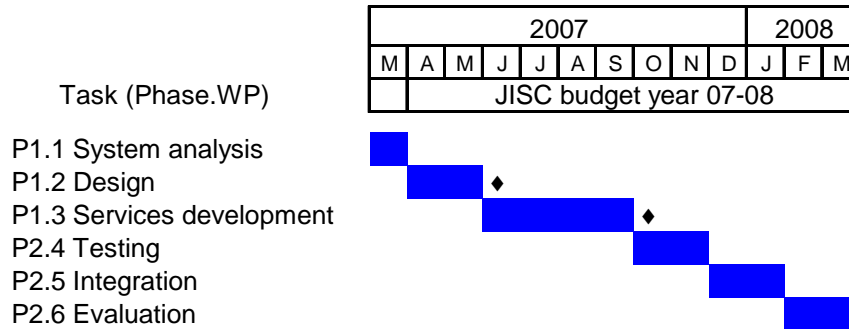


Figure 3. Gantt chart for the ASDEL project.

- 20 There are two milestones in the first phase of the project represented by a ◆ in Figure 3. The first is the signing-off (agreement) of the design documents. The second is the completion of all the Web Services and review for OSMM evaluation.

WORK PACKAGE 1: SYSTEM ANALYSIS AND VERIFICATION OF REQUIREMENT

- 21 Within the project team and in writing this bid we have set out a number of requirements. The first stage of this project will be to verify and formally document these. This will be achieved by a desk study and interviews with representatives of people in the HE and FE sectors.
- 22 Deliverable 1: Use case, scenarios, and requirements specification.

WORK PACKAGE 2: DESIGN

- 23 The purpose of this work package is to produce the design documentation for the project. We will take the agile approach developed and refined by the JISC funded project FREMA on designing and documenting services. The design will be suitable for both summative and formative assessment workflows. The aim is to design a delivery system that will completely adhere to the QTI v2 specification. The design will be refactored iteratively, to identify internal Web services. As with R2Q2, the processing of the tags from the QTI specification will be designed in such a way as to ensure that the engine may be changed easily as the specification or requirements change in the future. Independently of the design, a number of QTI v2 tests will be generated to act as a both a test of the engine and as exemplars for others.
- 24 Included in this work package will be:
- Appropriate UML diagrams (Service Usage Module (SUM), SRC, interaction diagrams).
 - The designs for the system and services.
 - Review of reusable component availability.
 - The test plans for the system as a whole and the individual services. Included in this will be exemplar test questions.
- 25 Deliverable 2: Scoping document made available on project website.

WORK PACKAGE 3: SOA AND WEB SERVICE DEVELOPMENT

- 26 This work package will implement the services design from WP2. We will take a similar agile approach as already used on the R2Q2 project. Standards will be used to ensure interoperability, for instance IMS Content Packaging; SOAP and WSDL for security; and REST services for non-secure processes. The work package will develop

- Provision of a web service API for retrieving assessment results.
 - The public interface to the service using both a REST and a SOAP interface.
 - The work flow for passing around the various components of a Test in QTIv2.1.
- 27 It is intended that the outcomes from WP1-3 will be presented to the community, probably as part of a Cetus Assessment SIG event, and their feedback will inform Phase 2 of the project.
- 28 Deliverable 3: Software and where applicable the WSDL description of the services.

WORK PACKAGE 4: ENGINE TESTING & API DEVELOPMENT

- 29 This work package will test and validate the Web Services built, in close collaboration with the other projects in this call on authoring and item banking. The system testing will take the scenarios and uses cases from work package 1 to ensure that the services operate as required, and informed by feedback from WP3. During this package a peer review for OSMM evaluation and Toolkit transition will be undertaken. The engine will be packaged for easily deployable and configurable on a range of platforms.
- 30 Deliverable 4 is a test report on the methodology and results of all testing and OSMM evaluation.
- 31 Deliverable 5: Programmer documentation for consumer application developers.
- 32 Deliverable 6: Quick Installation guide.
- 33 Deliverable 7: Demonstrator Client with online User guide for the User Interface Demonstrator.

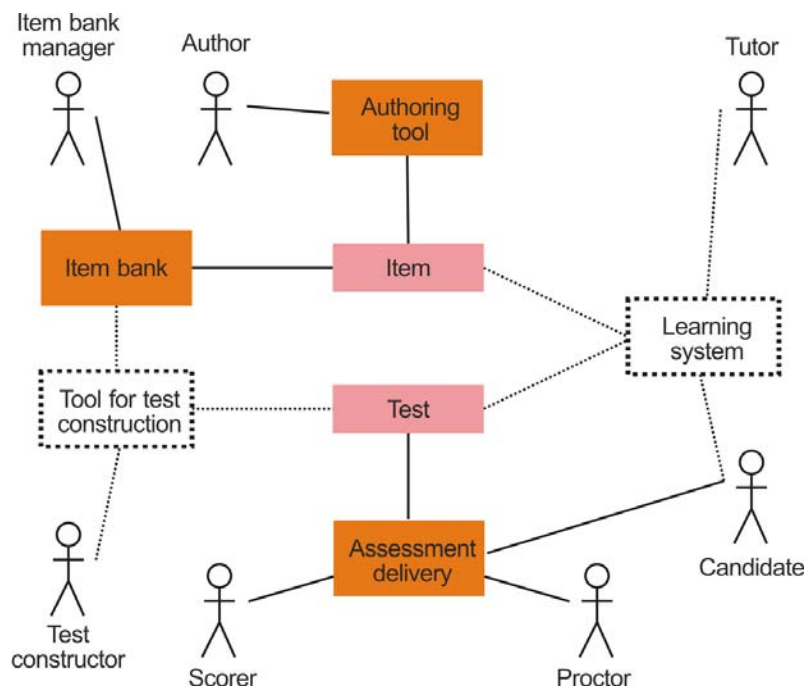


Figure 4. Phase Two: Integration of the successful bids from the assessment domain⁴.

WORK PACKAGE 5: INTEGRATION WITH JISC’S AUTHORIZING AND ITEM BANKING TOOLS

- 34 This work package will integrate with the other projects in this call on authoring and item banking (and existing item banks funded by JISC).
- 35 Figure 4 shows a modified diagram of the Use Case from the QTIv2 specification, demonstrating how the different tools and system in this call relate together. It clearly shows the boundaries between the delivery system, authoring tool, and item banking. A general scenario would be:
- A lecturer/tutor will write questions (items). The authoring tool will provide a user interface appropriate to the end user, and format and store the items using the QTIv2 standard. By using

⁴ IMS Question and Test Interoperability Overview, Version 2.1 Public Draft (revision 2) Specification http://www.imsglobal.org/question/qti2p1pd2/imsqti_oviewv2p1pd2.html

QTIv2 these items may be exchanged with other compliant systems not developed by the same developer.

- Users can select items from the item bank and place the items in a pool ready for constructing into a test. The test construction system, like the item authoring tool, will use an appropriate user interface and behind the scenes output the test in a QTIv2 or IMS CP compliant format.
- By having the test and item adhere to the QTIv2 specifications, the deployment of items, item banks, and tests from diverse sources can be delivered through the test delivery system to candidates via a learning environment or directly via their internet browser.
- The candidate can now take the test, and have the results reported in a consistent manner.

36 Deliverable 8: Demonstrator of all three projects working together.

WORK PACKAGE 6: EVALUATION

37 This work package will involve detailed coordination and planning with the other projects in this call on authoring and item banking. It is intended that the Projects Steering Group will provide the detailed statement of activities and actions for evaluation, which are likely to include a community "Show and Tell", piloting at the University of Southampton, and a usability study.

38 Deliverable 9: Evaluation of the assessment delivery engine, and on the processes and practices involved in all three projects working together.

2.3 Technology, Standards and QA

39 The technology used in this project will be JAVA based. The project will take a Service Oriented Architecture (SOA) approach. The services developed will be written in JAVA. Coding standards will be adopted to ensure readability, testability and installability. Code will be unit tested using Junit. During development the code will be deposited in subversion and bugs will be track using a public version of Flyspray. The project will build upon existing specifications and standards from JISC, IMS, and other projects. In particular, it is expected to reference agreed standards such as SOAP and WSDL of the W3C; the Question and Test Interoperability (QTI) version 2 of IMS, and IMS Enterprise Services Specification 1.0⁵ and/or LDAP⁶, SRU/CQL⁷. Compliance with SOAP will be assured using an appropriate testing package (e.g. SOAPscope).

40 Full account will be taken of issues relating to accessibility of Web-based systems and software and the outputs of this project will conform to published standards and guidelines.

2.4 IPR, Sustainability

41 While the code will be made available under an appropriate open source agreement for use within any educational establishment and in conformance with JISC's requirements, the IPR will also remain with the University of Southampton thereby allowing Southampton to further exploit the IP.

42 Sustainability of the code produced is through ensuring other universities and JISC/CETICS projects have access to the code and documentation for the system, through LGPLM or GPL licences (the code being published in Source Forge). Quality factors built in to the work packages will ensure successful Open Source life through achievement of a good OSMM rating, community engagement and community stated need. All reports, tools and code from the project will remain on the project server for a minimum period of three years and archived in the institutional repository (E-Prints) and appropriate JISC repository.

2.5 Dissemination of project outputs

43 Dissemination of information and outcomes from the project activities will be achieved using a number of methods. A Project Web site will be created at the start of the project and will have reports on the infrastructure and deliverables, evaluation reports, an RSS feed, and a Blog containing current information on activities. Presentations and publications derived from project work will also be available on the site. Project findings and results will be presented at relevant national and international conferences, JISC meetings, and CETIS Assessment SIG events. Particular attention will be paid to

⁵ IMS Enterprise Services Specification <http://www.imsproject.org/es/index.html>

⁶ Lightweight Directory Access protocol <http://en.wikipedia.org/wiki/Ldap>

⁷ SRU/CQL protocol <http://www.loc.gov/standards/sru/>

disseminating the work across e-learning and Web communities. The project will be published in the FREMA reference model database.

2.6 Risks

- 44 Some of the major risk factors to a project such as this that integrates many areas is the loss of key personnel and the possibility that the deliverables are not achievable.

Risk	P (1-5)	S (1-5)	Score (P x S)	Action to Prevent/Manage Risk
Technical	1	5	5	The team understands design principles and no one member of the team has any vital piece of knowledge not understood by the others. The team were involved in the development of R2Q2, and a similar design approach will be used in ASDEL. Also we will use the FREMA methodology for designing services for which the team are completely familiar with (as they worked on the project).
Staff: Recruiting and retaining.	2	3	6	There is always a risk to the start of the project by a delay in the recruiting and retaining of staff. This is offset by using existing staff, who have worked on similar projects. Also if require the academic staff can completed the first work package. Also by using good practice to ensure that all design/implementation rationales are capture, the effect of a person leaving the project will not bring it to a complete stop.
Authoring or Item Banking not available at the start of Phase2.	2	2	4	There is a risk that the other successful bids in this call may not be ready at the start of Phase 2. In this case we would develop a simplistic authoring tool and use existing item banks (ie E3AN) to show an integrative demonstrator.

Table 1. Main risks to the successful completion of the project.

3 BUDGET

- 45 The budget provision shows costs broken down into "Yr1" and "Yr2". Yr1 is the 1 month period of March 2007, while Yr2 is the 12 month period Apr 2007 to Mar 2008.

3.1 Summary

- 46 **Institutional value.** The respective contributions of JISC and the University of Southampton have been calculated such that the funding requested from JISC covers all directly incurred costs plus approximately 20% of these costs (representing an acceptable institutional overhead in consideration of the value of the project to the institution). In the TRAC model, this means that JISC is asked for approximately 46.5% of FEC, while the institution contributes 53.5%.

Directly incurred costs

	Ytd Mar07 Yr1	Apr07-Mar08 Yr2	Total FEC £
Total incurred	11,472	71,939	83,411

Directly allocated costs

	Yr1	Yr2	Total
Total allocated	3,174	44,552	47,726

Indirect costs

General services	4,974	78,948	83,922
Total FEC	19,620	195,439	215,059
JISC contribution	9,113	90,781	99,894
Institutional contribution	10,507	104,658	115,165

3.2 Direct costs detail

- 47 **Research personnel.** The project will start by employing one full-time researcher, will introduce a further full-time researcher 3 months in, and will wind down to one full-time researcher by the end. Provision is made for a Project Manager working 15% of her time on the project. The researchers will be located in LTG.
- 48 **Consultants.** The project will employ consultants Steve Lay and Graham Smith, and will consult with the e-Services Integration unit at Hull as explained earlier. Note that provision for the consultants represents approximately 33% of their expected cost, and the remaining 67% of costs are expected to come from the other two projects in the e-assessment call.
- 49 **Equipment.** The project will provide ICT equipment to the two researchers and the Principal Investigator, and a server for the project Web site and associated files.
- 50 **Travel.** The project budget makes comprehensive provision for meetings, dissemination activities, and an evaluation workshop. Note that provision for meetings reflects the expectation of extensive collaboration and coordination with the other two successful projects in the e-assessment call. Note also that provision for the workshop represents approximately 33% of the expected cost, and the remaining 67% of costs are expected to come from the other two projects in the e-assessment call.
- 51 **Other direct costs.** The project budget makes provision for two local advertisements for the two research posts, and for consumables.

	Mnth	Util	Spine	Gross £	FEC £
Total					

under the JISC VRE call, and is a co-investigator on the JISC-funded FREMA (assessment reference model) and R2Q2 (QTI services) projects.

- 55 **David Millard** is a Lecturer in Computer Science at the University of Southampton. David has over 50 publications in the areas of knowledge modelling for contextual information systems in hypertext, m-learning and e-learning. He is a key member of the EPSRC Equator IRC team at Southampton exploring novel m-learning experiences, a co-investigator on the European Learning Grid Infrastructure (ELeGI) project (EU IST Framework VI), and on the JISC funded Rendering and Response for QTI 2.0 (R2Q2) project. He is also the Technical Manager on the JISC FREMA Project.
- 56 **Yvonne Howard** is a Research Fellow at the University of Southampton's School of Electronics and Computer Science. She was involved in the EPSRC funded Automated Validation of Business Critical Systems with Component Based Designs (ABCD) project that made Formal Modelling techniques usable by practising Systems Engineers. Recently she has been involved with the Open Middleware Infrastructure Institute (OMII) EPSRC initiative to build a service oriented grid infrastructure for UK e-science. Yvonne is Project Manager for the JISC funded FREMA, FREMA2, and R2Q2 projects.
- 57 **David Argles** is a Lecturer in the Learning Technologies Group at the University of Southampton. He has taught for several years in both primary and secondary schools and has worked as a lecturer in Teacher Education at the University of Winchester, where he created the "Computer Education Centre" and was involved in the establishment of the government's national MEP Primary Project on the premises. He was recruited to the University of Southampton to help establish their "New College" widening participation venture in 1999. The venture ran successfully, and was then integrated into the main operation of the University, where he now contributes to the Learning Technologies research group.

**APPENDIX A
FOI WITHHELD INFORMATION FORM**

- 58 We would like JISC to consider withholding the following sections or paragraphs from disclosure should the contents of this proposal be requested under the Freedom of Information Act.
- 59 We acknowledge that the FOI Withheld Information Form is of indicative value only and that JISC may nevertheless be obliged to disclose this information in accordance with the requirements of the Act. We acknowledge that the final decision on disclosure rests with JISC.

Section / Paragraph No.	Relevant exemption from disclosure under FOI	Justification
None		

**APPENDIX B
LETTER OF SUPPORT**



School of Electronics and Computer Science

Professor Wendy Hall CBE FREng
Head of School

University of Southampton	T +44 (0)23 8059 2749
Highfield	F +44 (0)23 8059 2978
Southampton	E hos@ecs.soton.ac.uk
SO17 1BJ United Kingdom	www.ecs.soton.ac.uk

Lou McGill,
JISC Executive,
University of Bristol,
3rd Floor, Beacon House,
Queens Road,
BS8 1QU

20 November 2006

Dear Lou McGill

Re: JISC Circular 4/06 Capital Programme
Bid Title: ASDEL: Assessment Delivery Engine for QTiv2 questions

I am writing to confirm Southampton's commitment to the ASDEL project within the JISC's e-Learning: Assessment programme.

The project will be run in the Learning Technologies Group of the School of Electronics and Computer Science under the leadership of Dr Gary Wills, with support from Dr Hugh Davis, Dr Dave Millard, Dr David Argles, and Mr Lester Gilbert as co-investigators. They will be provided with all the necessary facilities of this School over the period of the above Contract in order that they can successfully complete this important and timely research proposal.

Yours Sincerely

A handwritten signature in black ink, appearing to read "Wills", with a long horizontal stroke extending to the right.

Professor Wendy Hall CBE FREng
Professor of Computer Science and Head of School

**APPENDIX C
PROJECT TEAM CVS**

Principal Investigator: Dr Gary Wills

Co-investigators: Dr Hugh Davis
Dr David Millard
Mr Lester Gilbert
Dr David Argles

Project manager: Dr Yvonne Howard (15%)

DR GARY BRIAN WILLS

Gary Wills is a Lecturer in Computer Science at the University of Southampton.

Education

July 2003	Post graduate Certificate in Advanced Educational Studies
July 2002	Post Graduate Certificate of Academic Practice
Jan 2000	Doctor of Philosophy, Design and Evaluation of Industrial Hypermedia
July 1995	BEng (Hons), 2:1, Electromechanical Engineering
July 1992	HNC Mechanical & Manufacturing Engineering

Summary of current research and scholarship activities

Gary's main research interests are Personal Information Environments (PIEs) and their application (usability) in industry, medicine and education. PIE systems are underpinned by adaptive hypermedia and advanced knowledge technologies in a distributed architecture. A related project in the industrial domain, allows engineers to view the same federate knowledge from different perspectives. This use advance knowledge technologies and ontologies to extract the knowledge and present this to the users using an appropriate interface.

Interwoven into the above research has been the related subject of providing people with PIEs (or slices of) for education, in particular supporting the learning and teaching of medical students. For instance in an EU funded project to create a virtual university, he investigated appropriate frameworks/infrastructures, pedagogical approaches and the use of knowledge technologies to create a learning environment appropriate for post-graduate training in surgery. The distributed nature of the work has been demonstrated by decoupling the system into Web services and a SOA architecture. This new project called CORE enables surgeons to collaborate, discuss and disseminate results clinical trials with colleague for whom they are not co-located. Other education software related to assessment; FREMA a framework for assessment and R2Q2 a response and HTML rendering engine for all QTIv2 questions types.

Professional bodies

Gary is a member of a number of professional institutions: Engineering Council as a Chartered Engineer; the Institution of Engineering and Technology, as Member, and the Institute for Learning and Teaching (now the Higher Education Academy) as a Member. He is also a member of the CETIS Assessment SIG.

Recent Relevant Publications

Wills, G., Davis, H., Chennupati, S., Gilbert, L., Howard, Y., Jam, E. R., Jeyes, S., Millard, D., Sherratt, R. and Willingham, G. (2006) [R2Q2: Rendering and Reponses Processing for QTIv2 Question Types](#). In *Proceedings of 10th International CAA Conference*, Loughborough University, UK.

Wong, S. C., Crowder, R. M. and Wills, G. B. (2006) [On a Service-Oriented Approach for an Engineering Knowledge Desktop](#). In *Proceedings of 15th International World Wide Web Conference (WWW2006)*, Edinburgh, Scotland.

David E. Millard, Christopher Bailey, Hugh C. Davis, Lester Gilbert, Yvonne Howard, Gary Wills (2006) [The e-Learning Assessment Landscape](#). *The 6th IEEE International Conference on Advanced Learning Technologies*. Kerkrade, The Netherlands, July 5-7, 2006

Grange, S., Wang, C., Gilbert, L., Sim, Y. W., Millard, D. E., Hall, W., Gardner, E. and Wills, G. B. (2006) [A Web/Grid Services Approach for Integration of Virtual Clinical & Research Environments](#). In *Proceedings of Integrated Health Records "Practice and Technologies"*, National eScience Centre (NeSC), Edinburgh.

Wills, G., Miles-Board, T., Bailey, C., Carr, L., Gee, Q., Hall, W. and Grange, S. (2005) [The Dynamic Review Journal: a scholarly archive](#). *New Review of Hypermedia and Multimedia* 11(1):pp.69-89

DR HUGH CHARLES DAVIS

Present Appointment:

University Director of Education (with responsibility for eLearning Strategy)

Head of Learning Technology Research Group (within Electronics and Computer Science)
(ECS has the maximum possible grades in both teaching quality and Research Assessment)

National Involvement in Education

- I have been closely involved in the work of the Learning and Teaching Support Networks for Information and Computer Science (LTSN-ICS) and for Engineering (LTSN Engineering). I have done invited talks and conferences and workshops on a wide range of topics.
- I have acted as external examiner to two universities at BSc and MSc level.
- I am a computer Science subject reviewer for the QAA and an HEA registered practitioner
- I am and have been on the steering groups of a number of national projects funded by TLTP and FDTL.
- I will co-chair the HEA-ICS conference in 2007.

Research

I am focussing my work within eLearning Frameworks on three areas; Learning Objects for Assessment, Personalisation of Learning and Architectures for eLearning. An emerging interest is in the contribution the semantic grid can make to eLearning. I am involved in and lead a number of current projects in these areas funded by EU, Eduserv, and JISC Programmes (ELF, Capital, VRE, DLIC).

Recent External Responsibilities

- Programme Chair for ACM Hypertext 2001
- Programme Chair for Adaptive Web Based Systems Workshop, WWW 2003
- Co-Chair for "Critical Success Factors for Institutional Change (CSFIC '06) collocated with ECDL 2006, Alicante.
- On Editorial Board of the Journal New Review of Hypermedia and Multimedia
- Educational Track Programme Committee for WWW 2000 (Amsterdam) WWW 2002 (Hawaii), WWW 2003 (Budapest) , WWW 2004 (New York)
- Programme Chair for "Critical Success Factor for Institutional Change" CSFIV '06 at ECDL '06 Alicante.
- Programme Committee member for:
 - PerSWEd'05: Personalizing the Semantic Web for Education to be held in conjunction with UM'2005 and AIED'2005,
 - "Authoring Learner and Pedagogical Models in Adaptive Educational Hypermedia" held in conjunction with UM'2005 Edinburgh
 - ALT-C Manchester 2005
 - Adaptive Hypertext Dublin 2006
 - The 6th IEEE International Conference on Advanced Learning Technologies (ICALT 2006) in The Netherlands.
 - Semantic Web for eLearning (SWEL) Workshop 2006
- Subject Reviewer (Computing) for QAA (trained April 2003)
- Member of the CETIS Interoperability Standards Working Group on QTI
- Steering Group member of IBIS project (SHEFCE) run by Strathclyde (2003-2005)

External Examining

- I have examined in excess of 20 PhDs of which 5 have been as external examiner
- External examiner for the BSc in BIT at Bournemouth, (2001- 2005)
- External Examiner for MSc in 'Interactive Multimedia' and in 'IT and Multimedia', at Heriot-Watt (2001 – 2005) and also for MSc in eLearning (2004-2005)

Publications

I have 133 publications listed at <http://www.ecs.soton.ac.uk/~hcd/research/> in the areas of the application of e-learning and architectures for Hypertext and e-learning.

DR DAVID MILLARD



Education

May 2001 Doctor of Philosophy, Computer Science
Jul 2005 Post Graduate Certificate of Academic Practise
July 1997 BSc (Hons), First Class, Computer Science

EXPERIENCE

Southampton University 2003- Lecturer, Computer Science

David works within the Learning Technologies Group (LTG) and Intelligence, Agents, Multimedia (IAM) group at the University of Southampton. The thread running through his research is one of contextual information systems. The contextual information can be in respect to a person (such as Adaptive Hypertext, Physical Hypertext, e-Learning, and Narrative Systems) or to a machine (such as on the Semantic Web and via contextual Services on the Semantic Web or Grid).

He is co-investigator on the EU ELeGI project (GRID infrastructure and mobile GRID applications) and the technical lead for the JISC FREMA project (e-Framework Reference Model for Assessment). He is also a contributor to the EPSRC Equator project (a multi-site collaboration in the area of mixed reality and ubiquitous computing environments).

He has been involved in international research for eight years and has presented papers at many conferences and workshops, most recently ACM Hypertext 2005 and ICALT 2005.

University of Southampton	2005-	Lecturer
University of Southampton	2003-2005	Senior Research Fellow and Lecturer
University of Southampton	2000-2003	Research Fellow
New College, Southampton	1997-2000	Part-time Lecturer

RECENT PUBLICATIONS

Millard, D. E., Gibbins, N. M., Michaelides, D. T. and Weal, M. J. (2005) Mind the Semantic Gap. In Proceedings of ACM Hypertext 2005, Salzburg, Austria.

Millard, D., Howard, Y., Bailey, C., Davis, H., Gilbert, L., Jeyes, S., Price, J., Sclater, N., Sherratt, R., Tulloch, I., Wills, G. and Young, R. (2005) Mapping the e-Learning Assessment Domain: Concept Maps for Orientation and Navigation. In Proceedings of e-Learn 2005, Vancouver, Canada.

Tao, F. B., Millard, D., Davis, H. and Woukeu, A. (2005) Managing the Semantic Aspects of Learning using the Knowledge Life Cycle. In Proceedings of The 5th IEEE International Conference on Advanced Learning Technologies (ICALT 2005), Kaohsiung, Taiwan.

Millard, D., Woukeu, A., Tao, F. B. and Davis, H. (2005) The Potential of Grid for Mobile e-Learning. In Proceedings of The 4th World Conference on Mobile Learning (MLEARN 2005), Cape Town, South Africa.

Davies, W. M., Howard, Y., Millard, D. E., Davis, H. C. and Sclater, N. (2005) Aggregating Assessment Tools in a Service Oriented Architecture. In Proceedings of 9th International CAA Conference (in press), Loughborough.

Wills, G. B., Gilbert, L., Gee, Q., Davis, H. C., Miles-Board, T., Millard, D. E., Carr, L. A., Hall, W. and Grange, S. (2005) A Grid Services Implementation for a Virtual Research Environment. In *Proceedings of 1st International ELeGI Conference on Advanced Technology for Enhanced Learning*, Vico Equense - Napoli (Italy).

MR LESTER GILBERT



Education

- 1996 Post-graduate Certificate in Education.
- 1978 MSc (Psychology) (**Distinction**).
- 1974 BSc (Hons) (**First Class**)

EXPERIENCE

Southampton University 2001- Lecturer, Information Technology

I joined the University of Southampton as part of its initiative for widening participation and life-long learning in its recent "New College" initiative, where one of my major roles involved the development of e-learning provision. I am now located in the School of Electronics and Computer Science (ECS) in the Learning Technologies Group of researchers and projects.

I am preparing a monograph, *Principles of e-Learning Systems Engineering*, scheduled for publication in 2007, which integrates my business-oriented practical experience of Information Systems development with Multimedia and Computer Aided Instruction development. This work forms the basis of my focus on e-learning and the use of the Web and other technologies in learning and teaching.

I am a co-investigator on three JISC-funded projects, the "Framework Reference Model for Assessment" (FREMA), the "Collaborative Orthopaedic Research Environment" (CORE), and the "Rendering and Responses Processing for QTI" (R2Q2) toolkit.

I have participated in a number of recent conferences and workshops, including ALT-C 2005, ICALT 2005, UNFOLD, and the JISC Conference (Edinburgh 2005).

Canterbury Christ Church University 1994-2001 Senior Lecturer, Information Technology

University of Paisley 1993-1994 Lecturer, Information Systems

MRC Laboratories, The Gambia 1990-1992 Head of Computing and Statistics

Penn Point Systems 1989-1990 Technical Director

Intra Systems 1987-1988 Technical Manager

Syntek 1985-1987 Consultant

Ellesmere Electronics 1982-1984 Programmer, Consultant, Manager

University of South Africa 1981 Senior Lecturer

University of Cape Town 1974-1980 Lecturer

RECENT PUBLICATIONS

Gilbert, L., Sitthisak, O., Sim, Y. W., Wang, C. and Wills, G. (2006) [From collaborative virtual research environment to teaching and learning](#). In *Proceedings of TENcompetence Workshop: Learning Networks for Lifelong Competence Development*, Sofia, Bulgaria.

Grange, S., Wang, C., Gilbert, L., Sim, Y. W., Millard, D. E., Hall, W., Gardner, E. and Wills, G. B. (2006) [A Web/Grid Services Approach for Integration of Virtual Clinical & Research Environments](#) (Speech). In *Proceedings of Integrated Health Records "Practice and Technologies"*, National eScience Centre (NeSC), Edinburgh.

Millard, D., Bailey, C., Davis, H., Gilbert, L., Howard, Y. and Wills, G. (2006) [The e-Learning Assessment Landscape](#). In *Proceedings of International Conference on Advanced Learning Technologies (ICALT) 2006*, Kerkrade, The Netherlands.

DR DAVID ARGLES

David Argles is a Lecturer in the Learning Technologies Group at the University of Southampton.

Education

PhD (1996), Southampton University. Thesis: "Concurrent Control for Children"

Post-graduate Certificate in Education (1974), Southampton University. Specialising in Mathematics and Physics

BSc (Hons) Electronic Engineering (1973), Southampton University

Summary of current research and scholarship activities

I have taught for several years in both primary and secondary schools and have worked as a lecturer in Teacher Education at the University of Winchester, where I created the "Computer Education Centre" and was involved in the establishment of the government's national MEP Primary Project on the premises.

I was recruited to the University of Southampton to help establish their "New College" widening participation venture in 1999. The venture ran successfully, and was then integrated into the main operation of the University, where I now contribute to the Learning Technologies research group.

Recent Relevant Publications

Argles, D., Frazer, A. and Wills, G. (2006) Learning Through Rich Environments. International Journal of Interactive Technology and Smart Education.

Marais, E., Argles, D. and von Solms, B. (2006) Security Issues Specific to e-Assessments. The International Journal for Infonomics Special issue: 'e-Learning Security'.

Marais, E., Minnaar, U. and Argles, D. (2006) Plagiarism in e-learning systems: Identifying and solving the problem for practical assignments. In Proceedings of The 6th IEEE International Conference on Advanced Learning Technologies (in press), Kerkrade, The Netherlands.

Gee, Q. and Argles, D. (2006) Practical Guidance on Automated Essay-type Assessment Feedback. In Proceedings of 7th Annual Conference of the ICS HE Academy (in press), Trinity College, Dublin.

Walters, R. J., Millard, D. E., Bernnett, P., Argles, D., Crouch, S., Gilbert, L. and Wills, G. (2006) Teaching the Grid: Learning Distributed Computing with the M-grid Framework. In Proceedings of ED-MEDIA 2006--World Conference on Educational Multimedia, Hypermedia & Telecommunications, Orlando, USA.

Argles, D. and Wills, G. (2005) CECIL – A Language for Learning Hardware Design. In Proceedings of EdMedia, pp. 4181-4188, Montreal, Canada. Kommers, P. and Richards, G., Eds.

Pau, R., Argles, D., White, S. and Lovegrove, G. (2005) Computer Geek versus Computer Chic: IT Career and IT Education. In Proceedings of 6th International Women into Computing Conference, Greenwich, UK.

Argles, D., Gee, Q. and Wills, G. (2005) Developing a Computing Degree to Encourage Widening Participation. In Proceedings of The 6th Annual Higher Education Academy Subject Network for Information Computer Science, pp. 135-139, York, UK.

Marais, E., Minnaar, U. and Argles, D. (2005) Plagiarism in e-learning systems: Identifying and solving the problem for practical assignments. Submitted to Information Security South Africa Conference, Gauteng, South Africa.

Argles, D., Pau, R. and Wills, G. (2005) Towards Collaborative e-Learning: Teaching Hardware Architecture. Submitted to 15th International World Wide Web Conference, Edinburgh, Scotland.

DR YVONNE M. HOWARD

Education

March 2003 Doctor of Philosophy, Computer Science
July 1997 BSc (Hons), 2.1, Computer Science

EXPERIENCE

Yvonne works within the Learning Technologies Group (LTG) and Open Middleware Infrastructure Institute (OMII) at the University of Southampton. Her initial research lay in process models for software development, investigating dynamic processes where evolution is driven by feedback in the domain. She was involved in the EPSRC funded Automated validation of Business Critical Systems with Component Based Designs (ABCD) project that made Formal Modelling techniques usable by real Systems Engineers. Recently she has been involved with the Open Middleware Infrastructure Institute (OMII) EPSRC initiative to build a service oriented grid infrastructure for UK e-science. Yvonne was Project Manager for the JISC funded FREMA, FREMA2 and r2q2 projects and is currently Project Manager for mPLAT and CLARET.

She has been involved in international research for eight years and has presented papers at many conferences and workshops, most recently eLearn 2005, Vancouver, Educa Berlin 2005 and ECOWS, Zurich 2006 .

University of Southampton	2001-2006	Research Fellow
Various Institutions	-1994	Software Development Manager

RECENT PUBLICATIONS

David E. Millard, Yvonne Howard, Swapna Chennupati, Hugh C. Davis, Ehtesham-Rasheed Jam, Lester Gilbert, Gary B. Wills 2006 (2006) Design Patterns for Wrapping Similar Legacy Systems with Common Service Interfaces. In Proceedings of ECOWS, Zurich, Switzerland (in press)

Millard, D., Bailey, C., Davis, H., Gilbert, L., Howard, Y. and Wills, G. (2006) [The e-Learning Assessment Landscape](#). In *Proceedings of International Conference on Advanced Learning Technologies (ICALT) 2006*, Kerkrade, The Netherlands.

Millard, D., Howard, Y., Bailey, C., Davis, H., Gilbert, L., Jeyes, S., Price, J., Sclater, N., Sherratt, R., Tulloch, I., Wills, G. and Young, R. (2005) Mapping the e-Learning Assessment Domain: Concept Maps for Orientation and Navigation. In Proceedings of e-Learn 2005, Vancouver, Canada.

Davies, W. M., Howard, Y., Millard, D. E., Davis, H. C. and Sclater, N. (2005) Aggregating Assessment Tools in a Service Oriented Architecture. In Proceedings of 9th International CAA Conference, Loughborough.

J. Augusto, Y. Howard, A. Gravell, C. Ferreira, S. Gruner, and M. Leuschel, (2004) Model-Based Approaches for Validating Business Critical Systems.. Proceedings of "System Testing and Validation Workshop", pp. 225-233, held in Amsterdam (The Netherlands), September 2003. Published by IEEE Press, ISBN:0-7695-2218-1, 2004.

Gravell, A. M., Howard, Y., Augusto, J. C., Ferreira, C. and Gruner, S. (2003) Concurrent Development of Model and Implementation. In *Proceedings of 16th International Conference on Software & Systems Engineering and their Applications*, CNAM, Paris.

Howard, Y., Gruner, S., Gravell, A. M., Ferreira, C. and Augusto, J. C. (2003) Model-Based Trace-Checking. In *Proceedings of UK Software Testing Research II*, University of York.

Henderson, P., Howard, Y. M. and Walters, R. J. (2001) A Tool for Evaluation of the Software Development Process. *The Journal of Systems and Software* 59(3):pp. 355-362.

Henderson, P. and Howard, Y. (1998) Simulating a Process Strategy for Large Scale Software Development using System Dynamics. *Software Process Improvement and Practice* 5:pp. 121-131.