JISC Grant Funding 06/11

Cover Sheet for Bids ***(All sections must be completed)***	JISC

Name of Strand: Strand A:		**Strand B:**		**Strand C:**	X

Name of Lead Institution:	University of Liverpool (School of Eng, Computing Services, Library)
Name of Proposed Project:	ENGrich
Name(s) of Project Partners(s) (except commercial sector – see below)	Sheffield Hallam University

This project involves one or more commercial sector partners **YES / ~~NO~~** (delete as appropriate)	**Name(s) of any commercial partner company (ies)** Materials e-Learning Technologies Ltd

Full Contact Details for Primary Contact:

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Length of Project:	15 months		
Project Start Date:	01 November 2011	**Project End Date:**	31 January 2013

Total Funding Requested from JISC:	£149,009
Total Institutional Contributions:	£49,433

Outline Project Description

The goal of the 'ENGrich' project is to integrate into a structured system existing online teaching and learning resources in Engineering disciplines, ranging from static images to interactive animations in order to support education and facilitate the incorporation of innovative and value-added services.

The project will deliver the following as outputs. A dedicated website, with visual gallery of thumbnail representations of digital content; providing merged metadata, links, input GUI (for community to apply their evaluation), and other utility code (such as embed). A portable 'widget' version of the enhanced ENGrich search facility, which will be used by the engineering community in their own teaching and learning platforms. Enriched metadata, which includes usage data and 'paradata' that was acquired, with subject community input through the ENGrich service, in a sharable and interoperable format.

The outputs and systems will be sustained by the host institution. In addition, outcomes and lessons learned will be shared within and beyond the HE sector, and amongst JISC-related communities.

I have looked at the example FOI form at Appendix A and included an FOI form in this bid	**YES / ~~NO~~** (delete as appropriate)
I have read the Funding Call and associated Terms and Conditions of Grant at Appendix B	**YES / ~~NO~~** (delete as appropriate)
<u>For FE institutions only:</u> Please tick this box if you are an FE institution in England, please tick this box to confirm that you meet the eligibility requirement of teaching HE to more than 400 FTE	☐

1. Rationale

Existing searches for educational resources relevant to Engineering return a **great number** of results of **unknown quality** and **relevance**, which are presented textually and can take too long to filter out. The Engineering information environment is very complex, and due to potential ambiguities, many important engineering terms (e.g. stress, fatigue, fracture, circuit, current, etc.) produce results more relevant to other disciplines. A **lot of time and effort** is often required to eliminate 'false hits' and isolate potentially useful results.

The current proposal envisages a service that pulls together **existing visual digital content** relevant to **Engineering education** using **innovative** methods of discovery and retrieval, and presents the results in a visual way. The techniques which enable **cross-search** functionality, such as APIs and metadata-harvesting will **aggregate** results from Google Custom Search and subsets of Wikimedia Commons, Flickr, YouTube, Slideshare, Jorum and Learning Registry. Importantly, we would not be storing physical media on our servers; the output is purely metadata in compliance with the Discovery Open Metadata Principles.

2. Project Aims and Objectives

The goal of the 'ENGrich' project is to integrate into a structured system existing online teaching and learning resources in Engineering disciplines, ranging from static images to interactive animations in order to support education and facilitate the incorporation of innovative and value-added services.

3. Project Deliverables

- A dedicated website with **visual gallery** of thumbnail representations of the ENGrich digital content; providing merged metadata, links, input GUI (for community to apply their evaluation) and other utility code (such as embed).
- A portable '**widget**' version of the enhanced ENGrich search facility that will be used by the community in their own teaching and learning platforms.
- The **enriched metadata**, which includes usage data and 'paradata' that was acquired, with subject community input through the ENGrich service, in a sharable and interoperable format. The reusable metadata is fully compliant with the Discovery Open Metadata Principles
- **Reports and dissemination practices** that will be of relevant to JISC-related communities.

4. Previous Work and Recommendations

The Community Led Image Collections (CLiC) Project (2006) has identified the **discovery gap** within the educational sector – the gap between how users search for information (typically through Google), and the provision of high-quality teaching and learning resources. Although focusing on image collections, the CLiC report can be readily applied to other multimedia repositories, including any resource formats. One of the recommendations of the CLiC report was that the concept of visual image collection directories be established on a subject basis. The report indicated a distinct lack of engineering image collections relevant to teaching and learning for the discipline community. This is also relevant to any resource format, highlighting the need for a discovery service which does not concentrate on engineering repository resources alone, but rather on cross-searches of whatever is available, either through repositories or metadata repositories.

Pilot Engineering Repository Xsearch (PerX) (2007) was developed by ICBL at Heriot-Watt University, and is a subject-based pilot service which cross-searches only freely available data, or metadata within the engineering learning and research communities. PerX utilizes a hybrid cross search approach, i.e. including different types of targets, such as harvested data (OAI-PMH), distributed searching (Z39.50), and non-standard protocols of gathering metadata. The project showed that in the subject area, searches should not be limited to repositories aimed at the engineering community. There are numerous multidisciplinary metadata repositories of interest to engineering, some interoperable, that must be included when building a full-scale subject resource discovery service.

As continuation to PerX, the same group developed the **TechXtra** project (2008). TechXtra is a free service which cross-searches 31 different collections relevant to engineering, mathematics and computing. The content is purely text-based, and includes articles, books, technical reports, full text eprints, the latest research, thesis and dissertations, etc.

It should be noted that neither PerX nor TechXtra are specific to teaching and learning materials, nor are they specific only to visual content. Also, there has been no attempt to access, utilise or create usage metadata, or paradata, in either PerX or TechXtra.

In teaching and learning visual content can help in making concepts clear to students. It makes lectures more visibly appealing, attractive and interesting. Most especially in engineering education, moving images, such as interactive animations, clips, flash files etc are finding an increasing use. One reviewer of the Image Case Study in CLIC observed: "*Much of engineering is not static but dynamic, so dynamic images are not just flashy but actually useful. Students today are also more conditioned to moving images rather than just stills".*

In summary, pervious JISC-funded projects have shown that the engineering community will benefit from creating an enhanced, peer-maintained, educational resource search service; one which delivers dynamic, visually-appealing, and interactive visual content, that could be tailored to users' interests. It may also have some advantage over Google Custom Search, in that it maintains a community (subject) context, and is acceptable to those who intend to maintain tight control over what is exposed from their resource collections onto the open web.

5. Overall Approach and Innovation

This proposal builds upon a CORE-Materials OER Phase 1 project. It was highly successful, in terms of its impact and outputs. It created collections of newly-released open educational resources in materials science and engineering, drawing also on existing file-share sites to ensure the resources were hosted elsewhere. The project utilised an API upload mechanisms to distribute the original resources to relevant file-share sites.

The success of CORE-Materials is as follows: on 21st July 2011, there were 1,586 resources uploaded, with 40,188 visits from 149 countries; this since the site was launched on 25th April 2010. The total upload views on file-share sites is around 200,000 each (e.g. YouTube having 186,709; Scribd with 184,399; and Flickr giving 230,702).

Visual digital content include images, video, presentations and animations. Importantly it also includes dynamic image-based content, such as Flash (which is crucial, because it is the format for so much existing material) and HTML5 (which we think will become increasingly important in the future). A dedicated Flash portal, or file-sharing site equivalent to Flickr, YouTube and Slideshare does not currently exist; but the dynamic content can now be isolated through the Google Custom Search. Usage statistics for CORE-Materials also support the fact that it users highly value interactive content (e.g. out of ten distinct resource types, interactive resources are 2.5 times more popular than an average resource).

At the heart of this ENGrich project will be the involvement of the academic Engineering community throughout all the stages: development, evaluation and embedding into practices. Lists of high-quality content providers across the subject, which will be used as a filtering parameter for the search results, will be created by the community. This service will enable engineering students and academics to **enrich** the raw search data, by classifying and evaluating them in terms of quality and relevance to the discipline. This automatically improves the results of future searches in an **iterative** manner. We can envisage some work on metadata merging, and on content analysis (e.g. contextual indexing) of the resources with limited metadata. The quality metadata is vital, and the contextual information can only come from the community itself.

Through ENGrich, we plan to bring into one place usage statistics from the file-share sites, so that they can be used as an ordering parameter and to be displayed as guidance for the users of our service. Another **innovative** angle of the service to be offered will be the delivery mode of the results

of the custom search: we aim to display these graphically (rather than as a text listing), with the aggregated rating and statistics, along with other associated features, such as embed code. We also propose making the enriched data available as RSS/Atom to other services and users, such as Jorum, JISC Media Hub, Learning Registry and iGoogle. We are essentially creating an original web-architecture, with a conceptual 'community enriched' approach.

Critical to project success will be ensuring the use of the following technical-based standards: Dublin Core Metadata (for metadata) and OAI-PMH (for metadata harvesting); XML (for data formatting); RSS / Atom (for resource feeds); W3C WAI Guidelines (for web accessibility); Google Analytics, and Social Bookmarking (for tracking usage and impact).

6. Work Packages

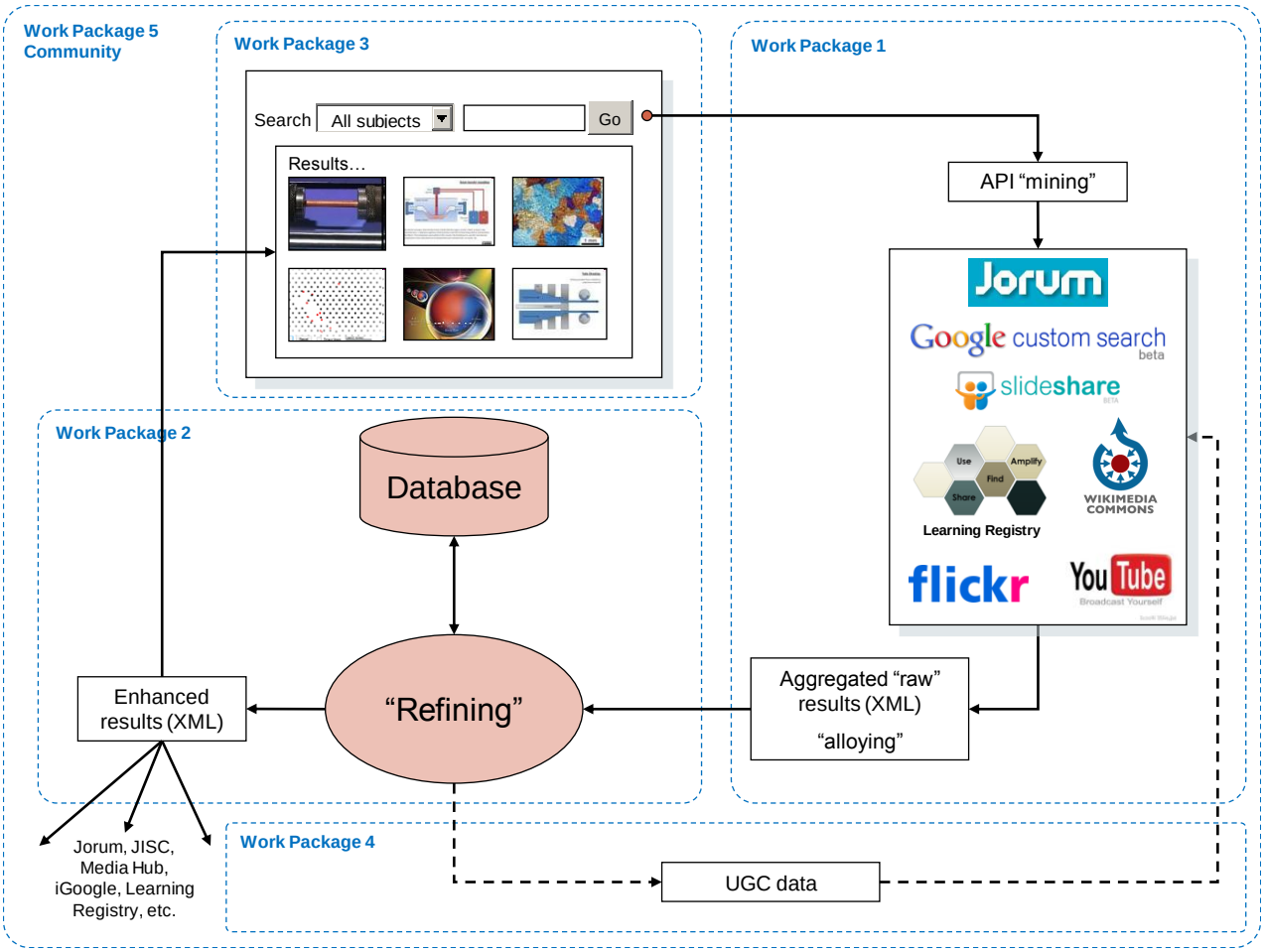

Figure 1. Work Packages and Data Flow

Work Package 1:
Developing Advanced Programming Interfaces (APIs) to retrieve 'raw' XML data from Jorum, Google Custom Search, Wikimedia Commons, Learning Registry, Flickr, YouTube, Slideshare etc. based on user's search term plus filters (e.g. resource type):

- To provide the basic **cross-search** functionality. We will explore the relative merits of real-time vs. non real-time searching, and also how to deal with the issue of multiple URIs, based on the work of earlier projects.
- To develop a system to handle inconsistencies between the available metadata elements from the different sources (e.g. "Author", "Creator", "Provider")
- To develop a system to **aggregate** usage metadata from the different sources (e.g. number of views, number of downloads, other statistical information), including paradata.

Work Package 2:
Design and develop a database to store engineering community input against the IDs of the 'raw' XML data in **WP 1** and develop code to produce refined/enriched XML (metadata) results:

- To enable the academic engineering community to apply **value judgments** on the **quality** and **relevance** of the raw data returned by the different sources.
- To develop a web service that generates output XML by **applying** community input from the database to the raw data returned from the sources.
- These XML data will be used to display the results, and also be available to other services, such as Jorum, JISC Media Hub, Learning Registry, iGoogle, etc.

Work Package 3:
Design and develop web UIs for output and input of data, including a portable search widget to be embedded in partners' teaching and learning platforms:

- To create a **visual gallery** of thumbnail representations of the ENGrich digital content; providing merged metadata, links, input GUI (for community to apply their evaluation) and other utility code (such as embed).
- To design and develop a portable '**widget'** version of the enhanced ENGrich search facility that will be used by the community in their own teaching and learning platforms.

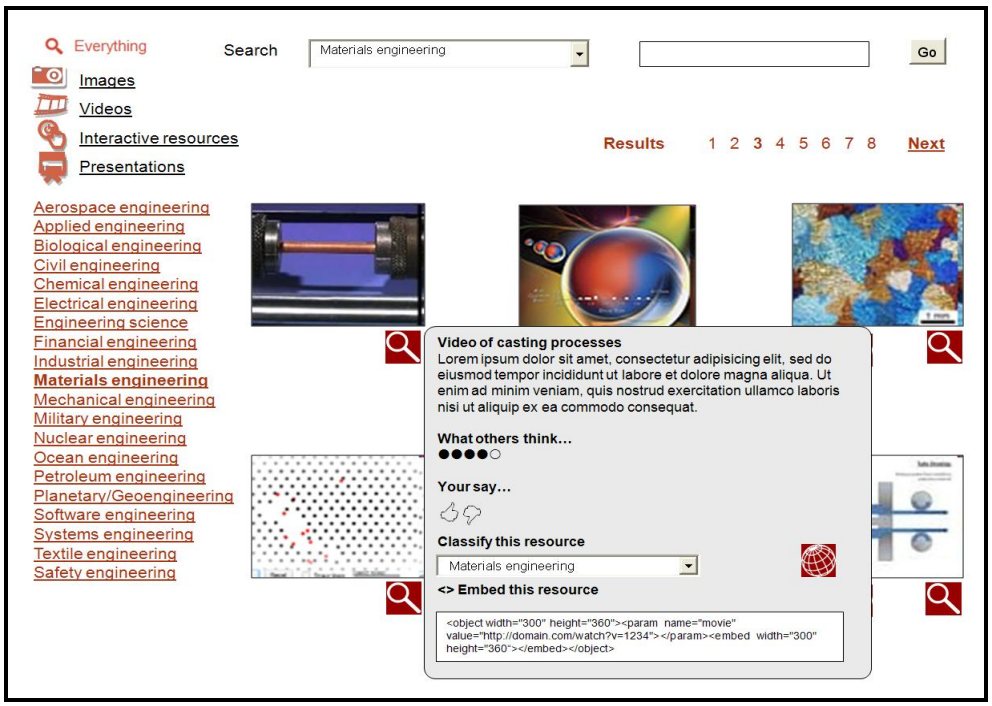

Figure 2. Suggested web user-interface

Work Package 4:
Investigate whether and how user-generated metadata might be fed back to the original sources using their respective APIs.

Work Package 5:
Facilitating the engineering community engagement through all the stages of the project, enabling academic peer reviewed social cataloguing. This will act to establish a sense of community, where devolved appraisal will take place. So the community will be involved in:

- Building a subject classification to cover all Engineering disciplines, expanding upon existing CORE-Materials

- Developing the list of preferred content providers in the subject, giving a contributor a personal identity. The list will be used in the algorithm to rank search results
- Classifying and evaluating search results in terms of quality and relevance to the discipline – thereby enriching the resources metadata.

We will ensure adoption of innovative approaches to student engagement, from experience on the national Cross-Academy Student Engagement Group of the HEA. Links to curriculum will be explored drawing on the our experience of change management as evolved through the national Supported Change Programme, which was used in the CORE-Materials project to co-ordinate the diverse needs of the partner consortia. The advocacy work will be used to ensure that new and developing engineering digital content collections provide suitable interoperability and can subsequently be included in the cross-search service.

7. Work Plan

Main Project Tasks	**2011**		**2012**												**13**
	N	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**
Hold project team meetings, to update plans / targets and to monitor / review progress															
Hold 3 meetings of the all project partners															
Create a project website to explain the project															
WP1: Develop and test APIs to retrieve XML data from search providers															
WP2: Design and develop the database to store engineering community input, set against the IDs of the 'raw' XML data in WP1															
WP3: Design and develop web UIs for output and input of data, and portable search widget															
WP4: Investigate user-generated metadata and its feedback to original source providers															
WP5: Build a subject classification to cover all Engineering disciplines, via community input															
WP5: Develop lists of preferred content providers in subject fields, by the community															
WP5: Classify and evaluate search results, in terms of quality & relevance to the discipline															
Participate in JISC programme-level activities															
Disseminate the project, outputs / outcomes, over the 15-months and beyond, with JISC															
Evaluate the project at intervals, drawing on formative and summative approaches															
Develop a robust business model for project sustainability beyond the 15-month pilot															

8. Stakeholder Analysis

Critical to the success of ENGrich, will be engagement with external agencies, both throughout and beyond the project. This will be in parallel to engagement internally within the institution – with academic staff and students in the School of Engineering; with colleagues from the Computing Services Department (building on their links with internal e-learning activities and resources); along with colleagues from the University Library (drawing on their skills and strategies of embedding digitised content within institutional practices).

To indicate the relevance of the project to external audiences, the following five scenarios depict different typical user cases, in which the ENGrich project provides added-value dimensions to their specific circumstances:

Scenario 1

Title	Access to subject specific and quality controlled data – **an undergraduate scenario**
Story	Janice is in her 2nd year of undergraduate studies in Mechanical Engineering. As part of her assessment, she is asked to produce a wiki on uses of materials in beams, columns and shafts. The university VLE contains some links on the subject, and she uses her lecture notes and library resources. But, with her 'shaky' background in the subject of Materials Engineering, and with limited time, Janice realises she needs a 'helping hand'. The ENGrich service seems to be the support she requires. It is subject-specific, and offers a filtering interface in the discipline areas of engineering. It saves time, because it brings the different format of resources together into one place, displaying them visually as thumbnails. The critical aspect for Janice, however, is the 'community' component of the service – the aggregated usage data from original source providers. This includes experts' value judgments, as well as ratings and reviews from other students. It makes all the difference for Janice, in deciding which resources to include into her wiki. With the help of the ENGrich service, she also learned how to critically appraise the results of the search.
Added Value	Authenticity and reliability of content

Scenario 2

Title	Enhancing the existing teaching and learning platforms – **an academic scenario**
Story	Richard is an academic lecturing in Aerospace Engineering. He is keen to deliver as much as possible of his teaching through on-line channels, one of which includes the university VLE. He has all his teaching materials available in the corresponding modules on-line. He would like to include a cross-search subject-specific functionality into his modules, without having multiple search boxes and the need for manual filtering of relevant content. The ENGrich portable 'widget' version of the enhanced search facility seems to be a perfect solution for Richard. It allows him to 'drag and drop' the search box into his own VLE, and thus incorporate it into the module. The students, who will study using his modules inside the VLE, will benefit not only from the resources put together by Richard. Additionally, via the 'widget', they will be able to gain access to the integrated online teaching and learning resources in the subject, ranging from static images to highly interactive animations, that come from 'external' trusted sources.
Added Value	Portability, interoperability

Scenario 3

Title	Creating new structured resources, i.e. teaching courses – **a new lecturer scenario**
Story	Katarina is a new lecturer, and she has to put together a course in Nuclear Energy by the beginning of a new academic year. She is new to teaching in higher education, and soon learns that there are too many places to look for resources, and too many resources out there, many of them of unknown or variable quality. Katrina wishes to find relevant resources quickly, to ascertain the validity of the source and to understand how she may make use of the material in teaching. She would love to find a service which delivers subject-specific resources of assorted formats, but having guaranteed quality. The ENGrich service is a 'one-stop shop' for anyone creating a teaching course in the subject of engineering from scratch. It facilities searching for a wide range of visual content from high-quality content providers. Katarina has found particularly useful other academic's comments and reviews, together with the number of reads and downloads, which the service aggregates. The credibility of the trusted sources is guaranteed, by the fact that the expert subject community was involved in every phase of service development.
Added Value	'One-stop shop' of high credibility

Scenario 4

Title	Reaching out to a wider audience – **a repository creator scenario**
Story	Phil is an enthusiastic Lab Technician in a Bio-Engineering Department, and through many years of assisting research fellows and students in the lab, he has created a reliable and quality collection of biomaterials artefacts. With the help of the university's e-learning team, he has built an on-line repository for his collection. Phil is now looking for ways of promoting this repository, but realises that that can be an often long and complicated process, and that one cannot rely solely on Google. Due to the engagement of the engineering community through all stages of the project, the ENGrich service provides a highly-regarded content. With the community having created the filtering system and the list of preferred content providers in the subject field, this service is an ideal vehicle for Phil to increase awareness to his collection. If approved by the subject specialists, it will be guaranteed to rank highly in the gallery of search results. Phil is particularly happy with the fact that the results are presented together with images, rather than simply as a textual description. A visual representation will encourage users to click through to his collection. For example, the description 'biomaterials artefacts' may be too generic and may be easily skipped over, whereas if the viewer saw an image with a relevant biomaterial structure, then they may be more inclined to follow the link; thus increasing user traffic to his collection.
Added Value	Promotion, awareness

Scenario 5

Title	Facilitating employer engagement in the curriculum – **an employer / industrialist scenario**
Story	Tom is developing learning materials for use both as in-house training in industry, and also for guest lectures he gives in his local university. He wants to make an interactive module based on his industrial research, to be placed into the company's Intranet and university VLE later. He has no problem in putting together the wording, but he would like to illustrate complex polymers structures and their processing routes, this all related to his research, with some moving images and interactive resources. Tom quickly finds out that a file-sharing resource, an analogue to Flickr, YouTube and Slideshare, for interactive animations does not exist. Although Flash movies can be isolated through the Google Custom Search, the majority of the resources which come up are not relevant to polymer engineering, and it takes a long time to go through the results, since they are presented only as a list. The ENGrich service offers exactly what Tom is looking for – i.e. a subject-specific, aggregated search facility, which includes moving images and animation resources. It saves time, because the delivery mode of the results from the custom search is visual: the results are displayed graphically, rather than as a text listing. Tom finds that the 'extra' features the service provides, such as utility codes (embed code for example), makes it quick and easy to add the interactive resources he has chosen to his learning materials.
Added Value	Searchability of interactive resources

9. Project Management Arrangements

The Project Team will constitute the core operational group, with staff having clear roles / responsibilities and maintaining close communications with each other; it will also carry out regular reviews of progress in response to feedback from users and changing contexts.

The Project Director (TB) will act as academic adviser, drawing on his experience institutionally as Chair of the Board of Studies in the School of Engineering at the University of Liverpool, and through his national role with the Higher Education Academy. We have a specific role (DT) with responsibility for day-to-day project management activities, including monitoring of progress and finances.

The Senior Liaison Officer (AM) will focus on strategic elements of the project, and on aspects of community engagement and stakeholder links. He will be supported in this task by a senior academic colleague from the partner institution of Sheffield Hallam University (MB), making use of his extensive links with employers in the development of blending learning materials for training and development.

The Project Team will comprise experienced technical staff (TN and JC), along with consultancy expertise (from MeLT), that successfully delivered the CORE-Materials project. Specific technical advice and guidance will be provided from ICBL at Heriot-Watt University (PB), where input will be shaped by his role within CETIS and his work with the Learning Registry, amongst relevant activities.

Strong institutional support will be provided to the ENGrich project through the involvement of two partners at the University of Liverpool, over and above the 'test-bed' of the School of Engineering – the University Library (with colleague DC), and the Computing Services Department (with staff JG).

Project Team Members:

Tim Bullough (TB) co-ordinates learning and teaching within the School of Engineering at the University of Liverpool. He runs sessions at annual new lecturer and postgraduate teacher training events for the Higher Education Academy. He was the first academic at Liverpool to use the University's VLE for large-scale formative assessments, and for managing PBL teaching activities in Materials Engineering. He received a University Teaching Fellowship for his VLE innovations.

Diane Taktak (DT) has experience of project management in academia and industry, with control of sizeable budgets and of staff numbers. She has attended courses in project management and in the use of Microsoft Project, and has worked at the University of Liverpool since January 2007.

Adam Mannis (AM) has experience in management of change within HEIs, student empowerment, embedding of learning technologies, and employer engagement strategies. Prior to joining Liverpool, he managed applied research projects involving consortia of European universities and industries, and contributed to the development of indicator-based evaluation frameworks in projects.

Mike Bramhall (MB) is a Professor of Engineering Education; and is the Head of Learning, Teaching and Assessment for the Faculty of Arts, Computing, Engineering and Sciences at Sheffield Hallam University. As well as being a National Teaching Fellow, he is also a Senior Fellow of the HEA. Mike co-ordinates the development of technology-based teaching resources, and blended learning materials for employer engagement and training. He has recently developed an institutional policy and framework for 'Retention and Student Success' for Sheffield Hallam, nationally recognised by HEFCE.

Materials e-Learning Technologies (MeLT) is an independent consultancy specialising in the design, development and deployment of e-learning resources in the field of Materials Science and Engineering. Since 2004, MeLT has been working with the World Steel Association in creating steeluniversity.org, a highly interactive website. More recently, MeLT has been a key partner in the CORE-Materials project, developing the database and web UI for the project's repository of OERs.

Tatiana Novoselova (TN) gained a PhD in physics of metals and materials science in 1996. Since, then, she has more than 15 years of work experience in the educational sector, gained through roles within areas of research in materials science and development of software and educational resources. Her position in the recent CORE-Materials project was in identifying, collecting, re-developing open educational resources (OERs), and in sharing them through the creation of a discipline repository.

John Connor (JC) is a Liverpool engineering graduate, who since 2009 has worked on technical projects, such as the rebuild of corrosion educational software in adobe Flash, and the design of a questionnaire delivery system to first year engineering students. During these, John has become highly proficient in web design (PHP, HTML, CSS and SQL), RSS feeds and database design.

Phil Barker (PB) has worked at ICBL since 1996; his work focuses on facilitating the use of learning technology at F&HE level through supporting resource selection. He has worked almost exclusively on projects funded by JISC, HEFCE, SHEFC and the HE Academy, frequently as project manager.

He currently works for JISC CETIS, on resource description dissemination and discovery, including support for JISC's UKOER programme; he has also recently managed the Bayesian Feed Filter project and contributed to the Materials and Engineering subject centres' UKOER pilot projects.

David Clay (DC) is Head of Academic Liaison at the University of Liverpool Library. He has been involved in a number of previous JISC initiatives and, amongst other roles, has responsibility for developing the necessary skills and strategies to embed digitisation within institutional practices, for investigating the long-term sustainability of digitised content, and for making it relevant to users.

Jake Gannon (JG) is Head of Application Systems and Services at the Computing Services Dept of the University of Liverpool; being formerly Groupware Team Leader. Locally, he is a member of the institution's E-Learning Steering Group; nationally, he shares on institutional portals and technologies.

10. Risk Analysis

There are a number of risks associated with certain project tasks. Four of the most significant of those identified are listed in the following table, along with a mitigation plan. With sound planning, these risks can be minimised, and contingencies can be put into place:

Risk	Probability (1-5)	Severity (1-5)	Score (P x S)	Action to Prevent / Manage Risk
Failure of the project team to deliver the work plan and all of the WPs	1	5	5	ENGrich builds on experience and expertise of those involved in recent successful JISC projects.
Difficulties in accessing source providers due to unstable APIs	3	3	9	This work will make use of multiple and trusted source providers, rather than concentrate on a narrow range.
Problems in 'closing the loop' to feed back user comments; as in WP4	1	2	2	Expertise relating to WP4 resides in technical staff from both MeLT and ICBL (the latter linked to CETIS).
Low uptake of volunteer staff and students to collaborate; as in WP5	2	3	6	The team has extensive networks of contacts (staff, student groups and employers) already in place for WP5.

11. Dissemination and Evaluation

Communications Plan

Project outcomes / outputs are to be disseminated to external stakeholders by the following activities:

Dissemination Activity	Audience
Website for the project	Project Team; Partners; JISC; Public
Project blog – for all partners to interact	Project Team; Partners; User community
Themed sessions at specific events (e.g. at local, national and international conferences)	Engineering academics and employers, librarians, technical developers
Publication of findings in reports	Partners; JISC; Engineering community
Sharing of practice with other projects	JISC; Stakeholders
Promotion of 'good practice' and of user case-studies	All stakeholders; Engineering academics, industrialists and learners
'Roadshow-type' visits to HEIs and employers, inclusive of evaluating project deliverables	Partners; Stakeholders; Engineering academics, employers and students

Evaluation Plan
The project will be internally evaluated, as part of an overall reflective process during academic years 2011-12 & 2012-13, using tried-and-tested techniques developed by the Higher Education Academy:

Factor to Evaluate	Questions to Address	Method(s)	Measure of Success
Strategies for engagement	Is the methodology clear and working well?	Team review of outputs	Partners on board, and resources
Technical developments	Are the user interfaces appropriate for learners?	Peer review; User surveys	Systems interoperable and working
Dissemination outcomes	Have these been successful in engaging community?	Questionnaires and interviews	Critical dialogue with the project
Main piloting process	Has the project team adapted the technology?	User logs; Questionnaires	Impact of resources on learners
Whole project	What lessons have been learned?	Case-studies from users	Outputs taken up and developed further
Sustainability	Have we put in place robust plans for sustainability?	Institutional support by university services	Outcomes / outputs taken up and embedded at end

12. Value-for-Money and Business Sustainability
The ENGrich project provides levels of matched funding from project partners in excess of £49,000.

The University of Liverpool has allocated internal funds, from future Computing Service Department budgets (shown in Section 13. on Page 12), to ensure sustainability of outcomes and outputs beyond the lifetime of this project. Such sustainability activities are outlined in the following table:

Project Outputs	Action for Take-up and Embedding	Post-Project: The Future
Project website Visual gallery of ENGrich digital content	To be maintained for at least 3 years beyond project end, by the Computing Services Department, embedded into the University of Liverpool's systems. Technology designed to be re-usable and also re-purposable.	Project Team to ensure deliverables are listed and/or included in both the project website and in JISC Media Hub; this together with appropriate archiving arrangements in place. Continuing use by project partners and by stakeholders.
Portable 'widget' version of the enhanced ENGrich search facility	To provide scenarios and cases studies of use; Promotion through conferences, mailing lists and JISC website. Identification of generic issues; technology independent.	Technical issues disseminated across wider HE communities. Knowledge and experience gained disseminated through project website; Further dissemination opportunities, including via JISC, CETIS, etc.
Enriched metadata, inclusive of usage data and paradata, acquired in a sharable and interoperable format	To identify areas / encourage development of open metadata; liaising with both source providers and JISC Media Hub. Provide input for other projects working on cross-search issues.	Learning transferred to other users across the Engineering and JISC-related communities. Reusability in other disciplines and across other learning communities.

13. Project Budget and Costings

Directly Incurred Staff	**Nov 2011–Mar 2012**	**April 2012-March 2013**	**AprJul 13**	**TOTAL £**
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Non-Staff	**Nov 2011–Mar 2012**	**April 2012-March 2013**	**Apr Jul 13**	**TOTAL £**
Travel and expenses	£1000	£2000		£3000
Hardware/software	£333	£667		£1000
Dissemination	£500	£1000		£1500
Evaluation	£167	£333		£500
Other – External Consultant	£10000	£20000		£30000
Total Directly Incurred Non-Staff (B)	**£12000**	**£24000**		**£36000**
Directly Incurred Total (C) (A+B=C)	**£27929**	**£51611**		**£79540**
Directly Allocated	**Nov 2011–Mar 2012**	**April 2012-March 2013**	**AprJul 13**	**TOTAL £**
[redacted]	[redacted]	[redacted]		[redacted]
[redacted]	[redacted]	[redacted]		[redacted]
[redacted]	[redacted]	[redacted]		[redacted]
[redacted]	[redacted]	[redacted]		[redacted]
Directly Allocated Total (D)	**£12348**	**£24718**		**£37066**
Indirect Costs (Liv & Heriot Watt (E)	**£18112**	**£36224**		**£54336**
Total Project Cost (C+D+E)	**£58389**	**£112553**		**£170942**
Amount Requested from JISC	**£49670**	**£99339**		**£149009**
Institutional Contribution *(incl £27,500 from partners - see letters of support)	**£16478**	**£32955**		**£49433**
%Contrib over the life of project	**JISC 75 %**	**Partner 25 %**		**Total 100%**
No. FTEs used to calc indirect and estates charges, and staff included	**No FTEs 1.26 FTE**		**Which Staff All staff**	