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| Cover Sheet for Proposals (All sections must be completed) | JISC Capital Programme |
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|--|-----------------|-----------|
| Name of Capital Programme: e-Learning | | |
| Name of Lead Institution: Cranfield University | | |
| Name of Proposed Project: Adding Topic Map Based Personalisation to the HORUS Self-Managed Learning JISC Web Service | | |
| Name of Project Partners: University of Manchester | | |
| Full Contact Details for Primary Contact: Name: Dr Bernard Scott Position: Head of Flexible Learning Support Centre Email: B.C.E.Scott@cranfield.ac.uk Address: Cranfield University Defence College of Management and Technology Defence Academy Shrivenham Wilts SN6 8LA Tel No: 01793 762303 Fax No: 01793 783746 | | |
| Length of Project: 18 months | | |
| Project Start and End Dates: September 1st, 2006 – February 29th 2008 | | |
| Total Funding Requested from JISC: £188,618 | | |
| Funding Broken Down over Project Years: Year 1: £125, 746 Year 2: £62,872 | | |
| Total Institutional Contributions: £87,973 | | |
| Outline Project Description The project is based on an existing successful JISC e-learning framework web service, HORUS. HORUS enables the support of student centred, knowledge domain based planning and the pursuit of learning vital to life-long learning. The major innovation in the proposal is to extend HORUS by deploying topic map representations of knowledge and skills domains at different levels of granularity, together with a variety of adaptive teaching and advisory support regimes. Conversation theory, with its associated theories of knowledge and skills representation and adaptive teaching, provides the needed coherent and unifying conceptual framework. Conversation theory will guide the construction of a reference meta-model of the use of topic maps to support lifelong learners. The reference meta-model will in turn guide the components based construction of topic map based web services and the extension of HORUS services to support lifelong learners. | | |
| I have read the Circular and associated Terms and Conditions of Grant at Appendix B (Tick Box) | YES √ | NO |

Project Proposal for JISC Capital Programme

Cross Institutional use of e-Learning to Support Life Long learning

Project Title

Adding Topic Map Based Personalisation to the HORUS Self-Managed Learning JISC Web Service

Introduction

Rationale for Project

The project is a response to the JISC Programme aim of using e-learning technologies to support lifelong learners by providing personalised learning experiences that meet the needs of individual learners in a range of settings.

Current developments to support lifelong learners, such as e-portfolios, web based adaptive teaching systems and tools for self-managed learning, are at a relatively immature stage. Several challenges need to be addressed, e.g.:

- the linking of multiple and future systems
- establishing consistency of terms and meanings through common metadata and shared ontologies for knowledge and skills domains
- conceptually and operationally linking multiple knowledge and skills domains
- conceptualising and linking knowledge at different levels of granularity
- supporting the evolution and growth of knowledge domains
- supporting personalising learning pathways

There is a need also for a sound theoretical basis for the development of new technologies based on a sound understanding of the needs of lifelong learners.

The new developments proposed are based on existing successful JISC e-learning framework web service, HORUS¹ and on the methodological approach developed under the COVARM project for analysis and modelling of processes and for web service design². The major innovation is the deployment of topic map representations of knowledge and skills domains at different levels of granularity, together with a variety of adaptive teaching and advisory support regimes. Conversation theory, with its associated theories of knowledge and skills representation and adaptive teaching, provides the needed coherent and unifying conceptual framework. Conversation theory will guide the construction of a reference meta-model of the use of topic maps to support lifelong learners. The reference meta-model will in turn guide the components based construction of topic map based web services and the extension of HORUS services to support lifelong learners.

Topic maps are increasingly being used in support of learning activities^{3, 4} and adaptive web-based systems are receiving more considered attention^{5, 6}. The proposed project is unique in bringing together the technologies of topic mapping and those of adaptive hypermedia.

¹ See <http://www.csc.umist.ac.uk/horus/>; <http://www.jisc.ac.uk/index.cfm?name=delethorus>.

² See <http://covarm.tvu.ac.uk/covarm/>; Barn, B., Dexter, H. et al (2006). "COVARM – Course Validation Reference Model", Final Report. JISC.

³ Park, J. and Hunting, S. (eds.) (2003). *XML Topic Maps: Creating and Using Topic Maps for the Web*, Addison-Wesley, Boston, MA.

Background

The project brings together two web based technologies, topic maps and HORUS, using conversation theory as the unifying conceptual framework and a reference model approach to support the development and implementation of new services

HORUS

HORUS has been developed as a JISC web service under the JISC e-Learning Framework. HORUS consists of suite of tools that facilitate the delivery of programmes in which self-managed learning and quality management are key educational and operational requirements, respectively.

The tools support learners and teachers by:

- Making curriculum objectives clear to the community of practice
- Holding a register of relevant activities and facilitating access to them
- Gathering feedback about each learner's experiences during those activities
- Presenting accumulated feedback to learners in the form of a personal portfolio to encourage reflection on experiences to date and well informed choice of new ones
- Analysing the information to provide quantitative, directed, resource discovery to other learners seeking a relevant learning experience
- Disseminating near real-time feedback to teachers about the perceived value of the learning experiences they have provided
- Analysing the data to provide quality assured information about individual learners, teachers and learning experiences.

These capabilities have generic value in any area where learning is designed to be problem-based, self-directed, reflective and it is necessary to quality assure the process. The toolkit functions have been shown to be especially effective, with aspects of curricula such as placements, study periods, pre-registration induction and distance learning.

COVARM was concerned with the development of a reference model for the validation of courses in higher education. It developed, *inter alia*, a robust and comprehensive method for the analysis, modelling and testing of process models, meta-models and use cases. Its approach was based on industry standard techniques employing UML (Universal Modelling Language) for display, analysis and definition of models.

Conversation Theory

Conversation theory (CT) was developed by Pask and Scott in the 1970s^{7, 8, 9}. CT is constructivist, dialogical theory of learning and teaching, developed from the first principles of self-organising systems¹⁰.

⁴ Dichev, C., Dicheva, D., and Aroyo, L., (2004) *Using Topic Maps for Web-Based Education*, Advanced Technology for Learning, Vol. 1, No. 1.

⁵ Brusilovsky, P., Stock, O. and Strapparava, (eds.) (2000). *Adaptive Hypermedia and Adaptive Web-Based Systems*, Springer, Berlin.

⁶ De Bra, P., Aroyo, L., and Chepegin, V., (2004) The Next Big Thing: Adaptive Web-Based Systems, *Journal of Digital Information*, Volume 5 Issue , Article No. 247, 2004-05-27. <http://jodi.ecs.soton.ac.uk/Articles/v05/i01/DeBra/>.

⁷ Pask, G. and Scott, B. (1973). "CASTE: a system for exhibiting learning strategies and regulating uncertainty", *Int. J. Man-Machine Studies*, 5, pp. 17-52.

⁸ Pask, G., Scott, B. and Kallikourdis, D. (1973). "A theory of conversations and individuals (exemplified by the learning process on CASTE)", *Int. J. Man-Machine Studies*, 5, pp. 443-566.

⁹ Pask G. (1975). *Conversation, Cognition and Learning*, Elsevier, Amsterdam.

As such it is useful as a unifying framework for a wide range of pedagogical approaches¹¹. CT includes a subtheory of “conversational domains” and associated knowledge elicitation methodologies for carrying out knowledge and task analysis¹². Others have developed variants of CT, with applications to learning and teaching, learning to learn and the design of educational systems^{13, 14, 15}.

CT was used by Pask and Scott was used as the conceptual framework to design CASTE (Course Assembly System and Tutorial Environment), an adaptive tutorial system incorporating a hypertext topic map that supported constructivist, conversational learning¹⁶. CASTE also served as a versatile ‘learning lab’ in which to study learning under a range of different conditions. A wealth of data demonstrated the efficacy of CASTE as a teaching system. Current technologies still fall short of being able to support the full implementation of CASTE but many of the key feature can be implemented using today’s open standards technologies.

CASTE was developed by Pask and Scott in response to the need to provide learners with a description of a body of subject matter so that there could be “conversation” between a computer-based tutorial system and the learner about learning strategies. Whalley, with approval, refers to CASTE as a system that “provided both a ‘virtual’ environment for the student and a system to facilitate learning conversations about it” and “clearly worked as an integrated whole”¹⁷.

Topic Maps

The term ‘topic map’ has generic and specific connotations. Generically, it refers to methodologies for using networks of labelled nodes and arcs to represent ‘knowledge’ in its broadest sense as ‘topics’ or ‘concepts’ and the relations between them. Synonyms at this generic level are ‘concept maps’, ‘knowledge maps’ and ‘mind maps’. The specific connotation is to web-based topic maps that use a standard convention for labelling and defining nodes (topics) and arcs (relations between topics) and other arcs which link topics to ‘resources’. The latter are any digital or physical artefacts that provide contextual, pragmatic, operational meaning to topics and the relations between them, over and above meanings conveyed by topic and relation labels and definitions. There is an active research and development community working on web-based topic maps¹⁸. The conventions of construction, labelling and defining have been captured as an ISO standard (ISO 13250¹⁹).

¹⁰ Scott, B. (2001a). “Gordon Pask’s Conversation Theory: A domain independent constructivist model of human knowing”, *Foundation of Science*, 6, pp. 343-360 (special issue dedicated to the relationship between radical constructivism and the sciences).

¹¹ Scott, B. and Petch, J. (2006). “Developing unifying conceptual frameworks for learning design”, paper presented at *1st Conference on Pedagogical Research in Higher Education*, Liverpool Hope University, May 2-3, 2006.

¹² Pask, G., Kallikourdis, D. and Scott, B. (1975). “The representation of knowables”, *Int. J. Man-Machine Studies*, 7, pp. 15-134.

¹³ Harri-Augstein S. and Thomas L.F. (1991). *Learning Conversations*, London, Routledge.

¹⁴ Laurillard, D. (2002). *Rethinking Higher Education: A Conversational Framework for the Effective Use of Learning Technologies*, 2nd edition, London, Routledge.

¹⁵ Britain, S. and Liber, O. (1999). *A Framework for Pedagogical Evaluation of Learning Environments*, JTAP Report 41, www.jisc.ac.uk.

¹⁶ Scott, B. (2001b). “Conversation theory: a dialogic, constructivist approach to educational technology”, *Cybernetics and Human Knowing*, 8, 4, pp. 25-46.

¹⁷ Whalley, P. (1995). “Imagining with multimedia”, *Brit. J. Educational Technology*, 26, 3, pp. 190-204

¹⁸ See <http://www.topicmaps.org>

A useful way of conceptualising web-based topic maps is to see them as a subset of work on the development of the 'semantic web', a subset that places particular emphasis on the usefulness of knowledge visualisation.. As with other semantic web activity, work is focussed on characterising particular knowledge domains as 'ontologies'. As noted repeatedly in the literature, there is no one well-specified and agreed definition of 'ontology'. Definitions are generally of this kind: 'an ontology is a description and specification of a conceptualisation'.

CT has a sub-theory of 'conversational domains', domains of knowledge and skills about which there may be 'learning conversations'. In a learning conversation, participants construct conceptualisations of each other's conceptualisations to arrive at agreements about shared understandings, including agreements to disagree. Topics are operationally grounded as procedures and skill to be practiced and mastered. CT has a well-defined methodology for knowledge and task analysis which guides the description and specification of conceptualisations as 'ontologies'. The outcomes of a conversation theory knowledge and task analysis can be represented using the conventions of web-based topic mapping. This requires the imposition of two main constraints: (1) relations between topics are restricted to those of logical or analogical entailment (2) 'resources' are formally mapped as task structures, where nodes are operations and arcs are precedence relations.

Relations of logical entailment within a domain show possible learning pathways. Analogical relations are a way, unique to conversation theory, of mapping relations between domains. This adds both to the richness of representing knowledge structures and also adds to the richness of possible learning pathways.

In topic mapping generally and in conversation theory in particular, topic structure may be specified at different levels of granularity. In an educational context, this means being able to apply topic mapping at a whole programme or course level down to the level of individual lessons composed of 'learning objects'.

At Cranfield University, topic mapping has been used in association with the ADL SCORM reference model in development of interactive multimedia learning materials for Army officers studying at a distance. Topic maps are provided at whole course level (c. 200 hours of learning) to support non-linear navigation to individual lessons (20-40 minutes 'chunks' of learning). Topic maps are used within lessons to support non-linear access to the individual SCOs (shareable content objects) that make up a lesson. Learner access to SCOs can be tracked. Currently, work is being undertaken to add adaptivity to lesson delivery by having access to lessons made contingent on assessments of learner performance^{20, 21, 22}.

This combination of technologies, methods and sound theoretical base will allow an important development in technology to support life-long learners by:

- providing learner-centred information of progress through knowledge domains as concrete transferable records
- providing a more coherent and informed means of planning individual pathways of learning than mere scheduling of events
- providing an intelligent means of linking engagement with multiple syllabi
- providing a means of sharing information through time and across discipline areas.

¹⁹ See <http://www.y12.doe.gov/sgml/sc34/document/0129.pdf>

²⁰ Scott, B. "Topic maps and learning design", presented at *Topic Maps Workshop*, Oslo, Feb 26-27, 2005.

²¹ Johnson, Z. and Scott, B. (2005). "Using topic maps to support non-linear navigation for UK Defence e-learning programmes", *Learning Technology Newsletter*, 7, 1, pp. 39-42.

²² Scott, B. and Johnson, Z. (2005). "Using topic maps as part of learning design – some history and a case study", proceedings *III International Conference on Multimedia and Communication Technologies in Education*, Caceres, Spain, June 7-10th, 2005.

Type of Proposal

The proposal is for a technical collaboration between the Cranfield University and Manchester University. Cranfield University's existing work on the use of topic maps and adaptive educational systems for personalised learning will be complemented by Manchester University's existing deployment and development of the HORUS web service for self-managed learning. For both institutions the project outcomes will contribute to their strategic aims of deploying e-learning in support of achieving excellence in learning and teaching.

Project Duration

The project will run for eighteen months. The start date will be September 1st, 2006, with an end date of February 29th, 2008.

Project Governance

A **Project Management Board** will meet monthly to monitor progress across work packages, monitor and manage risks, agree changes and address major issues. Additionally it will manage the quality assurance and control aspects of the project. Day to day project management will be coordinated by the project lead. The Project Management Board will use a set of instruments for documentation and management that will be set out in the Project Plan but will include a risk register, a Test Plan, a Quality Assurance Plan and an Issues Log.

Contribution to the JISC Programme

The project will contribute to the JISC Programme by:

- Piloting new e-learning technologies to support lifelong learners, especially support for work-based learning, flexible delivery and personalised learning experiences
- Developing, piloting and implementing technical models that support the flexible, affordable and pedagogically diverse implementation of e-learning.

Project Description

This section describes the work packages, timetable, deliverables and risks associated with the project, as well as outlining plans for future sustainability.

Work Packages

The project will be managed as a structured set of **work packages**. Each work package will have concrete deliverables, known dependencies with other work packages, managed interfaces to other work packages and known deadlines. Each work package will have a designated leader and will be (as far as possible) localized at one institution.

WP1 Whole System Analysis and Architecture

The key activity here is the development of a reference meta-model that captures through use cases the requirements for providing personalised learning experiences for lifelong learners in work based, problem based learning situations and other self-managed learning situations such as distance learning and other forms of resource based learning. The system analysis will provide a statement of functional (application features and functions) and non-functional (e.g., quality of service, performance levels, security) requirements for meeting the needs of lifelong learners that are extensions of current HORUS functionality. The system architecture specification will identify the set of components needed in HORUS to ensure the system meets all functional and non-functional requirements within a component service framework and will introduce and enforce a development framework, including the development process itself, that can identify, specify and provide the required set of components. The development framework will include the tools and methods for quality assurance, configuration management and change

management. Other work packages are positioned within the overall processes of system analysis, reference model and system architecture specification and development framework that this work package defines.

WP2 Topic Mapping

This work package will address the development of topic map functionality in web services for educational purposes to provide canonical ways of displaying knowledge and skills domains as sets of topics, relations between topics and links to resources, with resources themselves mapped canonically as structured tasks. Topic maps and task structures will be readily extendible following knowledge and task construction rules. Construction rules will include rules for specifying analogy relations as mappings between knowledge and skills domains. Knowledge and skills domains will be specifiable at different level of granularity with rules for the recursive embedding of knowledge and skills domains as topics within higher order domains. Metadata schema for describing knowledge and task domain content ontology and structure will be specified based on the ISO topic map standard and extended as necessary.

Implementation will be based on existing open source topic mapping tools, with functionality extended to support the construction rules described above.

Service interfaces will be created so that the topic map services provide access to HORUS services and resources. In the simplest case, this will be a direct unmediated access. In more complex cases, access will be mediated via the adaptive advisory system to be developed as extensions to HORUS within Work Package 3.

WP 3 HORUS Development

This work package will, taking its specifications from WP1, extend the existing functionality of HORUS in order to provide:

- A service interface to the topic map tool
- Development of a reflective practice component
- Development of a personal planning component
- Development of knowledge components.

For the integrated System the work package will implement and test the service interface and test the viability of the system in real educational settings

WP4 (Supporting) Project management. Project management will follow a light weight version of Rational; Unified Process (RUP) and PRINCE2. It will be driven by the planning document following JISC guidelines and allow for a rapid prototyping approach to work packages. The Board will receive and review the Issues Log and the Risk register. The project will report to the JISC programme committee through the JISC contact. The project manager will be responsible for ensuring day-to-day running of the project according to plan, for change management and for co-ordinating the various aspects of the project. Each work package has a responsible person who will report to the project manager on a fortnightly basis and to the Board monthly. The Board will receive and agree reports on progress, change, risks, dissemination and external contacts.

WP5 Dissemination

Dissemination will be via the Project website, reports, workshop presentations and articles in learned journals.

Risk Analysis

| Risk | Probability | Impact | Mitigation |
|--|-------------|--------|--|
| Inter-institution communication issues | Low | Medium | Set up communication mechanisms such as email groups, blogs, and internal facing websites. |
| Loss of key personnel | Low- Med | High | Ensure that there is overlap between roles |

Quality Management

Quality management will focus on: Quality assurance; Quality Planning and Quality Control, following JISC guidelines and enhancing them as appropriate. A Quality Plan will be developed at the start of the project, which will describe standards for document production (e.g. requirements specifications, the use of a project glossary; non-functional requirements) and process management ((version and configuration management for software development activities; change management control; requirements tracking). Quality control will oversee 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 (using Requisite Pro) 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. Other elements of quality control will include the regular maintenance of a risk register and issues log as described elsewhere in this document.

Budget

| Item | University Funded | Project Funded |
|--|-------------------|----------------|
| Project Director (BS) 0.1time x 18 months | 21,000 | |
| Programmer/Developer 1.0time x 18 months Grade 7 at Point 41 (£35,480) | | 66,525 |
| Systems Analyst 0.5time x 18 months Point 41 | | 33,263 |
| Senior Project staff (JP) x 0.1time 18 months Point 54 | 9,485 | |
| Middle project staff (HD, SS) x 0.1time 18 months Point 44 | 14,539 | |
| Secretary 0.1time x 18 months at point 22 | 3,850 | |
| Travel and subsistence | | 5000 |
| Direct costs | 48,874 | 104,788 |
| Overheads at 80% | 39,099 | 83,830 |
| Sub Total | 87,973 | 188,618 |
| Project Total | 277,591 | |

All staff salaries include 25% on cost.

Qualitative and quantitative benefits

For both institutions the project will provide (i) prestige as leading edge developers of e-learning support infrastructure (ii) opportunities to engage academic staff in the development and delivery of high quality e-learning.

Relevant Experience and Knowledge

The partnership has a rich basis of experience and skills specific to the problem domain that help ensure the success of the project. The Project team has extensive experience and knowledge of the JISC Domain and of the JISC Framework initiatives. They have extensive knowledge and experience of e-learning development and delivery at institution level and e-pedagogy. They have commercial and academic experience in modelling and associated skill sets as well as in systems analysis. Members of the team have a strong reputation in developing new ideas and innovative solutions in this field.

Key Personnel, roles and skills

Dr Bernard Scott, Head of the Flexible Learning Support Centre, Cranfield University (CU), Defence College of Management and Technology (DCMT), The Defence Academy, Shrivenham): project lead, e-learning pedagogy, topic mapping, adaptive systems, e-learning development and delivery. Dr Scott's early career was that of a full-time researcher, an experimental cognitive psychologist and cognitive modeller. In the 1970s, Dr Scott worked with Gordon Pask at System Research Ltd, developing conversation theory and computer-based systems for teaching, course assembly and knowledge elicitation. Later, he qualified and worked as an educational psychologist. In 1990, he returned to HE as an educational technologist, researcher and staff developer. His research interests include: theories of learning and teaching; individual differences important for learning and teaching; principles of course design; adaptive tutoring systems; institution wide issues concerning the deployment of ICT and organisational change. He has published extensively on these topics.

Dr Simon Shurville, Senior Lecturer in Electronically-Enhanced Learning and Knowledge Management Systems based in the Flexible Learning Support Centre, DCMT: requirements analysis, service specification, technical architecture, e-learning pedagogy. Currently Dr Shurville is project lead and technical architect for the e-Learning Platform for DCMT. He directed development and deployment of the Sussex University Managed Learning Environment (2002-2005). Previous research projects have included online student modelling and an intelligent virtual learning environment for post graduate students. His recent foci have been on work-based learning and change/project management for learning technologies in HE. He has developed and delivered a variety of online and blended learning courses, including the development of multimedia interactive learning materials.

Dr Jim Petch, Head of Distributed Learning, Manchester University: services and QA review, e-learning development and delivery. Dr Petch's current responsibilities include: researching the e-learning development and delivery processes and modelling the e-learning domain: developing best pedagogic practice in e-learning; leading the University's e-learning strategy. Current and recent consultancy studies and research and development projects include: the JISC Frameworks Scoping Study; the HORUS Project under the JISC e-Learning Tools programme; EU Minerva Project, NODE, Analysis and modelling of networked learning; Regional Development Agency. - set up a centre for development of CPD courses based on university masters programmes for SMEs in NW England; Project Leader, ESF Funded Project to Develop Web based self help training tools for SMEs for on line development of e-learning materials; SPIN Project, EU 5th Framework Project for Internet based system for Spatial Data Mining using data of public interest; SDILA Project, EU TEMPUS Project to develop distance education for Land Administration in Hungary; eLearning Research Centre projects on the E-learning Life Cycle Model; UK eU Business failure and risk management; educational models.

Dr Hilary Dexter, Senior Research Fellow, Distributed Learning Centre, Manchester University: requirements analysis, service specification, model driven architectures, service and component based development. Dr Dexter is a systems analyst, researcher and consultant with extensive experience in

component and object oriented analysis, design, and methodology and with: proven experience and expertise in UML, Component Based Development, and Model Driven Architecture; first class understanding of component based development, service oriented architecture and reusable asset frameworks; expertise in systems analysis in complex environments; knowledge of the relevant standards for eLearning course/programme development and understanding of the implications of compliance; experience in development and implementation of enterprise architecture; understanding and experience of the application of modelling and development methodology in the distributed learning environment; knowledge and experience of quality assurance frameworks and their implementation in the software and distributed learning deliverables development processes.

Dissemination

The Project will maintain a set of open dissemination activities that will allow the progress and results of the project to be seen and accessed by anyone via the Internet. Additionally it will conform to the dissemination plan that forms part of the JISC programme, engaging with stakeholders through meetings and workshops that report and exchange idea on the progress of the work and on the nature and quality of the main deliverables. The project will adhere to JISC PR guidelines on publicity materials and the production of press releases.

Sustainability and IPR

IPR

As per the terms and conditions of JISC grants – the partners will retain shared IPR on the software artefacts and associated documentation. However, project outputs will be made available, free at the point of use to the UK HE and FE community in perpetuity; these may be disseminated widely in partnership with JISC. The partnership agreement will define IPR arrangements that conform to JISC requirements.

Sustainability

The envisaged application development and technical architecture for the project is based on open standards . The JISC directives on application and tool component frameworks and standards will ensure that the project outputs will be sustainable in the medium to long-term future. In addition the project members plan to maintain the momentum of the application area by continued engagement with key stakeholders in their respective institutions.

**Professor G C Mays
Deputy Principal and Director of Education
Cranfield University
Defence College of Management and Technology
Defence Academy
Shrivenham
Wilts SN6 8LA
Tel: 01793 785340
Fax: 01793 783746
Email: G.C.Mays@cranfield.ac.uk**

June 21st 2006

JISC Capital Programme
e-Learning
e-learning-bids@jisc.ac.uk

Dear Sirs,

Re proposal: Adding Topic Map Based Personalisation to the HORUS Self-Managed Learning JISC Web Service

The attached proposal is fully supported by senior management. This work is fully aligned with the University's published Strategic Plan, which includes the aim:

“Cranfield seeks to bring the benefits that e-technology offers to all aspects of its work including its learning and teaching, research, internal management and external relations with students (prospective, current and alumni), customers, suppliers and other stakeholders.”

Yours Sincerely,

G C Mays



Dr. Bernard Scott
Head of Flexible Learning Support Centre
Cranfield University
Defence College of Management and Technology
Defence Academy
Shrivenham
Wiltshire SN6 8LA

21st June 2006

Dear Dr Scott,

JISC Capital Programme Bid – Topic Mapping and HORUS Tools

The University of Manchester through its Distributed Learning Unit in the Teaching, Learning and Assessment Office fully supports the bid by Cranfield University for a project on Topic mapping and HORUS Tools and commits to fulfilling its role as a partner responsible for work packages, management and deliverables.

Yours sincerely

Dr. James Petch
Head of Distributed Learning