Cover Sheet for Proposals	***JISC Capital Programme***

Name of Capital Programme:
(e-Learning)

Name of Lead Institution:
University of Southampton

Name of Proposed Project:
eLearning Simulations Toolkit (SimKit)

Name of Project Partners:
University of Portsmouth

Full Contact Details for Primary Contact:

Name: Dr David Argles
Position: Lecturer
Email: da@ecs.soton.ac.uk
Address: School of Electronics and Computer Science
University of Southampton
Highfield
Southampton SO17 1BJ
Tel No: 023 8059 2698
Fax No: 023 8059 3218

Length of Project:
3 years

Project Start and End Dates:
Sep 2006 – Aug 2009

Total Funding Requested from JISC:
£199,393

Funding Broken Down over Project Years:
Year 1: £106,145 **Year 2:** £93,248 **Year 3:** £0

Total Institutional Contributions:
£494,684

Outline Project Description

Despite regulations introduced in 1994 to improve Health & Safety Training for the construction industry, problems continue. Current delivery and certification involves recall of lecture notes in an exam environment, or recognition of answers in a multiple choice setting.

This project recognises the potential of interactive and graphic-rich simulations to empower learners in a variety of initial and continuing professional development environments to access and assimilate content in a meaningful and memorable way. Such an approach also offers the potential for including the important factors of human interaction within the skill set.

For such an approach to be useful in a range of situations, it is important that the project should deliver services located within a framework rather than simply producing individual learning packages. Consequently, it will exploit the JISC-funded R2Q2 project to render and process the simulations as QTI items. These items will be packaged and presented as units of learning according to the IMS Learning Design standard and for comparative evaluation will also be presented through a portal framework. The tools developed will contribute to the JISC E-framework and will be embedded in courses that include one jointly delivered on an ongoing basis by the partner institutions.

I have read the Circular and associated Terms and Conditions of Grant at Appendix B (Tick Box)	**YES**	

Introduction

This project will develop an interactive learning environment based upon gaming and simulation technologies to deliver training in construction site risk assessment for more effective health and safety management. Risk assessment is a particularly challenging and difficult topic to teach and has implications for a variety of domains. Through this project we will address these issues by combining and harnessing learning technologies in a way that fits the human cognitive system.

The 1994 Construction (Design and Management) Regulations were implemented to bring about 'proactive' safety management throughout the planning, design and production processes. It was hoped that this would address the 'lack of foresight to danger' identified in the Blackspot Construction report and would also improve the efficiency of the industry by reducing the number of non-injury related accidents. To help meet these targets, a range of qualifications have been introduced within the sector (e.g. the CITB Construction Health and Safety Test (CSCS), and the range of qualifications offered by the National Examination Board in Occupational Safety and Health (NEBOSH)).

A key question concerning current material delivery is whether the basic recall of lecture notes in an exam environment (e.g. for NEBOSH or undergraduate degrees), or the recognition of answers in a multiple choice setting (CSCS test) is preparing individuals to execute, apply and prioritize matters of health and safety in the field. With the emphasis on 'multi-skilling' and continual professional development, interactive and graphic-rich games and simulations could be used to empower learners from across the spectrum (professionals seeking refresher courses to unskilled labourers preparing for CSCS) from a place and at a time best suited to their needs. Such tools could be used to teach both 'hard skills' (e.g. site emergency evacuation procedures) and 'soft skills' involving human interaction (e.g. decision-making under time pressure, communication, motivation and leadership).

Learning concepts using such interactive tools must be designed and delivered according to the workings and mechanisms of the human cognitive system. This system underlies human learning performance involving information retrieval, processing and consolidation for further use. If learning through interactive gaming/simulation technologies is to be effective, they must not only enhance the acquisition of information, but must guarantee that the learner retains and can retrieve this knowledge back at the work place, and most importantly, utilise it in a way that impacts on, and positively changes behaviour back at the work site. There is now a growing literature to support the value of dynamic and interactive environments to improve both learning and decision-making (compared with relatively passive transmissions of information for example lectures), particularly when learners are cognitively engaged in a thorough, structured debrief as an integral part of this process. Interactive technology is also used in simulations and training environments for decision makers training in agencies such as Fire[1] and Police[2] services. Much of the thrust of this recent work has been to improve the perceptual fidelity of the simulation environment for trainees. A real challenge for improving the effectiveness of IT supported simulating environments is to provide players and facilitators with an enhanced context for debriefing and reflective learning[3,4]. This is an important and challenging objective to accomplish and must be informed by current research in human cognitive functioning.

In developing new learning tools for the delivery of health and safety training, it is necessary to determine which subject areas would be most appropriate for such techniques and in what ways the cognitive learning system, coupled to the needs/characteristics of the different learner groups would impact on their design and operation. This study requires an interdisciplinary effort to develop a new understanding of these issues and enable a prototype risk assessment simulator for construction health and safety education to be designed.

The project will involve a joint collaboration between the University of Southampton's School of Civil Engineering and the Environment (CEE), the School of Electronics and Computer Science (ECS), and the School of Psychology (Psy), and the Portsmouth Business School (PBS) of Portsmouth University. This builds on an existing relationship where Portsmouth University and Southampton University collaborate on the joint teaching of risk management to business and engineering students. These students are usually continuing professional development students studying part-time for their qualification.

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[1] VECTOR Command UK (1999). Vector Command Training Simulation (Version 02/06/00): www.vectorcommand.co.uk

[2] Crego, J. & Harris, J. (2001). Simulating command. In R. Flin & K. Arbuthnot (Eds.), *Incident Command: Tales from the Hot Seat*. Aldershot: Ashgate

[3] Blockley, D. 1992 '*Engineering from Reflective Practice*', Research and Engineering Design, 4, 13-22.

[4] Kolb, D. (1984). *Experiential Learning: experience as the Source of Learning and Development*. Upper Saddle River: Prentice-Hall.

The project is for 3 years, starting on 1 September 2006 and finishing on 31 August 2009.

Project Description

The central thrust of the project involves the delivery of a desired simulation as the delivery of a set of QTI items. In particular, QTI version 2.1 makes provision for question rendering and response processing which is dependant upon previous responses, and the project will seek to exploit such conditional processing as a mechanism for providing the interactive content of a simulation.

The project will exploit the JISC-funded R2Q2 project to provide Web services for the rendering and processing of QTI items, and will investigate and report on the technical and pedagogic issues around simulations as issues around assessment.

The project will explore two methods of delivery of the simulation as an activity for a group of collaborating students. One method will involve packaging a set of QTI items – the simulation – as a Unit of Learning (UoL) according to the IMS Learning Design standard, and then 'playing' that design. IMS LD makes provision for students to collaboratively work on a UoL, and this mechanism could be used for the reviews, discussions, debriefs, and so on which are an integral part of the pedagogic value of a simulation. The second method will be a simpler approach where the simulation (the set of QTI items) is made available to a student through a portal framework. In this case, students will arrange their own participation in discussions, retrieval of resources, and so on.

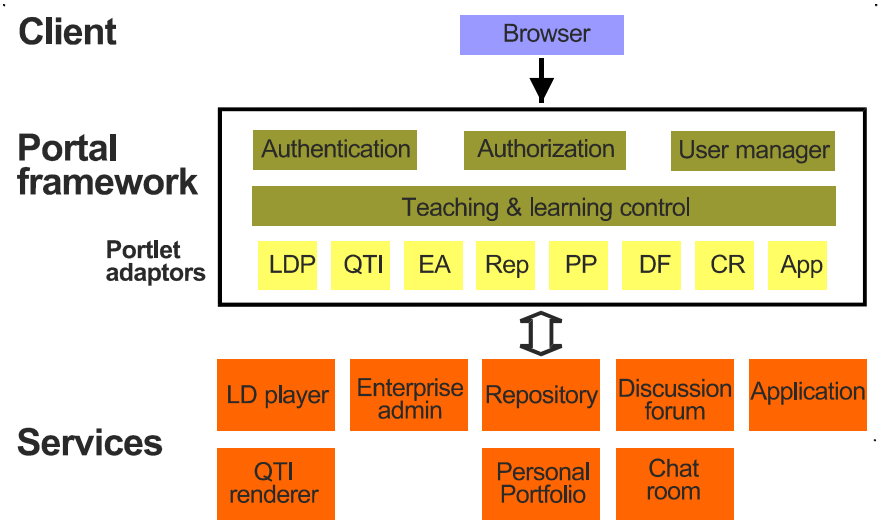

Figure 1 Proposed system overview

The project will develop an editor which will assist a tutor in casting a simulation in the form of a set of QTI items. Similarly, the project will develop an editor for assembling the QTI items into a UoL to create a packaged simulation as a unit of learning. The project will specify, design, implement (programme and alpha test), pilot, and improve both of these tools. It is expected that the JISC-funded RELOAD project will provide the basis for an editor for both QTI items and for the LD UoL.

The project will also specify, design, implement (programme and alpha test), pilot, and improve the necessary run-time structures for both a LD player and a portal framework. It is expected that the JISC-funded SLED project will provide the basis for a service-based LD player, and the JISC-funded CORE project will provide the basis for a portal framework.

Project Scenario

Students seeking a qualification (such as the CSCS) and registered with an appropriate programme of study would develop their understanding of and skills in risk assessment by accessing a 'simulation' unit of learning from a place and at a time best suited to their needs. Using a browser, students would log on to a portal framework or an institutional virtual learning environment (VLE), and choose and activate a simulation. Students would be presented with a particular risk scenario, and then would be taken part-way through a simulation of a variety of possible outcomes depending upon their responses to a series of questions and

requests for action. The students would then pause their activities within the simulation and would join a discussion group, where they would exchange and consider their experiences and reflections with the other students involved in their cohort and with their tutor(s). Following discussion and debate, the students would re-join the simulation and progress further. As before, their particular experiences of the simulation would depend upon their responses to the activities and questions asked of them. A number of such cycles of simulation activation, pause and group reflection, and simulation continuation would be provided according to the needs of the particular intended learning outcomes involved in the particular simulation.

While the simulation would involve materials of varying degrees of fidelity within the scenario, one of the important points of this project is to improve the effectiveness of the simulation by providing for debriefing and reflective learning. Additionally, it is expected that simulation materials and processes already developed by a tutor would be readily incorporated into SimKit, and the result readily deployed and played from a VLE or portal.

Project Management

There are four partners in the project:

The Learning Technologies Group (LTG) at Southampton will lead the project and will retain a senior researcher to manage the project day to day, to arrange the dissemination and to take responsibility for reporting. Southampton will employ a programmer to work with the implementation of the system.

Portsmouth Business School (PBS) will concentrate on the development of two simulation scenarios for developing, testing and application with learners in different areas of risk management. A research assistant will be employed for these tasks.

School of Civil Engineering and the Environment (CEE) at Southampton will concentrate on the exploitation of their existing risk assessment materials and procedures for qualified engineers pursuing continuing profession development. A research assistant will be employed for these tasks.

School of Psychology (Psy) at Southampton will provide expertise in cognitive issues surrounding the development and evaluation of teaching and learning materials and environments which maximize the students' learning experience. A research assistant will be employed for these tasks.

The project will begin with an initial project start-up face-to-face meeting with all those taking part in the project. A similar team meeting will occur at monthly intervals to monitor progress against objectives. There will be a final, project closure meeting. There will be two major project reviews. The first will take place after 12 months, where it will monitor progress against objectives, and will also examine recent developments in relevant tools and services that have been developed by other projects. The second major review will take place after 24 months. This review will undertake tasks similar to those of the first review, and in addition will plan the detailed deployment of the project deliverables in the third year. Public versions of the minutes of these meetings will be published on the project Website. Each of the work packages will require formal review and sign-off meetings, and these are spaced at monthly intervals. There will be weekly technical meetings of the project staff, making use of Virtual Presence Technologies. Financial reports will be supplied by ECS financial management, and a Final Report will be produced at the end of the Project.

Work plan and deliverables

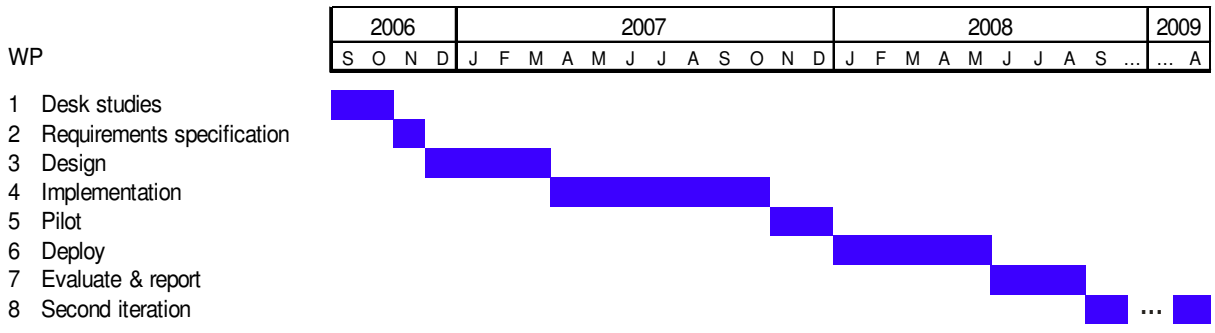

Figure 2 Gantt chart

The project comprises eight work packages (WP1-WP8) and 12 deliverables (D1-D12). The deliverables are described in the work package that creates them. The work plan is reflected in the Gantt chart in Figure 2.

Work package 1: Desk studies

1. Review of risk assessment training methods and technologies used in a variety of safety-critical educational contexts (Civil Engineering and the Environment, University of Southampton).

The project will commence with a desk study (comprehensive literature review) of current risk assessment health and safety education for the three key personnel groups of undergraduates in higher education, professionals already in the construction industry and semi-skilled and unskilled workers already in, or entering the sector.

These groups typify the life-long (professional development) and the work-based learners, who require tailored, high quality education often at a distant location. For each learner group, the range of training methods related to risk assessment currently offered will be explored and evaluated. The review will identify the extent to which industry is directly involved in the development and assessment of risk in health and safety training (both vocational and institutionally taught), and will highlight priority areas for improvement by learner category, including the scope for interactive technologies for enhancing student-centred learning.

As part of the review process, a series of targeted interviews will be undertaken with the relevant UK bodies responsible for health and safety, (e.g. the HSE, the Quality Assurance Agency, the Construction Industry Council, the CITB (related to their 'Skills Needs Analysis for Construction') and the emergency services. These parties will be asked to joined the project 'Knowledge Network' which will be used as a steering group to assess concepts and ideas developed during the project.

Deliverable D1: Report on the priority areas for training in risk assessment, current interactive training methods used, scope for development of gaming/simulation tools which actively use pre/debrief as part of the game structure

2. Review of simulation approaches relevant to risk assessment education (Business School, University of Portsmouth)

The characteristics of the risk assessment educational methods for the various learner groups identified in D1 will be used to identify existing simulation approaches that could be used to train individuals in a more interactive way. Simulation tools and technologies will be reviewed to determine what factors make them interesting and motivating to the player and how they could be evolved or adapted to cater for the specific risk scenarios identified.

When analysing current practice and research in this area, it becomes apparent that many papers have proposed taxonomies of game style and criteria for good game design, but they tend to lack structure, in that they list good ideas and observed issues, but fail to draw these together in an organised and applicable way. The problem is compounded by the fact that three distinct themes come together in this context; gaming, simulation and eLearning, and their inter-relationships and relative roles are far from being clear. An ontology of 'rich environments' which bring together the most appropriate elements of games and simulations in the context of risk assessment e-learning, through exploration and experimentation in virtual worlds will be defined.

Appropriate types of delivery format coupled to assessment methods for the different learner styles (see D3) will be developed, and the scope for packaging the content in different ways for different cultural learner groups evaluated. This will consider multi-player on-line gaming, and learning from locationally-remote situations with on-line support. To this end, the wider applicability of the delivery and assessment formats identified to risk education in other disciplines will also be discussed.

The aim is also to recognise that we aim to empower the teachers and learners in an area of changing legislative requirements, emerging technologies and work practices. Hence this workpackage will also identify what is required to facilitate the authoring and updating of scenarios

Deliverable D2: Report on gaming and simulation concepts and formats most appropriate for delivering interactive risk assessment training.

3. Teaching and learning issues associated with interactive technologies (Psychology, University of Southampton)

The various issues associated with delivering and assessing the specific risk assessment material identified in D1 through the interactive technologies identified in D2 will be investigated. Of key importance is to identify, according to the range of cognitive learning process that would be displayed by the diverse workforce, which interactive technologies best fit the way the mind works, and the ways in which such

technologies should be modified or adapted to cope with differences in the culture, learning motivation and language of players. Specific issues that will be addressed are:

- The importance of player-game interaction and the impact on player motivation, retention, and impact on behaviour at the work place. Also, the extent to which the action level in the game can be traded against the need for adequate player-reflection time to ensure effective learning and application.
- The ways in which learners could experience conflict, competition, challenge, opposition and surprise, and the ways different cultural groups might react to this which could impact on the game design.
- The scope for learning through 'role reversal' (e.g. a designer takes the role of a planning supervisor in hazard identification), and the importance of 'debriefing' and reflection as part of the gaming/simulation experience for fostering deeper learning.

The key teaching and learning issues which will impact on the effectiveness of the specific simulation tools identified in D2 will be presented in the form of a conceptual design framework. This will identify the key factors that will need to be addressed in different areas of construction risk assessment simulators design in order to effectively address the various cognitive learning processes exhibited by the players. Issues concerning the wider application of the technologies identified to other areas of health and safety risk assessment training in related professions will also be discussed.

Deliverable D3: Report on the learning and teaching issues affecting risk assessment game design and delivery and a framework for effective educational health and safety games design.

Work package 2: Requirements specification

WP 2 provides the systems analysis and requirements specification for the three technology components – the editor for constructing a simulation as a set of QTI items, the editor for assembling a set of QTI items and further resources into a Learning Design unit of learning, and the portal framework and run-time environment. WP 2 will build upon and be fully informed by the desk studies of WP 1, and is scheduled for one month. The workpackage will be led by LTG with collaborative analysis from CEE, Psy, and PBS.

Deliverable D4: Systems analysis and requirements specifications.

Work package 3: Design

WP 3 provides the initial and detailed design for the technology components -- QTI simulation items editor, the LD UoL editor, the portal framework, and the run-time services required by the portal framework and LD. It also provides the initial and detailed design for the content, the risk assessment learning module. WP 3 is scheduled for four months, taking input from UP and Psy, while the LTG leads on the design of the technological components, and CEE leads on the design of the risk assessment content.

Deliverables D5 & D6: Designs for editors, and designs for run-time frameworks.

Work package 4: Implementation

WR 4 is scheduled for seven months, building the required software and constructing the required risk assessment content. This effort will be led by LTG building the QTI and LD UoL editors, the portal framework, and the run-time services, with input from CEE, PBS, and Psy, and will be led by CEE building the risk assessment content resources and QTI items, with input from LTG, PBS, and Psy.

This work package will develop a number of services for delivering the simulation system. The system will use a portal framework in which to deliver and run the simulations, with the functionality being provided by the Web Services. It is expected that many of the required Web services will be reused from those already developed by JISC on other programmes; particularly from those developed by the Virtual Research Environment programme.

Deliverables D7 & D8: Software, and report.

Work package 5: Pilot, adjust, improve

Following implementation and alpha testing, a period of two months is scheduled for piloting, evaluating, and enhancing the software and materials developed. WP 5 will test and validate the integration of the Web services used. The pilot will refer to the scenarios and use cases from WP 1, and the requirements from WP 2, to ensure that the system operates as required. WP 5 will also provide a peer review for Open Source Maturity Model (OSMM) evaluation. This workpackage will be led by LTG with input from Psy, using pilot facilities provided by CEE and PBS.

Deliverable D9: Report on pilot and peer review.

Work package 6: Deploy

WP 6 will involve the deployment of the first iteration of the risk assessment simulation. PBS and CEE will manage and coordinate the deployment of the simulation with groups of students at Portsmouth and Southampton. During the five months scheduled for this workpackage, LTG and Psy will provide support.

Deliverable D10: First deployment report.

Work package 7: Evaluate and report

Following deployment, WP 7 will provide an evaluation report, and will prepare for the second iteration of the risk assessment simulation in year 3 of the project. Around three months have been set aside for evaluation, the lead being taken by Psychology in collaboration with CEE, PBS, and LTG.

Standard user evaluation methods will be employed to focus upon the usability of the simulation by non-technical users (e.g., can it be used simply and effectively?). This will involve both qualitative (workshops, focus groups) and quantitative (experimental) evaluation methods. The results of these activities will be distilled into an evaluation report and form part of the final report. In addition a number of recommendations for future work will be prepared, dealing with both technical issues and the generic applicability of the principles to other disciplines and subject domains.

Deliverable D11: Evaluation report.

Work package 8: Second iteration

WP 8 will involve the improvement of the risk assessment simulation, informed by the evaluation of WP 7, and an iterative deployment of a second version with students at Portsmouth and Southampton. PBS and CEE will manage and coordinate the second iteration, scheduled for 12 months. During this period, LTG and Psy will continue to provide support.

Deliverable D12: Second and final deployment report.

IPR, Sustainability

While the code will be made available under an appropriate open source agreement and may be used within any educational establishment in line with JISC's requirements, as per the terms and conditions of JISC grants, the University and its partners will retain shared IPR on the learning content, the software artefacts, and associated documentation. This will be confirmed via a Consortium agreement for defining IPR arrangements that conforms to JISC requirements.

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 workpackages will ensure successful Open Source life through achievement of a good OSMM rating, community engagement and community stated need.

The developed system will be promoted through the CETIS Special Interest Group on Assessment and other national and international forums. All reports, tools and code from the project will remain on the project server for a minimum period of 2 years and archived in the institutional repository (E-Prints) and appropriate JISC repository.

Dissemination of project outputs

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 contain current information on activities (a blog with Atom and RSS feeds), reports on the infrastructure and deliverables, and the evaluation report when available. Links to relevant articles and projects relating to the project will be added. 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 and JISC meetings. Particular attention will be paid to disseminating the work across e-learning and Web communities including the CETIS SIG on assessment. Project deliverables, reports, etc., will be placed on the project website and will be maintained for two years after completion of the project. Source code will be deposited

on SourceForge under an open source licence which conforms to JISC requirements. Learning materials will be deposited on Jorum.

Risks

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.

Table 1 Main risks to the successful completion of the project

Risk	Prob (1-5)	Sever-ity (1-5)	P x S	Action to Prevent/Manage Risk
Technical (Incomplete or unavailable prior work)	2	2	4	While service descriptions, designs, and implementations will be repurposed from current on-going projects, it is possible that these current projects may be unable to provide the anticipated materials. The risk will be managed by the fact that work from these current projects will be exploited such that unavailability from one or even two of these projects will not prove fatal to the proposed deliverables.
Staffing and personnel loss	2	3	6	The team understands design principles and no one member of the team has any vital piece of knowledge not understood by the others. The design principles have already been published. The advantage of this approach is that we are relying on an experienced existing team. The project team has strength in depth and full institutional support.
Web services	2	2	4	There is a risk that the deliverables are not achievable in a Web-services approach. We aim to start by wrapping the present tool as a Web Service and breaking it down into small services where appropriate. This reduces the risk of not delivering an effective set of services and tools.
Organis-ational change	1	3	3	The project software will be embedded into the teaching delivered by both Portsmouth and Southampton universities, and this provides mitigation against organisational changes in the courses involved.
E-framework	4	2	8	Issues are expected around the appropriateness of the E-framework and its maturity during the life of this project. The project team has excellent experience of contributing to the E-framework development and is capable of finding alternative approaches.
Collaboration	2	3	6	Ensure support from senior staff – arrange a steering committee with senior membership from both institutions.

Technology, Standards and QA

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. 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 the Remote Question Protocol (RQP) to provide remote processing of assessment items on behalf of assessment systems[5]. Compliance with SOAP will be assured using an appropriate testing package (e.g. SOAPscope). Full account will be taken of issues relating to accessibility

[5] RQP was developed as mark of the serving maths project http://mantis.york.ac.uk/moodle/

of Web-based systems and software and the outputs of this project will conform to published standards and guidelines.

Quality management in this project will be addressed by focusing on Quality Assurance; Quality Planning, and Quality Control. JISC has developed guidelines on quality assurance which cover areas such as the establishment of frameworks (procedures and standards), project management guidelines and policies on open source software development. This project will use these guidelines and enhance them as appropriate.

Quality Control on this project is the act of overseeing the software development process to ensure that the quality assurance procedures and standards are being followed. The deliverables from the software development activities will be checked against the requirements and the standards defined in the Quality Plan. Complementary activities will include the use of quality reviews where the software, models and documentation will be reviewed by a subset of the team. Examples of such reviews will include design model reviews, code walkthroughs (when necessary) and peer review. Other elements of quality control will include the regular maintenance of a risk register and issues log.

Institutional Benefits

This project will allow for situated learning at both universities to lead to a better quality of learning experience. The techniques and tools which are to be developed are expected to have exceptionally wide application for both risk assessment specifically and for simulations as a style of teaching and learning within both the partner institutions and more widely within the UK HE and FE sectors. It is expected that the approach and tools developed will also be of interest to professional and accrediting bodies.

Key personnel

David Argles is a lecturer in IT and Course Coordinator at the University of Southampton. He specialises in the design of simulations for learning, and has developed a novel approach to learning hardware design through simulation which has continued to be used with students in a number of universities over a period of some 15 years. He was a consultant to the UK government's Microelectronics Education Programme, and a consultant to Texas Instruments' education programme and has run his own spin-out company for the last nineteen years. Dr. Argles has a particular interest in activities that demand real-time concurrent processing, such as on-line collaboration in learning.

Edward Borodzicz is a Professor of Risk and Crisis Management at Portsmouth University. Edward was trained in both psychology and social anthropology specialising in the management of human behaviour and response to crisis situations. The main methodology used for Edward's research activities is the design, implementation, and evaluation of simulations and games to improve decision maker effectiveness in crisis. Edward has conducted risk and crisis management work with a number of organisations ranging from Police, Fire, Ambulance, and local authorities in the UK and mainland Europe (EC STEP project), banks and insurance companies and risk management compliance in Higher Education (knowledge transfer projects at Southampton and University of Wales). Edward frequently responds to and advises groups such as the Civil contingencies secretariat, London assembly, emergency planning society, and other foreign organisations and governments who must prepare and respond to the risks of terrorism. Most recently, Edward developed a simulation to train small to medium size business in resilience to the effects of terrorist attacks in crowded areas (Project ARGUS). This interactive training simulation is now being offered throughout the UK by the security services (MI5).

Tom Cherrett is a Lecturer in the School of Civil Engineering and the Environment based in the Transportation Research Group. In 2005 he won the Vice Chancellors Teaching Award for his PCAP dissertation looking into the ways undergraduate health and safety exams could be better delivered using extended matching questionnaires. Before starting a career in academia, Dr Cherrett worked in the warehousing and distribution industry in various warehouse and transport management roles. All involved the day-to-day co-ordination of large staff teams and the associated management of their health, safety and welfare. This practical experience coupled to his undergraduate teaching duties in 'health and safety in construction management' mean that Dr Cherrett has a fundamental understanding of health and safety regulations in the workplace. His interest in how best to deliver interactive health and safety training at undergraduate level has lead to the development of this research proposal. His core research areas are in transportation research, specifically freight and logistics (developing sustainable strategies for the collection and disposal of wastes and the distribution of goods in urban areas), and urban traffic control (improving incident detection and journey time estimation using urban traffic control infrastructure). He is currently heading SUE project 5 'Transport and Logistics' under grant number GR/S79626/01 and is a co-investigator on the Green Logistics project (EP/D043328/1). He was the research assistant on grants GR/J97724

(Estimation of journey times from detector data) and GR/L43602 (Journey time estimation in urban road networks), and has experience of co-ordinating large, multi-disciplinary projects (the EU 5th FP PRIME project).

Itiel Dror is a Senior Lecturer in the School of Psychology and specialises in learning and cognitive psychology. He has extensive research experience in using technology to enhance knowledge and skill acquisition. Dr Dror's work spans academic and basic research as well as applied and real world applications. Underlying Dr Dror's work is the belief that technology can play a critical role in learning; however to succeed and be efficient it must be tailored to the human cognitive system. The cognitive system encodes, stores, retrieves, and utilizes information, to name just a few cognitive processes that are relevant to learning. Dr Dror's specialty is how to build learning technologies in a way that interacts and works well with the cognitive systems. He has applied his basic academic research in this area to a variety of real world settings, working for and providing consultancy to the US Air Force (e.g., Dror, 2004; Ashworth & Dror, 2000) the UK Passport Services (e.g., Dror & Shaikh, 2005a, 2005b), as well as to commercial companies.

Lester Gilbert is a Lecturer in IT at the University of Southampton, with experience in cognitive psychology and learning theory as well as IT. He has worked as a programmer and manager in commerce and industry, leading and managing the development and delivery of commercial CBT, CAI, and interactive video training solutions for customers such as Midland Bank, British Aerospace, Abbey National, and UK Atomic Energy Authority. He will be publishing a text, "Principles of eLearning Systems Engineering", in 2007. He is the Technical Manager of the CORE project funded under the JISC VRE call, and is a co-investigator on the JISC-funded FREMA and R2Q2 projects.

Gary Wills is a Lecturer in Computer Science at the University of Southampton. His main research area is in the application of advanced knowledge technologies, and in particular Personal Information Environments, for the industrial, education and medical domains. Gary is the project manager for two JISC funded projects that use a service oriented architecture: Collaborative Orthopaedic Research Environment project funded under the VRE call and the R2Q2 (rendering and response of QTIv2 questions) under the latest Tools call. He is also a co-investigator of the JISC funded reference model for assessment (FREMA) project. Gary was also the Technical manager in the Virtual Orthopaedic European University project (VOEU) responsible for developing the infrastructure for a Virtual Learning Environment, for post-graduate training in surgery. Gary is a member of the CETIS Assessment SIG.

Other staff. It is probable that recruitment will be required for the full-time Senior RF within ECS, and for the part-time Junior RFs within CEE, PBS, and Psy.

Budget

4.5% further salary & costs increases assumed in 2nd year of project
3.0% further salary & costs increases assumed in 3rd year of project

Directly incurred costs					**FEC**	**Total**
Personnel	**Yr1**	**Yr2**			**£**	**£**
Project manager	7,300	7,860			15,160	
Lead senior RF LTG	26,978	34,859			61,838	
Junior RF CEE	14,212	10,202			24,414	
Junior RF PBS	11,369	10,202			21,571	
Junior RF Psy	11,369	4,946			16,316	139,298
	Days	**Grade**		**Day Rate £**	**FEC £**	
Consultant LD	6	3		500	3,000	
Consultant QTI	6	3		500	3,000	6,000
	Qty	**Grade**	**Unit cost £**	**Rate £**	**FEC £**	
Equipment						
PC & software	3		1,500		4,500	
Portable & software	1		1,500		1,500	
Server & software	1		1,500		1,500	7,500
Travel & subsistence						
UK meetings	24			200	4,800	
UK conference	6			700	4,200	
Overseas conference	2			1,500	3,000	12,000
Other						
Recruitment advertising	2	1		400	800	
Consumables	6.25			360	2,251	3,051
	Yr1	**Yr2**				
Total incurred	99,780	68,070				167,849
Directly allocated costs						
Personnel	**Yr1**	**Yr2**	**Yr3**			
Principal investig LTG	10,511	10,984	11,299		32,795	
Co-investig 1 LTG	4,650	5,011	5,315		14,976	
Co-investig 2 LTG	2,187	2,357	2,500		7,043	
Co-investigator CEE	10,511	10,984	11,299		32,795	
Co-investigator PBS	10,511	10,984	11,299		32,795	
Co-investigator Psy	9,301	10,022	10,630		29,953	150,356
Institutional estate	40,142	37,945	12,486			90,573
Total allocated	87,814	88,287	64,828			240,929
Indirect costs						
General services	126,444	119,525	39,329			285,298
Total FEC	314,038	275,881	104,158			694,077
JISC contribution	106,145	93,248	-			199,393
Institutional contribution	207,893	182,633	104,158			494,684

Supporting Letter(s)

Professor Graham Moon BA (Hons) PhD
Director of Research

Direct line: (023) 9284 6191
Email: graham.moon@port.ac.uk

University of Portsmouth

Research and Knowledge
Transfer Services
Purple Door
University of Portsmouth
James Watson Hall
White Swan Road
Portsmouth PO1 2BF
United Kingdom

T: +44 (0)23 9284 4444
F: +44 (0)23 9284 4445
E: purpledoor@port.ac.uk

20 June 2006

Dear Sir/Madam,

The University of Portsmouth would like to recommend this application from Professor Edward Borodzicz, in conjunction with University of Southampton, for funding by the JISC (Joint Information Systems Committee) Capital Programme.

The project represents an exciting opportunity to develop an interactive learning environment using gaming and simulation technologies. This environment will then be used for delivering high quality training in construction site risk assessment, leading to more effective health and safety management.

We therefore confirm that we are happy to support this application and believe that you will excited by this proposal and that you will see fit for the proposal to receive the funding it is applying for.

Regards and thanks

Graham Moon
Director of Research
University of Portsmouth

University of Southampton

School of Electronics and Computer Science

Professor Wendy Hall CBE FREng
Head of School

University of Southampton
Highfield
Southampton
SO17 1BJ United Kingdom

T +44 (0)23 8059 2749
F +44 (0)23 8059 2978
E hos@ecs.soton.ac.uk
www.ecs.soton.ac.uk

Lesley Hawkins
JISC Executive
Northavon House
Coldharbour Lane
BRISTOL
BS16 1QD

21 June 2006

Dear Lesley Hawkins

Re: JISC Circular 03/06: JISC Capital Programme
Bid Title: eLearning Simulations Toolkit (SimKit)

I am writing to confirm Southampton's commitment to the JISC Capital Programme's 'eLearning Simulations Toolkit' project.

The project will be run in the Learning Technologies Group of the School of Electronics and Computer Science under the leadership of Dr David Argles, with support from other members of the LTG and from project partners in the School of Engineering Sciences, the School of Psychology and the University of Portsmouth Business School. 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

Professor Wendy Hall
Head of School

University of Southampton

School of Electronics and Computer Science
Learning Technologies Group

University of Southampton
Highfield
Southampton
SO17 1BJ United Kingdom

T +44 (0)23 8059 3669
F +44 (0)23 8059 2865
E ltg@ecs.soton.ac.uk
www.ecs.soton.ac.uk

Lesley Hawkins,
JISC Executive,
Northavon House,
Coldharbour Lane,
BRISTOL,
BS16 1QD

21 June 2006

Dear Lesley Hawkins

Re: JISC Circular 03/06: JISC Capital Programme
Bid Title: eLearning Simulations Toolkit (SimKit)

I am writing to confirm Southampton's commitment to the JISC Capital Programme's 'eLearning Simulations Toolkit' project.

Successful outcomes from this project will inform future policy at the University of Southampton and will significantly impact upon future decisions involving our teaching and learning infrastructure. The successful demonstration by the project that effective, lower-cost simulations can be straightforwardly constructed and delivered by Lecturers and Tutors in a variety of learning environments will undoubtedly accelerate the take-up and exploitation of technology-enhanced learning and teaching both at this institution and elsewhere.

Yours sincerely

Dr Hugh Davis
University Director of Education