simSHARE

FINAL REPORT

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celebrating 10 years

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1. Executive Summary

1.1 Background, aims and objectives

Simshare was a subject-strand project within the UK-OER programme but was based on a learning tool rather than a specific subject. Simshare's focus was on simulations as Open Educational Resources (OERs) and building a user community around their development and re-use.

The project set itself the following objectives:

1. Collation and dissemination of simulation resources that are repurposed as open educational content.
2. Creation of guidelines for future publication of simulation projects.
3. Increase awareness of staff to use simulation more widely and effectively through staff development.
4. Create methodologies that will help staff to see more clearly how simulation OER can be interpreted and in particular how to:
   a. Generate or re-purpose a simulation.
   b. Archive a simulation.
   c. Retrieve a simulation and analyse its component parts for educational value and purpose.

1.2 Outcomes

Simshare has:

- Developed a website, supported for three years, that acts as an interface for simulation submission to a repository, download of stored simulations or their component assets, and also supports a community of practice.
- Held a series of dissemination events that have promoted the use of simulation learning as well as introducing OERs.
- Worked with project partners and other donors to re-purpose simulations for re-use in a range of contexts, supported by a comprehensive suite of metadata.
- Evaluated the issues around the use of simulations for learning, teaching and assessment in HE and FE, and the potential benefits of simulations as OERs.

1.3 Conclusions and recommendations

A key element of Simshare's mission was to extend the use of simulation learning and teaching to a broad range of subjects and share current practice from those areas where simulation use was more established. We concluded that such an approach had practical issues for the project, for example in terms of soliciting simulation OERs from different subject areas, and was impeded by the inbuilt subject-disciplinary culture present in UK HE and FE.

Recommendation

With the increased availability of freely-licensed open educational resources, more consideration needs to be given to extending the use of these resources beyond their original subject context. In particular:

- Providers of OERs should be aware of the potential wider user constituency when addressing dissemination and discovery, and facilitating re-purposing.
- Bodies that support pedagogic innovation in HE, such as HEA, JISC, SEDA, should recognize the new opportunities provided by OERs and support more interdisciplinary initiatives at national and international levels.
- Interdisciplinarity itself can bring about radical curriculum innovation but only if institutions adopt fundamentally changed values about the nature of OER at all levels of management.

A simulation OER repository such as Simshare, with a high level of investment in support and guidance as well as a resource repository, adds tremendous value to its products. In this way, it can be much more effective in encouraging the use of simulation in learning and teaching. The Simshare community site provides a strong element of guidance, and by offering a habitat for a user community, Simshare is providing as much support and encouragement as it can for potential users.

Recommendation

The UKOER community should recognize the added value of OERs in facilitating radical pedagogic change, in particular in the case of resources that may involve high levels of initial investment (or be thought to do so), through presenting their resources in ways that:

- Drop the barrier to initial adoption by reducing the investment needed to implement the technique.
- Present clear information about implementing and managing a technique.
- Showcase a broad range of resources, some of which are not complicated or labour intensive.

Simulations are not simple learning objects whose purpose is necessarily clear and which can be downloaded for instant, out-of-the-box use like a video on YouTube. Ideally, simulations require extensive metadata that allow a potential user not only to understand the narrative but also to appreciate what is involved in running the simulation, including staff - and other resources and forms of assessment. This raises the need for a re-appraisal of metadata issues in UKOER.

Recommendation

A small follow-up project should examine the different metadata strategies of the UKOER projects, with a view to identifying the common issues faced and shared solutions.

When Simshare was designing its practical implementation, it became clear that the project would need its own repository to achieve its aims rather than using JorumOpen as the main repository. We consider that the UKOER programme needs to re-examine how project repositories function and how these are networked to maximise access to OER resources.

Recommendation

A central 'one size fits all' repository did not fit the pedagogic or practical needs of Simshare, nor of several other UKOER projects. UKOER should:

- Study the advantages and implications of a distributed model for OER repositories and
- Continue to introduce infrastructure to support such a model.

2. Background

2.1 Project context and key issues

Simshare was a subject strand project, focused on providing OER to facilitate and encourage the use of simulation and related approaches to learning. Simulation is a powerful and innovative form of teaching and learning. The benefits include situated learning, active learning, the embedding of professional work patterns and practices in academic programmes, the enhancement of professional programmes, and the creation of more authentic tasks and deeper student understanding of symbolic thinking as well as of professional practice. In addition to making simulations freely available, it is concerned with increasing the use of simulation as a means teaching and learning in Higher Education, both by raising awareness of the availability and use of simulation across a wide range of subject areas and by producing guidance about their use.

2.2 Current state of simulation OER release and resource sharing

A number of simulation techniques and engines exist that can be used in HE (largely commercial, though there are open-source versions). However the full-scale development of a body of widely shareable and re-purposable educational content amongst simulation designers and users has been to date almost non-existent. This has had serious consequences for the uptake of simulation as a form of situated learning; for whilst the power of simulation as a heuristic is widely recognised, so too is the effort required by staff to create and resource simulations.

2.3 Building on previous work and opportunities

The project built on the JISC-HEA-funded SIMPLE project, which was designed to share the SIMPLE simulation platform developed at the Glasgow Graduate School of Law. SIMPLE had undertaken extensive research into the use of simulation in Higher Education (SIMPLE final report, Hughes et al. [2008]).

2.4 Approach to OER release and importance to stakeholders

The project aimed to add value to the HE/FE educational community in significant ways by developing an infrastructure to support the creation and release of open educational simulation resources and to collate and repurpose existing simulation materials for use by the community.

The project will enable a community of practice to form around simulative approaches to learning by helping staff to create, use, evaluate and re-purpose simulations much more effectively than would have otherwise been the case. By forming part of the UK-OER programme, the project can reach beyond narrow subject boundaries.

The main ways in which the project advanced OER release and use were:

- Providing a repository for a variety of simulation resources used in HE and FE.
- Allowing users to search for simulations and to use comprehensive supporting information to download and re-purpose as necessary complete simulations or individual simulation assets.
- Creating a community of practice around the development and use of simulations, thereby raising awareness of their pedagogic value in HE and FE.

3. Aims and Objectives

3.1 Simshare's Aims and Objectives

In the project plan, the aims and objectives were set out as follows:

The project aims to add value to the HE/FE educational community in significant ways by developing an infrastructure to support the creation and release of open educational simulation resources and to collate and repurpose existing simulation materials for use by the community.

On completion the project will meet the following objectives:

- Collation and dissemination of simulation resources which are repurposed as open educational content.
- Creation of guidelines for future publication of simulation projects.
- Increase awareness of staff to use simulation more widely and effectively through staff development.
- Create methodologies that will help staff to see more clearly how simulation OER can be interpreted and in particular how to:
  - Generate or re-purpose a simulation.
  - Archive a simulation.
  - Retrieve a simulation and analyse its component parts for educational value and purpose.

The project refined and rationalised its work packages alongside the interim report submission in November 2009 but the aims and objective remain as stated here and in the project plan.

3.2 Open Educational Resources to be released

The project plan identified eleven simulation resources to be released by four partner institutions. We have since attracted donations of additional simulations from several other institutions. The original tranche of resources comprised simulations based on the SIMPLE platform, and addressed law, computing science, architecture and management science at undergraduate, postgraduate academic and postgraduate professional levels. Several of the second wave of simulations were not based on SIMPLE, for instance a PowerPoint-based simulation to be delivered in a seminar format, and a web-based action maze. In view of the later start of this project we initially concentrated on the simulations we had identified in the project bid, which given the lead partner, tended to be more legally based simulations. Indeed at the time of submitting our interim report we were unsure if we would manage much more than the simulations we had offered (see the Interim report 'we are mindful of the timescale of the project and while we will endeavour to include cross disciplinary simulations our involvement in this aspect may be reduced'.) However during the course of the project we actively tried to attract simulations from other disciplines to build up a rich resource which would ultimately be of benefit to others beyond the project partners. We are continuing to upload in a number of disciplines and if funding had permitted it, would have investigated more ways of encouraging others to participate.

Although the number of simulations released through Simshare is currently quite small, they are important because of the range of simulation types and subject areas, and form an effective showcase for the application of simulation-based teaching in Higher Education. Further, each simulation is a composite of several individual resources. Some have as many as 50 artefacts, comprising documents, photographs, PowerPoint slides, videos, styles, templates and online forms. The simulation resources are supported by generic online guidance in the use of simulations and by a combination of metadata and a narrative description that provides a potential user with all of the information that they need in order to use or re-use a specific simulation.

3.3 Technical developments

Simulations are often complex resources, with associated materials including documents, audio and video. We therefore built an online repository that enables donors to upload their simulation resource and add metadata, and allows users to evaluate whether simulations are suitable 'as is' or after modification before downloading them. We included a social networking element in the site to encourage the formation of a cross-disciplinary community of simulation users, both those who build their own simulations and those who download ones from the site. We also included a comments facility so that users could share their experience of individual simulations.

3.4 Practices and processes for review

We have paid special attention to two issues that sit alongside the technical release of simulations as OERs.

- Metadata for simulations need to balance the interests of depositors in making the submission of the simulation as straightforward as possible, and the needs of users to gain as much information as possible not only about the simulation per se but also about the practical aspects of running it.
- Very often, simulations pose IPR issues because they may contain a range of materials for which the depositor does not hold copyright. For instance in the field of simulations of legal practice, realistic official forms may be needed and clearly the simulation author does not hold copyright and cannot release these under a Creative Commons licence.

3.5 Lessons to be learned

The project is unusual amongst UK-OER activities, especially in the subject strand, in that it is concerned with a type of resource rather than a subject area, and is cross-disciplinary. In designing the project evaluation strategy, we have taken into account the UK-OER generic evaluation framework (http://www.caledonianacademy.net/spaces/oer/index.php?n=Main.GenericFramework) and used this to scaffold several observations on the progress and success of the project (see Appendix 7). However, we feel that we can serve the UK-OER programme and our project best by focussing our evaluative efforts tightly onto those aspects of the project that are unique – those that are associated with the development, release and subsequent use of simulations as OERs. These and other aspects of our evaluation are articulated as six key questions:

3.5.1 How has the type and variety of resources affected the way that the project has approached simulation deposit and use?

Simulations come in several different shapes and sizes, and different subject areas employ different types of simulation methodology. In view of this, it was necessary to anticipate the needs of depositors and users. In particular, we tried to:

- Create an online environment to accommodate a wide variety of file types, single and multiple files, and different simulation software packages.
- Use a 'light-touch' generic metadata protocol combined with

a template simulation description document that together provide a comprehensive description of the simulation and how it has been used.

- Encourage depositors to provide their simulations in formats that facilitate re-purposing.
- Encourage users who adapt simulations, especially for new subject areas, to share their derived work.

As part of our user testing, we assessed:

- The usability of guidance for donors, including help for metadata, IPR and licensing.
- The usability and usefulness of the site information, simulation descriptions and metadata for potential users searching for simulations to re-use.

3.5.2 How has the cross-disciplinary nature of the project affected that way that simulation deposit and use has been handled?

For Simshare, the main institutional issues have centred on bringing about change and extension in the use of simulations. The cross-disciplinary focus of the project has raised particular problems, both in terms of 'breaking into new markets' and in accommodating the broad range of simulation types employed by different subjects. In particular:

- Do simulations 'travel'? Can an approach developed for one subject area be transferred to another?
- Will potential users look beyond their subject areas to assess technical or pedagogic approaches to simulation?

3.5.3 What are the main incentives and barriers to development, sharing and re-use of simulations?

Simulation-based learning is uncommon across many subject areas, despite the fact that it offers benefits in terms of both subject learning and transferrable skills. Developing simulations does not need to be complex, although many academics perceive it to be so. What are the incentives and barriers to sharing and re-using simulations? For instance:

- What determines whether an author is willing to share simulations?
- What encourages the use of simulations by third parties?
- What are the barriers to simulation use?

3.5.4 Do simulations make good OERs?

The project evaluation centres on the benefits to various stakeholders, both of simulations and simulations as OERs. We build on the findings of the SIMPLE project, which examined in depth the development and use of simulation-based learning and teaching. Given the complexity of some (though not all) simulations, does their availability as OERs enable adoption where development from scratch might have precluded their use? Are simulations suited to being OERs?

3.5.5 Has the repository and website been successful in supporting a community of simulation developers and users?

The project developed its own web-based interface and repository because of the need to handle complex simulations. This followed programme guidelines regarding standards and interoperability. The development has raised the issue experienced by other projects of how to provide a free-standing repository where materials are also accessible from JorumOpen and other sites. Areas for evaluation and comment:

- Technical and usability assessment
- Distributed access and version control
- Sustainability

3.5.6 Programme and project management – where has this worked well and where could it have been better?

In section 6 we share a number of successes and lessons from the project, both within the project and in relation to the programme and other projects. These include:

- Communication
- Modification and adaptation of the project work planning
- Unforeseen issues
- Relationship with stakeholders and partners
- The role of subject centre in sustaining the project

4. General approach

4.1 Depositors and users

Our depositors and users are similar in many respects but may be at different stages in their use and development of simulations. The use of simulation as a learning and teaching tool in HE is relatively scarce, so we sought to involve innovative teachers who perceive the added value associated with transactional learning.

Depositors (donors) were existing developers and users of online simulations and role play. Our potential users are people who already use simulations and want to expand their range, plus new users who might have found online simulation intimidating because of the perceived overheads in design and preparation.

We canvassed both depositors and users through contacts at various levels, from individuals and institutions to the HEA Subject Centres. We used conferences to canvas interest, and in particular built targeted 'recruitment drives' around our roadshow dissemination events.

4.2 End use and end users

Simshare is aimed primarily at academic staff rather than at students because simulation resources are typically context-specific and used within learning and teaching frameworks, rather than being free-standing learning objects that could be used by students for independent learning. 'Customers' for simulations will be people who are convinced of their usefulness in education, and who are prepared to download materials from the site either to use 'as is' or with modification.

We envisage that simulations will be used directly in their current role, possibly adapted for local conditions or for application in new subject areas. In addition to their use 'as is', they may be re-purposed, either to extract a particular style or mechanism from the simulation and use this to build an entirely different product, or to adopt individual components from a complex multi-element simulation.

Users need to be convinced of the usefulness of simulations in their educational context. One of the aims of the project was to build a community of users as well as providing a location for the sharing of online simulation materials. In this sense, the simulations made available from the project repository have an additional role as 'ambassadors' for learning and teaching using a wide range of simulation techniques. We encouraged the submission of a variety of simulations that encompass a range of technical and pedagogic approaches and cover diverse subject areas.

End users may have been discouraged in the past from using simulation in their teaching or training because of the perception that simulation can only be used in conjunction with significant support and resources, both for developing and managing simulations. By being able to demonstrate that the technique can be used at a range of levels, from very simple role play to complex multi-player exercises, we hope to expand the user community.

4.3 Finding simulation resources and working with depositors

In light of the wide range of potential simulation donors and users, we have taken a broad-brush approach to building our user community. Amongst other approaches, we have:

- Targeted personal contacts to increase contribution to our bank of simulations
- Worked personally with donors to facilitate uploads
- Publicized the project through HEA subject centres
- Sought to capitalize on local interest through our roadshow dissemination events

4.4 Engaging key stakeholders

Since the project was concerned with a type of learning and teaching resource rather than a subject, our depositor and user community was scattered. We enlisted the help of other Subject Centres to spread the message outside the confines of the partners' subject areas, and approached professional bodies to explore their attitudes to simulations as learning and teaching tools.

4.5 Technical, legal and organisational issues

We faced a range of issues that typify simulations as OERs. These included:

- Resources that were complex mixes of file types.
- The need for comprehensive metadata.
- The need to accommodate third-party materials that fall outside the licence for the main simulation.

We expected to make extensive use of the experience of partners in addressing these issues, and to capitalise on the results of the SIMPLE project.

4.6 Making simulations available

In its project plan, the project identified a need to design and run its own repository for simulations, supported by a community of practice. In particular, we wanted to extend the scope of the project to support the use of simulation as a pedagogic tool, rather than simply providing online materials for download and use/re-use. In specifying the design for the repository, we placed emphasis on enhancing the opportunities for the application of simulation as a learning, teaching and assessment tool.

- Users access the simulations through a download interface, where they can inspect a comprehensive set of information about the nature of the simulation, how it has been used and the resources needed to support it.
- Users can add comments on simulations, and the site supports a community of practice through social software. Users are encouraged to submit repurposed simulations to the project repository.
- Tracking data from the site also allows user behaviour to be followed and the social networking area provides data on the user community.

4.7 Plans for support and guidance

We were very much aware of the needs of resource donors when we designed the repository site and the online supporting materials. We ensured that the project site carried extensive guidance, both as online help and downloadable documents. This was designed to support the educational uses of simulations in HE and FE, as well as the practical aspects of using the project repository.

5. Implementation

5.1 Implementation overview

The project started work in late summer 2009 and appointed core staff in October. At this point, the major tasks for the project were:

- The design and development of a web-based interface that would allow users to:
  - Upload simulations to a repository, and document these simulations.
  - Explore the contents of the repository and download simulations.
  - Develop a community of practice.
- Establishing the necessary framework of supporting information and advice to underpin the use of the repository, including:
  - Clarifying the IPR issues around release of simulations.
  - Defining a protocol for supporting information and metadata.
  - Developing guidance for practical issues.
- Developing a strategy for attracting and harvesting further simulations (beyond the contributions of the project partners).
- Developing a dissemination strategy.
- Consolidating the project evaluation.

As part of the process leading up to the interim report in November 2009, we critically examined the project plan and workpackages, and revised the latter to give greater prominence to some of the tasks listed here.

Software development and testing proceeded into February 2010, and we made extensive modifications to the site on the basis of user testing by the project team and on reflection of lessons learned from other similar sites within and outside UK-OER. Alongside this, we designed comprehensive documentation to cover the submission and use of simulations as OERs.

The project moved into a new phase in March 2010, centred on attracting and collecting new simulations, dissemination and completion of the project evaluation.

5.2 Technical development

The project web interface was built to allow users to upload simulations and supporting materials to a repository, explore and download simulations already in the repository, and support a social network around the development, use and re-purposing of simulations.

Key features of the project site (see also Appendix 1) include:

- A searchable listing of simulations in the project repository.
- A 'front page' listing of newly uploaded and recently accessed simulations.
- An upload site that allows the submission of a range of file types and facilitates tagging with Jorum-compliant metadata (see 5.4).
- User profiles that provide information on users.
- The option for users to comment on individual simulations.
- Comprehensive online support for depositors (see 5.5).
- General guidance on the pedagogic value of simulation (see 5.5)

The site is at http://www.simshare.org.uk. It is constructed on open-source software and is built to high standards of accessibility and usability (see also Appendix 2).

5.3 Managing IPR and other legal issues

Our approach to IPR and other legal issues was based on working with depositors to ensure that their simulations were compliant, and providing comprehensive online information. The issues that we had to address were:

- Establishing whether our simulation depositors had the rights to offer the simulation under a Creative Commons licence as an OER.
- Ensuring that there were no third-party materials within a simulation that should be excluded from open release.

Our guidance materials and FAQs addressed these issues (see 5.5).

5.4 Hosting and uploading of materials

We implemented an online repository for Simshare that provided an easily searched bank of simulations that were in turn supported by comprehensive descriptions. Since we aimed to spread the use of simulation-based teaching into new subject areas, it was important that potential users would have the best possible opportunity to understand how a given simulation works and from there how it might be repurposed to fit their own requirements (see Appendix 1 and Appendix 4).

In addition to using our own repository, links to all Simshare simulations on the JorumOpen platform were supplied. The retention of the editing function within the project database meant access within Jorum would always be to the latest versions of simulations and their supporting material. This avoided the inherent problems of maintaining separate copies.

5.5 Guidance materials

Our guidance materials are supplied online and are tightly integrated with the different processes taking place through the project online interface. Guidance materials comprise:

- Tooltips for the different components of the upload, metadata, registration and personal profile processes (see http://www.simshare.org.uk).
- Online guides to key topics such as IPR (see http://www.simshare.org.uk/).
- Frequently-asked questions (FAQs) (see http://www.simshare.org.uk/documentation.php).
- Pedagogic guidelines relating to the use of simulation in learning and teaching.

5.6 Stakeholder engagement activities

5.6.1 Simulation donors

We solicited simulations from donors by direct personal contacts (including building on the SIMPLE project), and via publicity through HEA Subject Centres and other networks and at conferences and workshops, such as UKCLE's Learning in Law Annual Conference 2010 and OER10.

5.6.2 Simulation users

We sought to engage users through networking and through our dissemination roadshow events.

5.6.3 Extending to new subject areas

We approached HEA Subject Centres and used personal contacts to extend both our simulation bank and our user base to a wide range of subject areas.

5.6.4 Professional bodies

We sought the views of two regulatory bodies, the Solicitors Regulation Authority (SRA) and the Law Society of Scotland (LSS) with respect to the use of OERs in training to meet professional standards. The respondents, both of whom were already aware of OERs, were Collette Paterson (Deputy Director of Education and Training at the LSS) and Mandy Gibb (Consultant in the Education and Training Unit at the SRA). One question asked whether the use of OERs could be helpful from a regulatory point of view. Both noted that their remit was to ensure high educational standards were met, and this did not involve promoting a particular teaching method or type of material. However, Collette Paterson recognized the potential for OERs to strengthen quality:

The Society would certainly welcome the use of any tool which assists in the achievement of high standards, including the sharing of best practice across providers if that results in best practice.

Mandy Gibb made a similar observation:

The SRA has over the years encouraged the dissemination and sharing of good and best practice in learning and teaching and so as long as those who are using OER are able to make sound judgements about the quality of the material available then it is potentially an incredibly useful way of achieving that.

Both expressed some reservations:

'I can see that from a wider perspective the openness of OER could in itself be a potential issue if it is used or accessed by educators who are not themselves capable of evaluating the resources - but this has always been the case with more traditional resources.' [SRA]

'…there will always be a balance between providers wishing to drive up standards, and therefore share best practice, and protecting rights over their educational developments and specific recognition for those developments.' [LSS]

However, the overall tenor of both responses was positive, with a clear perception of the value of OERs:

'…at their best they encourage innovation, creativity and provide the ability to share resources with a huge audience in a fairly instant way.' [SRA]

There was also an interesting case study of simulation OER use outside a formal academic environment:

'The Society has already seen evidence of providers of traineeships using open simulations during the newly qualified stage. The example which springs to mind is SIMPLE. Two professional support lawyers working for large law firms were working on simulated transactions between their respective newly qualified solicitors (in addition to their live work and as part of their transition from trainee to NQ). The Society highlighted SIMPLE, and they were as a result interested in what SIMPLE could potentially do for them.' [LSS]

6. Outputs and Results

6.1 The Simshare resources

Twenty-eight simulations have so far been uploaded to the Simshare repository. These include the eleven resources originally offered in the project plan, all of which were based on the SIMPLE simulation platform. The second wave of simulations offered to Simshare were more diverse in terms of types and subject areas, and involved seven institutions beside the original partners.

There are two significant points that must be made at the outset when discussing the results of Simshare. The first concerns the nature of value, while the second related one concerns the nature of learning objects. We need to discuss this in a little detail in order to make sense of what we say in this and the subsequent section of the report.

6.1.1 The nature of value

When OER are defended the argument to value is nearly always significant. OER are valuable, it is held, because they are more visible than in passworded institutional repositories, can be shared and the process of sharing induces collaborative work and the sharing of good practices (Doyle, 2005). Out of collaborative activity arises increased value. The argument does require to be tested, however. Which collaborative activities increase value more than others? How can we best support this value-laden activity, and thus attract more users to the site? It is our experience, based not just on the project itself but upon experience in using simulations beyond Simshare, that simulation building and use is a deeply collaborative affair, where small groups of staff can achieve considerable success in working in a focused way upon sim activities. Value, in other words, is directly linked to educational social activity, in which a culture is formed that consists not just of pedagogic design activities but of the sharing, testing and renewal of social approaches to learning. This approach was advocated over a century ago by Montessori, Dewey and others, and revived in many ways since then – Engeström's cultural historical activity theory (CHAT) approach is one example (Engeström, Miettinen, Punamäki, 1999), and situated learning and its designs is another.

6.1.2 The nature of learning objects

The second point relates to the nature of learning objects and their definition within OER communities. It is probably fair to say that this is one of the more problematic issues in the design and use of OER. The phrase 'learning object' is something of a paradox: is it an object, that is, a tool with which one learns, or is the object an item of knowledge that one must learn? Does its nature or essence affect its use? Should we separate this out along the lines of Aristotelian essence and accident?

The distinction is an ancient one in educational literature, as Marton & Booth (1997) made clear in their phenomenographical study. The complex issue is further compounded by the nature of simulations, which are frequently not knowledge objects in the sense that a photograph or a lecture might be said to be objects, in that they have an existence that is separable and verifiable from other objects. To appreciate the complexity of the matter and the difference it makes, we can consider one definition of a knowledge object, namely Entwistle & Marton's, in their classic phenomenographical study (1994). According to them, the metaphor of a knowledge object describes 'aspects of memory processes and understanding which [are] not reductionist'. It is, they say, 'a way of making sense of personal experiences of learning and studying' where:

'The nature of the knowledge object formed will depend crucially on the range of material incorporated, the effort put into thinking about that material, and the frameworks within which the knowledge object is developed.' (174-5)

What is interesting about this is that in their definition Entwistle & Marton do not define a knowledge object as an object at all. Instead it is made up of a number of mental and social processes. According to them there are four characteristics of knowledge objects:

- A student's awareness of a closely-integrated body of knowledge.
- The quasi-sensory representation of this corpus.
- A movement from unfocused and episodic remembering to much more detailed and coherent knowing.
- Structure of the knowledge object itself.

Others have adopted the same approach. Dewey expressed a similar concept when he wrote about the concept of 'idea artefacts' (Dewey, 1981, vol 16, 326-7; 330); Sherry Turkle's constellation of ideas around the term 'evocative objects' are similar (Turkle, 2007), and Berardi-Colletta et al. took the same approach towards the concept of metacognition (1995).

If this is true of artefacts such as photographs or lecture notes, then the concept of a simulation makes learning even more of a process than the phenomenographical view of it. A simulation essentially involves an enactment or re-enactment of an aspect of individual and/or social acting in the world. Put crudely a sim involves learning through performance; and the mediating force of that performance affects users (those running a sim as well as those performing it) in two ways. For those performing a simulation, effective learning is a product not of better verbalising as they move through it, so much as the experiential memory, the metacognitive processing, involved in the effort to produce explanations and next-stage steps. For staff running a sim, the performative nature of it means that a simulation is curiously and frequently unvisualisable until its first run, in the sense that a theatrical production is unvisualisable until its first performance or a film until it emerges from the cutting room with music and other post-production processes embedded in it. Indeed probably the best metaphor for the experience of a simulation is that of reading a sophisticated poem or novel, multi-layered, highly-complex, the experience of which cannot be represented fully in any way other than the original experience (all other interpretive embodiments of the art work being fragmentary only).

To summarise:

1. Value in an OER project such as Simshare arises not just out of the innate worth of the resources themselves but within the social context of the resources' use.
2. A simulation is best viewed not as an object of or for learning but as a process of learning; and the more capable of visualisation that process is to users (staff as well as students), the more useful the process will become to all categories of users.

These two points inform much of our interpretation of the project's evaluation below.

6.1.3 Visualising simulations

There is a wide variety of simulations on the Simshare site. At their simplest, the simulations comprise a single resource such as a word-processor document or a PowerPoint slide set. However, most of the simulations uploaded to Simshare are very content-rich, so that alongside the basic simulation narrative there may be more than 30 asset files ranging from single documents

and forms through digital evidence artefacts such as images, to complex multimedia. A feature of the Simshare repository and download system is that most simulation assets are available for individual download, so that they form resources in their own right.

As said above, though, visualisation is critical. In order to ensure that simulations are as easy to re-use as possible, Simshare asked depositors to provide additional information about each resource outside of the compulsory fields, to allow potential users to understand the implications of using a simulation in terms of, for example, student role(s), support, staff time and run-time. We also asked for assets to be provided in a form that encourages re-use. In the case of simulations built using the SIMPLE platform, assets that were originally XHTML files were converted into word-processor documents; and a viewer was developed that can represent the process of the simulation as a timeline.

Although the Simshare repository is the primary location for these simulation OERs, permalinks to the Simshare simulations have been deposited with JorumOpen so that simulations can be accessed easily from outside the project repository. This means that there is only one version of any simulation, which will be identical and current whether accessed from Simshare or Jorum.

6.2 Technical development

Simshare built a web-based simulation repository that allows users to upload simulations and to download resources, either as complete simulations or as individual asset files. If, as said above, value arises out of social context and from viewing it as a process, not an object, then this flexibility is essential to the remix culture that we want to promote and sustain on our site. A user may be inspired to create a sophisticated sim from a single document on the site. Or he/she may want to streamline a substantial sim consisting of many resources to just a few.

Crucially, the site was also designed to foster and support a community of simulation users and developers. All users can set up profiles that are modelled on those in social software sites and users can be 'followed' to discover what resources they have uploaded and downloaded. Alongside this, there is a substantial body of information about the use of simulations in HE and FE, with FAQs and relevant web links.

The site is described in detail from a user perspective in Appendix 1, and from the developer's perspective in Appendix 2. The core parts of the site are:

- Register/Profile – set up a new user identity and built a user profile.
- Share – upload and publish a simulation with its metadata (basic plus expansive).
- Find sims – search the simulation bank in the repository, using the basic metadata suite to refine the search, and download a simulation or a single asset file.
- Links – web links that provide further information on the use of simulation in learning, teaching and assessment.
- About us – information about the project and the project team.
- FAQ – frequently asked questions relating to the site, including information on IPR and OERs.

6.2.1 Registration and user profile

New users can register with the site, and this creates a new user profile. This profile can be edited subsequently, and automatically includes a record of simulations that the user has submitted to the site or has downloaded. Users can also 'follow' other users to build a social network where they are aware of others' interests and activity on the site. Users can opt to receive e-mail notification when their simulations are accessed, when comments are left or when someone connects to their profile.

6.2.2 Uploading and publishing simulations

New simulations can be created using a simple upload form into which the donor (a registered user) enters a basic suite of metadata (corresponding to the JorumOpen core data) and uploads the files. A more expansive description of the simulation can optionally be completed. A simulation remains unpublished until the donor is satisfied that the simulation and its metadata can be released. Once a simulation has been published, it is publically available to other users and can be downloaded.

6.2.3 Searching and downloading

Any person accessing the site can search for simulations. By default, all published simulations in the repository are displayed in a table that can be sorted by title, date, owner, institution or subject classification. A more selective search can be undertaken using user-specified search terms, or refined by subject area (JACS level 0) or institution.

Selecting a simulation will present the basic metadata, including an overview and keywords and an inventory of the constituent files. The entire simulation is bundled into a zip-compressed file for a single download, or the user can download individual asset files. Users must be registered and logged in to download files but need not be logged in to search for simulations.

6.3 Innovation in practices and processes

Simshare aimed not only to widen the availability of simulations but to widen the use of simulations. For this reason it was important that the repository site was more than simply a place where simulations could be deposited and retrieved.

We built a social site into the Simshare online platform. This was designed to encourage a much greater level of user interaction, and was one of the major drivers for investing a large amount of effort into building the web-based repository.

Users can register at the site and set up their own profiles. They can link up with other users, and can leave comments on simulations that they have used.

Alongside the user-driven parts of the site, it also offers extensive information and guidance on the use of simulation in HE and FE.

A substantial innovation was to support the use of simulations outside their original subject context. This was based on making simulations as easy to re-use as possible and providing documentation that allows users to appreciate the potential for re-use in a different context.

6.4 Guidance and support for simulation sharing

The project repository site contains extensive guidance material on the development of simulations and their use as OERs. The site contains online help and FAQs around the processes of uploading and re-using simulations. We have paid particular attention to clarifying IPR issues for donors and users, and have provided detailed guidance in our project's terms and conditions (Appendix 3) and in the site FAQs.

Our events contained a workshop session on tools and approaches to help participants create effective simulations and give them advice on dealing with design issues in simulation teaching, learning and assessment. The activities and presentations encouraged delegates to think more seriously about simulation learning and how to plan their own practice.

We spent significant time designing our metadata policy. Because of the complex nature of several simulations, we acknowledged early on that metadata would need to provide potential users with information about a wide range of topics, including the practical issues of how the simulation had been used and the resources required to run it. After finding that our protocol was becoming too complex for completion online, we opted to incorporate a minimum suite of metadata into the online upload process (corresponding to the JorumOpen metadata suite), and to provide a word processed document as a template for a more expansive description of the simulation (Appendix 4).

6.5 Dissemination events

The major dissemination effort by the project has been a series of day-long events promoting both Simshare and the use and sharing of simulations. Venues for the events were as follows:

- Cardiff 15 March 2010
- York 21 April 2010
- Edinburgh 19 May 2010

A fourth event has been scheduled for later in the year and we are working with colleagues in MEDEV, UK Centre for BioScience, and Heath Sciences and Practice in planning a joint Subject Centre OER event. There is more information, including the workshop resources, at http://www.ukcle.ac.uk/simshare/workshops.html.

The events consisted of presentations about the value and nature of OER, simulation learning sessions, invited and contributed simulation case studies, Simshare workshop and panel session. Although delegates came primarily from law (undergraduate and postgraduate teachers), as most of the simulations in simshare were from that discipline, the events also attracted colleagues from Nursing, Business, Centre for Welsh Medium, History, Veterinary Medicine, Philosophy, Pharmacy, Biological Sciences, Urban Studies and Geosciences. In addition there were support staff members from Learning Services, Faculty and Institutional IT services, Learning Enhancement Unit, Library Services and e-learning units.

The workshop structure was varied to suit the background of the participants but broadly speaking consisted of plenary introduction to simulation and OER, followed by explanation of the Simshare website, and to round off the morning, case studies both from participants' own practice and discussion. In the afternoon there were workshop activities on structuring simulations, getting started with the Simshare website, uploading & sharing sims, etc.

The workshops were designed to focus on the power of simulation as both a pedagogy and practice; and to introduce participants to the concept of Open as a movement in the wider sense. The plenary focused on the latter, while we tended to allow simulations to speak for themselves in the case-studies. In the plenary itself Maharg focused on defining types of OER for participants, dividing them into institution-based, discipline-based and pedagogy-based OER. After a brief roundup of the nature and development of OER he took the MIT OpenCourseWare initiative as an example, giving details from the 2005 and 2009 reports that indicated the extent of the initiative and the scale of use and remix.

In addition to this he pointed out that, paradoxically, sustainability was not the main issue faced by OER providers. Sustainability in terms of surviving and thriving in the market place is the aim of organisations such as Microsoft. However Simshare is not an organisation: it is an ecosystem, like Linux; and like all open ecosystems it is remarkably tolerant of failure, for as has been pointed out many times with reference to open communities, cheap failure enables the creation of multiple possibilities. It is a community that can be operated on a publish-then-filter model, and this community requires very minimal infrastructure to be sustainable. What it does require, though, is strong social capital of a specific type (defined below at 7.4.2).

Feedback was obtained from delegates at the York and Edinburgh events using a standard proforma (Appendix 5). Quotation and analysis of the feedback is set out in the relevant sections of our report below. In more general terms, the feedback we received revealed that all participants were impressed with the concept of OER. At the York workshop, when asked if they would register and set up an RSS feed so that they could be notified when sims were added in their subject area, 56% of delegates said they would, 44% gave a qualified yes and no-one rejected the idea. Participants expressed cautious assent when asked if they would use the sim resources to be published on Simshare, with 33% indicating that they would and 67% that they might. They were right to be cautious of course: much depends on the quality of the resources uploaded to the site.

They were also impressed with the site. There were no comments that the site lacked information they required in order to understand what they needed to do; and one stated that the site 'gave all necessary information'. Given the relative complexity of what we were asking potential donors to do, this was a compliment in itself. When asked if they felt ready to use the website, 56% of respondents said yes, 33% maybe and 11% needed more time to decide. When asked whether further guidance was needed on the site before they would use a sim, 78% said it was already sufficient. Similarly, in relation to uploading their own sims, 67% were satisfied with the existing information available.

The complexity of the process of donation may, however, have been too daunting to some participants. When asked 'will you add your simulation teaching resources to the Simshare website?' none rejected the idea, 11% said they would and 89% that they might. One participant made a revealing comment: 'Will depend upon institutional policies'. This comment was reinforced by some of the discussion during the workshop, where it became clear that the culture of institutional silos was still a barrier to open learning. Others, though, clearly relished the remix culture that the site could engender. When ask how he hoped his uploaded resources might be used, one participant replied 'To provide inspiration to others and a blueprint to design new simulations'.

At the same workshop a staff member queried how, when resources included student answers, the materials could be dealt with on the site. It was a good point, and our answer was that it was best not to upload them but to include a note that staff who wished to see them could make contact with the author off-site.

Members of the project took advantage of various events to publicise the project, including the Learning in Law annual conference 2010 (http://www.ukcle.ac.uk/newsevents/lilac/index.html), the annual BILETA conference (http://www.univie.ac.at/RI/BILETA2010/) where we ran a workshop as well as giving a paper. We also delivered a paper at OER10 (http://www.ucel.ac.uk/oer10/index.html), and sent publicity materials

to other smaller subject based events and conferences. UK OER programme meetings provided opportunities to liaise with other projects, and collaboration with other HEA subject centres enabled Simshare to attract simulation materials in different subject areas.

We also published an article in UKCLE's bi-annual journal Directions and contributed an article for the forthcoming MEDEV Bulletin.

6.6 Lessons to be learned

As described in section 3.5, the project's major evaluation effort centred on those aspects where our experience was unusual or unique. In particular, we examined the issues around harvesting and disseminating simulations as OERs; cross-disciplinarity; incentives and barriers to the use of simulations, and practical issues around the handling of a wide variety of resource materials.

6.6.1 How has the type and variety of resources affected the way that the project has approached simulation deposit and use?

There was a range of issues around dealing with simulations as OERs. Whilst many projects have been dealing with a variety of file types, few will have had such a diverse range of objects, from single files through to complex multi-player narrative simulations.

6.6.1.1 Meeting the need to handle a range of resources, from single-file narrative descriptions to complex, multi-file software packages

We anticipated the practical issues around handling different types of simulation both by embedding considerable flexibility into the upload process to the Simshare repository site and by adopting a single model for a simulation and its metadata that accommodated the anticipated variety of simulation types. In some ways this was always going to be problematic, given the huge range of potential simulations, from the most highly-structured, data-driven scientific experiment to a simulation of an event in a virtual world such as Second Life. Nevertheless it was clear from early iterations of the web site's metadata files that we needed to clarify and simplify the process of organising files online for users. One user, an Architecture lecturer, did have problems in uploading resources and struggled with the interface. Others, notably a Law lecturer, found it relatively easy. Another Law lecturer, with some technical background, had no problems at all. When asked about the information she had to provide on metadata, and her perception of the usefulness of this data, she replied: 'Yes [the information was necessary and helpful to potential users], it would allow a tutor looking at the link to decide whether they wished to proceed any further'.

As regards interface on the single model, feedback from the workshops suggested that we were on the right track. At one workshop, when asked if they would use sim resources on the Simshare site, 33% of users were definite that they would, with 67% of users more circumspect. None said that they would not consider it.

6.6.1.2 Setting a generic simulation description protocol that functions equally effectively for the simplest and most complex simulations

Since we are particularly keen to encourage re-use and re-purposing of simulations, we have designed a metadata protocol that will provide as much information as possible about a simulation and allow a user to decide whether a particular resource is suitable for their needs. Our short mandatory metadata that are completed online when a simulation is submitted allow users to search the repository but do not provide detail about other key things such as the practical issues around using the simulation.

To enable donors to provide more extensive information, we designed a template with additional fields for completion on a voluntary basis. This document can contain as much or as little detail as is appropriate (Appendix 4). It was hoped that if the shorter metadata file is insufficient to describe the more complex simulations that might be uploaded, the more substantial pro forma would catch the information that donors may wish to provide.

We had originally designed a wholly online metadata submission that embodied all of the features in our current basic metadata plus the content of the template description. We realised that this was placing a burden on depositors, especially those whose simulations did not merit the very extensive detail needed for more complex resources. The resulting document, though one user found it irritating to fill out, satisfied other users. One commented that it was 'A detailed file with clear progression'.

6.6.1.3 Encouraging depositors to submit simulations in forms that maximise the opportunities for re-purposing and for extracting useful artefacts for use in other contexts

Complex simulations may be difficult to unravel, in terms of:

- Relating the different components within the simulation, especially relating assets to the narrative.
- Understanding the nature and function of individual assets.
- Following the narrative where this is encapsulated in the simulation structure, for instance within a web-based simulation or as the narrative framework within a SIMPLE simulation.

Where possible, we encouraged donors to ensure that the simulation narrative was clearly accessible and that the role of different artefacts was clear enough for them to be re-used as free-standing objects. In the case of SIMPLE simulations, where the simulation narrative is contained within the simulation's XML manifest file, the project piloted the approach to producing parallel versions – one in native SIMPLE format and a second 'de-constructed' version based on a text narrative description with word-processed artefact files.

6.6.2 How has the cross-disciplinary nature of the project affected the way that simulation deposit and use has been handled?

Simshare set out to promote the use of simulation in HE and FE across all subject areas where it would be appropriate. Simshare was managed by the HEA's legal subject centre, UKCLE, and built on the work of the SIMPLE project that also arose from development of simulation in legal education. It was a challenge to break out of this mould, and this in turn made it more difficult for us to anticipate the practical needs of simulations from other subject areas.

Nevertheless, Simshare successfully attracted non-legal simulations, especially in subject areas where simulation was already used extensively (such as medicine). The important task for the project was to break down the barriers, so that potential users could see relevance to their own requirements in simulations that have been developed for other subjects and, perhaps, using an unfamiliar approach.

The social network aspect of the project, especially in the early stages when there are a small number of users with a

wide range of backgrounds, is a good opportunity for 'cross-fertilization' because we are attracting pioneers who are prepared to try something new. The challenge is to capture this collective experience as a foundation for a truly cross-disciplinary simulation network.

The problem, as with all cross-fertilization and cross-disciplinary work, is to think seriously about the basic model of development so that the process becomes easier, not more difficult, through time. A major source of the problem lies in the distinction between a broadcast model of inter-disciplinary development, as against a collaborative model. The broadcast model is characterised by a closed process of project development, where there is ownership by one institution, or by a cluster or consortium of users, which release the project to public view only when the projectware is complete. External contributions to the software are generally desired; but they are not always forthcoming, largely because of the lack of public ownership over the process of creation.

Contrast this with the collaborative model, where there is public consultation of the developmental roadmap, where the project itself is sited outside institutional walls (in a Foundation, for example) where individuals and institutions contribute to the project in kind. The Apache Software Foundation (Apache httpd) or Mozilla are classic examples of this approach.

The difference between broadcast and collaborative approaches is not merely structural or economic. It is also cultural: within Apache and Mozilla, as well as Wikipedia and many other such projects, the entire culture of creativity, production and reuse is open. The usual relations of software architecture and implementation, for instance, do not hold. There is a lesson here for interdisciplinarity. If we are to aim at interdisciplinarity as a project goal, we need to start at a place where disciplinarity is already not an issue. The UKCLE subject centre has always been admirably open in its approach to multi, cross and interdisciplinarity; but its remit is still strongly tied to the discipline of Law. It may be that JISC should consider this issue as part of their ongoing plans for any open educational project.

6.6.3 What are the main incentives and barriers to development, sharing and re-use of simulations?

Previous experience with project partners and the SIMPLE project has shown that simulation learning can be hard to sell to both academic staff and students. The advantages include experiential learning and enhanced ancillary skills development, with plagiarism-robust assessment. Set against these, academic staff may be confused about how to use simulation and may perceive it as labour intensive, whilst students may find simulation hard to equate to learning and assessment goals, and may fail to value tasks that cannot be mapped directly onto discrete assessment tasks.

It is not difficult to see why this is the case. As Maharg (2007), and Hughes et al. (2008) and others have pointed out, any form of problem-based or inquiry-based education, any form of simulation or games-based education, when taken seriously and designed deeply in a curriculum, requires fundamental educational change that many departments and faculties are simply unwilling to contemplate. Simulations are often perceived as labour-intensive by staff, for instance, because the simulations are badly designed in context. If staff create a substantial simulation and slot it into a conventional curriculum it will nearly always result in extra teaching burdens for staff. It will also confound student expectation: students will be taught (and perhaps assessed) conventionally but then have to adapt their work rates and style to a quite different educational approach.

Our approach has been to combine the sharing of simulation resources with extensive support on the use of simulation in learning in HE and FE. This is really the only way forward. As with all technology-use in educational contexts, the context matters profoundly, and transforming the context can be as difficult if not more so than designing and implementing the innovation. The roadshows that Simshare has organised under the aegis of UKCLE are only the start: we need to provide much more support, on an open platform, to support the open resources that we have gathered together.

Participants at the roadshows confirmed this in their feedback. Many of them were very positive about the idea of sharing sims, and about simulation itself. As one put it, 'Enthused by simulation', though another participant noted that not all her colleagues were as enthusiastic, adding 'Must convince others'. One participant, a head of department, was very keen and had promoted the approach in her department. She noted that 'My role as HoD does not permit me sufficient time to control unit design'. Another participant made reference to the economic argument: 'There is no real merit in reinventing the wheel! If others have useful resources, why not use them.' One participant from a law firms was interested in the possibilities of the site for professional practice uses: 'I am a lawyer in private practice with responsibility for training development. We are looking at a variety of media to improve our learning provision and this many well be a resource that can be of use to us.' There may be problems there with licence issues, but that a practitioner from a large law firm who was involved in training was seeing the potential of simulation and Simshare was encouraging.

Roadshows, web sites, ground-up initiatives are important; but just as important are the policy initiatives, and it is here that organisations such as HEA and JISC could play a more significant role than they have played to date. Institutions need to be persuaded of the necessity to address openness as a 'core organizational value' (Wiley & Hilton, 2009) if initiatives such as the JISC/HEA UKOER programme are to have substantial impact. Openness needs to be embedded within policies, institutional frameworks and business models. Signatures of senior officers to this is essential but so too is the implementation work of deans, heads of schools and departments and other middle management layers in institutions so as to bring about a culture change. Nor is it the case of merely making institutional resources available as in MIT'S OpenCourseWare (http://ocw.mit.edu/OcwWeb/web/home/home/index.htm). Openness should extend to collaboration with other institutions, and with social bodies beyond the university. Activities are OER too – we should not restrict the definition of OER to static resources on a website.

6.6.3.1 What determines whether an author is willing to share simulations?

Like many other projects, we have encountered mixed motivations and drivers for authors who are considering depositing simulations with Simshare. On the positive side, authors are keen to share, and often to showcase their work. Many of our contributors had already shared their work on an informal basis, and the SIMPLE community had already established an ethos of free distribution of software and materials.

Factors that might discourage authors from sharing simulations include concerns that the resource might not work effectively outside its original context, and that they may feel that the quality does not match the standards that they would expect from publicly-available materials from more conventional sources, e.g. book publication. Arendt & Shelton's study of incentives and disincentives for the use of OpenCourseWare is useful (2009). Using Rogers' (1983) categories of perceived innovation attributes they surveyed 753 individuals.

They discovered that the greatest incentives were:

1. No cost for materials.
2. Resources available at any time.
3. Pursuing in depth a topic that interests me.
4. Learning for personal knowledge or enjoyment.
5. Materials in an OCW are fairly easy to access and find.

The greatest disincentives for OCW use were the following:

1. No certificate or degree awarded.
2. Does not cover my topic of interest in the depth I desire.
3. A lack of professional support provided by subject tutors or experts.
4. A lack of guidance provided by support specialists.
5. The feeling that the material is overwhelming.

Most of these apply to both authors and third parties – and indeed some of these points were raised at workshops. Perhaps more profound is the fact that actions such as freely uploading work lies outside the conventional academic schema for many disciplines. There is little direct benefit that academics can accrue either for themselves or for their institution under present teaching and research dispensations, and so the activity of open donation slips down the list of priorities.

6.6.3.2 What encourages the use of simulations by third parties?

The big selling point for Simshare is that users can access ready-made simulations that can be used without a major investment in development. One of the major aims of the project was to lower the initial investment needed for simulation use, and thereby encourage the wider use of simulation in HE and FE.

Simshare not only provides 'off the peg' simulations but is also a showcase for what can be done with simulation. It provides an opportunity for potential users to see what can be achieved by using simulation in a variety of contexts. Simshare tried to ensure that deposited simulations are both easy to re-use and can be translated into new applications. What would encourage third party use even more would be small gains, well advertised. As reported in Hughes et al (2008), for example, Glamorgan Law School adapted the Strathclyde Personal Injury sim (used in a postgraduate, vocational level programme) to a first year undergraduate academic module. It was well-designed, and the result was not just an increase in retention, but an increase in the average results in a conventional examination. In other words the simulation not merely engaged student interest, but enabled them to thrive in a more conventional learning and assessment regime. The lecturer involved is currently writing this up for publication. We need more such narratives of success, what brought about that success, and how it could be replicated elsewhere. In itself, this would be an ideal open educational resource.

Workshop participants were often enthusiastic about the use and remix of simulations. When asked if they would add any sims they already had, a number commented:

'I'd very much like to again if time allows.'

'Already doing so and will continue to do so.'

'I am thinking of an inter disciplinary sim of product involving computing, product design and business schools.'

6.6.3.3 What are the barriers to simulation use?

The largest obstacle that potentially inhibits simulation use is the perception of the potential costs in terms of development and running/support. Simulation is commonly perceived to be a complex tool, so that there needs to be a large effort involved both in designing and developing a simulation, and in running it and supporting staff and students. However as centres such as the GGSL at Strathclyde have proven, this need not necessarily be the case, particularly if the curriculum undergoes redesign to accommodate simulation as a new approach to teaching, learning and assessment. As Hughes et al (2008) reported, for instance, once the capital costs of software development of SIMPLE were stripped out of the reckoning, the capital costs of developing and improving the blueprint year on year were tiny; and the financial costs of delivery (largely but not only staff costs) of an entire module were around a half to two-thirds of conventional delivery via lectures, seminars and examinations. Year on year, this represents a substantial saving. However if the simulation were simply added to a conventional course, it would have added significantly to delivery costs. Good design is central to effective use and remix of a simulation.

Simshare has addressed the first aspect by offering ready-made simulations, which users can implement without the need to develop a resource from the ground up. We cannot do anything directly about the running costs but we can show that not all simulations are complex, those that are need not be costly, and that many can run without the need for a complex background support.

The other barriers to simulation use are pedagogic. Academic staff members have varying perceptions of the value of simulation, and for a number of reasons may view it as an overhead rather than an alternative to other forms of learning and assessment. Workshop participant feedback confirmed this. Three delegate comments:

'I find I'm completely sold on the potential but would need to make arguments within dept and institution.'

'Not all institutions see merit of tech enhanced learning.'

'Many law lecturers need to be convinced.'

The view from legal practice was perceptive (and could also be applied to research institutions whose profile at the workshops was very low):

'Again from the standpoint of private practice it is likely to need to involve a considerable amount of user time to create resources and from a standing start a business case needs to be made in an organisation where the core business is provision of client services. Development of learning programmes, along with other ancillary elements of practice, inevitably is given less priority. This may foster a tendency to stick with the more traditional learning methods and it is therefore and uphill struggle to encourage use of different methods and media (worth doing though).'

To help counteract the pedagogic barriers at least, Simshare has included extensive guidance, to demonstrate how simulation can be used effectively. This guidance, and the links to related literature, can demonstrate the sophistication and power of simulation as a heuristic.

Other barrier issues included institutional policy and privacy:

'Privacy issues'

'[Need for] good practice'

'Evidence arguments'

'Designers willingness to be contacted to answer questions'

Our work on eliminating barriers, of course, is only a start. Astonishing progress in terms of changing culture has been achieved by huge projects such as MIT's OCW; but that was supported by very considerable grants. As we have argued above, real openness is not simply the process of archiving static objects on a website. It is a change of culture, a change of mindset and a change of behaviour; and OER is only sustainable, in the absence of substantial grants, if we change our practices at a deep level. Culture, mindset and behaviour are inextricably entwined, and changing one involves shifting the rest. The effort involved is such that those who are open to change need support in making it a reality. For this reason we would advocate for the future:

- Openness of support (staff using simulation to help others).
- Openness of pedagogic development (adaptation of models of teaching, learning and assessment locally and disseminating these adaptations widely).
- Collaborative simulation activities between institutions. For example, the Personal Injury transaction run at GGSL could be split, with one side of the adversarial transaction being played at one institution, while the other is played by students at another institution. Or students could play the roles of pursuer/plaintiff solicitors, while real trainee claims handlers could play their real-life roles.

6.6.4 Do simulations make good OERs?

The specific topics addressed in the previous three sections broaden out into more general issues around the suitability of simulations as OERs.

6.6.4.1 Are simulations suited to being OERs?

We have found that simulations form effective OERs. In particular, the availability of 'off the peg' simulations encourages users to experiment with simulation as a new pedagogic tool, whereas they might not be prepared to make the initial investment where it involved developing simulations from scratch. This was stated as such by some attendees at the workshops.

It should be noted that the term OER and the culture of OER is much more conducive to the design and use of simulations than the prior term, 'learning object'. As we have noted above, simulation focuses less on objects, and more on the experience that results from the use of objects in context.

6.6.4.2 Does making simulations available as OERs improve the simulations or their application?

This is a complex question, and one to which some of us on the project have given considerable thought. It should be said at the outset that releasing simulations as OERs may broaden their availability and usability. By providing simulations for copyright-free use in the form that they are presented on the Simshare site, we have been able to allow developers to add value to their simulations by:

- Making complete simulations available for re-use and re-purposing
- Making individual assets available for re-use in other applications
- Publishing full details of the use of the simulations
- Allowing potential users to experience different simulation types and approaches

However releasing simulations as OER does not inherently improve them, any more than writing on a wiki improves the writing. What matters is the value and quality of what is released or added. What improves simulations is the work of others on the OER, together with the sense of others' eyes on one's work. The community, in other words, can help to maintain standards. Of course, a simulation is never quite as visible as text on a wiki nor is the process of amending a simulation as transparent as wiki-editing. Nevertheless, it is true that much of the basic hard work in creating a simulation goes not just into design but into the creation of more or less realistic documents; and if a community can help with this, then so much the better for the quality of the simulation.

Embodying simulations as OER can undoubtedly aid their application. Even to staff well-experienced in simulations, the first time one is used in earnest with a student cohort is always a time of heightened attention and nerves. Will it work? What will students learn? Are there any unseen errors in documents? Such questions are never far from one's mind. It helps to have the experience of someone who has run a similar simulation in the past, and who can predict what might be difficult, the schwerpunkt and the cognitive problems that might arise. In this sense a community is invaluable.

Finally, we should note there is a danger in doing this that students may access resources that, ideally, they should not see – we deal with this below.

6.6.5 Has the repository and website been successful in supporting a community of simulation developers and users?

The project repository site was only fully operational from the beginning of April 2010 so it has been difficult to assess its success in supporting a community of practice. Our information comes from feedback from dissemination events (see Appendix 5 – delegate feedback pro-forma) and from donors uploading simulations to the repository (see Appendix 6 – user feedback pro-forma), as well as direct evidence from the site itself.

After approximately one and half months and after two dissemination events, the site had 28 users (other than developers). The use of the user profile has been patchy – some users provide extensive information whilst others have just supplied a name or name plus affiliation. Comments on simulations have also been limited, and relate mainly to the dissemination events where the simulations were demonstrated. However, the comments indicate that users were engaging with the potential re-use of the simulations, and saw that the social networking aspect was both attractive and essential:

'This looks really effective as a consolidation tool.'

'Excellent presentation – this is very re-usable.'

'I like the profile and think the networking features are very helpful.'

'I like the idea of a like-minded group sharing experiences. A bit like a staff room without the coffee.'

'Could be a useful way to stay in contact with colleagues from other institutions'

'Very good - a bit like Linkedin'

Some wanted it extended:

'Basic, could do with integrated profiles with existing profile technology e.g. Linkedin.'

'Very good - Facebook type interaction would be brilliant.'

A few were more cautious:

'I think I would use these [social networking tools].'

'Probably too early to tell - but looking forward to see how sims are reformulated. Hopefully there is a good mechanism to encourage those who download to give feedback about how they use /change the sim.'

Discussions during the UKOER programme showed that whether OERs will actually be used extensively is a recurring issue within projects. Delegates to the second Simshare event were ambivalent. Asked 'Will you use simulation resources that will be published on the Simshare website?' no-one said that they wouldn't, 33% said they would and 67% said they might do. One delegate commented:

'Good place to share and find out about simulation learning.'

Similarly, delegates were unsure about contributing simulations themselves. At one workshop, in response to the question 'Will you add your simulation teaching resources to the Simshare website?' 89% said they might and 11% said that they would. In earlier sections of this report we discussed the contribution barriers facing potential donors. One reason for the hesitancy might be, as one of them said:

'Will depend on institutional policies'

This was also mentioned informally in discussion at more than one workshop. The same survey asked delegates 'If you would add simulation resources, how do you hope your resources will be used?' The following comment indicates the value of the site beyond the simple exchange of resources:

'To provide inspiration to others and a blueprint to design new simulations'

Feedback from three donors, who analysed their experience whilst contributing simulations rather than using the site in general, indicated that there was still some polishing to be done if the site were to encourage people to share their resources. The tension between ease of use for the donor and the effort of providing comprehensive metadata for end users surfaced in this survey, and revisited some of the discussion had by the project team whilst arriving at our current bipartite protocol. We asked simulation donors 'Did you think that the information that you were asked to submit was necessary and helpful to potential donors?' All agreed, but some were more enthusiastic than others:

'Yes, as it will help the indexing of the metadata and the quality of the search returns. It also gives users an idea about the content of your simulation.'

A second donor noted the difficulty of supplying sufficient data whilst making the (searchable) on-screen overview readable. Later, the same review suggested moving some information out of our expansive description document back into the overview, whilst criticising the duplication of the core metadata:

'Brief form is misleading; this is not brief at all.'

'I didn't think information which is available online needed to be duplicated on this document.'

'I think there are some bits of information that are on the word form that should be online instead - namely: programme of study, and student and staff roles.'

The project team has already developed a set of suggestions for upgrading the Simshare platform based on this user feedback and their own testing. Despite imperfections, the site has the potential both to facilitate the exchange of simulation OERs through donation and re-use, and to foster a user community. What is not present at the moment is the critical mass of users that needs to engage with the project to make it grow. Two final participant comments bear this out:

'Very interesting site and will definitely return to it, bookmark it, tell colleagues and hopefully use more.'

'All depends on strength of community which is being built- needs some sort of marketing / profile-raising."

6.6.6 Programme and project management – where has this worked well and where could it have been better?

The effective start of the project was delayed by several months, and this had implications for the way that the implementation was managed. It also meant that most of the outward-facing activities took place in the last few months of the project's life, so that opportunities for evaluation were correspondingly limited.

6.6.6.1 Communication

Geographic spread and partner time commitments limited the opportunities for face-to-face meetings. The core team was based in Glasgow and Cambridge, and worked closely with staff at UKCLE based at the University of Warwick. Various remote conferencing approaches were used to maintain contact during the project, with varying degrees of success.

A wiki was set up to support the management and organization of the project. Although initially this tended to become rather anarchic, a radical re-structuring enabled it to become a useful way to share information and ideas. See http://openukclesim.pbworks.com/ (guest username and password 'opensimvisitor')

The project maintained a web presence on the UKCLE website (http://www.ukcle.ac.uk/simshare/index.html) and a project blog at http://ukclesimoer.edublogs.org/. The blog was used to provide public updates on the project, whilst the wiki was the main area for information sharing within the project.

Given the dispersed nature of the project, communications were difficult but effective in achieving the outcomes.

6.6.6.2 Modification and adaptation of the project work planning

At the time of the interim report in November, the team reviewed the work plan set out in the agreed project plan and identified a number of points where change was needed to reflect the balance and focus of the project more accurately. No substantive changes were made, and new or revised work packages could be mapped onto the original specification.

The work packages were used as the scaffolding for the wiki, so that development and progress could be matched to project goals.

6.6.6.3 Unforeseen issues

Staffing recruitment within a short time frame was the reason that the project started its main implementation late. Our initial intention had been to employ a number of full time posts to be based at UKCLE's offices at the University of Warwick. UKCLE was in the process of appointing a Centre Manager in

May 2009, who would be a key appointment for the Centre as well as for the OER project. In retrospect this was not ideal timing for the project but one which was outside the control of the project team. With the Subject Centre funding becoming less secure just as the successful projects were being announced, we tried to outsource the work to an IT Lab or Unit within an institution. This proved almost impossible due to the recession, as many units were concentrating on their core business and were not prepared to take a risk on a project outside their known capacity. In August 2009 it became clear that if we were going to run the project we would need to both employ dispersed staff and take on more of the project management and academic advising than we had envisaged. We were aware of a web developer who had come to the end of his contract and who had worked on the SIMPLE project. The HEA were also particularly supportive and suggested a project coordinator whom they knew might have capacity to take on another project. In September the Centre Manager at UKCLE (the OER Project Manager) managed the recruitment process for the Project Coordinator, Web Developer and Development Officer. When the three project staff members commenced in October, the project was able to move forward on its main areas of activity but important time had been lost. Additionally, while the project was aware of the metadata requirements for JorumOpen, we also investigated the need for a more tailored metadata protocol specific to the project. This process took a lot of time and produced an online data submission process that was unwieldy and was considered to discourage simulation donors.

In hindsight, while the design and concept of the website itself was not complicated (i.e. the repository and the social networking aspects), some of the components and functionality employed had a high level of complexity that could not have been foreseen in the original project plan. In view of the nature of simulation resources the project made the correct decision to manage simulations in its own repository, and to encompass a social network to form the basis of a community of practice. During the course of the project the site has undergone several development phases, with radical re-design at points, in particular in connection with the metadata protocol.

6.6.6.4 Relationship with stakeholders and partners

All partners played a key role in supporting the project, and contributed to a range of activities from preparing their own simulations for upload to presenting at dissemination events. As there was a small number of partners (both in terms of institutions and individuals), it has been easy to establish consensus and keep all informed. Shared responsibilities, such as workshop presentations and resources, were relatively simple to manage.

The project also benefited from the earlier SIMPLE project (http://www.ukcle.ac.uk/research/projects/tle.html). This laid an important foundation for a community of simulation developers and users committed to sharing OERs.

6.6.6.5 The role of the subject centre in sustaining the project

UKCLE provided significant support for the project, both in terms of hosting and management, and in deploying staff resources to help with key areas, especially the repository and community site. UKCLE also organized the administration and content of the roadshow dissemination events. It played its part well in encouraging its home discipline, Law, to be involved in the project, and encouraging other disciplines to do likewise.

As noted above, UKCLE could play a significant role in sustaining the project beyond JISC/HEA grant funding, other than simply hosting the website. This will be dependent on funding and current priorities. Funding permitting, UKCLE could host roadshows and interdisciplinary initiatives (in particular joint Subject Centre events). Whether it could afford to do so in a period of recession and significantly reduced funding for all subject centres is another matter.

7. Outcomes and Impact

In this section we return to the main aims and objectives of the project, and itemise success factors and barriers to success for each.

7.1 Collation and dissemination of simulation resources which are repurposed as open educational content

7.1.1 Critical success factors

The project started with an in-built advantage that it was preceded by the SIMPLE project, which had been designed to extend the use of simulation-based learning in HE using the SIMPLE software platform:

'The SIMPLE project in general terms aimed to prove that simulations can effectively enhance learning across a range of disciplines, professions and institutions. It also set out to investigate the drivers and blockers to large-scale implementation of innovative technologies such as simulation within HE and FE.' (SIMPLE project site at http://130.159.238.105/?q=node/20)

The SIMPLE project and the succeeding user community were based firmly on open-access principles:

'The team at SIMPLECommunity welcomes the development of a vibrant open source community to support the evolution of the SIMPLE Environment. Going forward, the SIMPLECommunity will be made up of individuals, educationalists, institutions and companies, giving advice and technical support, and helping to promote the use of simulation based learning and the SIMPLE environment world wide.' (SIMPLE project site at: http://130.159.238.105/?q=community).

The project also embodied extensive experience in handling simulations as complex online resources. Technical experts from the SIMPLE project were available for consultation, and were also involved in much of development of the Simshare online platform. In the context of SIMPLE simulations, we developed an online viewer that extracted information from the SIMPLE manifest in order to allow a user to view the simulation timeline. In addition, the development of pedagogic theory and research literature gave the project a body of knowledge that could be added to or adapted by new simulation authors, should they so wish.

Simshare received strong support from its original partners, who not only shared their simulations through the project but put considerable effort into re-purposing these so that the simulation could also be used outside the SIMPLE environment, and that individual asset files were also accessible. One project partner, University of Glamorgan, produced a case study of how they repurposed one of the original simulations created at University of Strathcldye for use at their own institution. In addition to the partners, several other academic staff made simulations available through Simshare. These were gathered from delegates met at conferences, workshops and personal contacts. We also sent out a call through various lists and other networks. Some simulations were spontaneously deposited with no formal approach. Crucially, many of these were built in different formats, from paper-based simulations through to complex web-based products. It is important to Simshare's mission that it can demonstrate the rich variety of simulation types, so that users can appreciate the many opportunities that simulation offers in HE.

7.1.2 Critical barriers to achieving impact

'Impact' can mean many things. Here, we would define it as moderate use of the website, with steady traffic of simulation uploading and downloading. Many of the barriers to this have already been discussed. Simshare is focused on a particular way of teaching, learning and assessing. While there are almost limitless numbers and types of simulations that can be designed and used, there are sufficient points of similarity between them that the claim for a specialist pedagogy can be justified, and Simshare provides that.

However if Simshare is to be used even moderately well, it faces a dilemma. As Shirky (2008) observed, there is a fundamental paradox of group-forming: you can't have a group unless it has members but you can't be a member without a group. It's a paradox that drives all group activity on the web, and the intricacies of the relation of part to whole govern the success or failure of web groups. In the case of Simshare, and bearing in mind its core academic market sector, two things are needed for success, both of them barriers as well:

1. We need a critical core of simulations that should be seen to be uploaded and being remixed, so that the site looks busy to casual browsers. No one will contribute to a moribund site. Social software sites are well aware of this. As Shirky (2008) reports, the core development team of Flickr, in its early days, encouraged users to join by commenting positively on the photographs that were uploaded by new users. Early adopters of a site should be made to feel welcomed by a social presence within the site. This may well be a critical barrier to achieving impact, for the team that built and maintained Simshare will of course disperse once project funding is no longer available.
2. The website was designed to be the tool of a community and to require minimal technical attention; but a community needs a core to begin it, and bearing in mind our academic audience, the core must demonstrate the quality of the site through analysis and exploration of its products. The pedagogy of simulation, in other words, should be made available to users as a living, organic body of knowledge and users should be welcomed into that critical community so that they feel they can contribute to it.

These points are of course linked to the two core points made at the start of section 6, namely the argument to value and the physical embodiment of simulation as physical (or metaphoric) objects.

Another critical barrier faced by Simshare was establishing the project as a cross-disciplinary endeavour. We have explored this above, and make recommendations in our conclusions (section 8.1), but note here that our future users will only gain the full benefit from the project and its resources if they can explore a range of simulations outside their own subject boundaries. We suggest that the issue of cross-disciplinarity is not simply one of Simshare being more industrious in attracting a larger and broader variety of simulations, although obviously this is needed but is also a cultural problem that reflects the way that universities and Higher Education as a whole function in a disciplinary-specific structure and culture.

The openness of the site may also be a barrier to its success in two respects. First, a simulation may contain critical documentation that should not be released to students who may be browsing the site. Such documentation should not be uploaded with the rest of the sim. Second, the presence of an adversarial simulation, if viewed by a player who is currently

role-playing in the simulation, may affect the player's decisions in that he or she would have access to information held by the other side. These access issues are by no means fatal to the site, but may need to be considered in detail, and a solution implemented, perhaps based upon registration details.

Finally, it was noted above that one of the project's strengths was its links to the original SIMPLE project. While Simshare exists to promote any simulation in any discipline, the existence and relatively high profile of SIMPLE could also be a barrier to further dissemination. It was noted by one academic who had taken part in the SIMPLE project that if the SIMPLE software were not to be supported then the simulations currently running in SIMPLE would be difficult to maintain. He also noted that 'I don't think it is practical / realistic to re-use this simulation outwith SIMPLE'.

The SIMPLE software enables much in the way of functionality in one place that would otherwise be distributed in many; but this comment does point to the importance, for those projects that use the SIMPLE platform, of maintaining it.

7.2 Creation of guidelines for future publication of simulation projects

7.2.1 Critical success factors

The project team had extensive experience in supporting the use of simulations in HE, both in terms of developing simulations and their application in learning and teaching. They had also worked with colleagues in their own institutions and beyond to demonstrate simulation learning, for instance through the SIMPLE project. This expertise has been consolidated within the Simshare project and reflected in the way that simulations are handled by donors and users. We developed a clear modus operandi for the publication of simulations, to ensure that simulations accessed through Simshare are as useful and usable as possible.

Critical to this was the development of our metadata protocol. This took a surprisingly long time to finalise – from the start of the project we were clear that we needed to provide potential users with all of the information needed to understand how a simulation worked and was used, as well as the resource itself. However, we struggled to find a way to do this that would work for a wide variety of simulation types and could be managed in a way that did not place unreasonable demands on simulation donors. The separate guide document that sits alongside the resources and the online metadata is the eventual compromise, and works well for both donors and end-users. To some extent, this approach has been validated by the template designed for the EnROLE programme. (http://www.uow.edu.au/cedir/enrole/rp_repository.html).

7.2.2 Critical barriers to achieving impact

Whilst Simshare can create effective guidelines for publication and use of a variety of simulations, it may not be able to anticipate all of the types of resources that may be supplied to the site once the project's funding has finished. Whilst the online platform can continue to function with minimal intervention, it is inevitably 'frozen in time' in the scope of the resources that it can hold, support and release. Any major innovation in simulation design or use may not be capable of being accommodated within Simshare – this is a problem shared by nearly all repositories.

Another barrier is the distance between guidance documentation and sim resources. There are two aspects of this that are barriers. First, there is the perennial problem of the user manual or the handbook, and the response of many users, namely bricolage. Most users rarely read a user manual from cover to cover: just-in-time reading and understanding is what is required. Our guidelines ought to be similarly set out: not as academic papers or reports but as technical user manuals, ideally using the tone and brevity of website text production. Most academics are not expert at this form of communication, though it is certainly a mode of communication in which most will need to improve their skill for the future.

Second, and as noted above, a great strength of simulation as a heuristic is its performative context. From a design and remix perspective, it is also a weakness, for it lacks a visual / experiential continuum. In the same way that music or dance can be notated, so we need a symbolic language for simulation. Whether staff would be willing to learn this is another matter (and possibly another barrier). In this project our attempt to make SIMPLE sims visible resulted in the SIMPLE viewer, which significantly increased understanding of those simulations by providing a rudimentary timeline of the sim. Ideally this would be provided as a visualisation tool for all sims on Simshare but we did not have the development time and funding to do this, nor was it a major priority in the project. It is, though, a valuable project for another time and place.

7.3 Increase awareness of staff to use simulation more widely and effectively through staff development.

7.3.1 Critical success factors

Simshare developed an online platform that interlinks the simulation repository with strong pedagogic underpinning and a community of users. Our dissemination events highlighted the willingness of academic staff to explore the use of simulation, and to consider how to apply it in their own context. The online platform allows this process to continue 'virtually'.

A key element of the Simshare strategy to raise awareness was the writing and release of extensive guidance on the site. This included detailed pedagogic support, as well as addressing practical issues around the sharing and re-use of simulations.

The other strand to Simshare's success in increasing awareness was the availability of a range of simulation types, supported by comprehensive data from donors showing how the simulation is used to support learning. Although the primary focus of OERs is sharing and re-using, it is important to remember that an OER repository can also function as a showcase.

An important component of dissemination and staff awareness was not just making it easy for users to access simulation resources but to make them easy to use, and especially to re-purpose. Simshare encouraged donors to upload their simulations in a way that makes it easy for users to understand how the simulation works and for them to modify the resource to suit their needs. Furthermore, we also recommended 'share-alike' licensing, and asked that users who re-purpose a simulation to share their experience, and ideally to submit their own version. During our dissemination events, one of the most powerful presentations was by a project partner, who was able to show how easily a simulation can be re-purposed.

7.3.2 Critical barriers to achieving impact

There are clear cultural issues that need to be addressed. Whilst we feel that we have started to address these successfully during our dissemination activities, there is still much work to be done and this will not just be achieved by the availability of good simulation OERs. The project team is aware of the common

perception that simulations are intrinsically 'difficult', and require extensive resources and support. This is why we were keen to attract simulations that were clearly not complex either to build or use. Good examples were paper-based simulations and a seminar-based simulation that uses PowerPoint. We also included metadata for donors to give a clear picture of the time and resources needed to run their simulation.

Beyond the practical aspects, some of our potential users raised pedagogic issues. These included the difficulty of assessing students in a simulation, especially where this involved group work, and concerns about plagiarism. We consider that we have been successful in both raising and answering these issues when we have been working alongside potential users, for instance in our dissemination events – but acknowledge that such misconceptions might prevent users from considering the use of simulation in their teaching, making it unlikely they would Simshare to find that their concerns are misplaced. This is not something that Simshare can do much about. However the authors who have posted materials to the site, and the core group, can do much to argue the case for alternative, radical and innovative educational designs; and this process has begun. As a significant part of the serious literature on plagiarism points out, much plagiarism can be reduced by changing student expectations and by improved assessment design.

Licensing is always going to be a practical as well as a cultural barrier for all OER projects but only because of the relative novelty of OER itself. However, the clearing of copyrights within materials is a more serious barrier to use of Simshare. A substantial proportion of the grant funding awarded to MIT went towards the activity of clearing copyright on behalf of authors and, as anyone who has edited a book will confirm, we should not underestimate the time and effort required to clear even a few copyright issues. Some may never be satisfactorily resolved, such is the complexity of the matter and the disproportionate power invested in the hands of copyright holders. It could be said, quite reasonably, that the effort to overcome this obstacle is precisely what OER is about. This is true but it is a truth that will not win many converts to the OER cause.

7.4 Creation of methodologies that will help staff see more clearly how simulation OER can be interpreted

7.4.1 Critical success factors

By opting for our own repository and, in particular, our own process for publishing and describing simulations, Simshare provided important practical support for use of simulations as OERs. The Simshare site provides strong pedagogic grounding alongside other practical support. We have established an online environment in which a community of practitioners can exchange information as well as resources. This means that Simshare will develop a corpus of knowledge on simulations that will be available to all users coming to the site.

We also have tried to ensure that re-purposed simulations are shared with the community and are traceable to their parent simulations. In this way, potential users are made aware of the ways in which simulation OERs can be re-purposed, which provides them with more information on how they can apply specific simulations in their own context.

Finally, we need to take our own advice. Context is all, in simulation design and use; and we need to describe and analyse what we claim for the power of the heuristic. And if, as we say at the start of section.6 above, that the essence of sim OERs lie in their added value and in their unique contribution to the learning processes of students, then it behoves us to ensure that the claim is explained in detail, is unfolded into practical examples that are explored and is verified by data from staff and students. This has been already done on a number of forums – in three books (Maharg, 2007; de Freitas & Maharg, 2010, forthcoming, Maharg & Maughan, 2010, forthcoming), in book chapters and articles, and a blog (http://zeugma.typepad.com), and these are referenced on Simshare and elsewhere on the web.

7.4.2 Critical barriers to achieving impact

Community is never free, never a given. It is always contested, always in process of negotiation. We have talked throughout this section and the previous section of the report about the value of community. What do we mean precisely by that community? The term is a slippery one, particularly when applied to groupings of people focused on internet applications.

Shirky (2008) has defined well the type of community we need. Drawing on the sociology of social capital, he summarises the distinctions between bonding capital and bridging capital. Bonding capital increases trust and connections within a homogeneous group (e.g. a single disciplinary group interested in sims); it is relatively exclusive; people support each other's worldviews. Bridging capital by contrast increases the connections among heterogeneous groups (e.g. the different disciplinary groups interested in sims; or people relatively uninterested in sims); it is relatively inclusive; and puts people at great risk of drawing good ideas from each other. Simshare needs bridging capital to survive and thrive.

Above all, there are two constant threats to our community, in its fragile nature, and in its chronic lack of funding. People come together because they are attracted by similar approaches and values, and they want to share and develop something for themselves from that. The shifting nature of the grouping means that the core values need to be strongly articulated in any community where publish-then-filter is the norm, as we suggest it ought to be here. SIMPLE needs upgrading; Simshare will soon need recasting as simulations are added to the site, and as we see the need for further functionality; and we need to develop a dynamic community – the shopping list is long, the purse almost empty.

Clearly, any failure of the Simshare community will compromise this function of the project. Although Simshare would remain as a useful repository, and would make a significant contribution to the OER programme, it would be restricted in the ways that it could support users in applying simulation to their teaching practices.

The answer, it seems to us, is to construe Simshare as a 'commons-based peer production' (Benkler 2006, 59-63) where we can bring together heterogeneous groups by using bridging capital. This involves building up from the most local levels, where there is an opportunity to host and bridge between individuals and groups. We need to accept the classic power-law distribution of effort sharing and use. We need to reconceptualise OER not as harmonious sharing but as peer improvement and adaptation. Finally we need to link research to practice, and radicalise that practice by using Simshare as a zone of proximal development – a safe zone for experimentation for those staff who, like many of our workshop participants, stand at the edge of sim pedagogy as observers, intrigued, willing to step into the arena as players, if they had confident companions to accompany them.

8. Conclusions & Recommendations

The following conclusions and recommendations emerge from the project. We have also included as Appendix 7 a project-specific version of the UKOER evaluation framework, where we have added our observations against many of the evaluation questions and criteria. Here, we concentrate on some very specific messages from the project, where we feel that our experience has something special, and perhaps unique, to offer to the UKOER evaluation.

8.1 Cross-disciplinarity is important – but is Simshare ahead of its time?

Beyond the matter of releasing OERs, Simshare set itself the task of enhancing the value of simulation techniques in learning. The three main aspects of this were to encourage the adoption of simulation by making existing simulations available for re-use or re-purposing; by supplying extensive pedagogic underpinning to the site, and by encouraging a broad disciplinary base to allow the sharing of different simulation techniques across different subject areas.

The first two aspirations have been realised, and our various dissemination activities have shown that we are generating enthusiasm for simulation as a way of learning and teaching, and lowering the obstacles to its adoption. However, we have been less successful in making Simshare cross-disciplinary. Whilst we have been successful in making advances within law and related disciplines, we have experienced difficulty in widening the Simshare community.

Many simulation approaches to learning are transferrable across subject disciplines but it is difficult to implement a truly cross-disciplinary user community. Clearly, it was inevitable that Simshare would start life with a legal bias, if for no other reasons than because it has been sustained by the legal education subject centre and because it has its roots in the SIMPLE project, which was also based in legal education. Most of the simulations offered in the original project proposal were legal, and it has been easier to extend the scope of the project through contacts within the same or related subject areas.

Nevertheless, is it realistic to expect that Simshare can develop broader subject coverage within the scope of the pilot project, and without additional investment? There are several subject areas that use simulation approaches to learning but they often tend to have their own specific methods and may not either be aware of, or interested in, what is being developed outside their own subject area. At our dissemination events, it has been clear that it is easier to interest a potential simulation user if you can demonstrate something that is immediately relevant to their area of teaching.

This raises the broader issue of cross-disciplinarity in Higher Education. Whilst many individual academic staff will be aware of learning and teaching developments outside their subject area within their own institution, this is not commonplace and certainly. Outside an institution, teaching staff are likely to attend events that have a subject focus, such as those organized by HEA subject centres or by professional bodies.

Indeed, the issue of cross-disciplinarity embodied in OER actually goes to the heart of many key assumptions about the ways that:

- we organise our work as academics;
- how we manage our institutions as senior managers;
- the relationship between Higher Education and society at large is enacted.

If, for example, as an academic one sees one's allegiance to one's discipline and its sub-topics as primary (as the predominance of academics do – Trowler et al. 2005) then cross-disciplinary OER is always going to be problematic for a variety of reasons. Stallman's four freedoms – access, adapt, remix, redistribute – will make little sense across disciplines. If however there is a primary openness to the idea of sharing across disciplines then the possibility of a site such as Simshare succeeding are much improved. The same applies to the structure of institutions. Our system of HE in the UK is highly vertical, organised by discipline into clusters of adjacent knowledge fields. Cross-cutting initiatives such as Simshare work against this verticality.

Our limited experience from dissemination events and conversations with academics in other cross-disciplinary settings suggests that generic approaches to learning and teaching such as simulation can be 'sold' outside their original context. However, the subject-based approach to learning and teaching both within institutions and at a national or international level makes it difficult to scale this up.

Yet the process of scaling up will of itself not work unless thought is given to the process of start-up. The best interdisciplinary and cross-disciplinary initiatives are ground-up; and if they are to thrive and survive as permanent contributions to knowledge and practice then (inter)disciplinary institutions, cultures and structures are essential. They might include the following, set out in Maharg 2007, in what one might regard as an order of increasing improbability:

- Institutions working together on materials or methods projects, possibly forming joint centres in order to facilitate this.
- More interdisciplinary initiatives under the aegis of HEA subject centres and JISC, particularly in multi-site and international projects.
- A redefinition of the relationships between foundations that fund educational research and implementation, and their grantees.
- Lobby for change to the REF2013 process in the UK.

The second is pertinent to our Simshare initiative and therefore this report, and while improbable, is not impossible. The organisation of subject centres, while generally adopting clusters, cannot be said to be truly cross-disciplinary let alone interdisciplinary. There needs to be more substantial support for cross-disciplinary understandings that will result in joint projects across disciplinary barriers to break down the verticality of knowledge domains. An example of this might be the adoption of small simulation projects that define their timeline, are supported by a number of subject centres, and then go on roadshows to the subject centres involved in order to demonstrate their work. Or, more radically, the HEA may consider a serious initiative in cross-disciplinary and interdisciplinary work by founding a modest centre – a non-subject specific one – that would support such projects.

As we say, this is not impossible. An example might be the work of the Glasgow Graduate School of Law in the Standardised Client simulation, hosted on Simshare and also hosted on another OER site, http://www.teachinglegalethics.org. Those resources were the culmination of a two-year project, funded by a variety of small funders and involving professional legal education providers (The College of Law, GGSL), as well as medical education centres (in particular the Clinical Skills Centre, Medical Faculty of the University of Dundee). Two disciplines thus came together, ground-up, to share knowledge, experience

and practical know-how, and in the process created a world-first assessment regime in the discipline of law using simulation methods derived from medical education. Moreover, it is an assessment regime that significantly improves the quality of client-facing skills in law students, is cheaper than almost any other method, and is fairer, more reliable and more valid as an assessment.

The last sentence goes to the heart of the third issue cited above. OER is above all about improving the quality of learning resources in order that the experience of learning can be improved. Cross-disciplinary simulation sharing is undeniably efficient for society generally. There are huge efficiencies to be made if disciplines learn from each other that would benefit our institutions financially. It would also enhance our students' education if that too were taking place across disciplines, in an interdisciplinary manner. On this point, as in all the points regarding cross-disciplinary simulation sharing, our project could be said to be ahead of its time; but if we lacked ambition at the start we would never have achieved the small gains that we did achieve.

Recommendations

With the increased availability of freely-licensed open educational resources, more consideration needs to be given to extending the use of these resources beyond their original subject context. In particular:

- Providers of OERs should be aware of the potential wider user constituency when addressing dissemination and discovery, and facilitating re-purposing.
- Bodies that support pedagogic innovation in HE, such as HEA, JISC, SEDA, should recognize the new opportunities provided by OERs and support more interdisciplinary initiatives at national and international levels.
- Interdisciplinarity itself can bring about radical curriculum innovation, but only if institutions adopt fundamentally changed values about the nature of OER at all levels of management.

8.2 Release of simulations as OERs as an effective way to encourage use of simulation in HE and FE

Despite the important caveats raised in 8.1, we believe that Simshare has made significant advances in encouraging the use of simulation, even if this has not been as great as we would have wished. The use of simulations does not sit at the core of learning and teaching in most areas of HE and FE, although they can be highly effective where they are used. Their benefits include learning through practice rather than through acquiring factual knowledge, and gaining additional skills and often professional experience. In section 7, we noted that Simshare had set itself the task of not only releasing a body of simulations as OERs, but to do so in a way that both maximised their usability and that acted to stimulate the use of simulation in HE and FE.

We have already noted that potential users may avoid the use of simulation because it is seen as pedagogically risky, or because it involves significant new investment in terms of design, development and maintenance, or both of these. How does a resource like Simshare address these problems?

By providing a strong element of guidance, and by offering a habitat for a user community, Simshare is providing as much support and encouragement as it can for potential users. Furthermore, it provides a gallery of simulations of different types and complexity, so that anyone can discover the rich variety of possibilities for using simulation. By creating a standard metadata description that sets out how a simulation plays, potential users have a clear picture of what is entailed in using it.

In addition to encouraging users through support and demonstration, Simshare obviously provides them with the opportunity to use simulations developed by others, without starting with a blank sheet of paper. We have encouraged donors to upload their simulation in a form that facilitates re-use and re-purposing. In this way, the project removes the concerns of some potential users that they will have difficulty developing simulations.

So a simulation OER repository such as Simshare, with a high level of investment in support and guidance as well as a resource repository, adds tremendous value to its products. In this way, it can be much more effective in encouraging the use of simulation in learning and teaching.

Recommendation

The UKOER community should recognize the added value of OERs in facilitating radical pedagogic change, in particular in the case of resources that may involve high levels of initial investment (or be thought to do so), through presenting their resources in ways that:

- Drop the barrier to initial adoption by reducing the investment needed to implement the technique.
- Present clear information about implementing and managing a technique.
- Showcase a broad range of resources, some of which are not complicated or labour intensive.

8.3 Metadata needs – balancing the need to add value with practical concerns for donors and users

We have already raised the important issue that simulations are not simple learning objects whose purpose is necessarily clear and which can be downloaded for instant, out-of-the-box use like a video on YouTube. Ideally, simulations require extensive metadata that allow a potential user not only to understand the narrative but also to appreciate what is involved in running the simulation, including staff- and other resources and forms of assessment.

Hitting the right balance in designing our metadata was one of the major tasks in Simshare. From the beginning, we had a clear understanding that we needed more than the standard suite of fields used in JorumOpen, but it took a lot of drafting, discussion and editing to arrive at our end product. On the way, we found that we needed to return to basics on more than one occasion, especially where we found that we were building our protocol on a particular type of simulation or a particular subject.

Our eventual solution is a two-tier approach that collects a limited generic suite of data that are entered online at the time a simulation is submitted, plus a more expansive set of data that is compiled using a template document and can be more flexible and responsive.

We were also acutely aware of the need to balance the needs of users to have as much information as possible about a simulation, and the willingness of donors to complete an extensive metadata document.

Although we have not discussed this extensively within UKOER, we are aware that some other projects have gone through a similar process, and in some cases have started their work with some or all of their metadata requirements defined. We are also aware that the design of metadata and metadata standards is extremely contentious, both in operational terms and in the specific context of balancing the needs of different users

raised here. It would be a useful end product of the UKOER programme to collate the different approaches that projects have had with respect to metadata, and possibly to follow this up with a small project.

Recommendation

A small-follow up project should examine the different metadata strategies of the UKOER projects, with a view to identifying the common issues faced and shared solutions.

8.4 Repositories, dissemination and version control

When Simshare was designing its practical implementation, it became clear that the project would need its own repository for a series of reasons already outlined:

- The need to accommodate complex metadata relating to use as well as content.
- The need to interface the OERs with substantial guidance materials.
- The need to interface the OERs with an online community of practice.

In addition, we recognized that simulations evolve, and that donors should be able to make changes or updates to their simulations. We have implemented a system whereby the author has control of all of the constituent parts of the simulation, so can change individual components. The author can also delete a simulation, or reverse its published status to temporarily prevent downloads.

Simshare felt that such donor control of simulations was important. This in turn raised the issue of version control, and the way that this can be sustained if copies of the simulation exist in other repositories. We were relieved when it became clear that we could fulfil our commitment to deposit with JorumOpen by supplying a URL to the simulation in Simshare, and believe that this is the optimum way to handle the issue for many projects such as ours.

It would be helpful if Jorum could assist in the future by facilitating automated upload of URL-based entries. We gather that options are being examined, and look forward to progress. We are also aware of the possibility of establishing similar presence in other OER databases, such as the US Merlot (http://www.merlot.org/merlot/index.htm). Again, it would be helpful to have a standardised approach across UKOER where possible, and to have continued practical support.

Recommendation

A central 'one size fits all' repository did not fit the pedagogic or practical needs of Simshare, nor of several other UKOER projects. UKOER should:

- Study the advantages and implications of a distributed model for OER repositories and
- Continue to introduce infrastructure to support such a model.

9. Implications for the future

Simshare has deliberately set its sights high, by aiming not only to provide a way of sharing OERs and to encourage their use but also to promote what we see as an under-used method of learning, teaching and assessment. Our vision of the success and sustainability of the project is concerned as much with adoption of the use of simulation by new users and in new subject areas as it is with the use of the simulation OERs themselves. For this reason, we have built our own repository that is designed to support a user community or community of practice as much as it facilitates access to resources..

9.1 Implications for the user community

Simshare has laid the foundation for a user community, developing and utilising simulation within HE and FE. This will work through:

- Supporting a user community through personal profiles and social networking.
- Supplying generic information on the academic and professional use of simulation in learning and teaching.
- Providing a showcase for online simulations available from the repository.
- Developing a body of user-comments on these simulations.
- Allowing users to upload further simulations and their metadata to the repository.
- Encouraging users who have re-purposed simulations to submit the derived product to the repository.

The framework is in place to sustain a community of simulation developers and users, sharing simulations as OERs and also sharing learning, teaching and assessment practice relating to simulations in HE. The key question is whether this community will gather momentum, so that use of the site increases and the profile of simulation learning is raised.

Within a one-year project, especially where much of the work has been undertaken from scratch, it is unrealistic to expect Simshare to be mature at the close of the project. Our dissemination events have been successful in raising the project's profile but inevitably they only reached a comparatively small group of people. We have already raised our concerns about the difficulties of broadening the subject coverage and tapping into subject areas which work with simulation (see section 8.1). The opportunity for limited monitoring after the close of the project and a further two dissemination events will help to raise Simshare's profile but it would be optimistic to expect that this will be enough in itself to engender the step change that we hope to achieve. Further effort will be required.

9.2 Future development and sustainability of outputs

The project could be developed further by enhancing the site so that it provides more comprehensive support for donors and users. In particular, we could enhance the upload process by setting up automated feeds to other repositories (see section 8.4). However, building up the user community is of greater importance. If we could take this further, we would:

- Enhance the social network aspect of the site, with greater opportunities to share information and comments.
- Build a more extensive pedagogic resource on simulation-based learning.
- Build an attractive simulation gallery in which potential users can view simulations in action.

The other way that the project can develop further is through broadening the user community. As noted in the previous section, this is unlikely to happen on its own and will require investment of effort to target potential users in different subject areas.

We can approach sustainability of the Simshare project on two levels. On a purely practical level, the project is sustainable insofar as it has created a resource that makes freely available a corpus of simulation learning materials, presented in a format that makes them easy to use and easy to re-purpose. On the other hand, our view of project sustainability includes the community of practice that we are hoping to foster. At this stage in the project, this community is necessarily small and does not draw in users or developers from as wide a range of subject areas as we would wish.

9.3 Life after the project

Simshare's legacy is its online community and repository. The site is pretty much autonomous, in that all of its functions can proceed without any need for human intervention. UKCLE has agreed to cover the cost of the domain and hosting for three years. The longer-term future of Simshare will need to be reviewed before the end of that period. In the meantime we are hopeful that the funding can be found to maintain and increase the community that is vital to the life of the project, as we have described above. Of course, if the community continues to develop, then the project will need more and longer-term support, and will need to be in the position to undertake some of the enhancements noted in the previous section. On the other hand, if Simshare remains static, then it will be important to ensure that the resources that it contains are archived effectively.

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11. Websites referenced in the text

[All sites referenced May 2010]

- BILETA annual conference 2010
http://www.univie.ac.at/RI/BILETA2010/

- EnROLE programme
http://www.uow.edu.au/cedir/enrole/rp_repository.html

- International Forum on Teaching Legal Ethics and Professionalism
http://www.teachinglegalethics.org

- Massachusetts Institute of Technology OpenCourseWare (OCW)
http://ocw.mit.edu/OcwWeb/web/home/home/index.htm

- Merlot
http://www.merlot.org/merlot/index.htm

- OER10
http://www.ucel.ac.uk/oer10/index.html

- SIMPLE Community page
http://130.159.238.105/?q=community

- SIMPLE project page on the UKCLE website SIMPLE project
http://www.ukcle.ac.uk/research/projects/tle.html

- Simshare project blog
http://ukclesimoer.edublogs.org/

- Simshare project page on the UKCLE website
http://www.ukcle.ac.uk/simshare/index.html

- Simshare project wiki
http://openukclesim.pbworks.com/
(guest username and password 'opensimvisitor')

- Simshare repository and user community
http://www.simshare.org.uk

- UKCLE LILAC 2010
http://www.ukcle.ac.uk/newsevents/lilac/index.html

- UKOER evaluation framework
http://www.caledonianacademy.net/spaces/oer/index.php?n=Main.GenericFramework

- Zeugma blog
http://zeugma.typepad.com

12. Appendices

Appendix 1: Functional overview of the Simshare site - the user perspective

The site acts as both a repository for exchanging simulation OERs, and as the environment for a community of users. This appendix documents the main features of the site in the context of its two main roles. The layout follows the main site navigation – note that the active tab is white in the following screenshots.

Tab: Home

Figure 1: The home page offers quick access to recent developments on the site, as well as opening up the main features of the site

Tabs: Registration and Profile

This part of the site supports user engagement by allowing new users to set up a user identity and build a user profile. Once you have logged in, either as a new or existing user, the 'Register' tab changes to 'Profile', where the user can access and edit their profile and simulations, and set up connections to other users.

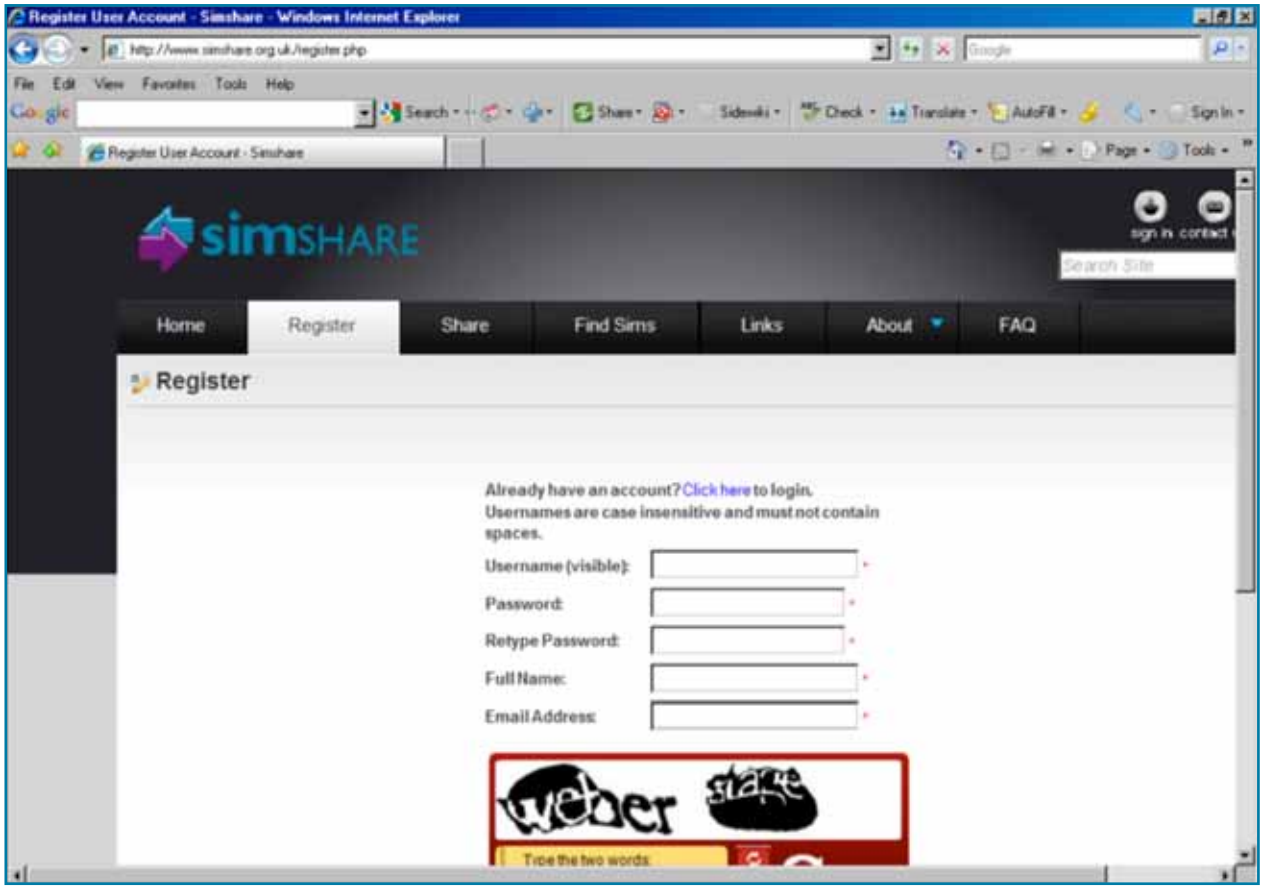


Figure 2: Registration page for new users

Users who have not registered have only limited functionality on the site. For instance, they can view simulations but they cannot download or upload.

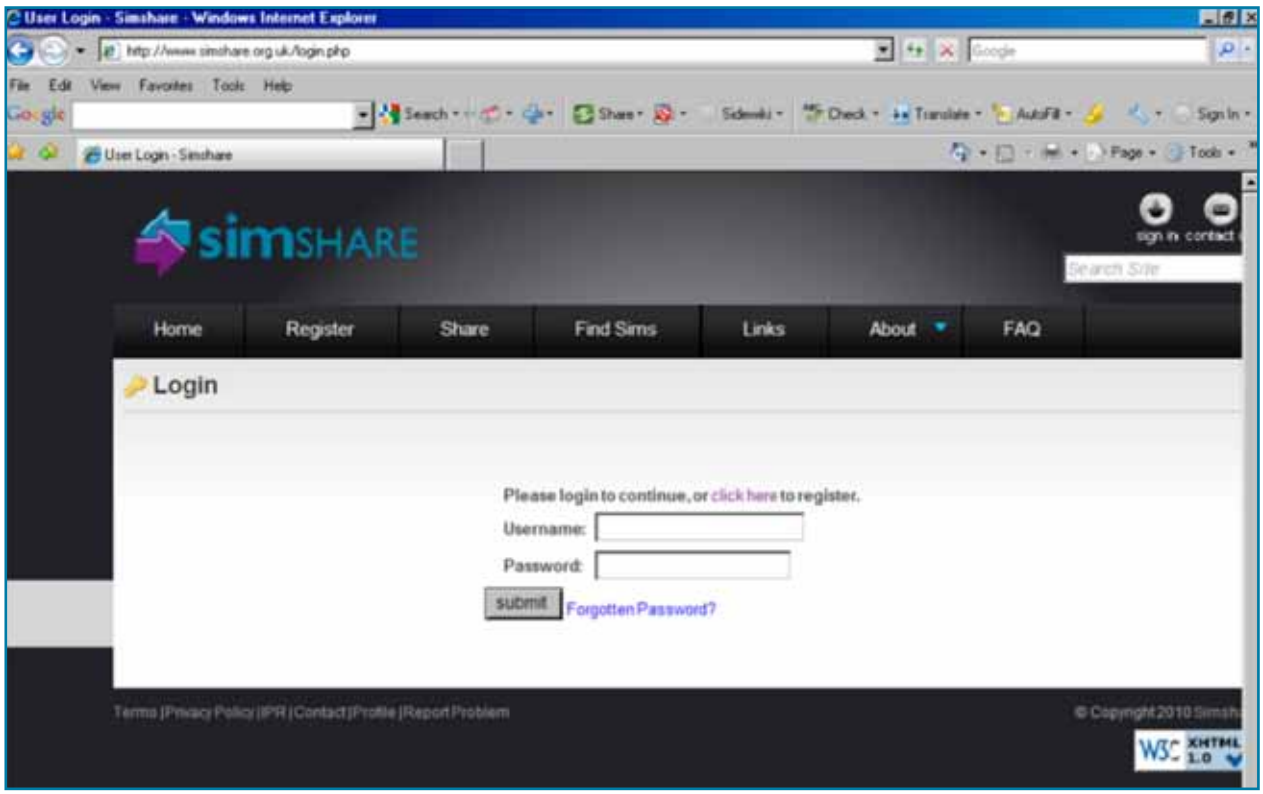


Figure 3: Login page for existing users

Once a user has a profile, it can be used to mange simulation uploads and downloads, and to join in the user community.

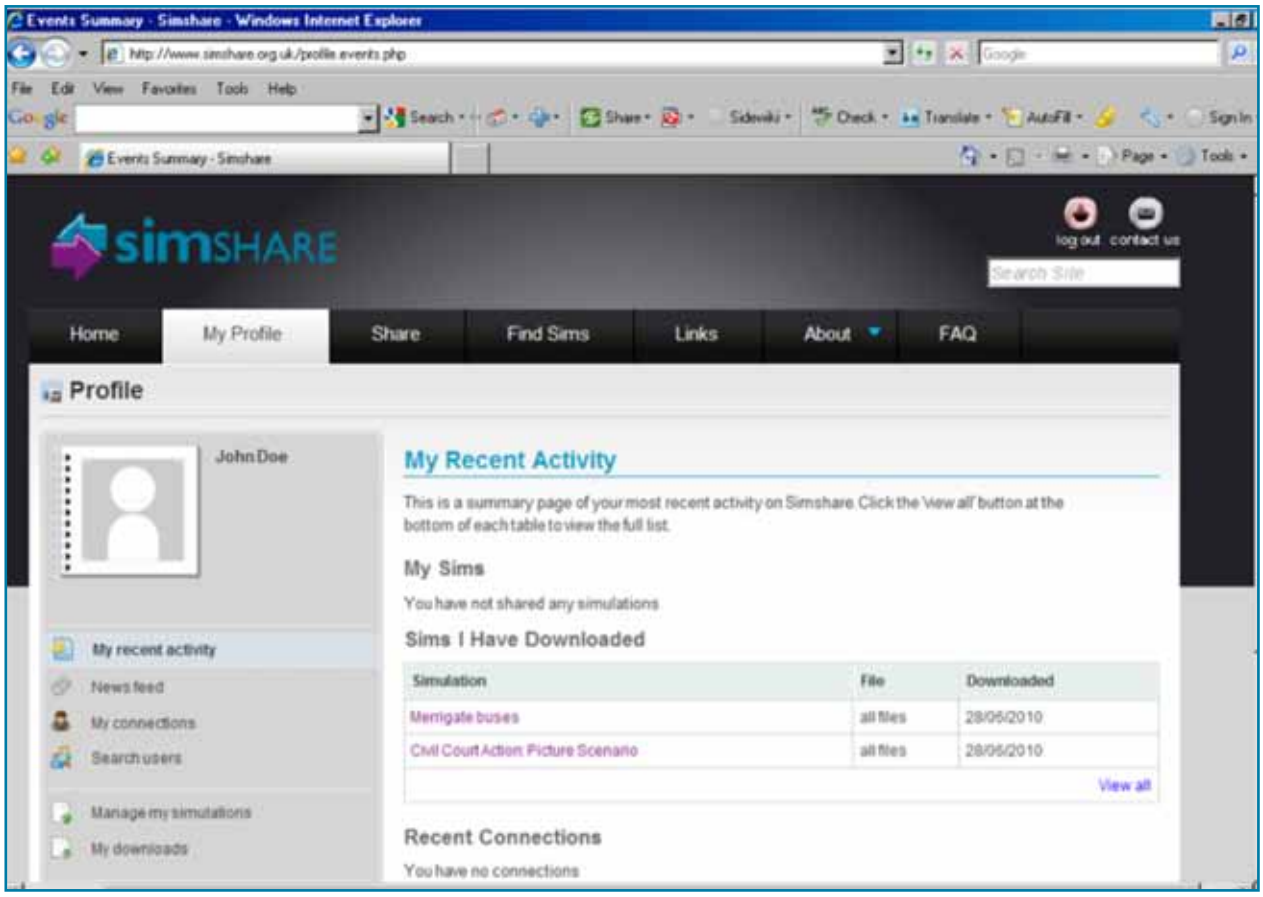


Figure 4: The opening profile page indicates the user's recent activity on the Simshare site

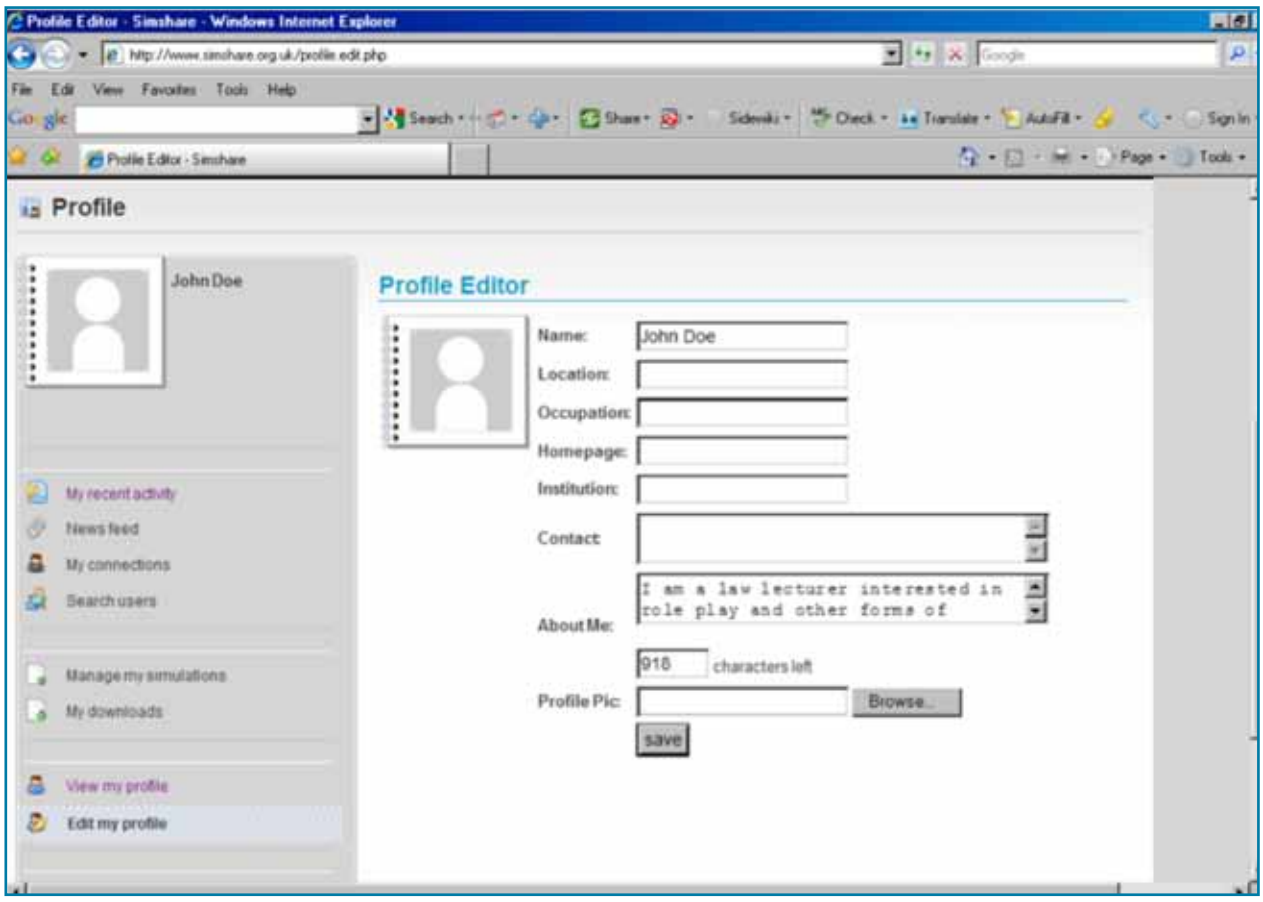


Figure 5: The profile page can be edited to provide more or updated information about the user

Tab: Share

Registered users can share (upload) simulations. Simulations can be deposited with the site without being published, and upload can be incremental – important when large quantities of files may be involved in a single simulation.

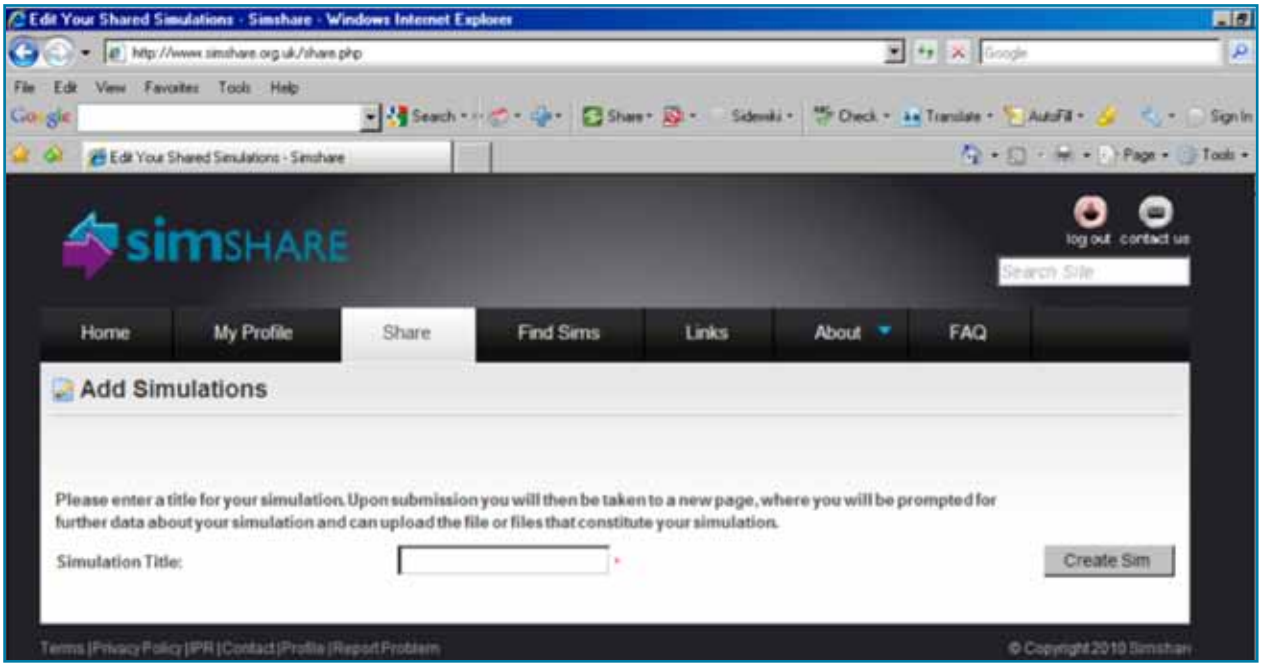


Figure 6: The process of uploading a simulation starts with creating a new title, which prompts a new database entry

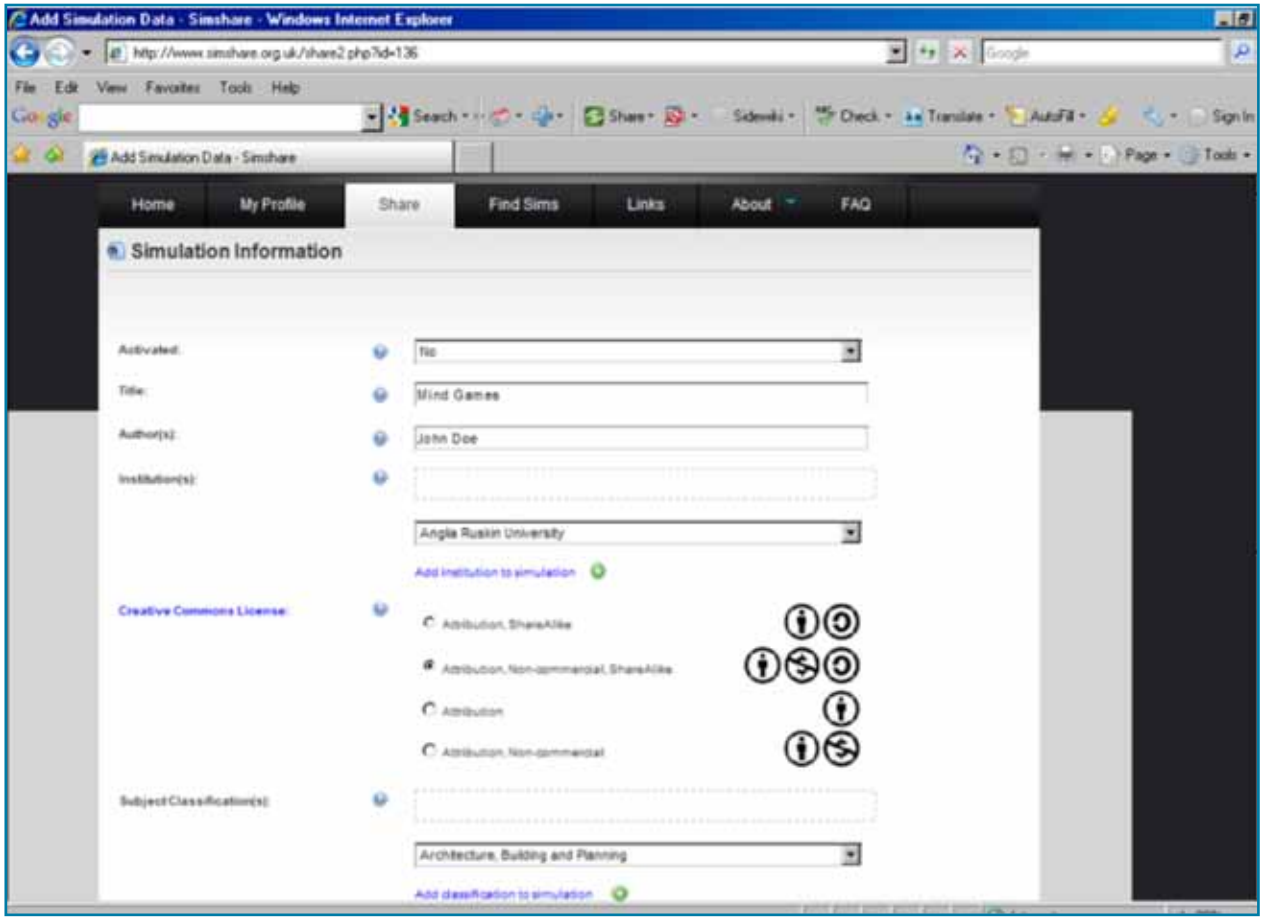


Figure 7: A core suite of metadata is entered online for the simulation; this can be supplemented with a more expansive description based on a template document

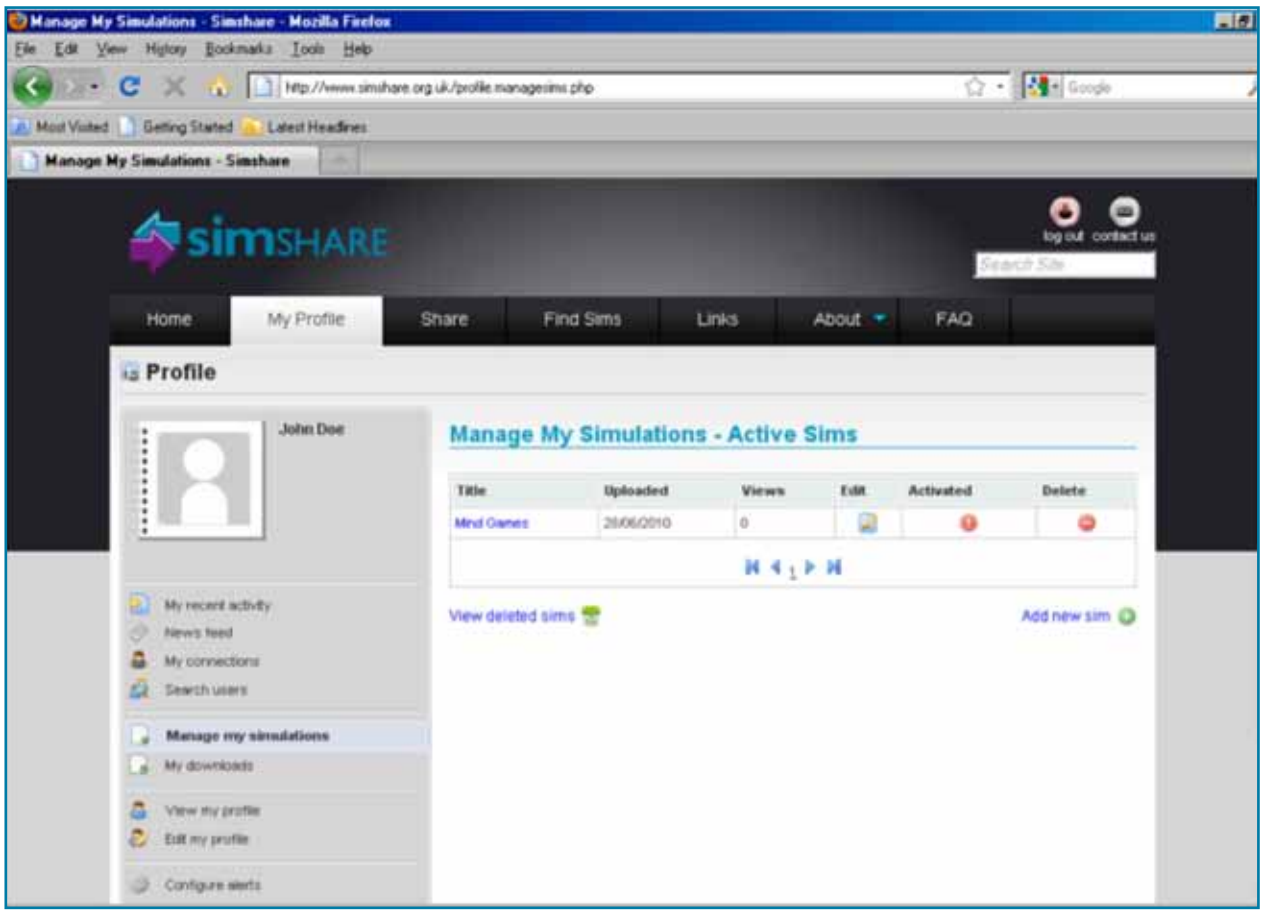


Figure 8: The user profile provides access to all simulations uploaded by the user, who can edit or update, including changing the 'published' status

Tab: Find sims

A user can search the simulation bank in the repository, using the basic metadata suite to refine the search, and download a simulation or a single asset file. A user does not need to registered or logged in to view the list of simulations and standard descriptions of simulations, but must be logged in to download simulations.

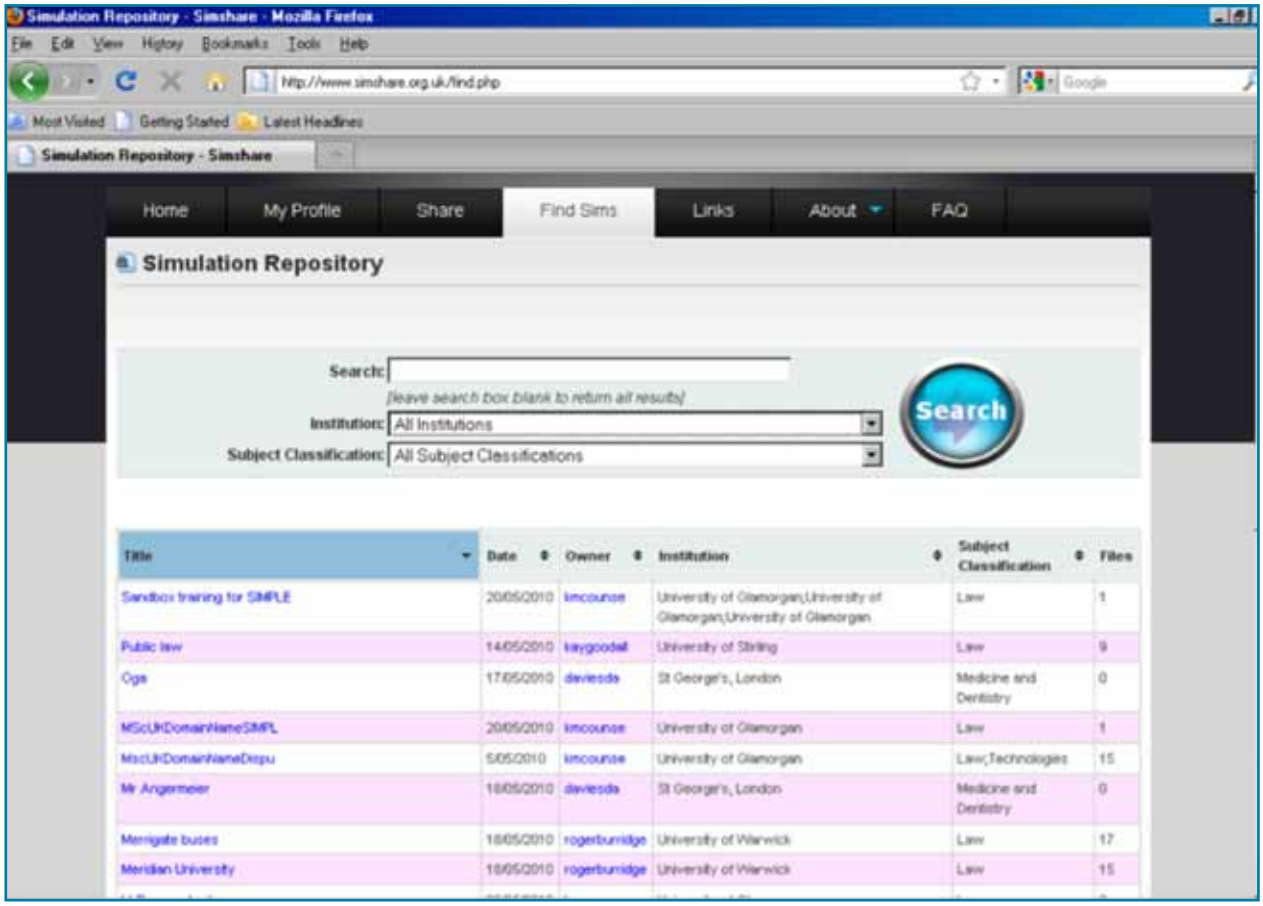


Figure 9: Initially, the 'Find sims' tab opens a page which lists all simulations in the repository, although the search can be refined using any search term stored as part of the simulation entries, including the subject code and institution

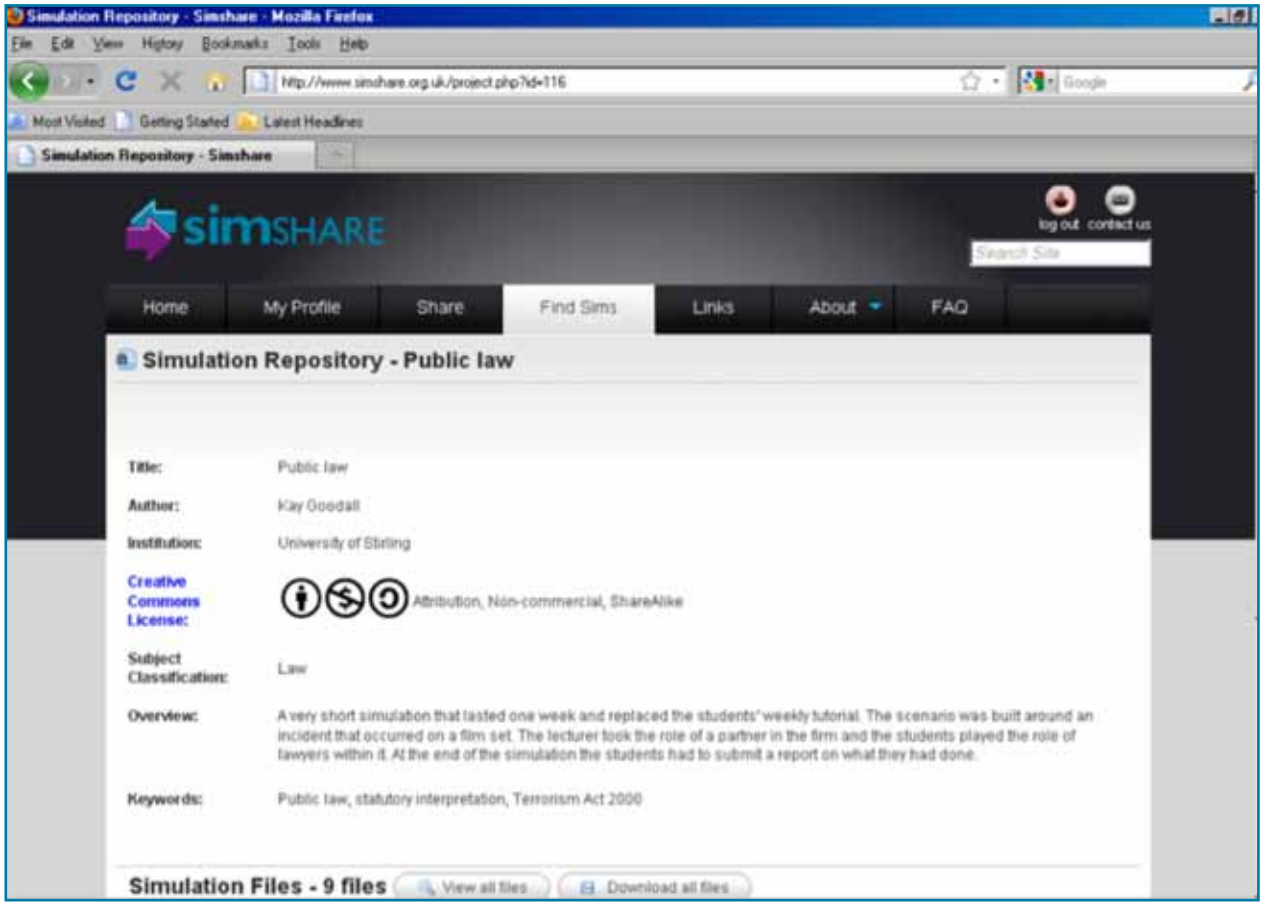


Figure 10: Following a link to a particular simulation opens a page that presents the complete data record and a list of files available for download, including a zip file of all the component files that is created automatically at the time of the download request

If the simulation uses the SIMPLE software platform, the user can select a special viewer that creates a representation of the simulation timeline, similar to that in the Narrative Event Diagram (NED) used in designing SIMPLE simulations.

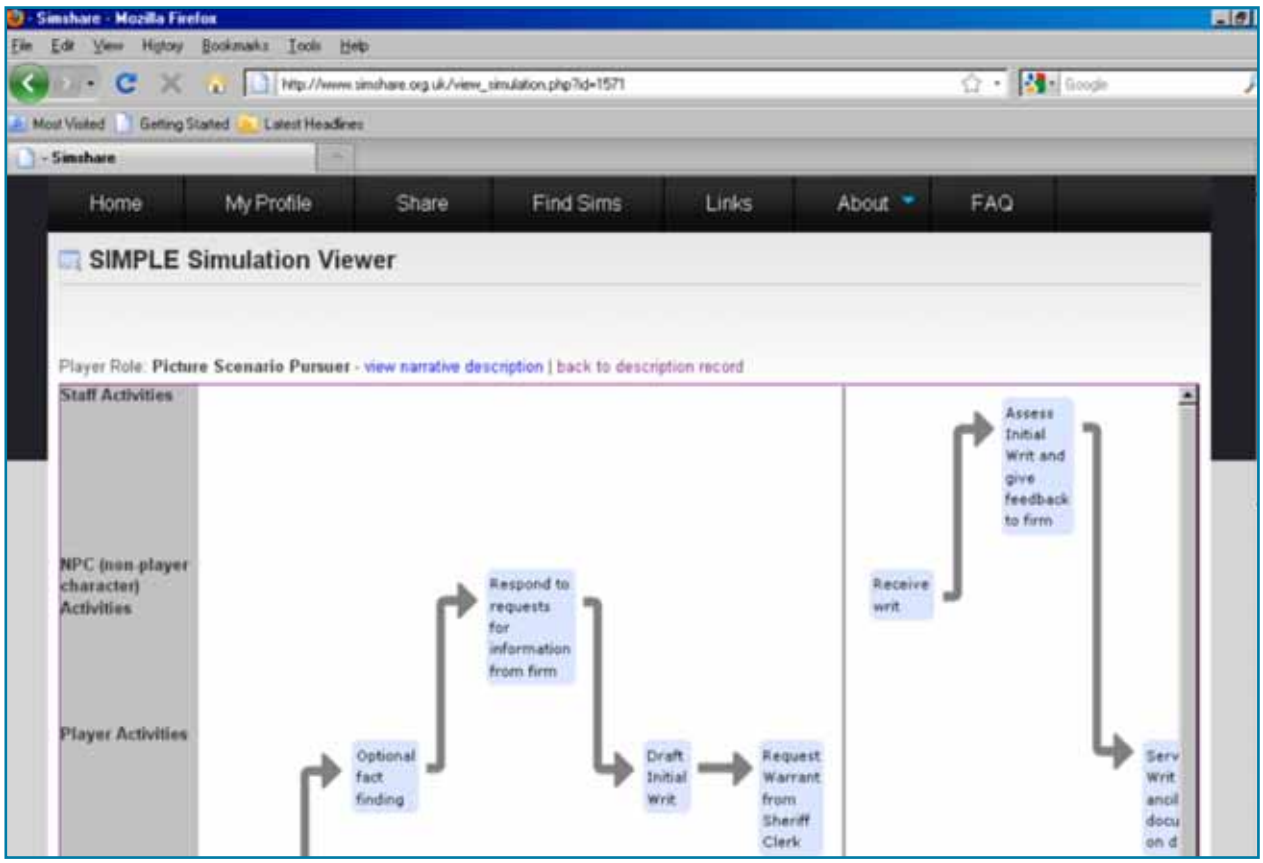


Figure 11: The viewer for SIMPLE simulations shows the narrative timeline in a scrollable window, and provides access to all resource documents

Tab: Links

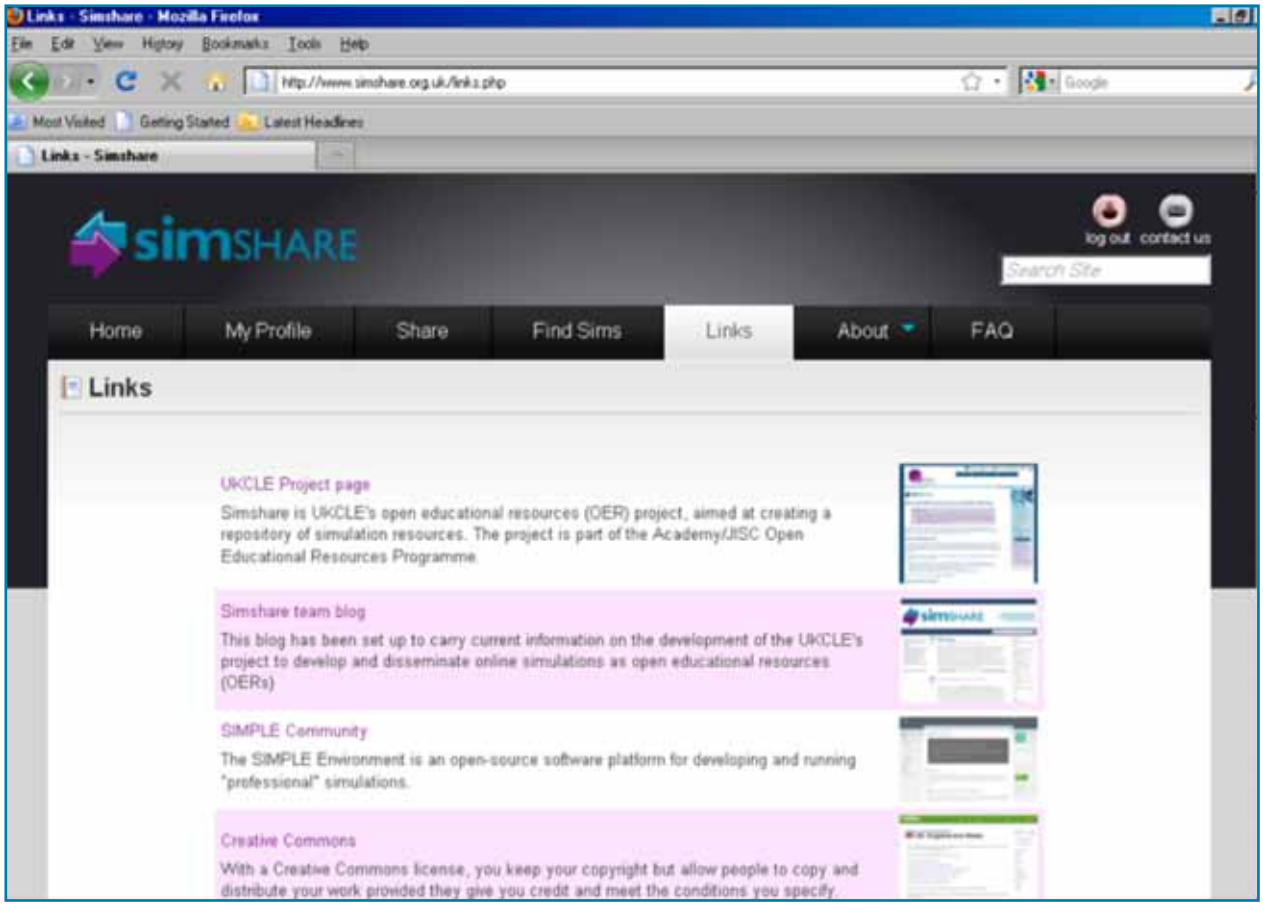


Figure 12: In order to support the use of simulations in learning, teaching and assessment in HE, the site provides web links to relevant sites

Tab: About us

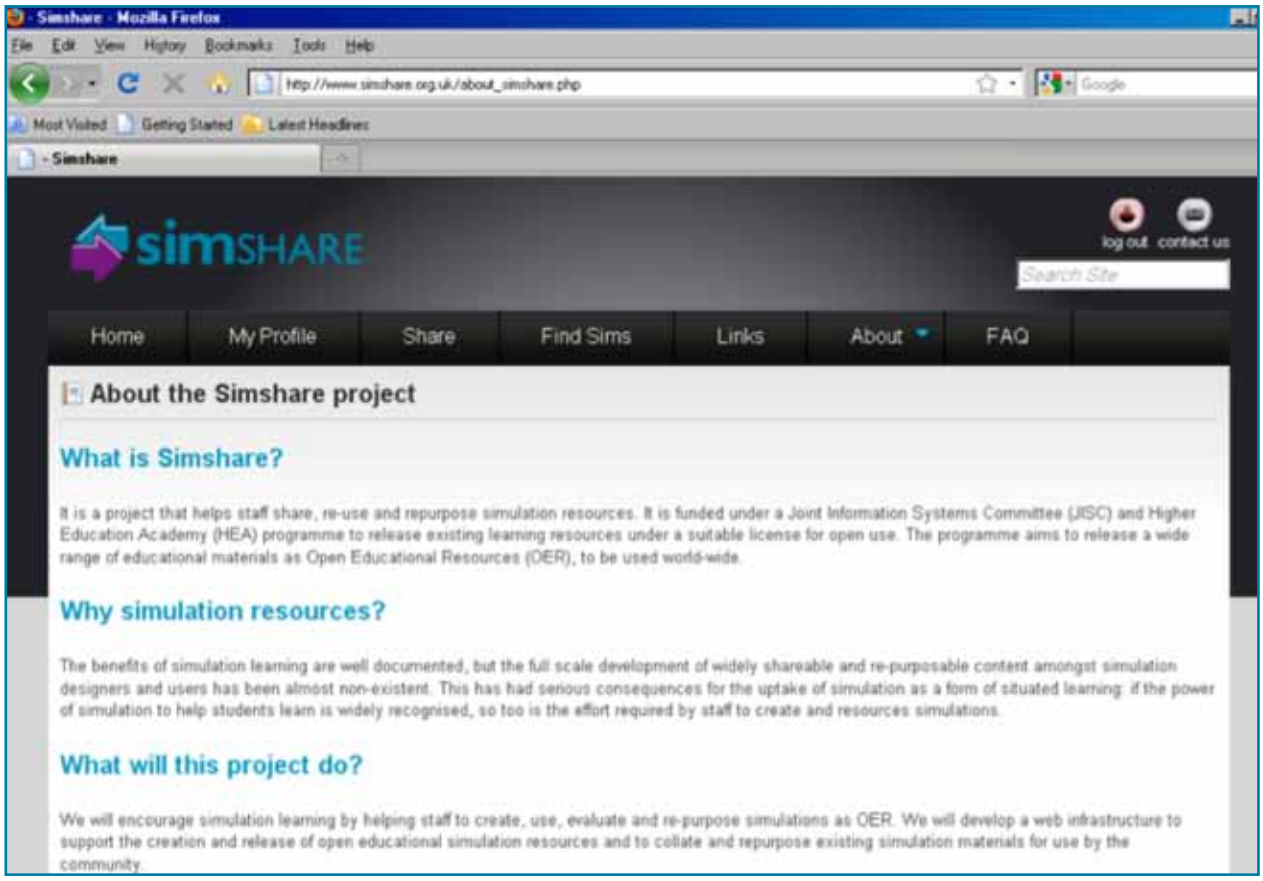


Figure 13: This part of the site contains information about the project and the project team

Tab: FAQ

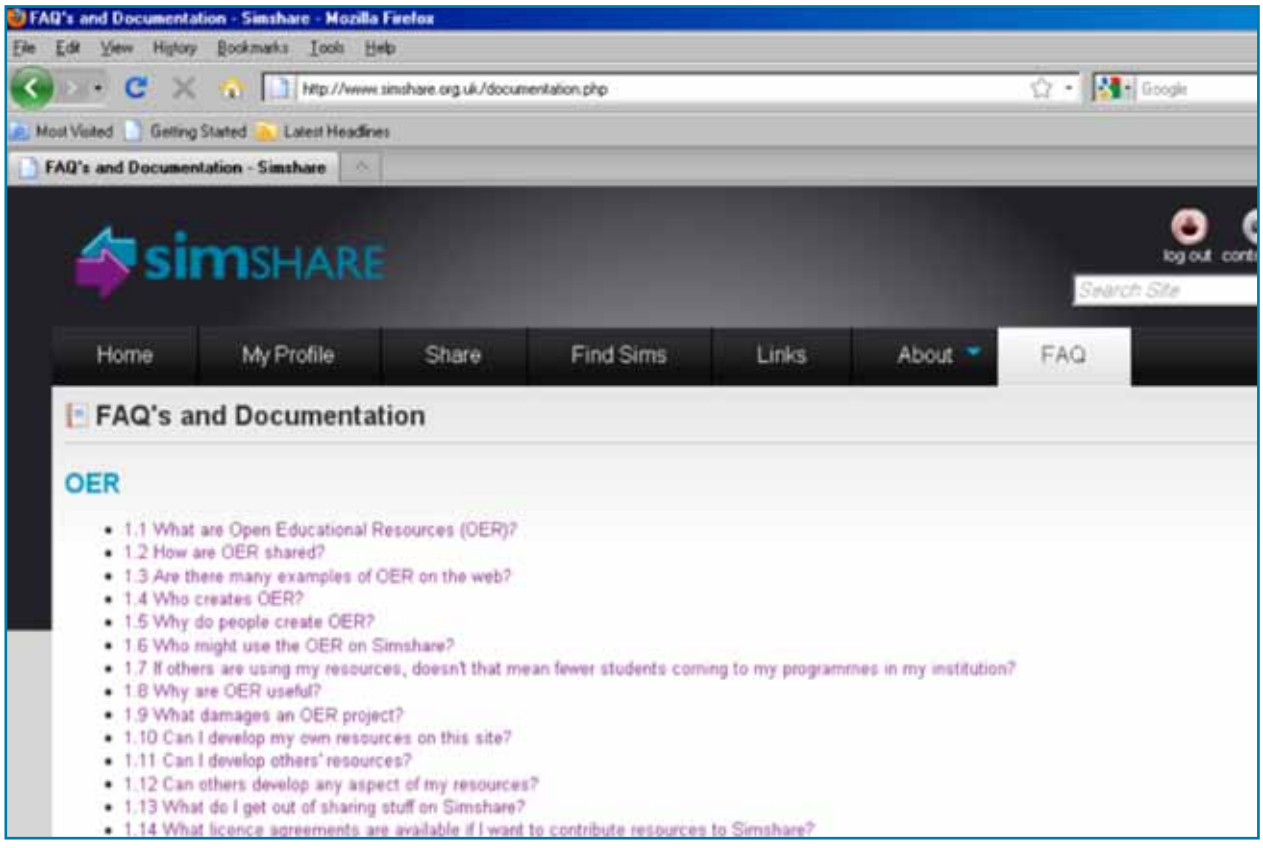


Figure 14: This part of the site answers frequently asked questions including information on IPR and OERs

Appendix 2: Functional overview of the Simshare site - the developer's perspective

Introduction

This document will discuss how the Simshare web server is set up and accessed, and list the special features within the Simshare site, some of which have been automated, and are activated by the web server itself, via cron-jobs.

Also, it will very briefly explain how the website is constructed and how communication runs between the webpages and the web server.

This document applies to Simshare project release 1.0

What is Simshare?

Simshare is concerned with simulations as Open Educational Resources (OERs), and with building a user community around the development and re-use of simulation resources.

It consists of two main functions that link together to bring a better user experience when compared with other OER sites. Its main functionality is to be a repository for teaching resources (simulations), but it is designed to present this feature through a social profile site. The users' repository is managed, monitored and maintained through the use of their personal profile (account) in Simshare. This also allows features to be included where you can create associations with other members of the Simshare community and monitor (and report on) activities that may be of interest to you.

Simshare has another unique feature that is related to the simulation tool SIMPLE. Simshare has the ability to represent SIMPLE simulations' timelines graphically and edit them live within your repository. You can find out more about Simple here: http://130.159.238.105/

Explanation for the approach taken to build Simshare

As Simshare is really the combination of a social networking site and a repository, it was anticipated that a lot of functionality would be re-used. This gave the need for the functionality (scripts) to be kept separate from the webpages (and templates and styling separate from the webpages for good design practice). The scripts were also separated into smaller groups depending on their anticipated level of use throughout the site, or by the specific sections of the site in which they were most likely to be used.

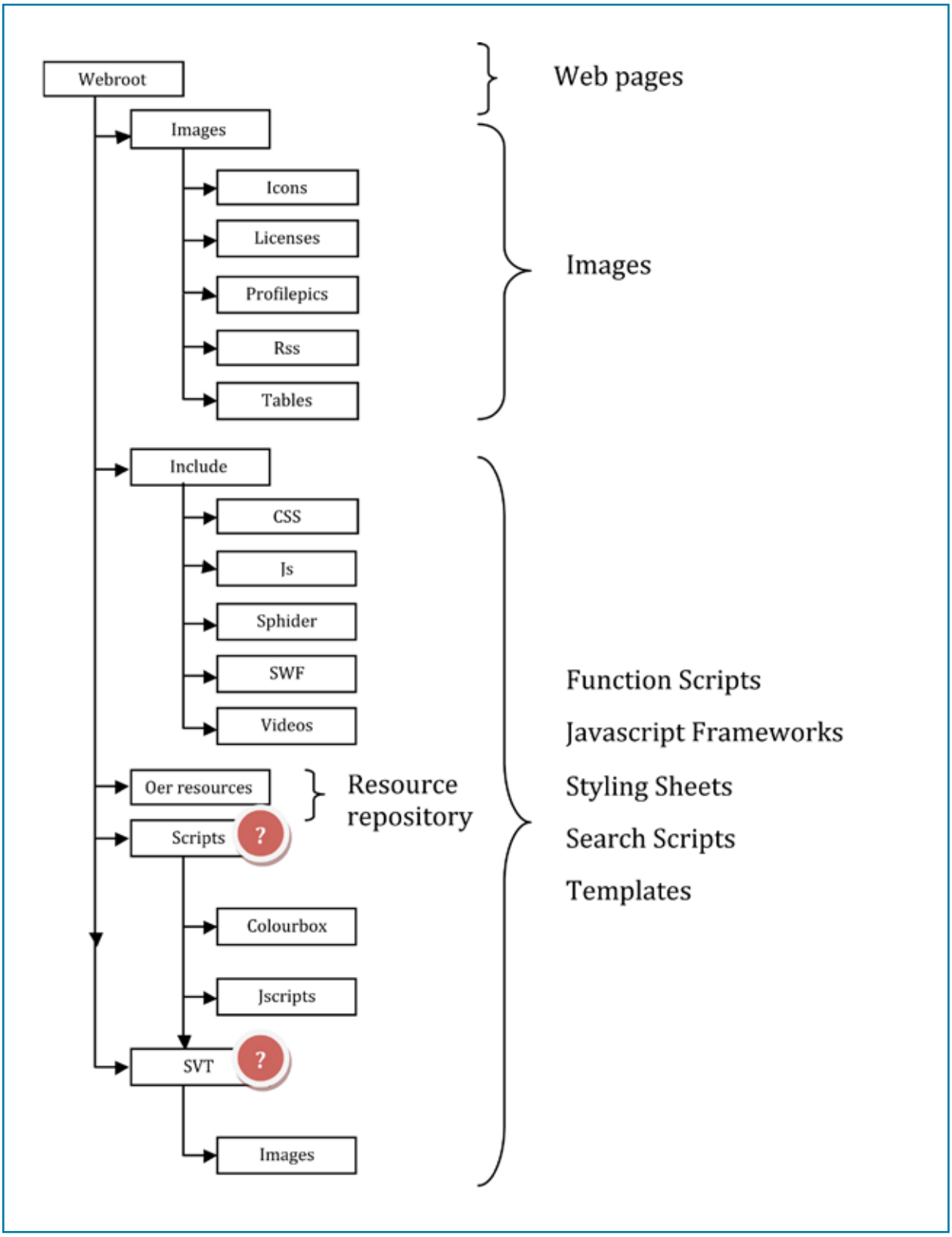
Apart from the good approach to structuring a website, it was also a benefit to the development team, design team, and content management team, as all three parties could work independently, and the possibility of the teams' efforts conflicting was reduced.

Brief overview of the logic and file structure of Simshare

File structure

Simshare follows a rather standard approach to its design and construction. The template is separate from the content, and a lot of the dynamic content is rendered through function calls.

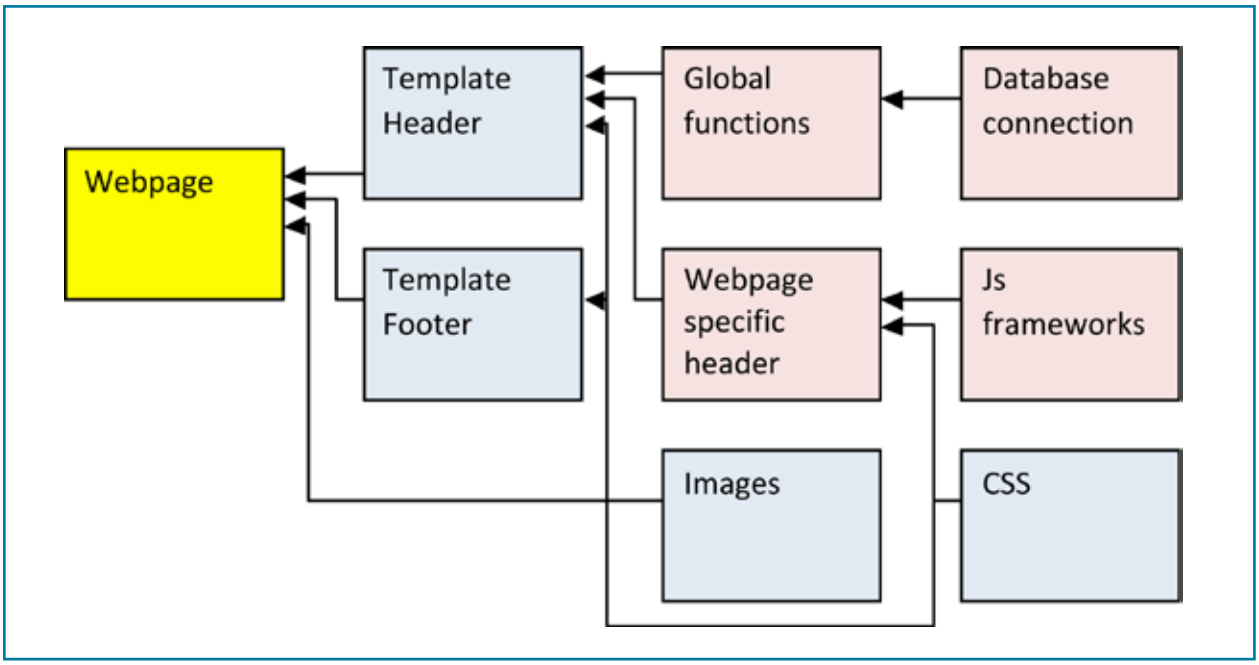
The files are separated out in to the following intuitive folder structure (limited to three levels deep in this display only). The folders with question marks should be relocated under the include directory, and their content moved into the respective folders within.



Page construction

Each page is built up using the following logic. Not all pages make the calls listed below. The yellow box is the page called in the browsers URL. The blue boxes are the calls made by all pages, the pink boxes are calls made by pages that generally require user authentication (a registered user's page).

The diagram on the last page of this appendix lists all the script files that build the site on demand. They are grouped into their file-type/purpose. It also shows the call logic between the files.



Special components and automated tasks

The site contains plugins taken from third-party open source communities. This section will discuss their purpose within the site, how they function and what they depend on to run. They relate to very specific tasks which may or may not impact the users' experience of the site.

User authentication - ReCaptcha

This plug-in gives an added layer of security to the registration process in the website. It is integrated into the registration form, and requires visual or audio recognition of mildly distorted texts, which the user enters into the given textbox. The purpose of this is to validate that the 'person' registering is really human, and not a computer. Hackers will use computers to register automatically on websites in order to perform malicious actions. So this plug-in helps us provide some cover from this threat.

The project can be found at the following address:
http://recaptcha.net/

Site search component - SPHIDER

This component provides the ability for users to search the site, including the contents of the repository (but not the files contained within). It has a script that crawls the site and indexes keywords into a database table(s). This is done automatically via a cron job on the web server, ensuring the site search is constantly up-to-date (24 hour maximum delay between new content and it appearing in search results).

The project can be found at the following address:
www.sphider.eu/

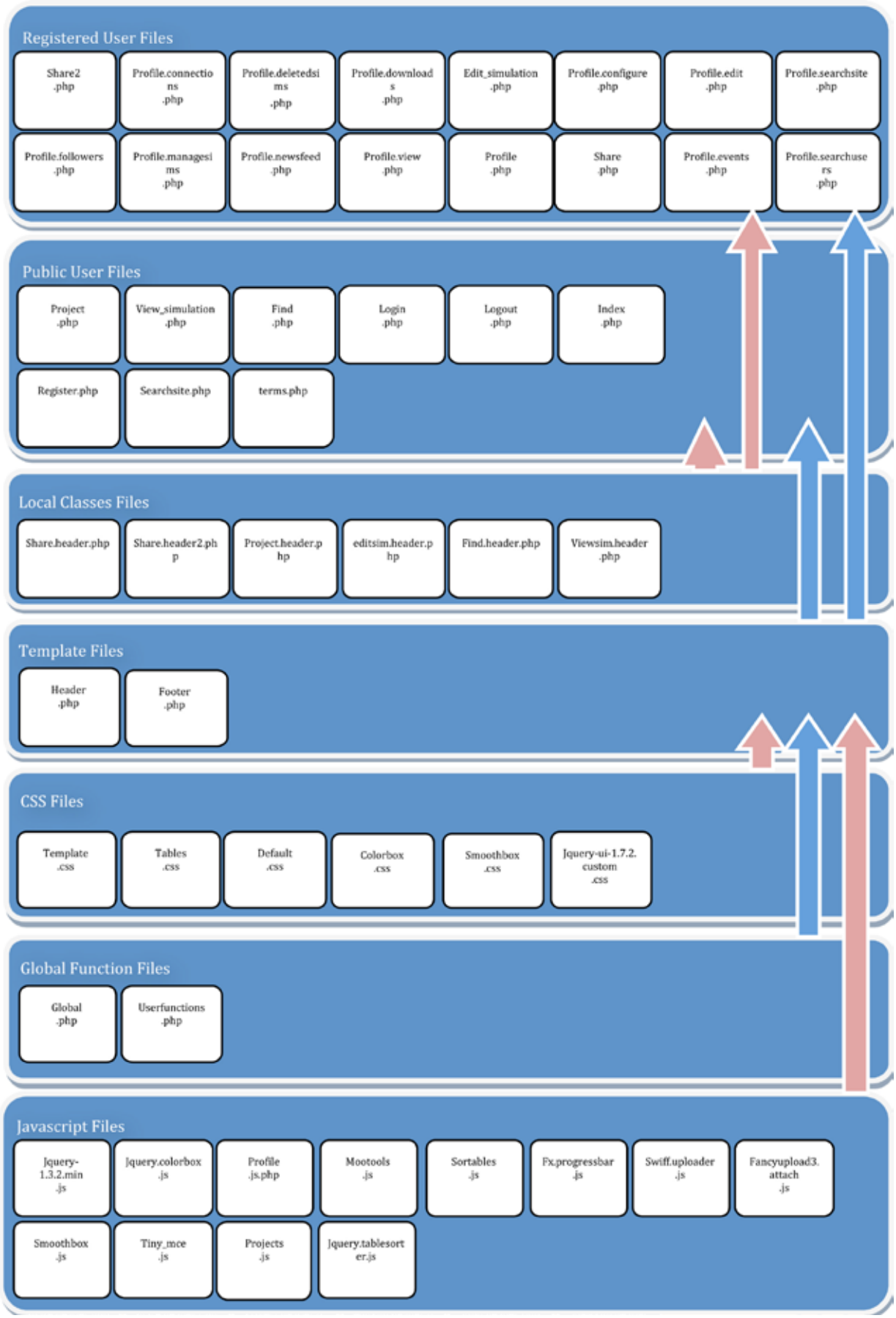
Upload script – Fancyupload3

Fancy upload was used to give the site a powerful and elegant way of uploading files to users repositories.

The project can be found at the following address:
http://digitarald.de/project/fancyupload/

Database backup

This runs a nightly backup of the database only. A bash script is executed via a cron job. The compressed backup files are not stored in an offsite location (separate to the web server itself) at present.


Registered User Files
Share2 .php
Profile.connections .php
Profile.deletedsims .php
Profile.downloads .php
Edit_simulation .php
Profile.configure .php
Profile.edit .php
Profile.searchsite .php
Profile.followers .php
Profile.managesims .php
Profile.newsfeed .php
Profile.view .php
Profile .php
Share .php
Profile.events .php
Profile.searchusers .php
Public User Files
Project .php
View_simulation .php
Find .php
Login .php
Logout .php
Index .php
Register.php
Searchsite.php
terms.php
Local Classes Files
Share.header.php
Share.header2.php
Project.header.php
editsim.header.php
Find.header.php
Viewsim.header .php
Template Files
Header .php
Footer .php
CSS Files
Template .css
Tables .css
Default .css
Colorbox .css
Smoothbox .css
Jquery-ui-1.7.2.custom .css
Global Function Files
Global .php
Userfunctions .php
Javascript Files
Jquery-1.3.2.min .js
Jquery.colorbox .js
Profile .js.php
Mootools .js
Sortables .js
Fx.progressbar .js
Swiff.uploader .js
Fancyupload3.attach .js
Smoothbox .js
Tiny_mce .js
Projects .js
Jquery.tablesorter.js

Appendix 3: Simshare Terms and Conditions

The Agreement

The following agreement describes the terms and conditions on which Simshare offers you access and use of material found on this website. This offer is conditional on your agreement to all the terms and conditions contained in this Agreement, including your compliance with policies, guidelines and terms linked by way of URLs in this Agreement ("Terms & Conditions of Service").

By using the Service or by exercising any rights provided to parts of it, you accept and agree to be bound by the "Terms and Conditions of Service". Simshare only grants you the rights contained in this Agreement in consideration of your acceptance of the Terms and Conditions of Service.

If you do not agree to the Terms and Conditions of Service you should not use the Service and therefore decline this Agreement, in which case you are prohibited from accessing and/or using the Service. Simshare may amend this Agreement at any time at its sole discretion, effective upon posting the amended agreement on http://www.simshare.org.uk/terms.php.

No variation or counter offer of this Agreement will be accepted by Simshare.

1. The Service

1.1 Simshare exists to encourage the use of simulation learning in HE and FE. It forms part of a major programme on releasing educational resources for open use under appropriate licensing. The project will encourage simulation learning by helping academic staff to share, re-use and repurpose simulation resources

1.2 You acknowledge that Simshare is a service provider that may allow people to interact online regarding topics and content chosen by users of the Service, and that users can alter the Service environment on a real time basis. As part of the nature of the Service, Simshare does not always or will not always be able to regulate the content/communications created and made available by users of the Service or otherwise. As a result Simshare has limited control, if any, over the quality, morality, legality, truthfulness or accuracy of various aspects of the Service.

1.3 You acknowledge that: (1) by using the Service you may have access to graphics, sound effects, music, video, audio, computer programs, animations, text and other creative output ("Content"); and (2) Content may be provided by Simshare or by others such as the users of the Service ("Content Providers").

1.4 You acknowledge that if any other links to other websites appear in Simshare or the resources inside Simshare, Simshare accepts no responsibility or liability for the content of that site. Any link is not intended to be, nor should be construed as, an endorsement of any kind by us. It is the responsibility of the user to check the terms of service and privacy laws of external sites.

1.5 You acknowledge that Simshare and other Content Providers have rights in their respective Content under copyright and other applicable laws and that, except as described in this Agreement, such rights are not transferred by mere use of the Service. You accept full responsibility and liability for your use of any Content in violation of any such rights. You agree that your creation of Content is not in any way based upon any expectation of compensation from Simshare. You acknowledge that this Agreement does not assign or transfer ownership, title or interest of the intellectual property rights (IPR) in the Service to you.

1.6 Simshare reserve the right to disclose the identity of users to third parties who claim that material contributed infringes their rights.

1.7 Simshare reserves the right to disclose criminal activity to the relevant authorities.

1.8 Simshare may update these Terms and Conditions of Service, Privacy Policy and Takedown Policy from time to time. Changes will have immediate effect from the date of posting on this website. A user's continued use of Simshare after these changes have taken place will be understood as an acceptance of the new terms.

1.9 Simshare may at anytime and without notice, revoke the rights granted in these terms of service.

2. Licences and IPR

2.1 Subject to the terms of this Agreement, Simshare hereby grants you a non-exclusive, royalty free and revocable licence to access and use the Service and use the content in the Service in accordance with the Terms and Conditions of Service for as long as you are in compliance with such Terms & Conditions of Service.

2.2 Users contributions to Simshare are licensed under a Creative Commons 2.0 UK licence. Information regarding this suite of licences can be found HERE.

2.3 Content owned or licensed to Simshare as part of the Service can be used by any user of the Service for any such purposes that are conducive to education, teaching, learning, private study and/or research.

2.4 Users of the Service can create Content in the Service in various forms. Simshare acknowledges and agrees that, subject to the Terms and Conditions of Service, you will retain any and all applicable copyright and any other intellectual property rights with respect to any Content you create using the Service, to the extent that you have such rights under applicable law.

2.5 Users may submit content to Simshare on the terms of a relevant licence. By doing this a user thereby licenses the deposited content to other users under the terms of that relevant licence.

2.6 You agree to use all best efforts to ensure that your Content does not infringe any intellectual property rights of a third party.

2.7 You agree that even though you may retain certain copyright or other intellectual property rights with respect of the Content you create while using the Service, you do not own the account you use to access the Service, nor do you own any data Simshare stores on Simshare servers, if such data has been submitted by others. Your intellectual property rights do not confer ownership of others' data stored by or on behalf of Simshare.

3. Simshare rules, guidelines and policies

3.1 You agree to read and comply with the Community Guidelines and Policies.

3.2 Users may:

- access and use Simshare
- use the resources and contributions available in Simshare under the terms of the relevant licences. Any user who does not agree to the terms of the relevant licence, should not make use of that resource or contribution.

3.3 By submitting a resource to Simshare, you confirm that:

- it is not defamatory or obscene
- it is not in any way illegal and does not infringe any law or any person's rights
- it is your own work or you have permission of the copyright holder to publish it in Simshare and it can be lawfully published in Simshare
- if you have included any content owned by a third party, you have properly attributed that party and you have secured the permission of that party to include their content so that it may be used in a manner described in these Terms and Conditions of Service and in the relevant licence
- the resource or contribution is not, as far as you are aware, the subject of any dispute or court proceedings
- you will allow Simshare and all other users of Simshare to use your resources and contributions under the terms of the relevant licence.

3.4 In addition to abiding at all times to the Community Guidelines and Policies, you agree that you shall not impersonate any person or entity without their consent, including but not limited to a Simshare employee, or falsely state or otherwise misrepresent your affiliation with a person or an entity.

3.5 Simshare reserves the right, at its discretion, to delete materials at any time.

3.6 By submitting to Simshare, users will be confirming that they understand and accept that these resources will be available for others to see and download.

3.7 By submitting to and using Simshare, users recognise that they must:

- not do anything which may cause the introduction or spread of a computer virus (intentionally or otherwise)
- not post any inappropriate messages including advertisements, chain letters, repeat messages/content or make any statement that is untrue or misleading
- be civil
- be constructive and not intend to disrupt, offend or abuse anybody
- be lawful and not deliberately provocative, i.e. not be racist, sexist, homophobic, defamatory, profane, obscene, harassing or otherwise objectionable
- be relevant and useful
- be non-commercial and non-promotional

4. Releases, disclaimers of warranties, limitation of liability and indemnification

4.1 As a condition of access to the Service, you release Simshare from claims, demands, damages of every kind and nature, known and unknown, suspected or unsuspected, disclosed or undisclosed, arising out of or in any way connected with any dispute you have or claim to have with one or more users of the Service. You further understand and agree that Simshare will have the rights but not the obligation to resolve disputes between users relating to the Service.

4.2 Any Content or other data residing on Simshare's servers or the Service may be deleted, altered, moved or transferred at any time for any reason at Simshare's sole discretion without notice and without liability to you or any third party.

4.3 Simshare provides the Service and Content strictly on an 'as is' basis and use of the Service and/or Content is at your own risk. Simshare hereby expressly disclaims all warranties or conditions of any kind to the extent permitted by law, including without limitation any merchantability or fitness for a particular purpose. To the extent permitted by law, Simshare accepts no liability for loss suffered or incurred by the user or any third party as a result of their reliance on the Service and/or Content.

4.4 To the extent permitted by law, in no circumstances will Simshare be liable to you or you liable to Simshare for any loss resulting from a cause over which Simshare or you do not have direct control, including but not limited to failure of electronic or mechanical equipment or communication lines, telephone or other interconnect problems.

4.5 In no event shall Simshare be liable to you or to any third party for any special, incidental, consequential, punitive or exemplary damages, including without limitation any damages for loss of profits arising (whether in contract, tort or otherwise) out of, or in connection with, the Service and or Content.

4.6 You agree to defend, indemnify and hold harmless Simshare and users of the Service and Content from all damages, liabilities, claims and expenses, including without limitation reasonable legal fees and costs, arising from any breach of this Agreement by you, or from your use of the Service. You agree to defend, indemnify and hold harmless Simshare from all damages, liabilities, claims and expenses, including without limitation reasonable legal fees and costs, arising from any claims by third parties that your activity or Content in the Service infringes upon or violates any of their intellectual property or proprietary rights.

4.7 Simshare doesn't guarantee:

- Simshare will be compatible with all hardware and software
- use of Simshare will be uninterrupted or error or virus free
- use of Simshare will deliver any specific outcome for users
- Simshare defects will be corrected

Users must take appropriate steps to ensure they regularly check for viruses when using Simshare or any resources downloaded from Simshare on any device.

4.8 Inclusion inside Simshare of contributions by users or third parties does not constitute or imply any endorsement, authorisation or recommendation by Simshare in relation that material or any comments, opinions or other statements made within it. Simshare cannot monitor or enforce compliance of third party content.

4.9 All users must ensure their resources and contributions meet all local laws where they access Simshare. Simshare cannot be responsible for any situation where a user breaches a local law.

4.10 Simshare makes no statement about the suitability of the resources, contributions, information and services contained on, or accessed via Simshare. All warranties, terms and conditions in this regard, including all warranties, terms and conditions implied by statute or otherwise, of satisfactory quality and fitness for purpose are excluded to the fullest extent permitted by law. For the avoidance of doubt this includes materials accessed via links

to Websites (including home pages, Web pages or documents they contain) operated by third parties.

4.11 Simshare further excludes to the fullest extent permissible by law all liability for damages and direct, indirect or consequential loss (all three of which terms include pure economic loss, loss of profits, loss of business, business interruption, depletion of goodwill and like loss) or otherwise incurred by a user or any third party and arising out of or in any way connected with the use of Simshare or the resources or contributions, whether based on contract, tort, strict liability or otherwise.

4.12 The user will defend, indemnify and hold harmless Simshare, its affiliates and its officers, directors, employees and agents from and against any and all claims, liabilities, damages, losses or expenses, including reasonable legal costs, arising out of or in any way connected with any breach by that user of these terms and the relevant licences.

5. Governing law and dispute resolution

5.1 This Agreement and the relationship between you and Simshare shall be governed by and construed in accordance with English law. You and Simshare agree that any dispute arising out of or in connection with this Agreement will be subject to and within the jurisdiction of the English courts.

5.2 You and Simshare agree to use best efforts to resolve disputes in an informal manner. Where you and Simshare agree that a dispute arising out of or in connection with this Agreement would best be resolved by the decision of an expert, you and Simshare will agree upon the nature of the expert required and together appoint a suitable expert by agreement.

5.3 Any person to whom a reference is made under Clause 5.2 shall act as expert and not as an arbitrator and his decision (which shall be given by him in writing and shall state the reasons for his decision) shall be final and binding on the parties except in the case of manifest error or fraud.

5.4 You and Simshare shall provide the expert with such information and documentation as he may reasonably require for the purposes of his decision.

5.5 The costs of the expert shall be borne by you and Simshare in such proportions as the expert may determine to be fair and reasonable in all circumstances or, if no determination is made by the expert, by you and Simshare in equal proportions.

6. General provisions

6.1 This Agreement constitutes the entire understanding and agreement between you and Simshare with respect of the subject matter hereof.

6.2 The invalidity or unenforceability of any provision of this Agreement shall not affect the continuation in force of the remainder of this Agreement.

6.3 The rights granted to you or Simshare arising under this Agreement shall not be waived except in writing. Any waiver of any of your or Simshare's rights under this Agreement or any breach of this Agreement by you or Simshare shall not be construed as a waiver of any other rights or of any other or further breach. Failure by you or Simshare to exercise or enforce any rights conferred upon it by this Agreement shall not be deemed to be a waiver of any such rights or operate so as to bar the exercise or enforcement thereof at any subsequent time or times.

6.4 The section headings contained in this Agreement are for convenient purposes only and shall not affect the interpretation of this Agreement.

6.5 Where the context so implies, words importing the singular number shall include the plural and vice versa and words importing the masculine shall include the feminine and vice versa.

6.6 All or any of Simshare's rights and obligations under this Agreement may be assigned to a subsequent owner or operator of the Service in a merger, acquisition or sale of all or substantially all of Simshare's assets.

Appendix 4: Word processor template document for an expansive description of a simulation

About this document

Are you a simulation owner?

Please fill out a copy of this form for each simulation that you are adding to the simshare website.

- This form consists of two parts
  1. a set of mandatory data that have already been included in the upload process which gives the user a complete picture of the simulation.
  2. additional optional data that provides useful information to potential users of your simulation
- We recommend you write your answers over the guidance notes (text in black at each section) or delete these as you go. Finally, before saving, delete this introduction page.
- Once you have completed and saved this document please upload it on the 'share' page along with your other simulation files.

Many thanks.

Are you interested in re-using this simulation?

This document, and any supplementary files, should provide all the information you will need to get started. If you require any further information please contact the owner via the contact details on their profile page or by using the comments feature on the website.

Simulation Details: mandatory fields

Please complete all fields on this page. These can be copied from the corresponding fields on the 'Share' page on www.simshare.org.uk

Subsequent pages include additional information.
Please overtype the instructions in each field.

Title
Please note the title of the simulation.

Author
Please give the name of the individual(s) who created the simulation.

Institution
Please give the name of the institution that owns the simulation.

Acknowledgements
Please note any acknowledgements if relevant.

Creative commons licence
Please select the licence you wish to release this simulation under: (delete all options except the licence you want to apply to your simulation). For full details of the terms and conditions of these licences, please see http://creativecommons.org/licenses/uk

- Attribution Non-Commercial Share Alike 2.0

  or
- Attribution 2.0

  or
- Attribution Non-Commercial 2.0

  or
- Attribution Share Alike 2.0

Subject classification
Please give the relevant subject classification(s) for the simulation.

Overview
Please give a brief description of your simulation.

Keywords
Please use commas to separate words and phrases.

Simulation Details: optional fields

These fields are designed to provide the extra information that a potential user of your simulation will need if they are going to use the resources. Please supply as much detail as you can – clearly this will vary from simulation to simulation, and some sections may be inappropriate to your resource. Again, please overtype or delete the instruction text.

Programme of study
Please name the degree or other programme in which the simulation is used.

Student roles
Please note what roles the students play, e.g. social worker, civil litigation lawyer, architect.

Staff roles
Please note any roles played by the staff, e.g. social services manager, senior partner, planning officer.

Detailed simulation narrative (related to the simulation resources)
Please give details of the simulation narrative. Relate the narrative to the simulation resources, indicating how and when in the simulation each individual resource is used.

Learning outcomes
Please give details of the learning outcomes, including both academic and 'transferable' skills where appropriate.

Assessment
Please give details of the assessment used in the current delivery of the simulation.

Resources
Please give an overview/inventory of (or further details of) the resources that are used in this simulation. For example:

- Documents such as reports, witness statements that are required to support each simulation and may be requested by the students acting in role (e.g. doctor's reports, car accident reports, planning decision etc.)
- Photographs (e.g. of the place of an accident, an injury, a building site)
- Videos (e.g. of witnesses being interviewed, of a construction site etc.)
- Proforma documents (e.g. contracts, planning application forms, transfer of property forms statements etc.)
- Other miscellaneous resources (e.g. newspaper reports, death certificates etc.)
- Web-based resources (e.g. Government agencies or professional bodies).

Student support
Please give details of the support provided to students using the simulation. For example, this might include:

- On line discussion forums
- Weekly tutorial meetings
- FAQs

- Surgeries
- Hard copy and on line guidance documents
- Preliminary exercises

Refer to any supplementary files/User Guides you are uploading if relevant.

Staff time
Please indicate how much staff time is needed to run this simulation.

Playing period
Please indicate the total period the simulation runs for, e.g. one seminar, 1 6 weeks or one semester.

Student experience
You may wish to include quotations from the students.

How could this simulation be adapted and re-used?
Please suggest any ways in which this simulation could be adapted and re-used in different contexts (e.g. could it be played over a different time period, or used with students studying at a different level or in a different jurisdiction? Is group work optional?). You do not need to try to anticipate the requirements of any and all potential users, but any ideas that you have could enhance the value of your simulation to others. It would be especially useful if you have already shared your simulation and can document this.

Are there any publications relating to the development and use of this simulation?
Please add references to print- or web-publications here.

Appendix 5: Feedback form used at dissemination events to explore delegates' attitudes to simulations as OERs

Open Educational Resources: Views and Attitudes

Below is a short questionnaire that we are asking all workshop attendees to fill out. We would be most grateful if you would spend a few minutes giving us your responses to these questions. Your replies will be used in our final report to JISC and HEA, and we may use comments you have made in subsequent research publications. All responses will be entirely anonymised for these purposes.

Should you wish to append your name, it would be greatly appreciated. With your permission we would contact you later to follow up any comments that you make.

Re-using simulations

1. Will you use simulation resources that will be published on the Simshare website?

Please tick an option:

☐ Yes

☐ Maybe

☐ No

Reasons:

2. Are there any questions that you would need or want answers to before you would use a simulation teaching resource published on this site?

☐ No - The site gives all necessary information.

☐ Yes I'd have further questions but I don't mind that these aren't answered by the site. I would get answers to these questions from the following sources:

☐ Yes I'd have further questions and I wouldn't be able or want to have to get the answers elsewhere so I would like to see further information on the site about:

3. Will you register on the site and set up an RSS feed of a search query so that you are notified when simulations are added covering your subjects of interest?

☐ Yes

☐ Maybe

☐ No

4. Do you think the case still needs to be made for the benefits vs costs of using the kind of resources you would find on the Simshare website?

☐ Yes

☐ Maybe

☐ No

Reasons:

Adding your simulations

5. Will you add your simulation teaching resources to the Simshare website?

☐ Yes

☐ No

☐ Maybe

Reasons:

6. Do you have any important questions that you would need or want answers to before you would add and publish your simulation teaching resource on this site?

☐ No - The site gives all necessary information.

☐ Yes I'd have further questions but I don't mind that these aren't answered by the site. I would get answers to these questions from the following sources:

☐ Yes I'd have further questions and I wouldn't be able or want to have to get the answers elsewhere so I would like to see further information on the site about:

7. If you would add simulation resources, how do you hope your resources will be used?

Profile and Networking Features

8. What do you think of the profile and networking features on the site? Will you use these? Can they be improved?

Simshare in general

9. Will you now go on to start using the website? Is there any other information or support you would need or want before you would get involved in the Simshare community?

☐ Yes I feel ready to use the website

☐ Maybe

☐ No I do not feel ready to use the website

I would need or want further information or support, such as:

10. Do you think that Simshare is a sustainable OER project beyond its funding (finishing at the end of April 2010)?

☐ Yes. Simshare should be able to sustain itself after April 2010.

☐ No. Simshare would benefit from additional funding to carry out further work.

Comments:

11. Any other comments?

Many thanks for filling out this questionnaire.

Appendix 6: Feedback form for website evaluation

Many thanks for adding your simulation to simshare. We would be grateful if you would take a few minutes to complete a questionnaire so we can gather feedback about how the site might be improved.

1. **Name**
2. **Date you used the site**
3. **Total time spent adding your simulation.**

   How long in total did it take to add your simulation to the website? (complete the webform, upload your files, and complete the word template description document, if applicable.)

4. **Site Navigation.**

   Was it easy to locate the right page to start to add and upload your simulation? If not, what design or signposting changes might help?

5. **Registering for the site**

   Was it easy to register to the site? If not, why?

   Did you read the terms and conditions?

   Were these clear and unambiguous?

   Was there anything in the terms and conditions that made you reconsider submitting your simulation?

6. **Adding a simulation – using the webform**

   Did you think that the information that you were asked to submit was necessary and helpful to potential users?

   If not, why not?

   Was the interface easy and intuitive to use?

   If not, why not?

   Did you use any of the help buttons?

   If so, which ones and did they help?

   Are you confident that you were able to identify the creative commons licence appropriate to your simulation submission?

   Did you understand what happens to your simulation if you don't publish?

7. **Adding a simulation – uploading files**

   Was this section easy to use?

   Did you have any non-file format resources (e.g. urls) If so, where did you add details of these?

8. **Adding a simulation – 'additional information' section: using the word template to give more information about the simulation.**

   Did you download and complete the template? If not, why?

   Did you download and read the example(s) of completed templates?

   If so, was it/were they helpful?

   How long did it take to complete the template?

   Were there any sections you were unsure about?

   Were there any sections you didn't complete?

   If so, why?

   Did you think that the information that you were asked to submit was necessary and helpful to potential users? If not, why not?

   Are there any changes you would suggest for this template/ section?

9. **Other comments**

   Please provide any other comments and suggestions for improvements.

Appendix 7: General observations from the project evaluation

The tables below contain conclusions from the Simshare project mapped into the evaluation framework prepared by the UKOER evaluation group. The tables are included to complement the specific points raised in the body of the report, especially in sections 7 and 8.

Synthesis and evaluation framework		
Focus area	***Questions***	***UKCLE simulation project: opportunities, examples, criteria, methodologies***
1. OER release processes	***1.1 What have we learned about good practice in OER release?***	Simply releasing the simulation OERs is only part of the process – they need additional supporting materials and a user community
	1.2 What issues are presented by the release of particular types of content (multimedia, interactive, student-created content)?	Simshare has addressed issues around simulations as OERs, including: ▪ multi-level resources (simulation as a whole, simulation narrative and metadata, individual resource artefacts and their metadata) ▪ use of simulations within and outside specific platforms ▪ release in forms that can be re-purposed outside their original context
	1.3 How can effective processes be shared and embedded?	
	1.4 How do existing repositories support the release of OERs in the UK?	Simshare felt that JorumOpen was not an appropriate primary repository for simulations because of their complexity; because of the need for thorough guidance on the use of simulations, and to allow for revision and updating without losing the ability to maintain good version control. The Simshare repository also supports a user community, which would not be possible with JorumOpen as presently constituted.

Focus area	*Questions*	*UKCLE simulation project: opportunities, examples, criteria, methodologies*
2. Developing, managing and sharing OERs	***2.1 Which models are appropriate for different contexts?***	Simshare has taken care to ensure that simulation OERs are available in ways that allow the greatest flexibility for potential users. Users may wish to: ▪ use a simulation as it comes off the site, ▪ modify a complete simulation for use in a new context ▪ use the simulation as is, but with different technology ▪ cherry-pick individual components for other applications
	2.2 How do different models benefit different stakeholders? How is this articulated?	
	2.3 Which models are sustainable? What affects sustainability?	In the context of this project, sustainability is mainly about: ▪ Involving a wider community, and encouraging the use of simulation in HE learning, teaching and assessment as we do so ▪ Broadening the subject coverage ▪ Involving a wider range of simulation types, in particular having a good choice of less IT-intensive resources so that potential users are not deterred by the need for significant up-front investment ▪ Ensuring growth after the end of the project, largely by facilitating the developing user community
3. Guidance and support mechanisms	***3.1 What guidance and support needs to be offered*** (a) nationally (b) at institutional or even departmental level?	Simshare found the need to provide extensive guidance both in terms of OER (issues like IPR, CC) and the pedagogy of simulations as vehicles for learning, teaching and assessment. We achieved this through a mixture of support on the Simshare site, with a strong pedagogic underpinning.
	3.2 Which support mechanisms are appropriate for different stakeholders?	
	3.3 What forms of evaluation are most appropriate and how best can benefits be assessed?	Simshare has not been public for long, and evaluation is incomplete. We have established a user community that will facilitate the exchange of ideas and views, and will allow users to comment on simulations that they have used. Simshare is aimed at teachers rather than students, so that the project relies on the academic skills of its users to ensure that simulations used as OERs are appropriate to their end use.
	3.4 What forms of quality assurance are appropriate and who should be responsible?	

Focus area	*Questions*	*UKCLE simulation project: opportunities, examples, criteria, methodologies*
4. Business cases and benefits realisation	***4.1 What are effective business cases for different stakeholders?***	Simshare's 'mission' makes it difficult to define a business case because not all of the benefits are simple and tangible.
	4.2 What benefits could HE and wider society expect to see from open educational resource release?	Simshare aims to raise the profile of simulation as a learning, teaching and assessment tool in FE and HE, and to lower the obstacles to simulation use by providing a range of simulation OERs which are re-usable and re-purposable.
	4.3 What particular benefits do subject communities, institutional communities and other communities receive?	*"Building sustainable, active communities of practice around re-usable learning objects"* Simshare's focus on a learning tool rather than on a particular subject area means that it is concerned as much with simulation OERs as a way of promoting a form of learning as it is with providing resources.
	4.4 What are the costs of OER release and who typically has to bear them? Are the benefits perceived as being worth the costs?	From a user perspective, the more complex simulations require significant investment in terms of design and build. Provided that they are considered as OERs from the start (so being aware of IPR issues etc), the cost of making these available as OERs is a trivial fraction of the overall production. For the project, the major investment has been in the infrastructure of the repository and its associated community network. This is 'capital' rather than 'recurrent', so, if the Simshare site continues to function, Simshare can grow as its user community grows. However, further investment at project level would be useful to undertake more dissemination, to target more donors, and to enhance the online community.
	4.5 What proportion of these costs has been borne by the project: are the costs sustainable without project funding?	

Focus area	*Questions*	*UKCLE simulation project: opportunities, examples, criteria, methodologies*
5. Cultural issues	***5.1 What are current norms for sharing educational content in difft communities? What global or local trends are in evidence?***	Simshare has been fortunate in discovering several practitioners who are keen to share their simulations, and to benefit from those of others. The project built on the SIMPLE project that was explicitly open source.
	5.2 What motivates and supports/ enables individuals to make their content open? What are effective mechanisms of reward and recognition?	It could be argued that the use of simulations in FE and HE is certainly not the norm, and is likely to be undertaken by those who innovate in learning and teaching and who would be pre-disposed to share good practice. Feedback from dissemination events included indication that simulation donors get personal satisfaction from sharing their work and participating in a community. We have little indication at present that they receive formal recognition in their institutes, perhaps reflecting the slightly second-class status of learning and teaching development in the career progression of the majority of academic staff in HE.
	5.3 What are the institutional, legal, cultural barriers to open content?	Simshare encountered some issues that may have prevented users contributing their work, including: Concerns that their institution would be unwilling to release their assets, sometimes produced at some financial cost Concerns that a resource was not of high enough quality to be shared Practical issues around the release process, for instance use of third-party materials
	5.4 Who benefits from release of content? How do they perceive and understand those benefits?	Simshare offers benefits to its user community at two levels: the availability of content and the sharing of practice. The immediate beneficiaries are academic staff who can use both individual simulations and the pedagogic support and user network to enhance their learning and teaching practice.
	5.5 How does the opening of learning resources affect the roles of individuals?	
	5.6 Within what kinds of communities does open sharing take place readily and effectively? ***What are these communities actually sharing? What can we learn from them?***	Because Simshare is concerned with a tool or technique rather that a subject-based resource, it is building its own community of practice. Sharing encompasses not only resources or resource elements, but expertise and experience.

Focus area	*Questions*	*UKCLE simulation project: opportunities, examples, criteria, methodologies*
6. Institutional issues - strategy, policy, practice	***6.1 To what extent do existing policies and strategies support the opening of learning resources?***	The biggest single institutional/ cultural issue that has faced Simshare has been breaking out of a subject-focused model to build a cross-disciplinary community where users from different academic areas can build on each others' practice and experience. In part, aspiring to achieve this within the lifetime of Simshare was optimistic, but we also feel that the current subject-based silo approach in HE is not pre-disposed to facilitate such a community.
	6.2 How are learning resources currently managed and made available within institutions?	
	6.3 Who is identified as responsible for legality, accessibility, re-usabillity and quality of open content?	
	6.4 In what ways do institutional practices (need to) change? How is transformation best approached?	
	6.5 How do existing management and departmental structures and staff roles need to be transformed to facilitate the opening of existing content?	
	6.6 Which existing institutional strategies does the opening of learning resources impact upon?	

7. Legal issues	***7.1 Are ownership and legal issues still perceived as a major barrier?***	Simshare has encountered various 'lego-technical' issues such as use of third-party materials, which may be a barrier to making a simulation available as OER. On the other hand, we have not met institutional issues, although we suspect that some HEIs and some academics do not engage with the legal aspects of sharing resources under open licence.
	7.2 Have perceptions changed during the timescale of the programme? Is new guidance needed?	
	7.3 Who in institutions and communities takes responsibility for the legality of open content release? What barriers do they present and what support do they offer?	
	7.4 What are the IPR issues relating to hybrid, multiply-authored resources?	

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8. Technical and hosting issues	***8.1 Are there any messages around tools and standards that come from the programme?***	
	8.2 What kinds of metadata are essential, what desirable, and what are the issues in creating and managing metadata?	Early in the project, Simshare identified the need for a metadata suite that went beyond the core suite used by JorumOpen. It took some time to refine this to make it usable for a range of users and simulation times. In the end, we opted for a two-tier approach, with core metadata entered online (and thus searchable) and an optional and more flexible word-processor proforma. We concentrated on capturing an effective narrative for the simulation and on information about simulation management and delivery.
	8.3 How do existing repositories support the release, management, discovery preservation and access to OERs e.g. OpenJorum in the UK, institutional repositories within an institution, web sources globally, etc	Because of the project's metadata needs and, especially, because of its associated user community, JorumOpen was not an appropriate primary repository. We are depositing permalinks to simulations on Simshare with JorumOpen, so that users can access the full simulation and metadata. This also means that any revision to a simulation on the Simshare site will be mirrored in the link from JorumOpen. We believe that a distributed model, with one primary copy and access from several locations, is the appropriate strategy.
	8.4 What issues arise when using public/third-party hosting solutions?	
	8.5 How best to make hybrid, interactive and multi-media resources available for open access.	*"Simulations are interesting example of hybrid multimedia resources which demand particular approaches to open release."* The major challenge in making simulations available is not technical issues with different file types, but encouraging donors to make their simulations available in a form that can be re-purposed, or re-used in a different environment (for instance a simulation developed using the SIMPLE platform transferred to a VLE). We have designed the Simshare repository so that potential users can: ▪ Gain a full understanding of the simulation and how it is used ▪ Retrieve individual assets as well as downloading the entire simulation.

Focus area	*Questions*	*UKCLE simulation project: opportunities, examples, criteria, methodologies*
9. Quality issues	***9.1 What quality processes are appropriate for different communities?***	Simshare has opted to use its user community to support quality through the facility to share comments and, ultimately, to share re-purposed simulations. With a few exceptions, the materials on Simshare are not directly useful to students.
	9.2 How do quality processes for OER release relate to other institutional quality processes? Are there tensions/barriers?	Clearly, simulations released through Simshare are open to the same issues that affect other OERs in terms of meeting local institutional standards where the simulation is being re-used. Simulations may be used in areas where learning is tightly constrained – for instance where there are health or safety issues – and end-users must be satisfied that a simulation meets key requirements, and does not leave users open to criticism or even to litigation. This risk may be a barrier to potential donors.
	9.3 Are OERs perceived to be of high quality? What impact do perceptions of quality have on release process/sustainability?	The simulation resources in the Simshare repository range from a single narrative file for a 45-minute role play to a twelve-week long, multi-player online simulation with an extensive corpus of asset files. The perception of quality and usefulness is potentially unique to each end-user, and we encourage simulation donors to make their resources available in a way that facilitates re-use in different ways. So far, our users have not raised serious quality issues, and have been enthusiastic about simulations not only as resources but also as showcases for simulation-based learning. Donors may view quality as a barrier – are their simulations of a quality that is appropriate to sharing with a wider community. There may also be concerns that a re-purposed simulation (like any other OER) may carry their 'badge' but not be of a quality that they consider acceptable.

Focus area	*Questions*	*UKCLE simulation project: opportunities, examples, criteria, methodologies*
10. Pedagogy/end-use issues (not a primary focus of evaluation)	***10.1 Which types of OER are used by different stakeholders?***	*"Note that it will be difficult to get feedback from downstream users of the OERs released under the pilot projects due to timescales, but most have measures in place to monitor uptake or to support adoption at other sites and gain feedback from workshops and pilots."*
	10.2 Can we see a pattern in relation to level of granularity and use, re-use, re-purposing?	
	10.3 How far are use patterns influenced by: the subject discipline and/or topic area; type of resources made available?	
	10.4 How is pedagogy manifested in open content, if at all?	Simshare is focused tightly on supporting the use of simulation-based learning in FE and HE, and supports this through its user community. Picking up sub-questions from the framework: *"What additional information needs to be packaged with OERs to make them more reusable?"* *"Guidance on how materials currently used"* In the case of simulations, information about the way that a resource is used, support implications, original context, plus an easy-to-understand narrative if this is otherwise hidden within the simulation (e.g. a platform-specific simulation such as SIMPLE). *"Balancing ‹pedagogy in› (intentions of original contributors) with ‹pedagogy out› (intentions of users, whether staff or students). Does the former matter at all, if users are clear about educational purpose?"* *"Case studies, comments, reviews etc "* *"Encourage contribution by users regarding contexts and strategies of re-use."* The Simshare user community supports this, by providing opportunities for users to put their experiences and, possibly, their re-purposed resources, back into the community. *"Different business/market models imply different balances here, from complete educational resources (inherently pedagogically meaningful) to re-usable assets."* Simshare encourages this. *"Role of templates to support consistency in preparing OERs for release"* This is central to the Simshare metadata process.

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	10.5 In what ways, if at all, do learning and teaching practices (need to) change when OERs are widely available?	Simshare uses simulation OERs to break down barriers to simulation use in FE and HE. Specifically, OERs can lower the initial resource implications for simulations use (staff time, IT support), but can also be important as showcases.
	10.6 What skills/literacies do staff and students need to adapt to using and creating content in an open way?	Using simulation OERs may demand little or no extra skills, and may be an effective way of bringing new users into the simulation-based learning community. Creation of simulation OERs implies little extra effort in relation to simulation design and development, if the simulation is intended to be destined for open release from the start. 'Retro-fitting' may involve replacing assets such as third-party materials.
	10.7 How can student-created content be made openly available for sharing, peer review and collaboration?	

11. Learner and other stakeholder involvement	***11.1 What role have learners played in shaping the programme outcomes? How have projects engaged learners, if at all?***	
	11.2 What role have stakeholders such as professional bodies and employers played in shaping the programme outcomes?	Simshare has had limited feedback from professional bodies, and this is restricted to legal accreditation. Whilst they appear to applaud the opportunities offered by simulation OERs, especially as a way of shared good practice, they acknowledge that their re-use implies an understanding of the pedagogic underpinning.
	11.3 What other stakeholders are emerging with an interest in this area?	

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12. Programme and project management issues	***12.1 What challenges arise from consortia approaches? Which consortia approaches are effective?***	The Simshare consortium is small, and has a 'history' from collaboration within the SIMPLE project. This has been a good jumping off point for laying the foundations for a cross-disciplinary user community.
	12.2 Collaboration	Simshare's focus on a learning tool rather than on a subject area places the project somewhat orthogonal to other projects, We have benefitted from dialogue with other projects on specific issues, but in hindsight we could possibly have used the UKOER community more effectively to pursue our goal of a cross-disciplinary resource. The UKOER community could continue as a network for sharing experience and expertise, especially in working 'outside the box' of the conventional subject-based approach to shared educational resources.

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