

Cover Sheet for Proposals	<i>JISC Capital Programme</i>	
Name of Capital Programme: Repositories and Preservation: Tools and Innovations Strand		
Name of Lead Institution: Birkbeck – University of London		
Name of Proposed Project: SOURCE (Sharing Objects Under Repository Control with Everyone)		
Name of Project Partners: Bloomsbury Consortium (School of Oriental and African Studies, the London School of Hygiene and Tropical Medicine and the Institute of Education)		
Full Contact Details for Primary Contact: Name: David F. Flanders Position: Multimedia Developer Email: d.flanders@bbk.ac.uk Address: Birkbeck College Library Malet Street Bloomsbury London WC1 7HX Tel No: 02070790899		
Length of Project: 2 years		
Project Start and End Dates: Oct. 2006 – Oct. 2008		
Outline Project Description: Lead Institution: Birkbeck College on behalf of the Bloomsbury Consortium Digital Content Type: Teaching and Learning (Learning Objects and Multimedia Content Assets) Repository Type: Consortium Primary Repository Functionality: Access by teacher and learner to rich multimedia content assets for the accelerated creation of learning objects Tools Created: Bulk-migration tools to and from significant UK HE platforms Innovations: Pedagogical workflow recommendations and Application Profiles for sharing digital learning content using bulk-migration tools		
I have read the Circular and associated Terms and Conditions of Grant at Appendix B (Tick Box)	YES <input checked="" type="checkbox"/>	NO

Glossary

API: Application Profile Interface is a series of codes that enables machine to machine communication.

Blended/Hybrid Learning: A mix-mode learning approach where digital teaching/learning content is delivered in a traditional face-to-face classroom.

Bulk-migration: refers to the movement of file and metadata on a mass scale to different platforms, via iteration or vector processing.

Container: Refers to the database architecture that organizes the content, this is in context to a platform which is the overall system that the container sits within, e.g. Blackboard is a platform where their LCMS is their container.

Content Package: Is a means of containing all files within a single file so that machines (and humans) can interpret their contents in a pedagogical context, e.g. like a book binding for a book

Digital Content Asset: Is any individual file that is not easily divided without loss of meaning and/or context.

LCMS: Learning Content Management Systems are Content Management Systems that are imbedded within VLEs or LMSs, e.g. Blackboard and WebCT have LCMS

Learning Object: Is any digital object intended for teaching/learning

Metadata: is data about data; in context to multimedia it is usually the only meaningful text made available to search engines that crawl text, i.e. Google, Yahoo, Microsoft, etc.

Multimedia: in general is in reference to any digital object that uses multiple signifiers to demonstrate its meaning, e.g. text, image, audio, video, animation, etc.

OKI: Open Knowledge Initiative, is standards organization that recommends and publishes best practice for creating interoperable APIs in a standardized form known as OSIDs.

OSID: Open Service Interface Definition is a kind of API that is in a standardized form that assures interoperability beyond multiple platforms, not just individual machine to machine communication as is the case with most APIs.

Published Files / Output Files: Files that are compressed versions of the source files to allow for transfer over the allowed bandwidth; these files are not repurposeable

Repository: Is the architecture for storing, accessing and managing digital objects and their metadata records. As an analogy to the physical library it is the digital shelving, card/computer catalogue, classification system (Dewey Decimal System) and desk clerk / library shelver.

ROI: Return on Investment is the annual benefit divided by the investment amount.

Shareable Learning Object: Is a learning object that contains all of its content including source files and has metadata ascribed to the individual multimedia content assets

Source Files: Files that are not seen by the user, but are the files that contain the content (digital content assets) for creation.

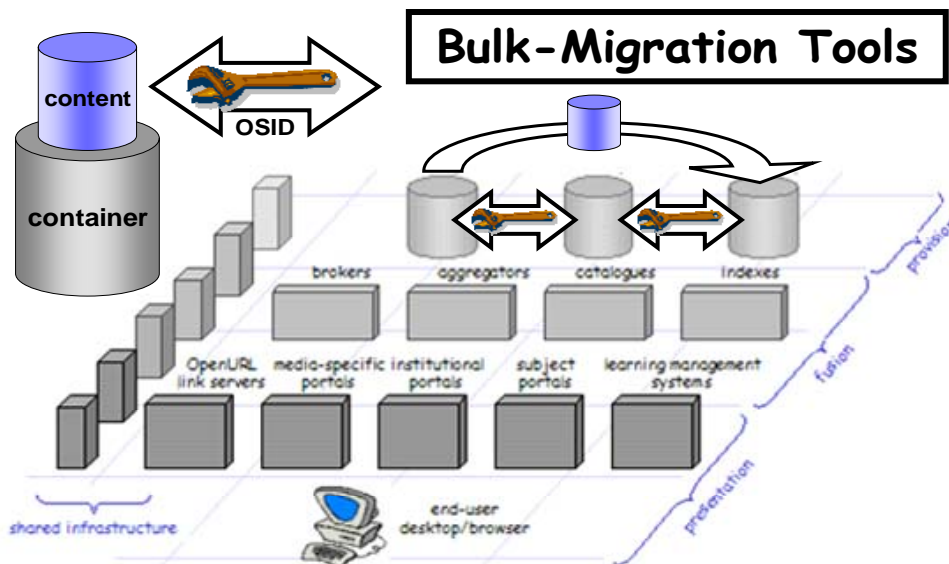
Teaching/learning platform: is a general reference to any system (VLE, LMS, LCMS, Repository, etc) that contains teaching/learning content.

Tools: generally refer to APIs and/or OSIDs in context to a specific container and/or platform.

VLE: Virtual Learning Environment is an interface for students and teachers to access tools and content for their course; in relation to a repository it acts as the digital classroom, where the repository acts as the digital library.

Overview – Project Placement within JISC IE Architecture and HE Teaching/Learning content:

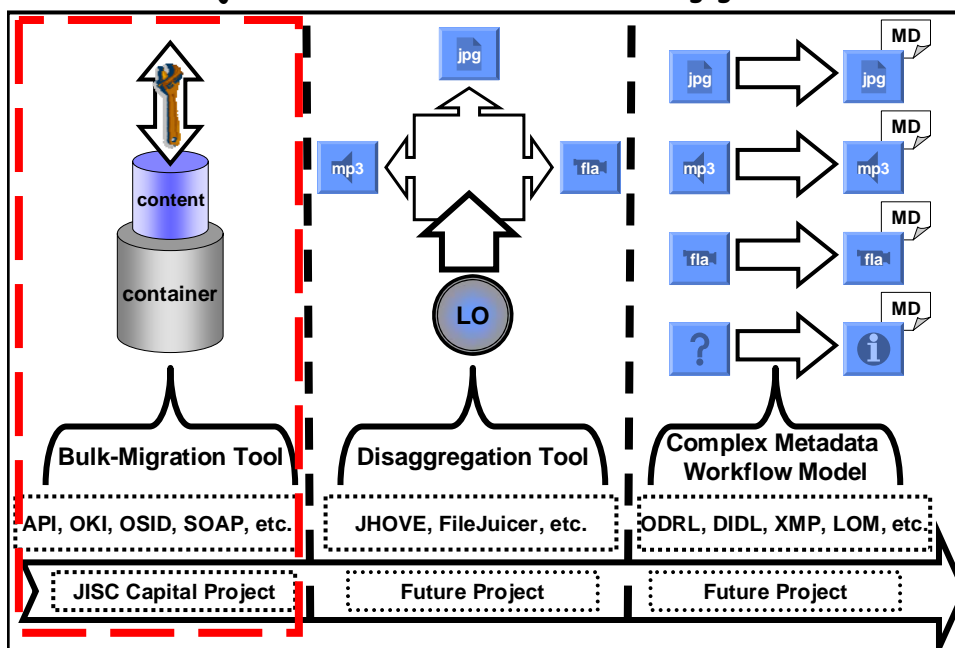
This project is directed at the ‘provision’ level of the JISC Information Environment Architecture. Specifically, it is the containers that ‘providers’ are using to manage digital objects that this project hopes to provide further interoperable tools and innovations. For that reason, *the core aim of this project is to enable bulk-migration and deposit of learning objects in significant UK HE platforms across the JISC provider IE architecture.* However, it must be stated from the start that the projected tools to be created for exchange of content between these containers is towards a larger pedagogical model aimed at reuse of digital content in HE. This pedagogical model directly relates to the creation of these tools as well as their projected use.



The creation of bulk-migration tools will further enable a competitive vendor environment where digital objects will be able to be moved between containers in an open and standardized form; thereby empowering the HE institution to select and try out vendor architectures without having to worry about their digital content being ‘locked-in’ to a proprietary system.

Beyond the basic technological deliverable of this project (bulk-migration tools) are the overall pedagogical innovations of this project; which reach beyond a set of interoperable tools and towards overall developments in reuse of teaching/learning content.

Technical Project Overview Towards Overall Pedagogical Reuse Goal



This project –as part of the capital programme- would be the first in a set of projects that will see an evolution in the workflow for reusing digital teaching/learning content and creating new learning objects. As a start the bulk-migration tools created will be aimed towards a larger pedagogical workflow for repurposing content. This project will NOT take on the disaggregation of learning objects NOR will it

implement a complex metadata workflow; however *it will create the bulk-migration tools in context to this future model for reusing teaching/learning content*. In other words, it is essential that this project does not merely create bulk-migrations tools, but rather takes the creation of these tools in context to a complete pedagogical model for reuse of digital objects. By designing these tools from the start towards this future, this project supports the larger overall goal of reuse for teaching/learning content in HE.

Business Case:

Significant advancements by Institutional Repositories to collect research material in the past few years has yielded several new publishing models which have been successful in making research material more accessible. In contrast, collections of teaching/learning content in the form of learning objects have not yet delivered on their expected return on investment (ROI).

Attempting simply to re-apply the publishing models adopted for research repositories to repositories of teaching/learning materials is, however, unlikely to succeed owing to the sharp differences in form and content between research and teaching/learning materials. The most significant difference is in the complexity of the digital media comprising learning objects (especially multimedia learning objects) in comparison to research e-prints. Moreover, it is often the case that only *parts* of learning objects are required for use by teacher/learner, and this demands a flexible publishing model and workflow that will facilitate the repurposing of data. Thus, there is a clear need to design new publication models/workflows that account for these complex features and to develop interoperable tools to support these models.

The main goal behind such innovations will be to create workflows tailored specifically for teaching/learning media that will enable teachers to download media assets to their desktops, repurpose these in generating their own learning objects, and then to upload this material into their preferred learning platform (i.e. VLE/LCMS or Repository) for access/use by their students and/or other teachers. To this end, a critical first requirement is to create bulk deposit tools that will facilitate the migration of resources to a variety of HE learning platforms (VLE/LCMSs and Repositories).

Such tools must take full account of the size and complexity of multimedia learning objects and must allow for disaggregation of the digital media assets that comprise them from the start of their creation. At present, it is common for archived learning objects to consist only of the *published* output of the source file content (e.g. compressed flash files of the original source files)ⁱ. Unless the source files are also contained within the content package along with the published export files, possibilities for reshaping and repurposing of the digital media assets will be extremely limited. In this case, with both source file and output file, difficulty arises from the size of content packages that contain their source files: these are commonly up to ten times larger than the compressed, published files. These demands require that the first step -in any pedagogical workflow that will enable ease in repurposing content- to be a bulk-migration tool in the form of a standardized Application Profile Interface (API).

Of course the next logical questions are *where do learning objects reside* and *how should they be migrated to the appropriate repository for disaggregation?* Birkbeck has been considering this issue for the past year and has closely followed movements in the HE sector for best practice. *While further scoping towards significant HE platforms that contain LOs will be part of this project*, Birkbeck has already begun dialogue with several vendors who are widely used for managing UK HE teaching/learning content (see appendix 1,2,3). These containers along with other widely used platforms for multimedia teaching/learning content will be evaluated in the context of creating bulk-migration and deposit tools.

The open and flexible ease of moving learning objects through significant HE platforms will greatly benefit the higher education sector (including Birkbeck and the Bloomsbury Learning Consortium). It is specifically the creation of these APIs as open standardized code (OSIDs) that will establish a non-proprietary and interoperable method for assuring that teaching/learning content is truly migratable now and in the future. These set of APIs/OSIDs will assure the continued development of open source code for the continued ease of migrating digital content across platforms as the information environment architecture continues to evolveⁱⁱ.

Perhaps the most significant consideration of this project is the inevitable need to manage the pedagogical and business models in the migration of learning objects across the UK HE e-infrastructure. In addition to creating bulk-migration tools for significant UK HE teaching/learning platforms, this project will also demonstrate innovation in its recommended pedagogical workflow by creating a series of recommended application profiles for metadata and packagingⁱⁱⁱ. Therefore, this project will both create bulk-migration tools and recommend best-practice in using them. This project will emphasize the significant work already done by JISC projects in this area (see below) as well as contribute to the larger 'information environment architecture' as JISC continues to 'accelerate the pace of change' in e-learning.

Alignment with Call (Repositories Tools and Innovations):

This project is submitted under the project strand of 'Repositories Tools and Innovations' whereby development will create tools for 'adding content to repositories' and pursue innovations in 'managing repository content'. To see the improved creation and use of learning objects a number of stakeholder demands must be met:

- Learner: a richer and more diverse learning experience through the use of multimedia content
- Teacher: greater availability of rich multimedia content to repurpose into new learning objects
- Administrator: improved ROI of eLearning content to capitalize on investment in creation (especially with regards to rich multimedia content)

The strategy for meeting these demands is to create the first set of tools that will support the above pedagogical gaps. In addition to the tools themselves, there will be a set of application profile recommendations for how these tools can be used to support the needs of learner, teacher and administrator. This first step towards large-scale sharing of digital resources will focus upon rich learning content in the form of multimedia objects that are easily reused and repurposed for teaching and learning across a diversity of subject areas. By facilitating transfer of multimedia content, the teacher/learner will have more pedagogical options for reuse of learning objects and their digital content assets. Ideally, by enabling wide reuse of rich teaching/learning content more new learning objects will be created and then once again made available for bulk-migration and reuse.

Project Aim and Objectives:

Aim: To enable the greater reuse of digital content across HE by enabling bulk-migration of content between significant UK HE teaching/learning platforms.

Objectives:

- 1.) identify significant HE learning platforms that contain multimedia teaching/learning content
- 2.) identify stakeholders and user case scenarios for using bulk-migration tools
- 3.) evaluate structure of source learning objects for recommendation towards application profiles
- 4.) create set of bulk-migration tools that will enable greater interoperability between teaching/learning content providers
- 5.) publish and disseminate bulk-migration tools openly to the HE community

Methodology (where, who, which, how, why):

Where?: (*objective 1: identify significant HE learning platforms that contain multimedia teaching/learning content*):

Where will these tools be used?

The first question that must be asked in creating a tool that will migrate content from one place to another is, 'where do we want to move content to and from?'. Birkbeck has already undergone a preliminary field-survey as part of the Bloomsbury Consortium where there are a minimum of three platforms that are being used among its partners (Moodle, WebCT and Blackboard). In addition to this is the growing need for a place to maintain the vast amount of digital content that is being generated across the Bloomsbury campus. This content has begun to be managed in the Sherpa LEAP project where Birkbeck has participated in creating and populating an ePrints repository with research content. Birkbeck and the Bloomsbury Consortium wish to now take the next step in managing their growing collection of digital teaching/learning content^{iv}. This is especially important for the Birkbeck ethos^v as it is ranked no.1 for teaching in the 2005 national student survey (2005)^{vi}.

The preliminary scoping study will look to discover which UK HE platforms are being broadly used to disseminate teaching/learning content, especially multimedia learning content. The strategy for this will be to contact heads of learning technology departments from a broad spectrum of UK HEs. We will look to implement a short survey via email so the data can be easily transmitted /returned as well as commented upon. In addition, the platforms that are identified as significant from this survey will be followed up with the platform providers to verify a quantitative number for use throughout the UK. The singular objective of this study will be to discover which containers within UK HE Universities contains – or, will most likely contain- the greatest mass of multimedia learning content in packaged or unpackaged form. This project will rely heavily upon its scoping study to select the most significant UK HE platforms for which it will create bulk-migration tools.

Who?: (*objective 2: identify stakeholders and user case scenarios for using bulk-migration tools*)

Who will use these tools?

The second part of the scoping study will be the identification of user-case studies. This research will follow on from the preliminary work already done by JISC projects. Additional user cases will be considered in direct relationship to the pedagogical implications that bulk-migrations tools will have on teacher/learner. The generation of this data will be done through qualitative interviews as well as further research and development with other JISC projects who have been considering these issues (see 'project partners' section below). These user cases will also play a key role in developing the overall pedagogical context (and therefore dissemination payload) in which the bulk-migration tools will be implemented.

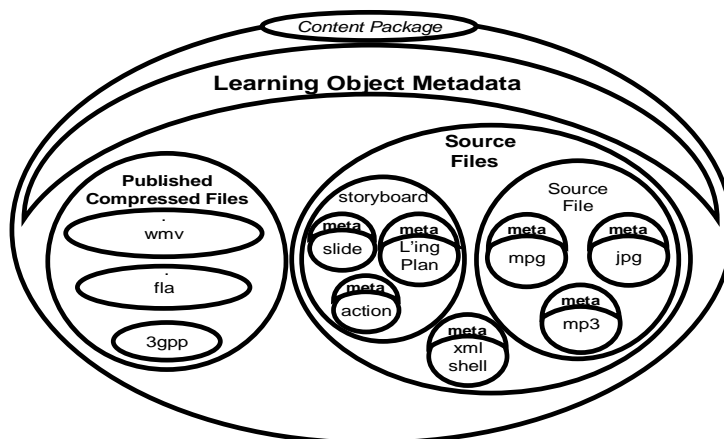
General Cross-Platform Migration Scenarios^{vii}:

- VLE/LCMS to VLE, e.g. all content from Blackboard to Moodle.
- VLE/LCMS to Repository, e.g. all multimedia content from previous year's courses in WebCT, archived into Intralibrary.
- Repository to VLE/LCMS, e.g. All multimedia objects uploaded into WebCT into designated course areas, as well as searchable from within Moodle.
- Repository to Repository, e.g. All objects moved from consortium repository to national repository either as whole or in part.

Which? (objective 3: evaluate structure of source learning objects for recommendation towards application profiles)

Which learning objects will we be using?

It is essential for this project that a diverse set of real world multimedia learning objects are used as the test-bed material for migration of content between platforms. We will therefore collect one-hundred learning objects with their source files included and package them with complex metadata. From this number of objects we will be able to define "bulk" and its ratios. The primary function of this collection of learning objects will be to demonstrate *diversity* in source file content. As stated, for these multimedia objects to be truly reusable and shareable they must contain their source files, not just their published web output files. In addition, for true reusability complex metadata must be added to each multimedia digital content asset.



Shareable Learning Object (SLO)

This diverse set of objects will be collected from several UK wide HE institutions. These objects will only be used in a test-bed and will *not* be distributed to the open public. Institutions that have expressed willingness to participate in this collection of objects include: Birkbeck and its partners within Bloomsbury, London Metropolitan University, JORUM, and the University of Ulster. Further institutions will be contacted to obtain the most representative sample of diverse learning objects possible.

This collection of objects will then support three different aspects of the project:

1.) The pragmatics of bulk-migration testing:

The analyses of this collection of learning objects along with the user case studies will address the form and function of the bulk migration tool. If the overall pedagogical goal of disaggregation and reuse is to be achieved then end user technical needs must be established alongside the pedagogical needs from the start^{viii}.

2.) Best-practice for packaging content with complex metadata for disaggregation reusability:

One of the pioneering steps of this project is to add a complete set of metadata that will support the user requirements for enabling reuse of content as separate digital content assets. This requires complex metadata sets to support each parent/child object-asset relation, including metadata application profiles for: Intellectual Property Rights, Provenance, Visibility (descriptive elements and standardized headings), Technical Requirements (for object and each multimedia asset) and Preservation. The project will rely heavily upon previous metadata best-practice in the sector, to establish metadata application profiles for each of these metadata sets (see below 'HE partners' section for related JISC projects).

3.) Greater diversity in JISC Application Profiles:

By analyzing and assigning complex metadata to individual multimedia assets within the Shareable Learning Object (SLO), this project will be able to recommend best practice in application profiles for varying levels of higher education which will contribute to the JISC information environment service registry. The deliverables of this project objective will be a set of recommendations for application profiles in relation to pragmatic metadata cataloguing workflows

that operate across consortia. The vision is a joint effort by a consortium to add metadata to individual multimedia content assets, thereby enabling a greater mass of objects to be described that would have otherwise been pragmatically impossible by a single institution. This is also one of the binding factors within this project that encourages partnership between learning technologists and librarians.

How? (objective 4: create a set of bulk-migration tools that will enable greater interoperability between teaching/learning content providers)

How do we create these tools?

The creation of the API/OSIDs will follow an iterative/agile code development process; where each platform to platform API will be viewed as a package independent of the other APIs. It is inevitable that each platform API will build from the precedent of the previous work-package, however the creation and testing of the API between each platform will be treated as an independent process. Each platform to platform migration will be divided along consumer/provider relation as according to OKI best practice (see Appendix 11 – OSID Interoperability). *Still awaiting the scoping study*, preliminary workpackages could look something like this within the overall project (please see appendix 4: ‘timetable’ for overall workpackages):

API/OSID Workpackage A	API/OSID Workpackage B	API/OSID Workpackage C
1.1) Repository A <-> Repository B	2.1)Repository B <-> Repository A	3.1)Repository (OS) <-> Repository A
1.2) Repository A <-> Repository (OS)	2.2)Repository B <-> Repository (OS)	3.2)Repository (OS) <-> Repository B
1.3) Repository A <-> VLE/LCMS A	2.3)Repository B <-> VLE/LCMS A	3.3)Repository (OS) <-> VLE/LCMS A
1.4) Repository A<-> VLE/LCMS B	2.4)Repository B <-> VLE/LCMS B	3.4)Repository (OS) <-> VLE/LCMS B
1.5) Repository A <->VLE/LCMS (OS)	2.5)Repository B <-> VLE/LCMS (OS)	3.5)Repository(OS) <-> VLE/LCMS (OS)

Each project-package would be self-contained and tested against a project control list. This control list will be the features and functions of the API/OSID as derived from the user-case scenarios. It is also important to note that workpackages will not be undertaken until the testing of the previous project-package has taken place. This will assure independent agile development of the APIs while still allowing for adjustments as the project iterates through its work-packages.

The current state of API development does not support a ubiquitous standard format for creating bulk-migration tools. Variation in programming language (Java, PHP, Objective C, C#, etc.) as well as web standards (SOAP, WSDL, etc) does not consider the pedagogical implications for educational resources. OSIDs present an opportunity to support an API created for teaching/learning whereby a standard contract between educational platforms -despite their use of programming language or web standards- can be created and published to the global education community. The emphasis for creating these bulk-migration tools must be upon SOA delivery of content to teacher/learner, not technologically ‘pulled’ by a single programming language or standard. The Open Knowledge Initiative (OKI) will support interoperability as well as standardization for varying programming languages^{ix}. To guarantee this standardization, Jeff Kahn of OKI will oversee the development of these OSIDs (Please see ‘key personal’ section below).

Why (objective 4: publish and disseminate bulk-migration tools openly to the HE community):

Why would we create these tools unless we know how they can be used?

The publishing and dissemination of these bulk-migration tools will once again return to the original scoping study of the project and look to implement several test cases in other institution beyond the Bloomsbury Consortium. Key stakeholders/champions (in learning technology departments) throughout the UK will be selected to participate in a workshop to use and implement these tools for their own institution. In addition, this project will look to team with an international partner to show an international demonstrator of the tools. In the latter case, it is of significant importance that this project recognizes the global teaching/learning community and the potential for sharing in the future if worldwide interoperability is to be achieved.

Most importantly this project will publish the created tools in a standardized format known as the Open Service Oriented Definition (OSID), which is a standard by the Open Knowledge Initiative organization^x. This standard will not only act as an international dissemination method, but will also assure interoperable use of the API across other platforms both now and in the future.

Project Partners:

Institutional Department Partners:

- The managing department for this project will be the Library. The Library will contribute knowledge of the JISC Information Environment, information management knowledge and skills, project management experience, and experience through its Multimedia Developer with learning objects. It is

also well placed to facilitate the essential links with other stakeholders in the College and in other institutions.

- Birkbeck's Central Computing Services and their Learning Technology Team will assist with the technical support and advise of the project.
- Additional advice and consideration for the pedagogical learning theories and pragmatics for Birkbeck's unique student populace will be provided by the Centre for Learning and Development.
- Pedagogic advice will be provided by the College's eLearning Co-ordinator, an academic with a keen interest in, and extensive knowledge of, the application of technology in learning and teaching.
- The project will report and be overseen by Birkbeck's eLearning Group. In particular this group will assure the alignment of the project with the College's eLearning strategy^{xi}.

Bloomsbury Consortium Partners:

- The project will be build upon the strength of the Bloomsbury Consortium and support the further development of the Bloomsbury Learning Environment^{xii} by enabling greater reuse of digital teaching/learning content among partner institutions. For sharing to occur, digital content must be easily transportable between platforms on a mass-scale. Currently, the Bloomsbury Consortium has a minimum of three significant VLE/LCMS's in use (Blackboard, WebCT and Moodle). However, more than platform variation reflects the pedagogical diversity within the partner institutions. With each school representing a different set of subject expertises, the complete learning object is not a viable unit for sharing at this time. Rather, it is the multimedia assets that have the greatest potential for reuse across the varying subject groups^{xiii}. Accordingly, it is multimedia assets that represent the viable unit of learning for a cross-disciplinary consortium repository. This cross-subject sharing is also directly focused on the current need to have a greater mass of rich multimedia learning content which is expensive to create and therefore needs be reused. Only in establishing a critical mass of learning content can the recommended e-learning 'communities of practice' be established for a viable 'blended learning environment'^{xiv}. For an 'accelerated pace of e-learning' to occur a greater mass of learning objects must be created from the current mass of digital assets between consortia members.
- Accordingly, institutions within the Bloomsbury Consortium that will support the tool testing process and evaluation process are: the London School of Hygiene and Tropical Medicine, the School of Oriental and African Studies, and the Institute of Education.

Teaching/Learning Platform Partners:

- As demonstrated by JORUM's R&D 'Repository Watch'^{xv} and 'OSS Watch'^{xvi}, there is a great deal of blurring between types of container-platforms: 'Content Management Systems', 'Learning Object Repositories' and 'Learning Content Management Systems'. This project will look to make a distinction between these types of containers by selecting a minimum of one container from each of the following platform categories (though this will be heavily dictated by the scoping study):
 - Learning Object Repository (LOR)
 - Learning Content Management System (LCMS)
 - Open Source LOR and/or Open Source LCMS

Learning Object Repository Partners:

- Because of the rapidly advancing LOR movement, it is necessary to partner with vendors to achieve the necessary code-development required to make LORs viable interoperable containers. The vendor LORs that have been identified thus far as leaders in UK HE are: Intralect's IntraLibrary, HarvestRoad's Hive and Dytec's The Learning Edge (TLE). These projections represent the current leading LOR providers. Intralect in particular has the largest HE market share (especially in the UK), and likewise Harvest Road has the largest global market share with a strong presence in the States and Australia. However, TLE was recently selected in a rigorous evaluation by BCCampus (Canada), and has demonstrated considerable development in creating APIs with other platforms. Bringing as many of these vendors to the table as possible with emphasis on enabling interoperable content transfer between them will help create a competitive repository market environment so that UK HE institutions will have greater choice and flexibility in choosing a repository provider. The assurance of these partnerships will be through pilot repository test-bed contracts assuring that open and non-proprietary code (API/OSID) is written for the sector not just for "partner" companies. As part of the contract, these vendor partners will also provide API programmers that will enable the cross-platform bulk-migration tools for the selected UK HE platforms (both Repository and VLE/LCMS). See appendix 1, 2, 3 for pre-arranged contracts.

Learning Content Management System Partners:

- The recent UCISA report on VLE implementation in the UK^{xvii} has demonstrated that Blackboard and WebCT are by far the leading VLE implementation. Accordingly, their LCMS's will be carefully evaluated for multimedia content. These LCMS are currently supported by the Bloomsbury Consortium, and so will be rigorously tested with the other significant platforms to assure complete interoperability for API (and ideally OSID) creation.

- It is also of considerable note that with the recent purchase of WebCT by Blackboard these products are inevitably going to change. Because of this there is a growing emphasis within HEIs that content should not be stored in a single platform, but rather should be stored in a system that can deliver up to any VLE no matter how it changes or develops. This is with highlight on the developing Enterprise LCMS: Moodle and Sakai.

Open Source Platform Partnerships (LOR and/or LCMS):

- In accordance with JISC policy this project will support the open source movement by looking to implement tools for a minimum of one open source platform. Dependent on the scoping study, the OS platform that represents the most significant container of multimedia content -or potential for containing multimedia content- will be selected for implementation. Birkbeck has followed movement in this sector for the past year and the following platforms are projected to be of significant consideration: Fedora, Moodle, Bodingtons, DSpace and Sakai.
- Fedora in particular is extremely robust repository architecture and tool-kit that is capable of scaling as multimedia content becomes more complex. Also in consideration is Moodle which is currently being used at large by the Open University, of which Birkbeck would look to partner with for tool testing. However, consideration will be made for other open source VLE/LCMSs, specifically Bodington's (developed by Oxford) which according to the UCISA report has as large a market share as Moodle in the UK^{xviii}. Also of consideration within the initial scoping study of this project will be other international OS deployments such as DSpace and Sakai which both have very large market share in the United States. International implementation for other OS products such as Moodle's market share in Australia will also be taken into account.
- Birkbeck will support the OS platform by hiring a programmer who will implement the selected platform as well as participate in the development of bulk-migration tools. The programmer will actively engage and partner with the OS community throughout the duration of the project. The code-development for the OS platform will be saved as the last work-package to assure ease and success of creating an open source platform API/OSID.

JISC and HE Project Partners:

- The projects that Birkbeck will look to partner with in accordance to JISC can be subdivided according to their contribution to the projects objectives:

1.) identify significant HE learning platforms that contain teaching/learning content	2.) identify stakeholders and user case scenarios for using bulk-migration tools	3.) evaluate structure of source learning objects for recommendation towards application profiles	4.) create set of bulk-migration tools that will enable greater interoperability between teaching/learning content providers	5.) publish and disseminate bulk-migration tools openly to the HE community
<ul style="list-style-type: none"> JORUM R&D Rights&Rewards CDLOR RepoMMan UNICEF VLE report 	<ul style="list-style-type: none"> JORUM CDLOR TrustDR Right&Rewards DAPI CETL-RLO 	<ul style="list-style-type: none"> JORUM RDN-LTSN CETIS CETL-RLO CDLOR IESR 	<ul style="list-style-type: none"> DAPI ASK SPIRE RepoMMan SherpaDP CETL-RLO 	<ul style="list-style-type: none"> OKI CETIS/JISC wiki JORUM DAPI

International Project Partners:

- Within the later stages of this project we will look to partner with an international university to demonstrate a proof of concept for international exchange of learning objects. The primary value in this demonstrator will be the dissemination to the global learning object economy; with emphasis on publishing the test in a well respected digital library journal.

Timetables:

As a timeline overview this project has identified a minimum of seven overall workpackages to accomplish:

- Scoping Study (Significant HE platforms and User-Case Studies)
- Application Profile Recommendations
- OSID/API Creation for each selected platform
- Open Source Platform Programming
- Pilot Repository Implementation(s)
- Bulk-migration tool creation
- Tool Training and Dissemination

gap. In the case of two failures the larger consortium would be available for consultation on fulfilling this gap. On the whole, this is a low risk project, as all partners coming to the table have a keen interest in seeing these tools created.

Dissemination:

The project will provide the *de facto* Web 2.0 presence (RSS feed and full integration into the DigiRepWiki). In addition, because of Birkbeck's central location in London, it will provide a minimum of six training-testing sessions ("code-bashing / mashups") for other HE institutions in which to participate.

It is also of significance that this will be the first JISC project to implement a full OKI OSID, which is widely recognized in the international learning technology sector. All documentation and code development will be made available via the OKI web-site with downloads of OSID available through Source Forge. *Support by the OKI organization is demonstrated by appendix 6 in a letter of support by the head of OKI Jeff Merriam.*

This project as a potential product of three international organizations from England (Birkbeck, Bloomsbury and JISC) , The United States (OKI) and Australia (Harvest Road or The Learning Edge), will naturally raise the profile of this project, presenting numerous opportunities to create further international partnerships that will lead to greater interoperability for the global learning economy. This will also be an ideal opportunity to publish in international journals, and disseminate JISC programme around the globe.

Evaluation:

Quality assurance in this project will be assured via multiple committees representing the stakeholders of this project.

- *Institution:* It will be Birkbeck's eLearning Group that will represent Birkbeck and its interests. Quarterly meetings will be held to evaluate and align project initiatives with the BBK e-learning strategy.
- *Consortium:* The Bloomsbury Consortium will be represented by two members from each school at quarterly meetings (pref. one from the library and one from the learning technology team).
- *UK HE:* The UK HE evaluation committee will be chaired by Tom Boyle (CETL-RLO), in addition members who have already committed to this meeting are: Ryan Hargreaves (JORUM), Sara de Fritas (London Knowledge Lab) and John Casey (TrustDR). Meetings will occur 2-3 times over the course of the project along with correspondence and reports.
- *OSID/API Technical Development:* The quality assurance mechanism for vendor API/OSID creation will be Jeff Kahn's participation and experience as part of the OKI organization (see appendix 7). In addition, reports will be submitted to the JISC API working group for evaluation and recommendations.

IPR Statement:

- The API/OSIDs created in conjunction with the bulk-migration tool will be published as Open Service Interface Definitions which in their own right are licensed as Open Source data through the Open Knowledge Initiative. However, to assure that the code created is open, due consideration will be made for the database copyright law and the open source General Public license. This will be duly written into the contracts of vendor partners.
- The one-hundred learning objects used for testing will *not* be disseminated beyond the test-bed of the project. All contributing members will sign an agreement for copyright responsibility and be encouraged to submit their objects to JORUM to assure a JISC copyright license is ascribed to them.

Sustainability:

This project has aligned itself with the overall **HEFCE e-learning and DfES e-strategy** to assure long-term pedagogical sustainability. The bulk-migration tools and application profiles that this project will create are directly aimed at the DfES, HEFCE and JISC agendas to 'accelerate the pace of digital learning'.

As a pedagogical means of sustainability, this project provides solutions to the three critical problems that DfES has identified in the 'provision of e-learning'^{xix}:

- Problem 1: 'the quantity and range of resources available to teachers and learners'
Solution: this project will create tools that will enable bulk sharing of resources.
- Problem 2: 'the quality and degree of innovation of those resources'
Solution: the project's content focus is upon rich multimedia content assets that can be reused to improve e-learning materials.
- Problem 3: 'the embedding of e-learning and ICT across the curriculum'
Solution: the project will build tools and processes that are interoperable with learning platforms in wide use throughout the HE sector.

Additionally, this project supports the general HEFCE objectives toward 're-use and sharing of learning' by enabling greater ease in moving digital learning content to the HE platforms that a learner is most likely to use, and meets 'cross-institutional learning' objectives by establishing a common shared repository between HE institutions.

By enabling Birkbeck with a teaching/learning repository Birkbeck will be in a place to champion the use of the repository by the consortium, hence their involvement from the start of this project. Naturally, this project will lead to further projects within the consortium amidst its own platforms and interoperability needs, representing a 'snowball effect' from JISC initial investment^{xx}

Critically, this project looks to address these issues using JISC's Service Oriented Architecture (SOA) approach based upon global standards that will support the other tools and services that JISC is funding in the Capital Programme. Specifically, the use of OSIDs as SOA architecture will assure the longevity of the bulk-migrations tool created, both in relation to platforms that will be identified in this project and further platforms that adopt the OKI standards.

Preservation:

It is important to note that the overall aim of this project towards repurposing digital content assets as more granular objects goes towards best-practice in preservation methods, where individual multimedia objects are already supported by many web preservation projects^{xxi}. This is in contrast to the complex learning object which is yet to have a preservation strategy.

Key Personal:

The core development team will be lead by a Project Manager (David Flanders) and technically supported by a platform programmer (to be hired). Additional code development will be accomplished through contracts with repository-vendor suppliers of which pre-arrangements have been tabled for further discussion and negotiation (see appendix 1, 2, 3). Overall code development will be overseen by an OSID authority (Jeff Kahn) and the OKI initiative.

David F. Flanders (Project Manager) is currently the Multimedia Developer at Birkbeck, where he has pioneered the use of learning objects across several schools in Bloomsbury, as well as formation of further 'communities of practice' with other institutions in the UK and abroad. In addition to learning object development he is a key consultant for digitization projects in image and video, including HEFCE funded digital image project London Architecture Online. He works across the consortium advising on digital audits and preservation. His previous experience includes working with the British Library on the 'Turning the Pages' project where his contributions to this learning object encouraged buy-in by Microsoft. He has also lead research teams in evaluating VLEs such as Blackboard for product development. He is an active member in the JISC community participating in the JISC API working group, as well as, regularly attending JISC events on digitization, eLearning and Digital Copyright Law (for CV see Appendix 10).

Jeffrey Kahn, doing business as Verbena Consulting, specializes in working with higher education and industry to make optimal use of the Open Knowledge Initiative (www.okiproject.org) and related efforts. Veberna Consulting is an authority on O.K.I. and has helped define, describe, and implement the service oriented architecture (OSIDs). Verbena Consulting has worked on several O.K.I.-related projects at MIT as well projects at Tufts University, Penn State University, the Museum of Fine Arts in Boston as well as offering technical advice to many more institutions. Verbena Consulting has worked with industry, including: Sun Microsystems, Cisco Systems, Apple Computer, HarvestRoad, Giunti Labs, ARTstor, Bedford Freeman and Worth Publishers, and others to adopt O.K.I.

References / Endnotes:

i Reference Ryan Hargreaves (JORUM R&D team) Ryan.Hargreaves@manchester.ac.uk

ii There is a dichotomy of needing vendors to create features and tools for educational purposes, contrasted with the business model for capitalistic advancement: This results in the creation of tools and features that are developed for overall financial gain and not with due consideration for overall development in the sector for the greater good: preservation or best-practice in interoperable innovation are examples of this dichotomy, see article by W Nasierowski, OPenURL: <http://journals.pepublishing.com/openurl.asp?genre=article&issn=0954-4054&volume=217&issue=8&spage=1145>

iii Most significantly, it is the combination of tailoring metadata to enable the pedagogical model of repurposing content that has the most implications for the tools this project will create.

iv SOAS was the lead institution in a successful collaborative bid (with University College London) for a HEFCE-funded Centre of Excellence in Teaching and Learning (CETL), entitled 'Languages of the Wider World'. The CETL has a strong multimedia element, and collaboration between SOAS and UCL in this area will undoubtedly have an impact on the development of the Bloomsbury Learning Environment. Ongoing digitisation projects at SOAS include those led by a Multimedia Project Board, such as the development of a Digital Picture Archive, as well as participation in the SHERPA-LEAP and SHERPA-DP projects.

v Birkbeck's success with its students' is the qualitative face-to-face moments within classroom, on the other hand, this qualitative experience is quantitatively supported by the overall digital information environment where learning content is available in abundance anytime, anywhere thereby making Birkbeck's part-time degree as close to full-time education as possible.

vi National Student Survey Reports available at: <http://www.hefce.ac.uk/learning/nss/data/> [accessed: 2006-06-22]

vii Exemplar Case Studies Already identified by JISC projects:

Learner:

- i.) Student uploads content into personal VLE space, everything from essays, dataset to PowerPoint presentations.
- ii.) At the end of their academic year a dialogue-box asks them if they would like to preserve their content for future use by other students.
- iii.) Upon agreeing and verifying with the IPR statement content is bulk-uploaded (via workflow) into collection.

Teacher:

- i.) Teacher uploads course content into VLE.
- ii.) At end of term, content is automatically uploaded into repository
- iii.) The next year the lecturer and students are able to review material the instructor has already created for the course including bulk-uploading the previous objects from the course.

Administrator:

- i.) HE institutions –upon agreement within their consortium- exchange multimedia content assets between each other for reuse amongst teachersvii.
- ii.) Lecturer -because of institutional agreement- is able to reuse a respected colleague's collection of multimedia asset within their own learning objectives.

viii OSID library available at: <http://okicommunity.mit.edu/filemgmt/viewcat.php?cid=16> [accessed 2006-06-22]

ix OKI web site available at: <http://okicommunity.mit.edu/> [accessed 2006-06-22]

x Wikipedia definition: <http://en.wikipedia.org/wiki/OSID> [accessed 2006-06-22]

xi http://www.bbk.ac.uk/elearning/elag/learn_strat [accessed 2006-06-22]

xii The Bloomsbury Learning Environment (BLE) is a unique collaboration between four of the specialist colleges of the Bloomsbury Consortium. Formed in 2004, the collaboration enabled the School of Oriental and African Studies, the London School of Hygiene and Tropical Medicine, the Royal Veterinary College and the Institute of Education to obtain a joint licence for the Blackboard VLE. Its role is now expanding beyond the original platform-based remit, and future plans include a wider investigation of e-learning and multimedia issues across all six Bloomsbury Consortium colleges, bringing Birkbeck College and the School of Pharmacy into the collaboration. Further, the colleges of the Bloomsbury Consortium are proposing to develop cross-institutional programmes of study, and collaborative developments in e-learning and multimedia will enhance the quality of courses which will be offered.

xiii Example: a lesson by the school of crystallography on the chemical composition of cement drying is not easily reused as a whole learning object, however the high-definition time-elapse video-clip of the cement structure forming could be used in-part by the school of architecture or school of fine arts to demonstrate the chemical process involved in building or sculpture

xiv See DLib Journal and SCORM recommendations for 'communities of practice'

xv <http://www.jorum.ac.uk/publications/index.html> [accessed 2006-06-22]

xvi <http://www.jorum.ac.uk/publications/index.html> [accessed 2006-06-22]

xvii UCISA VLE report available at: http://www.ucisa.ac.uk/groups/tlig/vle/index_html [accessed 2006-06-02]

xviii http://www.ucisa.ac.uk/groups/tlig/vle/index_html

xix DfES eStrategy 'provision of e-learning', *p.28, §82, available at: <http://www.dfes.gov.uk/publications/e-strategy/> [accessed 2006-06-02]

xx Birkbeck has several projects invested in the creation of additional multimedia learning content including: Visual Image Service for London Architecture images, information literacy learning object project, IT literacy skills course, Technique videos for web based training in Crystallography, Computer art images in the CaCHE project and numerous analog video and audio content queued for digitization.

xxi VDEP & Web ARC as described in the JISC funded LIFE report: <http://www.ucl.ac.uk/lsl/lifeproject/> [accessed 2006-06-02]
