Project Acronym:
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JISC Final Report

IESR Final Report - Phase II (2006 - Dec09)

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Executive Summary

Overview of activity ending December 2009

The IESR is an academic 'Yellow Pages for the internet' promoting authoritative, quality assured resources. IESR currently focuses on UK based collections but is a partner in the Global Registries Initiative (http://www.globalregistries.org/**)**

The primary audience for the IESR is the Higher Education (HE), Further Education (FE) and NHS sectors.

It is a registry of electronic resource collections; for each resource collection it holds (a) metadata about the resource collection and its contents, and (b) technical data about how the information resource collection can be interrogated (services). IESR provides both a web user interface and a machine-to-machine service. Its purpose is to provide the data that will allow information searchers to interrogate quickly and easily a range of electronic resources and collections without the user having to search (or even know about) each one separately.

Scope

In the first instance, IESR was created to hold details of all JISC funded, provided, sourced or negotiated electronic resources. Subsequently, its scope has been extended beyond this to encompass a wider and comprehensive range of electronic resources.

Identified Benefits for Target Users

1. IESR benefits individuals or groups searching for information, by making more information sources available – thus providing a richer search pool. The metadata held will also allow more focused, and therefore more efficient, searching.
2. IESR benefits the individuals or groups who provide information searching facilities (e.g. portal designers, web2 developers), by making richer and more focused searching possible (thereby improving their facilities). IESR also helps the design and build process by providing up-to-date technical information about each electronic resource/collection.
3. IESR benefits providers of electronic resources/collections by making their information accessible to a wider audience. Also, because the metadata allows for more focused searching, there should be a reduction in non-appropriate "hits".
4. Lastly, IESR provides a Collections Management Tool whose initial aim was to be used by JISC.

Background

Historical perspective

JISC initially funded the pilot Information Environment Service Registry (IESR) project as part of its Shared Services Programme for 14 months until December 2003, to investigate the feasibility of providing a machine-readable directory of quality assured electronic resources within the Information Environment.

The project scope initially looked at services within the JISC Information and wider academic and research cyber environment however, due to user and stakeholder request it shortly after included resources. Over time the resource and collection aspect overtook service descriptions.

There was a perceived need to improve awareness of existing resources and to promote their use. The initial aim of the Service Registry was to enable portals, virtual learning environments and other services to automatically obtain information about available electronic resources and, where possible, to access those resources directly through machine-to-machine transactions.

The aim of the Service Registry was to form a catalogue of the electronic resources available in the JISC Information Environment. The idea being at that time to enable portals and other services to discover which resources were available and appropriate for their users, and to supply information about how these resources could be accessed, through a machine-to-machine interface.

The IESR Pilot Project aimed to look at a number of resources and services currently available to users in FE and HE and develop metadata schema to hold all the detailed information required for discovery and access.

Users intended this information primarily for machine-to-machine interaction, rather than direct access.

The eventual aim of the Service Registry was to hold a comprehensive listing of resources supplied by the JISC and others; but during the pilot phase of the IESR, only a relatively small number of resources were involved, mainly from the collections held by MIMAS, EDINA, the AHDS, the UK Data Archive, the UK Mirror Service and the RDN.

The IESR project has now spanned 4 phases since its inception in 2003 however there has been a fundamental shift in its focus, driven predominately from feedback from the community.

In 2009, the decision was taken on advisement from JISC to focus on Collection-orientated resources rather than data or service entities. This was based on the realisation that developments in data registries were taking place in other areas in the environment and there didn't seem to be a business case for service entities.

Phase I - Pilot phase 2002-2003

Aims and Objectives

The IESR was funded by the JISC as a 14-month pilot project between November 2002 and December 2003. The project partners were the Cheshire Development Team at the University of Liverpool, MIMAS at the University of Manchester and UKOLN at the University of Bath. The project team was tasked with achieving the following aims:

- Design a metadata format for information to be held in the Service Registry;
- Develop a prototype registry, capable of describing resources and the ways in which they can be accessed;

- Populate the registry with sample data from JISC service providers;
- Liaise with stakeholders and potential users of the registry;
- Disseminate information about the project;
- Make recommendations for further developments.

These initial pilot objectives were achieved and carried forward into a phase II project whose core aim was to bring the IESR into a production-quality service.

Overall Approach

The design of the metadata for the Service Registry, and the specification of static templates (XML or Excel format) to enable early data supply, took longer than originally anticipated, with the final version being released in July 2003. This meant that some of the planned development activities in the original project plan were not undertaken. These included the development of OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting) and SRW interfaces to the service registry, and the development of a web interface for the creation of new descriptions. These tasks were to be taken forward in the second phase of the project.

Pilot phase Outputs

- Metadata formats for Collection, Service and Agent descriptions published;
- Static templates for data supply (XML and Excel) produced;
- Cheshire II software extended to enable support for SRW;
- Prototype Service Registry developed;
- Stakeholders surveyed and interviewed;
- Stakeholder report published;
- Data Creation Guidelines devised and published;
- Stakeholder meeting held;
- Web interface designed;
- Z39.50 interface developed;
- Service Registry populated with XML records supplied by Edina and UK Mirror Service.

At that time it was too early to estimate any impacts, as the prototype Service Registry had only recently been populated with 'real' data. An important aim of the next phase of the project would involve promoting the use of the registry among portals and other services within the JISC's Information Environment.

Summary of Pilot Phase Achievements

The metadata formats and static data supply templates for the various parts of the Service Registry (collection, service and agent) were published in July 2003 and are available on the IESR website at http://iesr.ac.uk/metadata/. The first records from the pilot project's service providers arrived in the same month.

(Data creation guidelines for data contributors were initially devised http://iesr.ac.uk/metadata/guidelines/Data_Creation_Guidelines.html but discarded in 2009 during phase IV due to user feedback about their complexity and replaced with a simplified data entry form).

The project team developed a pilot Service Registry using Cheshire II software. The prototype service had web and Z39.50 interfaces. The Z39.50 interface delivers IESR XML as well as SUTRS, GRS1 and Dublin Core XML. All accesses to the database are logged, and simple monthly usage statistics compiled. The database has been populated with those collection, service and agent descriptions which were created using XML (those from Edina and the UK Mirror Service). Further processing work was required to convert the Excel-formatted records (from the other pilot phase data providers) into XML.

Development work on the Cheshire software had also been funded as part of this pilot project. This was to enable the development of support for SRW (Search and Retrieve Web Service) in Cheshire and any other Z39.50 server, and of an XSLT browser interface to SRW.

Stakeholder liaison has been an important part of the project from its early stages. A Stakeholder Analysis was undertaken in January - March 2003. This has also been published at http://iesr.ac.uk/stakeholdrep.html

This work was followed up by a requirements-gathering exercise, which included a meeting for stakeholders. The report from this area of work is available at http://iesr.ac.uk/interimreqs.html.

Dissemination activities, including project progress reports from that time are available at http://iesr.ac.uk/dissemination.html. Presentations on the IESR were given at a JISC Portals and Shared Services Programme meeting in May and at an event for stakeholders in June 2003.

A Final evaluation report of Phase I is available at: http://iesr.ac.uk/finalevaluation.html

All interim project reports were submitted to the JISC as planned:

- Phase 1 Completion Report, February 2004;
- Progress Report, July 2003
- Progress Report, January 2003

Overview of Phase II (Jan 2004 - Feb 2005)

Aims and Objectives

The main aims of phase II of the IESR focussed on functional areas being able to bring the prototype Service Registry up to a level of robustness and functionality that would be suitable for a service of production quality. The areas of work fell into the following categories:

a) Software and metadata development;

The metadata was to be reviewed early in the project, in the light of the stakeholder requirements that were identified during the first phase. The functionality of the prototype Service Registry was be extended to support new methods of access to the Registry's own data. Interfaces for the creation and update of IESR metadata records would be developed.

A research work package, led by UKOLN, would investigate whether IESR metadata should be made available using a UDDI registry. This research package would also look at alternative models for the delivery of the Registry, including RDF and related semantic web initiatives such as DAML-S and OWL.

Development work at the University of Liverpool was to focus on implementing the capability of automatically checking the availability of IESR resources and recording their status.

Importantly, documentation of the Cheshire system was to be a priority.

b) Expansion of content;

The pilot phase of the IESR involved the creation of metadata about services provided by the AHDS (Arts and Humanities Data Service), EDINA, MIMAS, RDN (Resource Discovery Network), UK Data Archive and the UK Mirror Service. It was proposed that this coverage would be expanded in the next year of the project to include as many as possible of the resources listed in the JISC Resource Guides.

c) Evaluation;

UKOLN would continue to conduct evaluations during the course of this phase

d) Promotion and dissemination.

As the IESR moved into a production system, advocacy within the community of potential users of the service was considered to be essential to encourage portals and other elements of the Information Environment to make use of the information within the Service Registry.

The project team would also need to provide technical support to end users of the Registry.

Project Outputs

Key outputs for this phase related to software development and were:

- an OAI-PMH service for IESR supplying single entity descriptions in either simple Dublin Core or full IESR XML. As part of this work, the Meta-Registry (IEMSR) had also been enabled as a Cheshire database;
- extension of the IESR web search service to allow the inclusion of service type in a search;
- a first draft of an XML schema for IESR metadata was produced;
- launch of the IESR application and web site;
- a copy of the IESR data commissioned to UKOLN to investigate providing a UDDI view of the IESR.

Summary of achievements

In July 2004, the aims of the project remained the same, but there had been a delay in the area of Cheshire software development, which meant that some of the targets for this phase had not been met. This was due to absence of the project's principal developer for a period of two months.

A major consequence of this delay was that it severely impacted on the expansion of content due to the data entry/editing interface for the underlying Cheshire system not being usable or available.

The development timetable was also adjusted, with two tasks being postponed into any future phase. These are the proposed alerting service when new records are added and the automatic supply and updating of IESR descriptions.

On current day retrospective analysis it appeared that core requirements to improve the functionality of the data editor were dropped at this point. Some effort was spent in this area during the next phase but it was only following in-depth technical analysis in 2009-2010 that it became clear the extent of restrictions being imposed by:

i) the inflexibility of the underlying Cheshire software and the way it was implemented within the IESR physical schema;

ii) the difficulty experienced by potential contributors in the use and application of the IESR metadata schema. On discussion with stakeholders this was attributed to its complexity.

This was later to develop into a key issue during subsequent phases affecting the usability and utility of the community-facing side of IESR until a new IESR team addressed it again directly in 2009 within Phase V.

An end of phase evaluation report for this period has been made available at: http://iesr.ac.uk/docs/reports/2005/01/ with a Final evaluation of (pilot) Phases I & II provided by UKOLN at: http://iesr.ac.uk/finalevaluation.html

Overview of Phase III (March 2005 - July 2006)

Aims and Objectives

The main aims of phase III were continuation of those in the preceding phase, that is selected developments with the overall aim of bringing the prototype Service registry towards a level of robustness and functionality that would be suitable for a service of production quality.

The most significant areas here were to be the provision of further interfaces into the IESR, for data creation and access.

In particular technical effort was expended by UKOLN on how UDDI could be incorporated into IESR with a report available at: http://iesr.ac.uk/docs/outputs/uddiandiesr/. However this was not implemented due to the eventual demise of UDDI within the wider IT industry.

Project Outputs

The main activity during this phase focussed on iterative technical developments and dissemination events within the UK.

The deliverables for this phase were:

- An OAI-PMH interface to the IESR released on 27 May 2005. This service supplied descriptions of IESR services, collections or agents in either simple Dublin Core or full IESR XML. Use of the service was logged for the IESR's monthly statistics;
- An OpenURL Link-To Resolver service that can be used to retrieve single entity records in IESR XML by their identifier. The use of this service is also being logged.
- IESR identifiers were constructed as PURL object identifiers (POI). A redirect was established so that the identifiers resolve to the XML description of each IESR entity, using the OpenURL resolver service;
- A review of the IESR metadata schema;
- The IESR data was set migrated from Cheshire 2 to Cheshire3 database with SRU/SRW access;
- The software for running an OCKHAM node of the IESR data had also been installed at Liverpool, although with some initial problems with the process;
- Software specifications, including functional requirements, had been written to form a basis for software documentations, as well as to inform development;
- A data entry interface for IESR records.

There had been some significant development work at MIMAS in the provision of a data entry interface for IESR records in an attempt to overcome the limitations described previously. The aim of this interface was to allow contributors to describe collections, services and agents and submit them to the IESR. It would also permit editing of existing records.

Summary of achievements

CERLIM produced a report of their evaluation of the IESR in January 2006, which was circulated among members of the project and JISC. The main findings of the evaluation were that:

- The slow progress in some areas had been largely due to lack of resources, particularly resources to drive forward IESR strategy, policy development and proselytising of the services, and also to work with collection providers to help in the creation of records and to ensure quality control. Some of these activities would probably have been more appropriate to be carried out at the JISC level, rather than by the IESR team themselves, but in was noted that more time and resource were needed before the IESR could transition into a full service;
- The IESR had been broadly successful as a demonstrator project and the evaluators recommended further investment to "build a robust, user-facing demonstrator service based upon current functionality";
- Creating the collections descriptions was a cumbersome business, and collection owners had difficulty prioritising this work, especially since the person (or people) who would supply the service descriptions were likely to be different from the person creating the collections descriptions. So the conclusion was made that the IESR was becoming over-complicated;
- It was established that the software on which the IESR was based at that time was now unsupported, and concerns were expressed about its suitability as a platform for a production system;
- Levels of awareness of the registry were found to be low, with CERLIM recommending "the creation and wide dissemination of use cases, scenarios and working examples to demonstrate the potential advantages of the approach to the broader professional community";
- The evaluators also expressed some concern about subject searching but recognised that this function might require the use of an external service.

Aims and Objectives

Original Aims and Objectives

The IESR Project commenced phase IV with 3-year funding. One year into this phase (October 2007) there was a change of both Mimas Project and JISC Programme Manager resulting in a significant revision of IESR objectives for the remaining 2 years of phase IV.

This partly was due to recognition that an architectural shift was taking place within the Information Environment with a corresponding displacement of where the IESR sat within the emerging architectural landscape.

During the initial part of phase IV (August 2006 - Oct 2007) activity focused on two areas being software maintenance and dissemination activity.

Revision of Project Aims (2007 - 2009)

On user evaluation during the internal review it was apparent that most contributors approached the IESR initially with enthusiasm appreciating the business-logic of an 'Academic Internet Yellow-Pages'; but soon backed off when realising the manual overhead needed by them to catalogue a record when faced with a complex cataloguer-orientated input screen.

As the main focus had been on machine discovery, the web-based user search interface had limited functionality with no means to browse results in a useful way.

As a result, collections input adopted a plateau between 2007-2008 with major contributing stakeholders pulling away from the initiative. This was despite best efforts to overcome the unanticipated entry hurdle arising from overheads with data entry.

This had a significant impact on stakeholder perceptions of IESR with loose negative perceptions being verbalised at that time.

The effect was threefold:

i. Contributors had no easy entry gate to utilise IESR capability without considerable manual overheads;

ii. Despite there being over 2000+ collection records, there was no 'portal' output scenario in place to expose these accumulated digital assets;

iii. Emerging user requirements for Web 2.0 or individual discovery-orientated web-interface aspects were not being met.

This necessitated a radical approach to the project design in order to achieve its initial aims.

Recognising there was a point of stasis the new IESR team decided to make a significant revision of project aims and action within a turn-around strategy.

Revised Project Vision for this phase

Our vision is for IESR to be widely recognised as providing access to an authoritative, quality assured directory of academic information resources. The association with JISC and Mimas services will reinforce the message of access to high quality information sources.

User consultations and outreach activities indicate a lack of awareness of IESR but support for the potential value of such a registry. Library and learning resources staff currently obtain collections information from a number of disparate sources and there is requirement for a single, authoritative source of information. The IESR could fulfil an important role in providing a single point of reference for new resources.

The project team will develop simple, intuitive mechanisms to enable contributors to describe collections and services that complement their existing workflows. The benefits of including resources in IESR will be communicated to new audiences and promoted widely. At present there are limited mechanisms for querying IESR content by end-users. Development work will focus on better search and retrieval mechanisms to access IESR content and direct end-users to high quality information sources.

Aims for this phase were:

i. Reducing barriers of entry for existing and (potential) contributors to IESR by re-designing and engineering an easy to use entry-point for inclusion of their digital resources;

ii. Making a fundamental shift from the requirement for contributors having to take ownership of data entry to offering a cataloguing support service from within IESR;

iii. Moving from a passive/responsive 'Users will come' engagement perspective to a proactive outreach strategy focussing on high-value early win communities within an academic context;

iv. Providing a meaningful harvest point for contextual harvesting of relevant collection (and associated linked data) resources for individual researcher and institutional inquiry;

v. Providing a semantic and meaningful individual interface for macro search and brows to granular resources;

vi. Continuing support and development of machine interfaces such as Z39.50 for the library community but also developing more ubiquitous interfaces such as RESTful API's and Web 2.0 such as RSS to reflect current user-driven trends in this area.

vii. Enabling greater uptake of IESR benefits to the communities served by JISC through outreach engagement activities and provision of a cataloguing service to minimise barriers to its uptake;

Revision of Phase IV (Nov 2007 - July 2009) - Outreach & Cataloguing Extension

Following discussion with JISC In October 2007 additional extension funding was granted to support the IESR team to provide an outreach service for IESR.

The major barrier to IESR at the commencement of the 2007-2009 phase had been lack of awareness of the service and its benefits. To address this the team was boosted by one additional FTE. The aim of this phase was both a continuation of technical activities from previous phases but a fundamental shift of focus towards building processes for user community engagement.

Approach

The main method employed for this phase included user consultation and corresponding revision of scope. In more detail we used revised the aim of this phase to enable greater uptake of IESR benefits to the communities served by JISC through outreach engagement activities and provision of a cataloguing service to minimise barriers to its uptake. This was via the following objectives:

- Re-focussing of remaining effort within IESR to transition into service within the overall JISC IE and wider academic and allied environments;
- Consolidating activities to promote JISC Collections;
- Incorporating an inventory of non-commercial digital repositories & archives project (DRAI) into IESR;
- Development of cross-sector service-oriented use and business case for IESR deployment in the NHS;
- Identification of IESR architectural benefits to the IE from primary use-cases within the JISC Test-bed and Discovery to Delivery (D2D) programme streams;
- Establishing how complimentary benefits could be engineered between the allied UK Institutional Repository Search and the IESR Project in areas of machine-driven harvesting and discovery of services;
- Inclusion of all existing and future JISC Collections into IESR;
- Inclusion of University / College OPACs into IESR as part of an extended COPAC use case.

- Incorporating Inventory of non-commercial digital repositories & archives project (DRAI) into IESR. This was done as an additional work package within normal IESR activity;
- Exploring inclusion of results from JISC digitalisation projects;
- Inclusion of a cataloguer / contact manager / user-orientated role. This aim of this role was to provide day-to-day user-support services for individuals and groups wanting to obtain IESR benefits. This was a user-facing engagement-orientated post and provided help and knowledge with cataloguing effort into the IESR;
- Redesign of the current IESR website to support usability processes relating to the data editor and provide services to allow users to more easily produce their own descriptions. Also inclusion of Web 2.0 community tools such as RSS and tagging;
- Inclusion of NHS-orientated digital collections to demonstrate cross-service benefits

Complimentary to these new areas of work, ongoing IESR Core technical activities were prioritised in the ongoing work activity and included:

- Importing descriptions from Data Archive / ESDS by OAI-PMH;
- Importing OCKHAM by OAI-PMH;
- Completion of inclusion of JISC Collections records;
- Web Services Interface (SRU / SRW / SOAP);
- Data Editor Developments;
- Refinement of existing QA process relating to manually-entered and harvested records;
- Development of a standalone editor to create IESR description on local site
- Development of RSS alerts for new information
- Development of an automated check for resource availability in IESR

Implementation

Software Development

Development activity was focused on improving access to IESR's information and ensuring that the process of contributing data was as straightforward as possible. Some research and mapping of IESR data to UDDI had been undertaken during the lifetime of the IESR. Work on the UDDI view of the IESR data was discontinued and a Web Services SOAP interface to IESR was implemented, including support for SRW.

RSS alerts were created to syndicate the addition of new resources to the IESR.

The existing service availability checking had been extended to include IESR-described services other than Z39.50.

Also inclusion of support for describing, and capturing within the Data Editor, the types of information about users that are required by Shibboleth-enabled services (attribute acceptance policies).

Methods of ingesting XML descriptions into IESR from other registries and applications were investigated and appropriate interfaces developed. This supported collaboration and data

sharing with other relevant registries within the JISC arena, and batch harvesting of data descriptions by contributors.

The existing Cheshire-based Registry software would be released as open source under an appropriate licence towards the end of the proposed funding period. An assessment of the existing Cheshire-based software search functionality concluded that desired advanced search and discovery functionality could not be enabled nor scaled so an alternative Autonomy IDOL-based interface has been built alongside this to provide extended functionality.

Metadata

The project team have continued to develop the metadata schema used by the Registry to meet the needs of the IESR's stakeholders and to keep the schema in line with international standards such as the Dublin Core Metadata Initiative's Collection Description Application Profile and the NISO Metasearch Initiative Collection Description Specification.

However towards the end of the project phase, in response to user demands, they have had to take pragmatic decisions to minimise the metadata schema which had become a major barrier to entry for contributors.

Dissemination

The project team disseminate information about IESR, through conference and workshop presentations, conference papers, articles and the upgraded and re-branded IESR website. A re-designed communications and dissemination plan was developed, aiming to reach a variety of different stakeholder domains.

Demonstrating use

The IESR team have been collaborating as much as possible with colleagues on related JISC-funded projects in order to demonstrate use of the IESR.

These have included the Subject Portals Project, HILT and PerX. Practical demonstrations of interactions with the IESR have helped to promote the idea of service registries in general and encourage both potential users and contributors to engage with the registry. It was planned that activities of this nature would form a significant area of work in the service-in-development phase of IESR. Some examples of use cases have currently being developed, and this work will be refined and ongoing throughout the next phase (Jan 10- Feb11). The project team engaged in work with the extant JISC Information Environment Test Bed project.

Increasing contributions

The usefulness of the registry was perceived as being directly related to the number of collections and services described within it. An important area of activity for the project in this phase was to develop new and enhanced processes to encourage owners of electronic resources to include information about those resources within the registry in an easy to do way. This would cover a wider scope than the current IESR content, including for example descriptions of institutional resources such as repositories, catalogues and resolvers.

Policies have been developed for the inclusion of such collections within IESR, in consultation with the JISC. The description of institutional repositories will become increasingly important as more and more institutions create these resources and will want to make sure that their existence is advertised and their contents used within the academic environment.

Quality Assurance

The previous evaluation of the IESR by CERLIM confirmed the importance of the role of the IESR's Content Manager. As the number of resources included in the registry grows, this role will be increasingly vital to ensure the currency and accuracy of the descriptions, and to liaise with contributors. Automated checking procedures for the availability of services were developed in this phase, while the currency of existing data addressed by the introduction of periodic manual checking by contributors but more importantly, by in-house effort from the new IESR Cataloguing role.

Review

A number of formal reviews of the project have been undertaken in the third year of this service-in-development phase. (JISC RPP and Becta Evaluation of the IESR Project, 2008); IESR Project to Service Transition Plan, 2009)

Project Outputs

The main project outputs have been focussed on (i) developing and implementing a turn-around strategy for IESR and (ii) designing new business processes to promote increase in collections and community and user engagement. This encompassed high-level outputs being:

1. Improved procedures for contributing and accessing IESR data;
2. User assurance procedures to ensure that the IESR metadata schema meets the needs of users of the Registry
3. Support and assistance measures to encourage resource providers to include information about their services within IESR;
4. Presentation at Open Repositories 09 describing IESR's involvement and alignment with the Global Registries Initiative;
5. Raising awareness of IESR through the website, workshops, conferences and publications
6. A formal review of the impact and effectiveness of IESR, in consultation with the JISC.

<u>With specific outputs being:</u>

- Improved web search and browse facility using Autonomy IDOL;
- Improved data entry processes;
- Suggestion facility for additional resources for users;
- Deployment of an RSS alerting service;
- Improved process for harvesting and ingesting data;
- New website to promote engagement and new focus of IESR;
- Data cleansing of DRAI;
- Updated data quality assurance procedures;
- Prioritised content selection policy for specific subject areas (health, social sciences);
- More easy to use cataloguing support documentation;
- Simplification of the metadata schema;

- Increased content;
- User focus groups and engagement activities to guide feature enhancement;
- Improved technical documentation;
- Greater participation in workshops and dissemination events.

Summary of achievements

A number of problems were identified in contributing content to IESR and accessing it once available. The time necessary to create collection descriptions and the level of detail required was recognised as a major barrier to increasing the range of IESR content.

Creation of a typical record (comprising a collection, service and agent description) was taking around 30 minutes for someone familiar with the process to complete. It was recognised that this approach was unsustainable at a service level and needed to be addressed.

The new implemented cataloguing and data input form provided a more user friendly interface, including a streamlined set of properties and lowered existing barriers to content development. The new data input tool has significantly reduced the length of time required to create a record.

A cataloguing service was implemented to assist new contributors and had been promoted amongst key user groups.

The standards-based metadata developed by IESR has and still is being used by several initiatives internationally, including two project partners within the Global Registries Network.

The IESR at that time included a good range of electronic resources representing most of the major UK collections and there was a substantial increase in content during the past year. By December 2008 the IESR included 5520 collections, 6804 services and 6769 agents.

The IESR Web site had a major re-design in terms of voice and message in relation to benefits to contributors and the community. (www.iesr.ac.uk)

This substantial increase in collections within IESR from the aforementioned plateau in 2007 has continued to date.

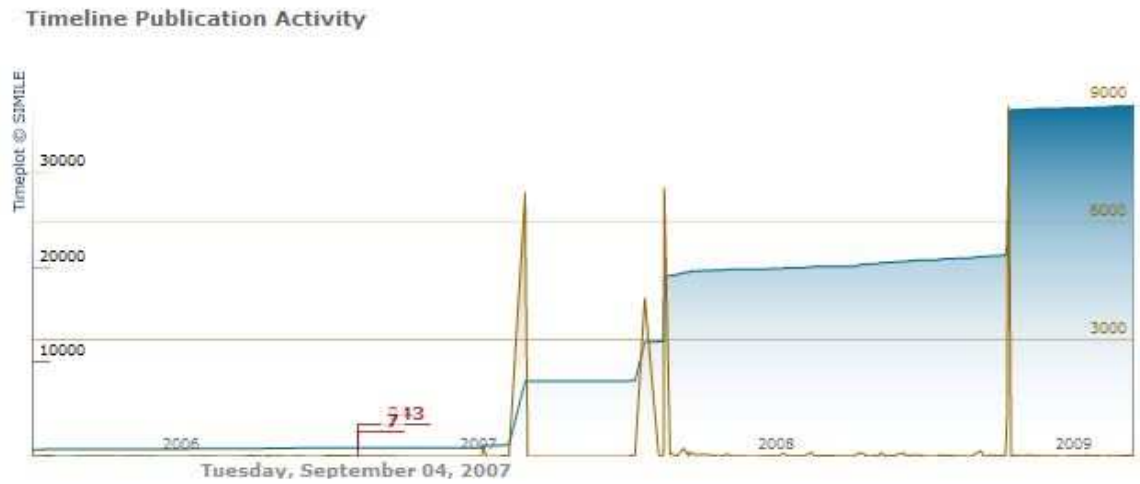

Figure 1. Volume of IESR Collections

IESR is a member of the Global Registries Network, which aims to enable global discovery of resources by sharing details between registries internationally. Currently IESR is collaborating with the OCKHAM Initiative, which is the registry of the US National Science Digital Library, and the ORCA-Registry, which is the Australian registry of scholarly repository collections. This initiative suggests a potential for worldwide use of IESR.

Awareness raising activities involved promoting IESR at events, conferences, meetings and through presentations and publications. The new IESR website re-launched in early 2009.

A review and evaluation of IESR was conducted during 2008 in consultation with JISC. A number of recommendations were presented and these have incorporated into project developments during the latter part of this phase.

Work started in early 2009 focussed on development of a demonstrator which highlighted the search and discovery benefits of IESR.

Main Conclusions and Implications at end of Phase IV (Dec 09)

At the end of this phase it was agreed that it was too early to establish if the turnaround strategy and revised user-focussed aims had worked. The activity up to this point was to establish new ways of working and optimisation of processes.

Now that these processes had been built into and made ready within the IESR service, we were now ready to commence user-engagement adopting the step-change approach offered by the repositioning activities.

It was agreed between the team and JISC Programme managers that a primary focus on resource, bibliographic and data collections was the main scope area for the next phase during 2010. Importantly, the preparatory and remodelling work needed an opportunity to see if this now was the way to go with IESR in moving from a technical to user-focussed service having clear end user benefit.

However in order to achieve this end-user benefit there needed to be a radical re-appraisal of the legacy technology underpinning the IESR catalogue and search infrastructure.

There were longstanding difficulties with the maintenance and adaptability of the Cheshire software that prevented necessary modifications to the data entry process. This was exacerbated further following the decision to significantly streamline the IESR data schema.

This was not a problem that could be solved in the short term so work was scheduled in the 2010 phase to completely replace the Cheshire software with a more conventional and supportable database.

It was important to radically improve the user search experience as a matter of urgency. As Mimas was in a position to extend its enterprise technology layer at no additional cost to the IESR project the decision was made to utilise Autonomy IDOL for search and indexing functions.

This decision was based on a cost to benefit basis. Considerable time and resources had already been deployed historically in trying to optimise search from legacy software and it wasn't justifiable to commit further resource for minimal return in this area.

Mimas had experienced major benefits in search and indexing capabilities from its development and evaluation of Autonomy IDOL and Lucene as part of the UK Institutional Repository Search Project in addition to developing valuable deployment experience of this these technologies in the Research and academic space.

The current IESR user interface and indexing engine was replaced using a lightweight Autonomy IDOL layer. This allowed our developer to replace the interface within 2 weeks with a beta interface being released for user testing.

This created a massive increase in user-end functionality in a very short time sitting on top of the legacy Cheshire system. This allowed us to commence engagement activities whilst the technical development team could focus on the more longer job of unplugging and replacing the legacy base tier.

Key functionalities now offered are visible on www.iesr.ac.uk and include:

- Serendipitous browsing of collections and guided navigation;
- Ultra-fast return of searches by keyword and relevance ranking;
- Dynamic clustering of collections into related areas from the IESR corpus;
- Real-time identification of contextually-related collections to a given search using semantically-driven mining from available collection descriptions.

This is a new and unique capability extended within IESR that, apart from the UK Institutional Repository Search (http://irs.mimas.ac.uk/demonstrator/) and later projects, has not been available to the Academic community before.

Implications

A Service Registry with frequently updated, wide-ranging information about available resources will make it easier for researchers, teachers and learners to find information and applications that are relevant to them. For providers of portals, the IESR will supply reliable information about electronic resources, saving the developers time in finding out the best way of connecting their applications to the various services that are available. The resource providers will find that the use of their services increases, as information about them is made accessible through the IESR's interfaces.

As use of the IESR becomes more widely demonstrated, it is expected that resource providers will see the advantages of using the machine-accessible interfaces that are promoted by the JISC Information Environment. This will encourage more providers to consider building such interfaces on to their resources, further encouraging use by researchers, learners and teachers. Project deliverables for the next phase are:

- Continuous iteration cycle to deliver flexible, adaptable components. The benefit of this will enable easy integration with existing systems in response to user-driven requirements and feedback;
- Changes to technology base and upgrade of technology infrastructure. The benefit of this will be to support more flexible use and integration of IESR both as a machine-machine service and web interface;
- A range of flexible resource discovery tools and mechanisms enabling users to exploit IESR content. The benefits of this will be more effective use of time and resources;
- Workshops to gauge requirements, evaluate outputs and demonstrate methods of exploiting IESR more effectively. The benefits of this will allow user-driven feedback into the iterative development cycles;
- Case studies demonstrating practical applications of IESR. The benefits of this will create tangible use cases to guide new potential users in how IESR could benefit their service;
- An IESR resource centre whose benefits are support and guidance to end user academic, information and technical stakeholders wanting to use IESR to enhance their service.