


Name of Capital Programme: (e-Learning; e-Infrastructure; Repositories and Preservation) e-Learning		
Name of Lead Institution: Coventry University		
Name of Proposed Project: Making Games Serious: The Role of E-Assessment		
Name of Project Partners: Warwickshire College; Futurelab; Lateral Visions.		
Full Contact Details for Primary Contact:		
Name:	Professor David Morris	
Position:	Director of e-Learning	
Email:	d.morris@coventry.ac.uk	
Address:	Coventry University, Coventry CV1 5FB.	
Tel No:	07974 984023	
Fax No:		
Length of Project:	24 months	
Project Start and End Dates:	1 October 2006 to 30 September 2008	
Total Funding Requested from JISC:	£195,000	
Funding Broken Down over Project Years:	£120,000 in Year 1; £75,000 in Year 2.	
Total Institutional Contributions:	£37,000	
Outline Project Description		
<p>This project addresses two of the major blockages to the implementation of serious games in HE – assessment and the lack of integration of games into the wider curriculum. The work concentrates on two games, an engineering/physics game (Racing Academy) and a business game (Liquidate). Both have been successfully used at the foundation degree level. The context for the work will be the FE/HE collaboration between Coventry University and Warwickshire College (an important HE provider in its own right). A major aim of this collaboration is to promote progression between the institutions to provide an integrated learning experience for students. Our joint e-learning benchmarking studies have shown that e-learning can play an important role in deepening collaboration to improve the student learning experience.</p> <p>The project has two major focuses. Firstly there is the development of effective, innovative and credible e-assessment systems to accompany the games. Secondly there is integration of the assessment and communications systems on which educational games depend within a familiar MLE environment. In tackling these two issues we hope to show how serious games can be better integrated into the learning and teaching diet for HE students and develop ways in which games can be used as a vehicle for collaboration between institutions.</p>		
I have read the Circular and associated Terms and Conditions of Grant at Appendix B (Tick Box)	YES 	NO

Introduction

The proposed work aims to explore how two existing games, Futurelab's *Racing Academy* and Coventry Business School's *Liquidate*, can benefit from integration into a learning environment such as that found in Coventry University's *CUOnline*. In particular we aim to develop assessment strategies and a communications infrastructure which will help exploit the full potential of the games to promote deep learning.

The project will contribute to the JISC e-Learning Programme by exploring the interfaces between 'game spaces' and institutional teaching and learning environments and developing strategies for exploiting the mutually reinforcing aspects of each of these virtual spaces. In particular it will:

- Develop two existing games to include assessment protocols and leverage the collaborative working environment of a modern MLE to diversify the learning experience.
- Provide support for Foundation Degree teaching and learning in Motor Sport, generic engineering and business courses at FE colleges.
- Support progression between institutions by developing ways of using games as a means of promoting smooth transition; this may involve competition between teams from FE partners and the university.
- Build capacity in the deployment of serious games across the sector.
- Develop and pilot assessment models for learning via serious games to support their effective implementation.
- Generate feedback on two use cases of serious games.
- Enhance knowledge of serious games through engagement with *Futurelab* and *Lateral Visions*.

Our primary areas of attention will be to integrate the games within a virtual collaborative workspace thus exploiting the power of the communication and team working tools available via *CUOnline*. In general terms games need to be integrated into the wider educational environment of the course rather than be treated as stand alone activities if they are to be successful agents of learning. However we must be wary of losing the inherent attractiveness of games to learners ("coolness") through over-institutionalising them. In addition we must allow students to learn via experimentation; this may require less tutor intervention rather than more. We wish to develop assessment strategies which will not only test the knowledge gained but evaluate team-working skills, the ability to learn from experimentation and the ability to communicate analytical findings. In addition to providing a means to mainstream the two exemplar games within undergraduate programmes, the work will extend our knowledge of how to integrate "serious" games within learning and teaching in general.

Racing Academy embodies two major elements of learning. Firstly there is the potential to use the self-organising communities which can emerge and develop round games to excite interest in physics and engineering and engage in a discourse around these areas. Secondly there is the theme of learning from experimentation. Whilst the game itself may be tractable for the student the underlying model is not. Thus students learn by experimenting with changing the parameters of the model on a systematic basis or through more intuitive approaches (playing hunches). However the educational object of the game (developing knowledge of physics and engineering) is not the same as the ostensible object of the game (designing a faster drag racer). The competitive desire to build a better dragster provides the compulsive element of the activity and must not be extinguished by the location of the game within a potentially restrictive educational environment. The 'coolness' of the game is a valuable weapon in gaining sustained attention and engagement by the players, and it is attention and engagement which are widely regarded by both students and teachers as being the most important factors in promoting learning.

Liquidate has been used in one form or another for over twenty years at Coventry Business School as an adjunct to undergraduate business education. It has also been used successfully at

the school and FE level although the parameterisation features of the game have been exploited to make it less demanding for such students. The game has a fairly traditional format which requires teams to take a number of decisions which are then entered into a model which is both stochastic and highly interdependent in that the actions of all teams affect the outcomes for any one of them. The game also allows for “shocks” to be introduced by game umpires; such shocks are usually woven into an evolving game scenario to potentially reward players who take a longer term strategic view of their play. The game scenario is typically revealed via the publication of “news”. In common with *Racing Academy* the underlying model of the game is not discoverable by players; it is far too complex. However repeated use of the game over the years has shown that it has a strong ex-post rationality in that players can typically explain why their strategies succeeded or failed in the light of the decisions they made, the strategies pursued by competing teams and the scenarios as they actually unfolded.

CUOnline is the name given to Coventry University's new on-line learning environment. It can be described loosely as “VLE plus portal plus repository plus integration plus e-portfolios plus...”. It integrates a VLE (WebCT Vista 4) with a repository system (Learning Edge), a student portal giving access to a wide range of “smart” services (based on Sharepoint), e-portfolios (via PebblePAD) together with a wide range of communication and collaborative working tools.

The partners to the project are:

- Coventry University <http://www.coventry.ac.uk>
- Warwickshire College <http://www.warkscol.ac.uk>
- Futurelab <http://www.futurelab.org.uk>
- Lateral Visions <http://www.lateralvisions.co.uk>

The collaboration is technology-focussed at the outset but at the implementation stage becomes learner-focussed and supports FE/HE collaboration, particularly in respect to foundation degrees, the provision of HE in the work place and elsewhere via team-based “competitive” use of games and the development of games-based technology to support flexible delivery. Lateral Visions are award-winning specialists in real-time interactive 3Dsoftware solutions. The company is dedicated to developing high-quality interactive software products that set a new standard of visualisation and simulation for many applications in business, education and entertainment.

Coventry University and Warwickshire College have recently collaborated in a joint project under the HEA/JISC e-Learning Benchmarking Pilot. This recognized the substantial collaboration that already existed between the university and the college and the commitment to move it forward. This project continues that collaboration. As part of the Benchmarking Pilot we produced a special report on the FE/HE collaboration and potential good practice. This drew attention to the potential for e-learning to enhance progression from HE in FE to HE on a regional (or sub-regional in our case) basis and the importance of promoting “deep” collaboration. ‘Deep’ collaboration will involve a lasting commitment to partnership working around issues that are important for all partners, for example progression from FE to HE, sharing of resources and e-learning development.. “Shallow” collaboration is likely to be short-lived and be narrowly based around a specific purpose. We hypothesize that the deeper the collaboration the more resource sharing goes on. Deep collaboration will be characterized by the sharing of processes, missions and principles. The university/college collaboration is governed by a Memorandum of Cooperation and the two parties have jointly funded the post of Partnership Development Manager to promote depth.

Futurelab and Lateral Visions jointly developed *Racing Academy* and have worked together on other projects. Whilst *Racing Academy* is undoubtedly successful as an education game its uptake in HE has been limited. We recognise that there is another JISC funded project which involves *Racing Academy* (http://www.jisc.ac.uk/index.cfm?name=eli_racing). We believe that there are substantial synergies with this project but that our focus is sufficiently different to avoid wasteful duplication. The use of *Racing Academy* in this project reflects our desire to have

available a second proven game with which to work rather than spend time becoming familiar with something else. Coventry University and Futurelab have been discussing potential joint projects in the games, modeling and simulation arena for some time and this bid is an outgrowth of those interactions.

The use of serious games is one of four major target areas for development in the University's strategic plan for e-learning. In addition the university has targeted serious games in its Applied Research strategy and is funding (£600k over four years) activity in this area. The University's enterprise company works closely with Advantage West Midlands (the RDA) on its serious games cluster strategy; our Enterprise Park is home to a number of companies involved in the games sector. The RDA has agreed very substantial funding for the development of a Serious Games Institute on our Technology Park. Work in this area is thus a major long-term commitment by the university. The experience gained in the direct context of this project is transferable to serious games and simulations deployed in the educational context in general. The university's e-Learning Unit will scale this experience upwards by integrating a number of other third-party games within the wider curriculum offered by the university.

The proposed duration of the project is two years. The first year will be used for development and testing. Year 2 will involve large-scale implementation of the games across Coventry University and its FE partners.

Project Description

According to the DfES *Educational Use of Games* report, games for entertainment have so far failed to convert to games for education. The report cites three key reasons: lack of curriculum relevance, lack of a practical assessment framework and irrelevant content or functionality. The core of this proposal is to transpose the compelling qualities of game play to an educational environment and create an externally verifiable educational assessment system which does not compromise the challenge or spontaneity implicit in gameplay. The project will capture the special qualities that games offer learning such as teamwork, collaboration, communication, self and group reflection, reflexivity and resilience in a set of documented assessment protocols. This will be done in the context of the two demonstration games chosen for this project. We also hope to map out the development of an open, generic software instantiation of those protocols. If we can make significant progress in the assessment arena we will have made useful progress towards removing one of the issues which still leaves games sitting on the margins of teaching and learning, that is the difficulty many teachers have with the notion that playing games leads to demonstrable and measurable educational outcomes.

The pedagogical approach taken by game-playing most closely resembles a Kolb learning cycle. Kolb argues that four mutually reinforcing modes of learning must occur if learning is to be effective, lasting and applied:

- Concrete experiences
- Active experimenting
- Abstract concept-making
- Reflective observing

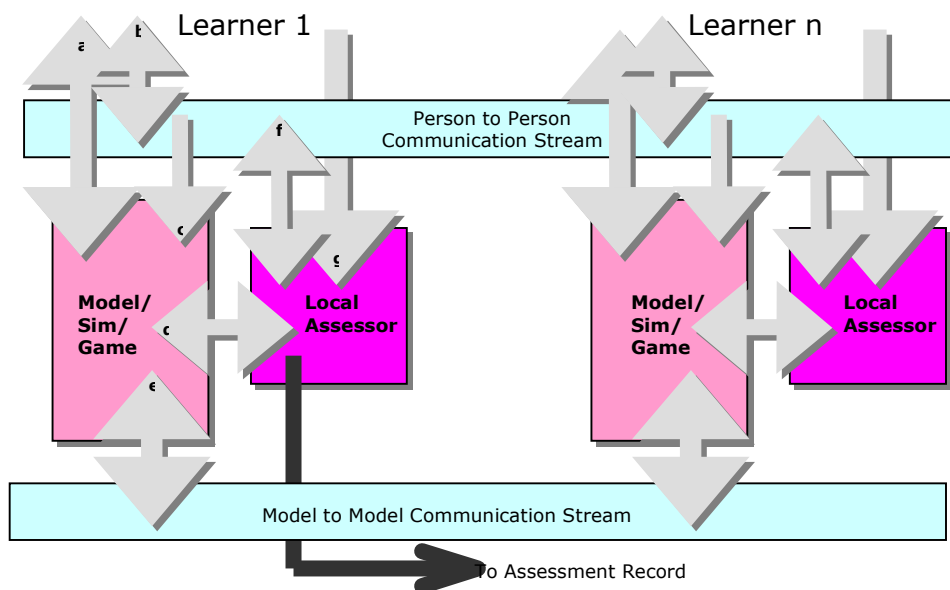
Whilst these four elements are most often seen as forming a cycle of learning, it is probably more helpful to apply a simple 'cake' analogy; all four ingredients must be present in order to make a successful cake and need to be combined with the help of an external agent (the skilled tutor); the cake does not bake itself. Games can provide the first two ingredients but do not necessarily automatically lead to the third and fourth; these need to be promoted by the educational environment within which the game is set.

Whilst the current project is limited in scope it is helpful to see it within our longer term vision of how games might be developed within an educational environment. A simplified schematic view of the architecture is presented in the figure below.

Figure 1 shows four components and the links between them. These are:

- Social software - person to person communication systems and research systems that can be embedded in the activity.
- The game or model engine - the element that provides the game or modeling environment for the student.
- The assessment system - that captures information on the activity for assessment purposes.
- The simulation/model communication system - passing messages from learner/user to learner/user so that their views can be updated by the other learner/user's action.

Figure 1: A Generic Architecture for Serious Games Implementation.



A modular system architecture for collaborative games, simulations and modelling tools.

The significant part of the architecture is embedded in the arrows that appear in the diagram - the information flows - which are the glue that makes the aspiration of pedagogically relevant games possible.

- a. Person–Engine interaction: this is playing the game or building/modifying the model.
- b. Person-person communication and research: this is the stream of information between the participants to the system. This can be synchronous or asynchronous, text, audio, video or whatever. It will also allow search, research and sharing.
- c. Simulation-Person communication stream: the communication stream between people may also need feeds directly from the game; updates and news of what is happening, what changes have taken place, what is happening on the leader board and so on
- d. The content system needs to communicate information to the assessment system for analysis and recording. The arrow is in two directions because the past history of the learner may well influence the working of the engine, for example the level of complexity of tools or level in a game.

- e. Engine-engine communication. There is need for the engines to communicate directly to each other changes undertaken. We anticipate the possibility of other collaborators may have other views of the model/simulation/game, however their model needs updating as a result of other learner's/tutor's/mentor's/player's interactions. The person-person communication also needs to be captured for assessment purposes as the communication clearly may contain important information about the learner and their activity (eg how they give help or how much help they have received).
- f. There is also a need for work the student is doing in the non-electronic world to feed into the system.

The focus of this project is two-fold. Firstly we will investigate ways in which the assessment of learning from games can be improved. In particular we wish to demonstrate how data captured from the game itself can be used as a basis for cost-effective e-assessment (flow d in the figure). Secondly we will develop ways of integrating games within virtual learning environments such as those offered by *CUOnline*. The former addresses one of the concerns of the DfES report directly, the latter attempts to harness both the monitoring and collaborative working possibilities offered by *CUOnline* including the potential use of social software tools such as blogs, web folios, collaborative learning environments such as *Elgg* and the on-line player communities associated with games such as *Racing Academy*.

The project is divided into nine work packages:

WP1: Kick-off activities including first meeting of the Project Steering Group, final determination of working protocols, agreements etc. Lead : Project Director.

WP2: Developing generic assessment protocols and architectures. Lead: Futurelab.

WP3: Implementing changes to *Racing Academy* to output data needed for assessment. Lead: Lateral Visions.

WP4: Implementing changes to *Liquidate* to output data for assessment. Lead: Coventry University e-Learning Unit.

WP5: Preliminary trial of revised *Racing Academy* with FD students. Lead: Warwickshire College.

WP6: Preliminary trial of revised *Liquidate* with undergraduate students. Lead: Coventry Business School

WP7: Integration of *Racing Academy* and *Liquidate* with *CUOnline* to provide enhanced learner to learner and learner to tutor communications systems. Lead: Coventry University e-Learning Unit.

WP8: Large-scale implementation of *Racing Academy* and *Liquidate* at Coventry University, partner colleges and in work-based learning settings. Lead: Coventry University.

WP9: Evaluation. Lead: Coventry University.

WP10: Dissemination. Lead: Coventry University.

Figure 2 shows the work flow and timings.

The project will be managed by a steering committee comprising:

David Morris Project Director (Chair)

Martin Owen

Carl Gavin

Richard Trigg

Any new software developed as part of the project activities will be open source. The IPR in the game does not rest with Coventry University. Subject to agreement with *Futurelab* any ancillary or supporting materials developed as part of the project would be made freely available to other educators.

There are a number of major strands to our sustainability strategy:

- Building a professional community of practice around applications of *Racing Academy* and *Liquidate* and the game environment in general.
- Progressively developing the sophistication of the user experience.
- Publishing ongoing evaluations of game use.
- Extending the number of environments within which the game can be used.
- Integrating the results of the project with the ongoing work of the Serious Games Institute.

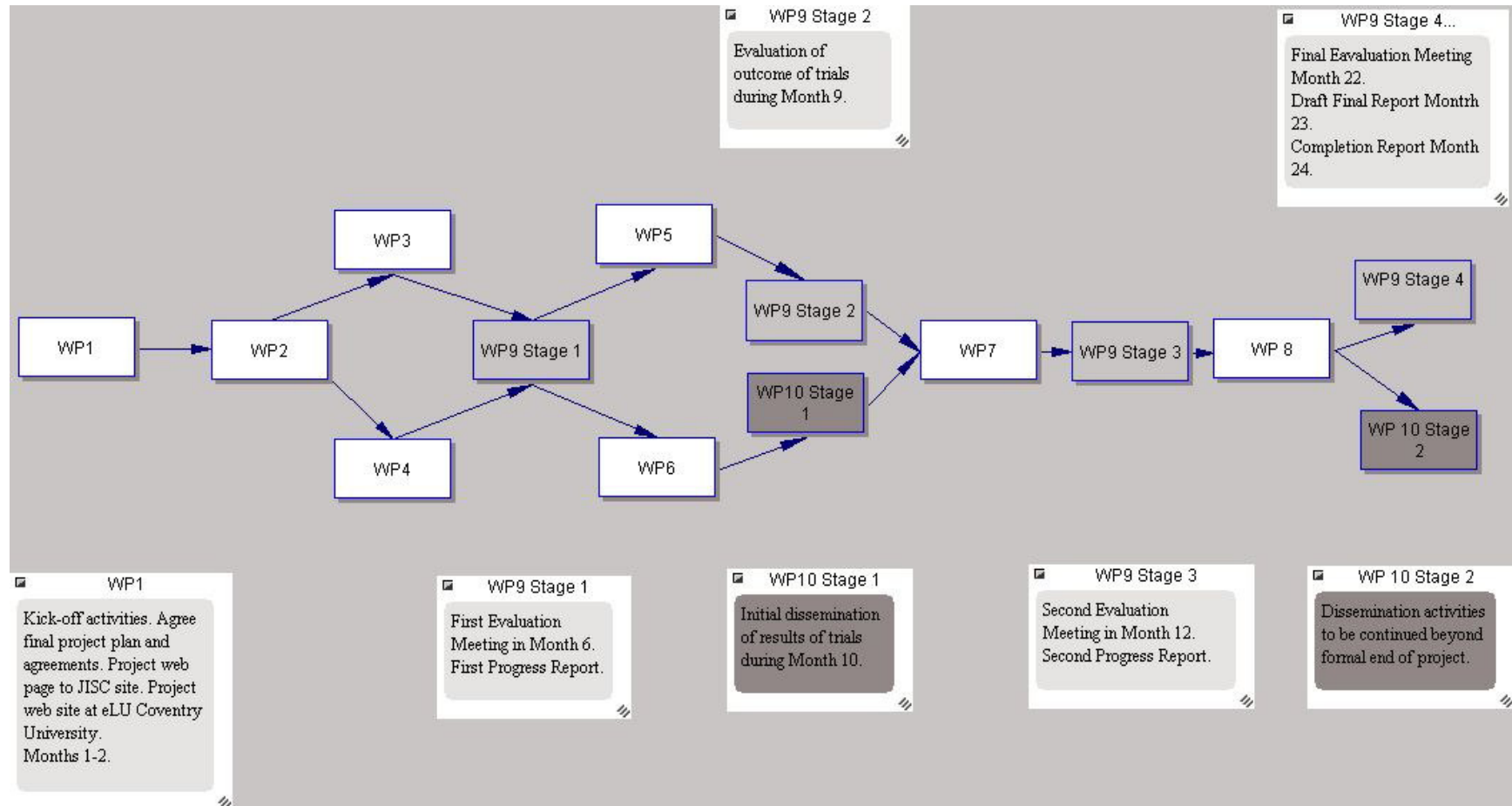
The project will be evaluated using a multi-methodological approach. Students will be asked to use blogs (provided within PebblePAD) to record experiences and achievements. Students will be invited to populate their blogs using a variety of media and not simply text in a diary format. Data will be collected by observation as students play the games as well as from the blogs. One to one Interviews will be conducted with a sample of teachers and students, which will provide more detailed feedback concerning their perceptions of the games and their experiences of using them.

The interviews and preparation of the evaluation report will be the responsibility of Nigel Briggs.

The results of the project will be disseminated via:

- Knowledge and experience shared in workshops, Roadshows, the West Midlands e-Learning Forum, WebCT Forums etc.
- Conference papers and published articles.
- Project web site.
- Project completion report.
- Case study reports.
- Dissemination video.
- Conferences, events and activities organized by the Serious Games Institute.

Figure 2: Work Flows



Budget

Item	Coventry University from Project £	Coventry University cont. £	Futurelab from Project £	Futurelab cont. £	Lateral Visions £	Warks College from Project £	Warks College cont. £	Total £
<i>Staff:</i>								
Project Director	10000							
Instructional Designer	50000							
Programmer	10000							
Teaching staff time		8000					6000	
Futurelab staff			40000					
Other staff	10000					25000		159000
Equipment and consumables		4000						4000
Travel and subsistence	2000		4000					6000
Costs of student trials		2000					2000	4000
<i>Dissemination:</i>								
Video			6000					
Other		5000		5000		2000	2000	20000
Evaluation	15000	2000		1000		1000		19000
<i>Other:</i>								
Additional game development					20000			20000
Total	97000	21000	50000	6000	20000	28000	10000	232000
JISC Funding Requested	97000		50000		20000	28000		195000

Note: The Coventry University staff costs use fEC Methodology. In this case overheads etc. are absorbed in the day rates used for budgeting. For guidance these are £700 (Project Director and Professor Marshall); £440 (Programmer and Instructional Designer); £500 (Other academic staff including D. Blight). The costs of the independent evaluator (Nigel Briggs) are shown under the Coventry column for convenience.

Key Personnel

David Blight

David is Principal Lecturer with responsibility for e-learning developments at Coventry Business School. He has worked on a number of major on-line learning projects including the development of *Winecon* (an on-line learning package for economics teaching) under the Teaching and Learning Technology Project (TLTP), the Cable and Wireless Virtual Academy (CWVA) and *Liquidate*, the successful business game.

Nigel Briggs

Nigel is an Educational Consultant. Until recently he was Principal of Stratford-upon-Avon College, one of Coventry University's oldest and most important FE partners. He has been a member of many national and regional bodies concerned with FE issues including many involved with the development of ICT in education.

Hans Daanen

Hans is responsible for technology in Futurelab. He works with the Projects Manager and project partners to assure forward thinking, technical direction and quality on all projects. Together with the Technology Manager he is responsible for the long-term strategy of Futurelab's technical infrastructure. Hans has broad experience in system design, ranging from ASIC design to large-scale software systems. Prior to joining Futurelab he was with HP Labs and Mobile Bristol where he worked on internet communication and network design, and before that he worked in various R&D roles within several companies in The Netherlands. His background includes an IT degree from Eindhoven University of Technology.

Carl Gavin

Carl Gavin graduated with a first class BSc with Honours in Computer Science from the University of Liverpool and went on to undertake PhD research, sponsored by Andersen Consulting, into the application of Software Engineering within industry, before rising through the research ranks to become a Lecturer and Director of Studies at the University of Liverpool. Leaving academia, he was Managing Consultant with Sema Group Consulting, consulting to a wide range of organisations in both the private and public sectors. Before founding Lateral Visions in Liverpool, Carl was head of Game Design at Codemasters, the largest privately-owned interactive entertainment software and games developer and publisher in the UK, where he was responsible for the design of a plethora of "Number 1" hit products including Colin McRae Rally 2.0, ToCA World Touring Cars, INSANE, and Operation Flashpoint. Carl has advised the government both nationally and locally, and consults and lectures to academic institutions on the nature and complexities of leading-edge real-time software engineering.

Juliet Hinrichsen

Juliet is an Instructional Designer working in the E-learning Unit. She joined Coventry in autumn 2005 from Derby University where she was Quality Manager for e-Learning. She has worked on a number of collaborative projects to help enhance undergraduate courses including the use of simulations, animation etc. Juliet will manage the project for the E-learning Unit.

Ian M. Marshall

Ian is Professor of Computer Games Technology at Coventry University. In total he has 20 years' experience in higher education in the UK. In 1997 he started the world's first Masters degree in Computer Games Technology and followed this up in 1998 with the first full undergraduate degree in Computer Games Technology. In 1999 he established the International Centre for Computer Games Technology at the University of Abertay Dundee. In total he has obtained over £3 million to support research in the last 10 years. He created the first online MSc in Computer Games Technology which was one of three products used to launch the British Council's first managed learning zone in Delhi.

David Morris

David is Director of the E-learning Unit and Professor of Business Education at Coventry University. He was Founding Dean of Coventry Business School, a post he held for seventeen years. He is the author of over 100 articles, book chapters and other publications including a number in the higher education area. He has advised many universities nationally and internationally on education topics, most recently on e-learning. He pioneered the introduction of WebCT to the university in the business school. David will be Project Director.

Martin Owen

Martin's role at Futurelab is to think strategically about the ways technology transforms learning. He helps to build new partnerships and bring new ideas into the organisation, and is involved in forming and evolving these ideas by taking them out to learners. Previously, Martin held a teaching and research post at the School of Education in the University of Wales, Bangor. Here he conducted a wide range of learning technology projects, including working with teachers on primary school numeracy with multimedia computers for the Welsh Assembly, and building a virtual e-village for UK and French teenagers. Martin has also worked as an advisory teacher and as a secondary science and technology teacher.

Andy Syson

Andy is Deputy Director of the E-learning Unit at Coventry University and manages WebCT within the university including staff and student training, phasing in of new tools, liaising with external and internal partners and the introduction of new versions.

Richard Trigg

Richard is Learning Technologies Development Manager at Warwickshire College. He was a major contributor to the 2005 *Report on the Role of e-learning in Further Education Colleges Across the West Midlands* and has pioneered the use of many e-learning tools within the FE sector. He has completed the Centre of Excellence in Leadership course e-Xplorer.

Mary Ulicsak

Mary works on prototype research and evaluation of digital technologies for learning at Futurelab. Previously, she worked in the Educational Technology Research Group at the University of Birmingham, where she focused on the use of computers to scaffold self-assessment of group skill usage and then provide feedback about the group's interactions. Other research work includes looking at websites to raise educational aspirations at the Centre for Applied Research in Educational Technologies at the University of Cambridge, and the use of jokes to improve children's linguistic comprehension at the University of Sussex.

**Pro-Vice Chancellor (Resources)
and Group Finance Director**
David G M Soutter
BA MA FCA

Coventry University
Priory Street Coventry CV1 5FB
Telephone 024 7688 7688
Direct Line 024 7688 8009
Fax 024 7688 8030
Email d.soutter@coventry.ac.uk
www.coventry.ac.uk



JISC Executive
Northavon House
Coldharbour Lane
BRISTOL
BS16 1QD

Our reference

DS/jl/200606.3

Your reference

Date

20 June 2006

Dear Sirs

JISC Circular 3/06 e-learning

I have read the bid and am pleased to support the Coventry University JISC Capital bid: Making Games Serious – the role of E-Assessment.

Yours faithfully

A handwritten signature in black ink that reads "David Soutter".

David G M Soutter
Pro-Vice-Chancellor (Resources) & Group Finance Director

**COVENTRY
UNIVERSITY**





Futurelab supports the Coventry University JISC Capital bid: Making Games Serious

Martin Owen
Development Director



Professor David Morris
Director of e-Learning
Coventry University
Priority Street
Coventry
CV1 5FB

19th June 2006

To Whom It May Concern,

Making Games Serious: The Role of E-Assessment

Lateral Visions is pleased to confirm its support for the above bid from Coventry University being made to the JISC Capital Programme under the e-learning strand.

Yours sincerely

Dr Carl J Gavin
MANAGING DIRECTOR

Lateral Visions Software Company Limited
3e Wavertree Boulevard South, Wavertree Technology Park, Liverpool, L7 9PF
Company Registration Number 4911294 VAT Registration Number 836 9586 69



Leamington Centre
Warwick New Road
Royal Leamington Spa
CV32 5JE
T: 01926 318000
F: 01926 318111
enquiries@warkscol.ac.uk
www.warkscol.ac.uk
Principal: Ioan Morgan

19th June, 2006

Direct Line: 01926-318223
Ref: im/rt/cmw/gen

JISC Executive
Northavon House
Coldharbour Lane
Bristol
BS16 1QD

Dear Sirs,

JISC Circular 3/06 e-learning

Please accept this letter as our endorsement of the collaborative and partnership commitment being taken by Warwickshire College with Coventry University on their *Racing Academy* bid for the above referenced call for proposals. Warwickshire College will lead on work package 5 – the preliminary trial of the revised games package with our FD learners as well as collaborating on all other work packages which make up the proposal.

Yours sincerely,

Ioan Morgan
Principal

Warwickshire College is a Beacon Status College



INVESTOR IN PEOPLE



CUSTOMER SERVICE EXCELLENCE

If you are visiting the College, please inform the person who sent this communication if you have any individual needs, for example, dietary, access, disabled parking or require emergency evacuation assistance.

Rugby Centre
T: 01788 338800
F: 01788 338575
Leamington Centre
T: 01926 318000
F: 01926 318111
Moreton Morrell Centre
T: 01926 318000
F: 01926 318300
Henley-in-Arden Centre
T: 01564 797800
F: 01564 797802
Trident Technology & Business Centre
T: 01926 884900
F: 01926 470214