Co-East ICT Strategy and Framework Assessment Report

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Submitted by CrossNet Systems

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CONTENTS

1 - EXECUTIVE SUMMARY

The purpose of the Co-East ICT Strategy Assessment is to investigate:

- Stabilising the existing public library network, before the addition of new libraries and the procurement of new systems
- Establishing a firm position for Co-East within new regional structures as the operational arm of the library and information sector.

Several key areas were assessed with the following summarised findings. Note that the aspect of assessing the ICT Strategy in terms of cross-sectoral systems (e.g., museums, archives, libraries) has not been fully addressed.

ICT Strategy:

It is considered that whatever model is chosen for the ICT Strategy that there will be similar technical issues that prevail in terms of security, interoperability and reliability.

Standards:

It is evident that the amount of effort in Z39.50 technology has been in terms of interoperability at the syntax level, and that this is not matched by the same degree of effort at the semantic level. Initiatives such as the Bath Profile are positive in this respect, but such profiles now need a period of visible stability to actively encourage system suppliers to conform or catch up to the profile specifications.

The ISO-ILL profile is complex by its sheer size and this gives a high risk to syntax and semantic interoperability. Consortia such as Co-East who deploy more than one ISO-ILL system should account for formal interoperability testing and encourage suppliers to proactively incorporate testbeds.

Migration:

Partners should place much more emphasis towards interoperability in their supply processes and take this to a finer level of detail and specifications. Guidelines to this are supplied at Appendix C.

Compliance:

There is much scope for interoperability and communications problems with the standards being used. Suppliers need to be more open about the specifications of their software in this respect and the consortium would benefit from an independent consultant who is able to verify interoperability standards to the necessary level of detail.

Stakeholders:

It is evident that the stakeholders are keen for a solution in order to protect their investments. This tends to suggest a “hybrid” approach between those partners who

have their own systems already and partners who are yet to come on board who may favour a managed centralised service. The costs of such a centralised service may appear higher at first, but there are hidden cost savings that are difficult to accurately define.

Co-East have suffered from being early implementers of rather complex protocols within the public library marketplace.

Recommendations:

Although it is a more complex approach, the current recommendation is that a hybrid system such as that described at 3.1.3 would be the most suitable.

It is recommended that a suitably experienced IT person is available to insist on the adherence to agreed profiles and standards, manage resolution of faults such as Z39.50 server outages and assist with management of migration to new systems where necessary.

The NCIP standard could be used either as a means of integrating a standalone ILL system into a range of library automation systems, through the provision of a standard web service or as a means of sidestepping ILL altogether.

It is recommended that the Bath profile Area A (bibliographical search and retrieval) at level 1 is adopted. Suppliers should be actively encouraged to meet this specification. In addition, systems should improve the quality of their holdings and circulation data.

Server specifications that minimise downtime, have a reasonable amount of spare capacity, can be readily administered and are suitably protected in terms of security and power supply should be adopted.

2 - INTRODUCTION

Co-East emerged as a body following funding from DCMS / Wolfson in 1999/2000. The funding enabled six library authorities within the East of England region to explore how library resources, such as library catalogues and community information databases, could be made available to the public on a regional basis through exploiting cutting edge ICT developments.

A key aspect of the project was to facilitate direct public access to these resources, both within libraries themselves and through remote access to these resources via users' computers at home, work or other community venues. It was envisaged that the end result would be the creation of a virtual private network, available in 181 libraries across the region and directly in people's homes.

At the end of the funded phase in March 2000, Co-East continued to operate on a Consortium basis to pursue both the technical solutions required to continue to share resources regionally and also to establish itself in the long-term as a body, working across the East of England to deliver, at an operational level, a fully fledged Inter Library Loans system.

1.1 Purpose of Assessment

The Co-East Board has identified that further discussions will be necessary to

- Stabilise the existing public library network, before the addition of new libraries and the procurement of new systems
- Establish a firm position for Co-East within new regional structures as the operational arm of the library and information sector.

3 - REGIONAL ICT STRATEGY

The following requirements were presented in assessing the framework for the Co-East and Co-East plus infrastructures:

- It must reduce multiple configurations and re-configurations as a result of upgrades, migrations, changes to LMS, and other requirements arising from the use of corporate networks.
- It must ensure enhanced security, and reduce firewall problems resulting from upgrades, migrations, changes to LMS, and other requirements arising from the use of corporate networks.
- It must provide a platform through which a potentially high number of institutions can access various types of services (cross-searching; inter-lending etc), remotely-managed and otherwise
- It must also be able to host websites from the simple to complex, which might require such tools to perform remote desktop access, web statistics software, together with secure access for technical and content maintenance.

In addition, a review and assessment of the models best suited to regional interoperability should be undertaken which would not only help run the existing network a bit more efficiently than it does now, but also would help it to be scaled to cross-sector, cross-domain institutions, specifically on the model that Co-East have been looking at.

3.1 Model Options

The investigation into the possible ICT Strategy for Co-East has thrown up three main options to be considered below. It should be noted that analysis for a centralised physical union catalogue has not been required.

3.1.1 Each partner has their own system for inter-lending

In this scenario, everyone who wished to automate their ILL trading with the Co-East partners would implement and maintain their own portal to the catalogues of the Co-East partners and ILL system.

Advantages

The main advantages of this approach would be:

- Existing investment in ILL systems would be protected.
- Partners would be able to set and administer their own business rules. For example, some could have fully automated ILL messaging and others could have manual intervention.
- Each partner would be able to set up to communicate with ILL partners outside the Co-East consortium if they wished.

Disadvantages:

However, there are significant disadvantages to this approach:

- Duplicated effort. Each partner would have to carry out the exact same processes to implement the portal of library catalogues at their site and set up the ILL parameters.
- There would be no central control of the standards being used. Each system would have to test and set up with all the other systems in use.
- There would be duplicated costs for hardware, software and support.
- Co-operation would be made more difficult, due to the different systems in operation at each authority.

3.1.2 A completely centralised model

In this scenario, all of the partners would participate in a totally centralised system that would provide a common portal to the library catalogues and ISO ILL messaging for requests.

The central system could be hosted at one of the partners or outsourced completely to a supplier.

Advantages

The main advantages of this approach are as follows:

- Complexity would be significantly reduced, as there would only be one system in operation.
- It would be cheaper and more cost effective, as there would only be one set of hardware and software and one set of support costs.
- There would be a centralised and single point of management
- There will be greater reliability as a result of reduction in complexity and management overheads.
- This approach could also lead to the implementation of further resource sharing projects.

Disadvantages

The main disadvantages of this approach are that it:

- disregards existing investment in ILL systems,
- will introduce integration issues with library management systems, as some partner's systems have preferred ILL software packages.
- potentially allows less flexibility for individual partners to set up their own ILL partnerships and business rules; and,
- there are additional cost overheads in authorities procurement procedures.

3.1.3 A Hybrid solution

It would be possible to build a solution that would allow some centralisation of functionality and also some degree of independence. For example, there could be a central system in place that would be available for those partners who had no access to their own ILL systems. This would provide the portal to the member's catalogues and the ILL messaging for these partners.

Partners who wished to implement their own ILL systems could use the central system for searching, but their own integrated ILL systems for the messaging. Their systems would have to interface with the central system, but not necessarily to the other independent systems, as the central system could act as a clearinghouse for ILL messages.

The central system could either be hosted locally at one of the partners, or outsourced to a supplier.

Advantages

The advantages of this approach are:

- It protects existing investments where needed
- It allows larger players to invest in technology recommended by system suppliers
- It still provides some centralised management
- It provides a way for those partners with no system to become involved.
- It still provides a route for further projects to resource share in the region.

Disadvantages

The main disadvantage of this approach is that it is more complex to set up and manage than the purely centralised system, as there is a range of systems to connect together.

In addition, the cost of this option is likely to be higher from a capital perspective, but reducing hidden costs such as less staff time involvement and charge-backs from IT departments should offset this.

3.2 Comments on the Scenarios

None of the scenarios solve some issues with interoperability – these are:

Reliability. One of the weak points of the connectivity is the Z Server, which must be available all the time.

Network connectivity. All of the catalogues are still distributed, so must be available for the service to work

Firewalls. Again, access through firewalls must be reliably maintained for the service to be successful.

All models require Z39.50 connectivity between portal and Z servers.

Models a) and c) also require ISO ILL between partners, with model b ISO ILL messages are entirely within hosted system.

All models require web access between partners.

3.3 Cross-sector Information Sources

It is noted that the ICT strategy could include provision of access to other resources such as museums and archives and digital collections. Some feedback in this respect was received from stakeholder discussions. There are several factors and implications involved in this.

Accessibility to such services

The user interface to other services such as museums and archives involves several criteria to address:

- different types of content such as images, audio, video;
- the data can be of different structure – eg, archive data is often of a hierarchical nature;
- there are issues in terms of applying an equality in searching to the indexes that such data offers where different standards apply;
- there are different connectivity mechanisms – for example, many museums in the region use the MODES package and MODES does not have a Z39.50 interface and many museums do not have internet connectivity at all.

There are few cross-sector search systems in the UK, and CoEast could benefit from the experience drawn by Norfolk in their recently launched NOAH service.

Value added services

It is feasible to layer the ISO-ILL standard across access to archives/museums in the sense of requesting copies of (say) images, or archive material (wills, probates etc).

Other value added services could be included such as:

- drill-down from the portal to underlying native web interfaces;

- provision of logistic data about the data sources (opening times, access etc);
- more function-rich portal services such as SDI.

It is evident that these types of service are only just beginning to appear in such portals, and a complex and detailed analysis of such services is beyond the scope of this assessment work.

4 – FACTORS FOR CONSIDERATION

It is difficult to prescribe any particular system specifications because the following need to be considered for each:

- Which specific software products would be used;
- Whether there was a preferred choice by an authority to a particular platform;
- Which of the models in the previous section are used.

With respect to the model (3.1.1) where each partner has their own system, we are not really able to advise because it is a matter between suppliers and partners.

With respect to models (3.1.2, 3.1.3) the following subsections in this section apply if any partners co-share their systems on the same equipment. Note in this context, co-sharing infers that each sharing partner is using the same system.

For either of the models suggested in section 3.1, it is advised that a test environment is set up in addition to the operational environment. Changes should be applied to the test environment before committing to operations.

System suppliers would need to advise if there are any licensing ramifications.

4.1 Server Specifications

The following general factors affect the server specification. These factors are particularly difficult to ascertain and require input from persons/organisations who have a good knowledge of hardware on the market and also from persons/organisations with experience in setting up and monitoring such systems.

Number of Partners on board

The system sizing should account for the number of partners that will be accommodated. It should take into account:

- Will partners eventually always be in a single co-operative or want “islands” of inter-lending within themselves or to other organisations;
- Do partners have plans to re-organise their own authorities and how would such re-organisation be represented in Co-East;
- What are plans regarding inclusion of other services than libraries for the purposes of cross-domain searching;
- Would the cross-domain searching be the same software as that for inter-lending.

Anticipated numbers of concurrent users

The system should be gauged in terms of the number of concurrent users as this can affect parameters of:

- Memory in the server;
- Processor performance, (possibly number of CPUs in a server);
- Network bandwidth for communications data;
- Disk and backup capacity (storage of log/MI data).

It is difficult to estimate the number of concurrent users in any system, but this can be affected by:

- Any existing system usage statistics
- Experience of staff in gauging interest and usage.

If usage exceeds planned sizing, the following can occur:

- All system memory can be used up resulting in system disk swapping – this has a severe degradation on performance;
- System processor usage is at full capacity resulting in poor performance;
- Network bandwidth usage can degrade the performance of other systems on the network

Approaches to avoid performance problems include:

- Setting limits to the number of concurrent users;
- Using real-time housekeeping to ensure that user sessions are terminated and closed properly;
- Using real-time housekeeping to alert IT staff if memory and CPU usage limits are reached.

Planned growth and headroom:

It is important to gauge the system sizing in terms of planned growth over (say) a period of 3 years or whatever life time the systems are expected to last. Factors affecting this are:

Authorities expressing interest in the project;

Anticipated cases where authorities may divide/merge to separate authorities;

Anticipated cases where authorities may change their system and have different requirements fore participation.

In the circumstances cited above, it is usually cost effective to allow for more CPU performance, memory and disk capacity in the initial purchase of a server than to purchase additional capacity at a later stage:

- Increasing memory capacity may require the current memory be removed and replaced thereby resulting in redundant memory (and cost);
- There are additional IT installation costs;
- There is a finite cost (administration etc) in that the server will be "down" for whatever period of time is necessary to do the upgrade;
- Disk capacity should be planned in terms of RAID or hot-swappable disk drives.

4.2 Other factors

Gauging Network Traffic

It is difficult to gauge the amount of network traffic for any such system and this is dependent on the model chosen. However the following are possibly useful for this, where we cite elements in formulae:

Z39.50 traffic:

Each z39.50 session comprises a direct TCP/IP network link from the system to the Z39.50 servers:

- Initialise request/response (approx 150 bytes);
- For each search request and search response (based on a 20 character term) (approx 80 bytes);
- For each record reviewed (approx 1500 bytes)

The system design will determine how many records are retrieved – some systems retrieve many records "behind the scenes" in case the user might want to see them or for de-duplication and sorting purposes. Other systems fetch records on a user demand basis.

ISO-ILL traffic:

ISO-ILL traffic varies in length from message to message, but the longer messages are the ILL requests. These can vary according to the number of bibliographic parameters and can be of the order of several hundred bytes. The other messages (e.g. overdue, lost) are up to (say) 100 bytes.

ISO-ILL traffic can be carried as either a direct TCP/IP connection or on emails. Note that email traffic is approximately double the size of the direct TCP/IP traffic because the data is MIME encoded.

Web access

A centralised service would bear the traffic of the web user interface. The usual factors apply in terms of graphic and image density and the quality of the html data.

Other factors affecting the web usage include:

- System design in terms of active components loaded to the browser;
- Whether the system deploys "server push" screens to update search progress.

Web traffic is likely to be significantly higher than Z39.50 or ISO-ILL traffic.

Logging of MI data

The system should be sized regarding any logging capacity of management information data and over what period the data is retained on the system. This will affect disk and backup capacities.

Other factors

Other factors to consider include:

- Protecting the system with an uninterruptible power supply;
- Management of backups either by a local tape system or corporate LAN backup store facility.

5 – APPLICATION OF STANDARDS

A number of international standards are applicable to the ICT Strategy Framework, and it is essential that the software components in the framework are suitable compliant.

5.1 Standards affecting Cross-Searching

The applicable standards and their relevance are listed below.

ANSI Z39.50-1995:

ANSI Z39.50-1995 (ISO 23950) is the standard for the search and retrieval of the library catalogue data. It is a mature standard (originating in the late 80's) and is maintained by NISO. It was adopted by ISO in 1996 through a fast-track process to replace the now obsolete ISO SR protocol (ISO 10162, ISO 10163). The protocol is client-server based using packets of data transported in the BER "basic encoding rule" format.

Most vendors of LMS systems provide support for Z39.50 with varying degrees of quality and support for the different services in the standard. This variance (particularly in Z39.50 servers) accounts for behavioural differences in systems offered to users. For example, some Z39.50 servers support author searching as forename-surname, others only support surname-forename. This degree of variance is potentially confusing for users. It is often the case that extensive measures are deployed in systems that search Z39.50 servers to try to overcome differences, for example, whereas the Z39.50 standard supports sorting of data, most Z39.50 servers do not include this facility and so if the searching system wants to show the data in a sorted form to a user it has to retrieve the data and perform the sort itself.

Certain organisations have co-developed "profiles" that are intended as baseline levels of conformance for vendors to strive to achieve. There is little evidence that the existence of such profiles actively encourages vendors to improve their software. One such relevant profile is the "Bath Profile". The lack of conformance to these profiles by vendors could be attributed to the fact that such profiles are regularly updated and several profiles seem to be addressing similar intentions – it leaves the vendors an increasingly complex task to decide how and what to support. For example, NISO are developing their own profile (as Z39.89) and the Z39.50 Agency web site cites at least 7 other "national" profiles.

Further use of Z39.50

An additional Z39.50 service that is referenced in the Bath profile is the scan (browse) service. This allows a user to enter a term and view terms that appear in the catalogue that appear before and afterwards (like a dictionary). In a single database environment this is attractive because for simple terms this service is often a quicker than the same term in a search. However, in a distributed database environment this can be very complex because the user interface has to consider the following:

- Merging/de-duplicating terms from different databases;

- Complex algorithms in managing the pagination forwards and backwards;
- User interface management of cross referencing terms to databases.

It should be noted that the GEAC Plus and the DS Z39.50 servers support scan but the Dynix V2 Z39.50 server (as at Cambridgeshire) does not support scan.

MARC

In the UK, most LMS systems are based on either UKMARC or MARC21 (formerly USMARC). There is a trend in the UK for migration from UKMARC to MARC21. When used with Z39.50 systems, MARC records are provided in the ISO2709 format. The quality of records in LMS systems varies enormously from system to system. As organisations move from system to system, the bibliographic data is often exported and imported from system to system and this can result in quality degradation.

MARC Holdings

LMS systems often use fields in the MARC records to depict the holdings and circulation status of the items. The MARC21 standard defines location details (in the 852 field) and electronic access (in the 856 field). However there seems to be a complete disregard for this in many LMS systems where there are widely varying degree of conformance.

For example:

A GEAC-Plus circulation field:

```
*999  CIRCULATION:
      indicators:  <  >
      $z  Chelmsford
      $z
      $z  Adult Book
      $z
      $z  Due 23/04/2003 00:00:00
```

A DYNIX circulation field:

```
*920  CIRCULATION:
      indicators:  <  >
      $a  GAMLINGAY
      $b  JF/CAS
      $c  checked Out
      $d  JUNIOR SPOKEN WORD CASSETTES
      $z  GAML
```

A DS Galaxy circulation field:

```
*852  CIRCULATION:
```

```
indicators:  <  >
$a  Bradford-On-Avon
$b  2349059000
$e  1
$h  ANF
$k  On Loan
$r  0
$x  2003-04-05
```

The implications of these when used in an inter-lending scenario differences include:

- neither the GEAC or DYNIX systems indicate the due back dates of checked out material and so staff manually deciding where to place a loan request to are unable to make a decision on a time basis;

- the GEAC system does not have a field that explicitly states the item is checked out – it is implicit;

- all three systems have different statuses (you need to see other fields to appreciate this) and unless the software harmonises this to common messages the staff need to understand these other systems;

- all three systems have different categories for items, potentially requiring extensive software to understand what these are.

This is therefore clearly a complex area to address.

OpenURL

The OpenURL specification is potentially important in allowing systems and their users to link through to different services that are capable of providing a resource. In the context of Co-East, OpenURL technology is potentially suitable for mechanisms for perhaps allowing the user of a distributed search system to link to the underlying OPAC, or, to perhaps make a choice of either loaning the item or making a purchase of that item.

For this to work:

- The library management systems being linked to have to operate in accordance with the specification of an OpenURL target; and,
- The systems providing data records need to include suitable information so that the OpenURL links can be generated.

To date, there are but a few systems commercially supporting OpenURL, although several OPAC systems support the conceptual behaviour of a Resolver.

The OpenURL specification is currently being put through the standardising process via a NISO committee, where public comment is invited until April 15th 2003.

5.2 Standards for Inter-lending

ISO-ILL

ISO-ILL (ISO 10160, ISO 10161) is the international protocol for interlibrary lending. It is a mature standard and is maintained by the National Library of Canada. The protocol comprises some 21 messages that cater for many possible scenarios of inter-lending. Like Z39.50, the protocol data uses the BER format, but the transport of the data can be a direct network connection or a MIME-encoded email.

Certain organisations have added and registered their own private extensions to the protocol, making it even more complicated for a vendor to achieve interoperability with another vendor's system. There is little information available regarding the support of these extensions.

Certain organisations known as the ISO-ILL Protocol Implementer's Group (IPIG) have co-developed an ISO-ILL "profile" with the purpose of base-lining applications against a practical working level. This is not just the working level of the protocol data interoperability, but also the operations of systems that use the protocol. For example, the operations of the standard allows for chaining of libraries. A request from library A can be forwarded on to library B and on to library C and so on. The reply from the end of the chain passes back along the chain to the originating library. On the one hand, this is useful for the libraries in the chain to understand (in the overall picture) who is loaning what to where – but on the other hand library A has to wait for the chain to be processed to know what is happening.

Given the complexity of the standard, adherence to the IPIG protocol is almost mandatory if interoperability is to be achieved.

Of the ISO-ILL systems on the market; some are components in a LMS vendors' suite, others are standalone applications. All such systems ideally work with the Z39.50 protocol and the ISO-ILL protocol side by side, but this is not mandatory.

NCIP

The NISO Circulation Interchange Protocol Committee has released a Draft of the ANSI/NISO NISO Circulation Interchange Protocol (NCIP) known as Z39.83 as a Draft Standard for Trial Use. The NCIP protocol has been designed in XML, and is accompanied by a DTD that defines the schema for transaction initiation and response messages. NCIP defines a repertoire of messages and associated rules of syntax and semantics for use by applications to:

- Perform the functions necessary to lend items;
- Provide controlled access to electronic resources; and,
- Facilitate co-operative management of these functions.

The standard specifically addresses conditions in which the application or applications that initiate the lending of items or control of access must acquire or transmit information about the user, agency, items, and/or access that is essential to successful conclusion of the function. The protocol also addresses the use of an agency's circulation application to manage access by a user to electronic resources such as electronic books, serials, and sound recordings.

The NISO Circulation Interchange Protocol Committee has based its work on the Standard Interchange Protocol (SIP) developed by 3M to support self-checkout systems. The 3M SIP supports a significant portion of the inquiry and update transactions to be defined in NCIP. In addition, the 3M SIP protocol is in wide use by a variety of libraries and self-checkout vendors around the world. It is anticipated that moving from this de facto base to a national consensus standard will facilitate the development of open systems.

5.3 Profiles

The standards that are emerging in the last decade are becoming increasingly complex and tend to take the approach of "satisfying most of the implementers most of the time". In practice, vendors find that the standards are a superset of their specific requirements, often resulting in cases of:

- Implementors only implementing part of a standard that meets their requirements
- Implementors possibly being put off altogether and doing something proprietary

There are positive attempts at improving interoperability by developing "profile" documents that specify agreed subsets of standards. Relevant profiles are:

Bath Profile:

This is a Z39.50 profile that has been designed to identify those features of the Z39.50 standard that are required to allow effective use of Z39.50 software in a range of library applications, including search and retrieval of bibliographic data from library catalogues; transfer of holdings information; cross-domain searches between libraries, museums and archives; updating union catalogues; item ordering and document delivery. It was designed in 2000 and was recently released to version 2. Despite the significant interest in this profile from implementers, vendors etc. there is a disappointing take-up of all but the basic conformance. A Bath Profile event is scheduled for July 7 this year in Bath to further promote the profile.

IPIG Profile:

This is a profile for the ISO-ILL protocol devised by the ISO-ILL protocol Implementer's group. It was issued in 2001 after several years of design and discussion. Given the low number of ISO-ILL systems available, this profile is of high significance because otherwise there is a considerable risk of interoperability failure.

Nevertheless, despite the existence of this profile, many organisations have added small private extensions to the ISO-ILL protocol and it is not known about the degree of

usage of these or their significance to Co-East systems in use. Version 3 of the IPIG profile was released in July 2002.

5.4 Z39.50 Blueprints

In the meetings with stakeholders (Appendix a) the meeting with the University of Hertfordshire refers to Z39.50 blueprints that the Inform25 system team have collated in conjunction with system suppliers – this information remains confidential.

The terminology "blueprint" in this context is somewhat indigenous to the Inform25 team and any internet searching in this context will not reveal anything of use.

Whilst system vendors do not typically publish such details, some libraries and library organisations will do so, for example:

An individual organisation that has developed their own system:

Research Libraries Group (RLG): http://www.rlg.org/zephyr/zepbib.html

A consortium: http://castor.tsl.state.tx.us/ld/projects/z3950/serverinfo.html

An individual library:

http://server.silo.lib.ia.us/z3950_htmls/r_bend/r_bend.html

Internet searching for such details is not so easy – for example, using Google on:

"z39.50 server details"

"GEAC cl_default" (where cl_default is the usual logical database name used by GEAC)

can be fruitful.

5.5 Systems suppliers adherence to standards

A report is given at Appendix D as to the current status of the systems in use within the Co-East partners.

6 – MIGRATION APPROACH

The supplied briefing document identified that the migration by partners of systems, networking infrastructures and components of systems presents issues that can lead to service failures and downtimes.

The following lists issues pertaining to system migration. We have provided a example check-list of issues that should be raised with suppliers in Appendix C.

It is important to recognise that the sustainability of the service is affected throughout all the lifecycle of the system in service, as denoted by the following typical lifecycle:

Tender specifications

Tender process and selection

Decommissioning with current supplier

Commissioning with new supplier

Operational lifecycle (maintenance)

Enhancements and updates

Tender Specifications

Any tender specifications should make suppliers aware that the supplied system has to be conformant to the relevant specifications. Tenders could invite prospective suppliers:

- To provide detailed information on how their system is compliant in standards, interoperability, and how they can demonstrate such conformance;
- To clearly demonstrate their awareness and/or participation in the relevant standards bodies;
- To provide relevant reference sites and applicable white papers etc;.

Tender Process Selection

Related to the point above, the suppliers could be asked to demonstrate the following:

- Their willingness to cooperate to interoperability testing with other organisations;
- How they can demonstrate interoperability testing in such deployment;
- If and how the products can provide diagnostics of interoperability problems;

- If and how the products can focus to and be tested around the specific area of failure.

Decommissioning with current supplier

If the migration is the result of a system being replaced then there should be a formal decommissioning approach:

- For the supplier to provide all appropriate interoperability technical parameters being used by the system;
- To consider the logistics of when one system is being set up and switched to the new system;
- To address additional networking and connectivity requirements;
- To consider an overlap period when each system can be tested side by side to compare behaviour against requirements.

In the latter point, a formal plan should be drawn up to ensure that the migration is tested to all operational requirements. This might seem like an overhead in costs, but should be traded off against the costs of resolving problems and possible system downtime. Any such planning should refer to the relevant part of the checklist given at Appendix C.

The elements of a plan would require:

- discussion between outgoing and incoming supplier concerning interoperability areas;
- outgoing supplier clearly identifying and demonstrating the interoperability criteria against other systems to the incoming supplier – appreciating sensitivity of confidential aspects of product design;
- incoming supplier being made fully aware of the decommissioning plan;
- that these points are treated as mini-milestones and that the authority is fully informed of what is happening.

Commissioning with new supplier

The commissioning with the new supplier should take into account the following:

- To address additional networking and connectivity requirements and involve relevant networking and security staff as necessary and to include relevant knowledge transfer of interoperability protocols as required;

- To ensure all partners are aware of the deployment timescales and be aware of all planning and test activities;

- To plan the setup of Z39.50 servers in terms of necessary indexes, holdings information, circulation formats, fields in records, search attribute combinations;

- To verify the conformance of the system in terms of interoperability against test beds;

The latter point might involve the requirement of relevant independent consultants to check and verify that the systems are suitably set up to be compliant against the agreed specifications.

Operational lifecycle

Throughout the life of the system it is likely that there will be changes that can affect the operations of the service:

- System upgrades should be put onto test environments before committing to operations;

- Real-time monitoring should be applied where possible to automatically detect and notify support staff of operational problems;

- System downtime (including network problems) should result in relevant stakeholders being notified;

- System moves, network changes etc should be carefully planned and notified to all relevant stakeholders in advance;

- Other partners should be notified of any changes to systems in case of operational behavioural problems arising;

- Partners should be kept up to date with changes to standards. Etc. that may reflect on future planning and specification revisions.

Technical Specifications

The relevant technical specifications that suppliers should provide are:

Z39.50:

- Combinations of search attributes;
- Setup and configuration of holdings and circulation information;
- Support of relevant profile and respective profile version (eg, Bath 1.1)
- Server address details;

ISO-ILL:

- Choice of communications – email or TCP/IP;
- Support of relevant profile (eg, IPIG);
- Making available the branch, stock and loan criteria rules;
- Email address details (if using email).

7 – COMPLIANCE APPROACH

It is important for suppliers to ensure that their systems are suitably compliant to the technical standards in use. The following apply:

- Ensuring the definitions of standards are well known and explained to all relevant staff;
- Ensuring that the standards for connectivity and protocols are correctly met;
- That the applications that use the standards conform to the expected operational behaviour – e.g., transitional behaviour (state) and profiles;
- That the technical parameters of the systems in use are describing and letting partners know about systems;
- The selection of technical criteria and configurations need to be through agreements between partners – this will optimise against confusion and problem solving'
- A formal testing approach should be adopted to ensure that each system confirms to the expected behaviour;
- That system vendors should be closely involved when configuring and testing systems, and that the tracking of problems and issues is a joint responsibility between vendors. Vendors should not be just allowed to claim "it is not my system at fault" without detailed proof of supporting evidence;
- All partners should retain and maintain version control awareness of systems by ensuring that their suppliers clearly state which version of the software they are running;
- All partners should maintain version control awareness of standards by ensuring that their suppliers clearly state which versions of standards (and profiles) their products support;

It is advised that an independent employee/consultant be used in the testing scenarios to have an independent and credible view to where "the buck stops" if any impasse between suppliers is reached. There are individuals or organisations in the UK who could provide such impartial knowledge and credibility that could be called upon.

7.1 Other Existing possibilities

Co-East should consider setting up a test bed scenario for interoperability problem solving. Again, an independent organisation or consultant could be deployed for this, and there are a few suitable freeware or open source packages available to be used.

7.2 Running a Test Environment

It is mentioned above that a test environment be operated in conjunction with the operational environment.

The purpose of the test environment would be:

- to provide operations verification in case the operational environment were to fail;
- to ascertain the impact of changes (bug fixes, cosmetics etc) before committing to the operational environment;
- to use as a fall-back in case the operational environment were to fail.

At the point that the system becomes operational, the test environment would be identical in terms of functionality; ie, it is a mirror of the operational environment, but with the following criteria:

- any user interfaces of the test environment would not be publicly known, they would be only accessible to staff and support personnel;
- any transactions conducted with the test environment should be against fictitious or dummy data.

As changes are required to the system, these should be initially applied to the test environment and checked that the intentions of the change are correct.

At determined points, the test environment is copied to the operational environment. Such determined points might be:

- immediate, if the change is reflecting the resolution of a serious bug;
- grouped over (say) a month, if the changes are perhaps cosmetic.

It is necessary to consider the implications of running a test environment, including:

- additional capacity of memory and disk on the computer;

- implications of licensing, and it is suggested that suppliers are contractually bound to allow a test version of their software to be run;
- possible configuration settings to avoid conflict between the operational and test environments.

The use of a test environment fits into all of the models prescribed. For example, in the hybrid model, the centralised operational software would communicate with operational software running at a site of a partner that had their own software. If both the centralised site and the partner with their own software had test environments, then the test environments can be used without affecting the operational systems.

The implications of running the test environments are:

- there is extra software to be aware of - to some extent by all players involved;
- technical knowledge is required to test things out on the test environment;
- technical knowledge is required to transfer fixes and changes from the test environment to the operational environment;
- possible additional disk/memory capacity.

It is difficult to put a firm price on running a test environment and the cost advantages it would have, but some of the saved costs will be via:

- staff time spent on ascertaining faults and in determining causes of failure;
- being able to formally manage changes;
- by having a fallback system to work with.

8 – STAKEHOLDERS

Meetings have been held with thirteen organisations all of whom have been involved at some level in the pilot projects for ILL in Co-East or in discussions as to future co-operation within Co-East. The reports of the meetings are included in the Appendix.

8.1 Current ILL Practice – Public libraries

Only Essex Libraries use a computerised ILL system regularly. They are successfully sending and receiving messages with the British Library. They have also managed to use the system with Cambridgeshire although this is patchy due to operational problems at the Cambridgeshire end.

All of the public libraries in Co-East use their Co-East partners to some extent for ILL requests, currently using V3 or Unityweb for location finding.

8.2 Current ILL Practice – Academic Libraries

The three Universities visited all use the British Library extensively for requests, only referring failed requests to other sources. All are fully automated – the requests being placed directly by users and going without being refereed directly to the BL.

8.3 Co-East ILL Projects – Issues

Essex reported disappointment that the aim of having a virtual catalogue and ILL messaging between all partners has not been achieved.

Norfolk reported that not enough experience of using the portal system had been gained to judge it properly, but the main problem was that Z39.50 servers would go down, making the service difficult to use.

It was also reported that it appeared to be very labour intensive set up and maintain the ILL systems at Essex and Cambridge.

There appeared to be little concern about connectivity or firewall issues, although this may be an issue for Essex if they bring their VDX software in-house.

8.4 Co-East ICT Strategy

The pros and cons of having a distributed system as against a centralised system were discussed. The two academic institutions already have successful working systems and preferred to keep their existing setup. Essex are happy with the operation of VDX, but were not completely opposed to a centralised system. The authorities yet to purchase ILL systems were open to either scenario.

The perceived advantages of having a centralised system for ILL were:

- Smaller players and those without ILL systems would be given a solution and be able to take part.
- If the ILL were managed centrally, then the overheads involved in keeping the system working smoothly would be removed from the individual partners.

- The original concept of having a virtual catalogue and easy ILL communications may be achievable at lower cost.

Disadvantages were:

- Integration with library systems may be difficult if people used an ILL system not approved of by their systems supplier
- Loss of investment in existing systems
- Possible loss of flexibility - If a centralised system were to be implemented, it would be necessary to be able to set the system up to echo the individual needs of the partners; some would want complete automation of requests, others require moderation also there would be requirements from some partners to send requests outside the Co-East region.

There would be definite resistance to using a centralised ILL system from the academic partners, who clearly see the benefits of interoperability and distributed systems.

All were comfortable with a model that had place for some centralisation – maybe a virtual catalogue, but an option as to how the ILL messaging is carried out. This could take the form of hosted software for those who required it and distributed systems for those who preferred to run their own systems.

8.5 Future requirements / vision

Hertfordshire and Essex were keen to see the original vision of a virtual catalogue being made available to the public and automated ILL in place.
Bedfordshire suggested that paid for services could be made available to the customers of Co-East partners if the authorities with the paid for services could deal with those customers directly and charge them for the service.
When asked about using a network to share other resources - for example archives databases, nof-digi databases, museums databases, there was little enthusiasm. The emphasis was on getting the initial concept of access to library catalogues and ILL working.

9 – RECOMMENDATIONS

9.1 ICT model

Although it is a more complex approach, the current recommendation is that a hybrid system such as that described at 3.1.3 would be the most suitable. This will provide access to a central 'virtual catalogue' and a clearinghouse for ILL messages, reducing the administrative costs of maintaining separate ILL systems for those who wish to buy into this solution. However, it will also respect the requirements of those with ISO ILL systems, who can decide to continue with their own systems and bear the additional support costs of maintaining their own infrastructure for ILL.

9.2 Central management / IT consultant

It is recommended that a suitably experienced IT person is available to insist on the adherence to agreed profiles and standards, manage resolution of faults such as Z39.50 server outages and assist with management of migration to new systems where necessary. This could either be an additional member of the Co-East central team or additional training for an existing member or alternatively Co-East could use the services of an independent consultant.

9.3 Look at NCIP

NCIP could be used either as a means of integrating a standalone ILL system into a range of library automation systems, through the provision of a standard web service or as a means of sidestepping ILL altogether and allowing access directly to the individual systems for the placing of requests. This is a fairly new standard and would require further investigation to see if it can be usefully implemented within Co-East.

9.4 Adopt specific versions / profiles for standards

It is recommended that the Bath profile version 2 Area A (bibliographical search and retrieval) at level 1 is adapted. Suppliers should be actively encouraged to meet this specification. In addition, systems should improve the quality of their holdings and circulation data.

9.5 Suggested Equipment Requirements for a Central System Approach

The following are advised for server specifications:

- Redundancy of disk (ie, RAID or mirroring);
- To have hot swap disk technology so that if a disk were to fail it can be replaced without having to shut down the server;
- Suitable tape backup system and tape archive storage (eg, fire-safe, off-site copy);

- To have redundant power supply or cooling fans;
- For power supplies or cooling fans to have hot swap capability so that faulty units can be replaced without having to shut down the server;
- To have capacity for adding additional disk and memory;
- To have software capability to support remote administration;
- That the server manufacturer can provide the desired maintenance;
- To deploy a UPS on the server power supply.

9.6 Undertake further investigation regarding incorporation of other sector services

Some of the stakeholders expressed interest in CoEast widening its remit to address other sector services including museums and archives.

It has not been possible within the logistics of this assessment to cover this in any detail, but it is recommended that if the CoEast board were to consider other sector services then the following should be undertaken:

- undertake a self-assessment of the services that could be included, eg, archives databases, museum databases, NOF-digi databases etc
- undertake a self-assessment of any potential network infrastructure that the respective organisations have;
- undertake a feasibility assessment analogous to this assessment in terms of addressing logistics and scope of such services.

The latter point would need to include:

- meetings with respective stakeholders/data owners;
- a feasibility of the suitability of the systems being used in terms of whether they can be searched or whether alternative hosting arrangements are needed;
- discussions with data owners about the usability of the data and the degree of data preparation necessary;
- an assessment of any existing projects in the region;
- an assessment of products on the market that could fulfil such requirements.

APPENDIX B – GLOSSARY

The following terminology has been used in this document.

ASP – Active Server Pages	A Microsoft devised technology for web-based applications
Bandwidth	The capacity of a network in terms of how much data can be transmitted, usually quoted per second.
Bath Profile	An internationally agreed specification recommending particular usage of the Z39.50 protocol. http://www.nlc-bnc.ca/bath/tp-bath2-e.htm
BER - Basic Encoding Rules	The definition of how protocols (eg, Z39.50, ISO-ILL) that are defined in Abstract Syntax Notation 1 (ASN.1) are converted to/from packets of data.
Client-server software	A software technology where two software entities communicate and co-operate over a network.
CPU - central processing unit	The component of a computer that performs the programmed operations.
Disk mirroring	A computer technology whereby the data on a computer hard disk is permanently replicated in real time by another hard disk in the same computer. If the original hard disk fails, then the mirrored disk is immediately used instead.
IPIG – ISO-ILL Protocol Implementers Group	AN international body of ISO-ILL implementers who have defined a particular subset of the ISO-ILL protocol to promote interoperability http://www.nlc-bnc.ca/iso/ill/implemen.htm#ipig
ISO-ILL	The International Standards Organisation standard for Inter Library Lending. http://www.nlc-bnc.ca/iso/ill/standard.htm
ISO SR - ISO Search and Retrieve standard	The International Standards Organisation former standards for search and retrieval, (ISO 10162, 10163) superseded now by ISO 23950.
LMS	Library Management System
MI - Management Information	Data recorded about the usage of a system for statistical and monitoring purposes.
MIME encoding	A mechanism for carrying binary data on email messages.
NISO	National Information Standards Organisation http://www.niso.org/
OpenURL	A transportation mechanism for metadata that describes entities or referents.
PC Anywhere	A commercial software tool to permit remote networked access to a computer. http://www.symantec.com/pcanywhere/
RAID	Redundant Array of Identical (or Inexpensive) Disks. A technology allowing a more complex approach to disk mirroring (see above).
Resolver	the entity to which an OpenURL can be submitted for

	interpretation.
SIP - Standard Interchange Protocol	A protocol developed by 3M to support self-checkout systems.
TCP/IP	Transport Control Protocol – Internet Protocol The network protocol commonly used in network infrastructures.
Test bed	Where the software components of a system are set up for test and verification purposes.
Transitional behaviour (state)	Where an input to a software system causes that software to perform a particular expected operation.
UPS – Un-interruptible Power Supply	A device that sustains the power to a computer in the eventuality that the mains supply fails. The UPS may also notify to the equipment it protects that the mains power has failed giving that equipment the opportunity to shutdown gracefully.
Z39.50	The ANSI (American National Standard Institute) standard for search and retrieval.
Z39.50 Search attributes	The characteristics of a Z39.50 search expression comprising one or more components which together define the context and semantics of the search expression.

APPENDIX C – MIGRATION CHECK-LIST

At the Tender Process Selection Stage

Suppliers should be asked to demonstrate the following:

- Their willingness to cooperate in interoperability testing with other organisations;
- Interoperability of their products to third party products;
- If and how the products can provide diagnostics of interoperability problems;
- If and how the products can focus on and be tested around the specific area of failure.

At the Point where the current supplier system is decommissioned

The decommissioning should address the following:

- The incumbent supplier should provide all appropriate interoperability technical parameters being used by the system;
- The incumbent system should be run in parallel for a short period of time to compare interoperability operations;
- The IT departments need to be formally involved to be fully aware of the migration planning and to ensure connectivity is sustained during this phase;

A formal plan should be drawn up to ensure that the migration is tested to all operational requirements. This might seem like an overhead in costs, but should be traded off against the costs of resolving problems and possible system downtime.

When Commissioning with a new supplier

The following should be undertaken:

- To address additional networking and connectivity requirements and involve relevant networking and security staff as necessary and to include relevant knowledge transfer of interoperability protocols as required;
- To ensure all partners are aware of the deployment timescales and be aware of all planning and test activities;
- To plan the setup of Z39.50 servers in terms of necessary indexes, holdings information, circulation formats, fields in records, search attribute combinations;
- To verify the conformance of the system in terms of interoperability against test beds;

The latter point might require relevant independent consultants to check and verify that the systems are suitably set up to be compliant against the agreed specifications.

During the Operational lifecycle

Throughout the life of the system it is likely that there will be changes that can affect the operations of the service:

- System upgrades should be put onto test environments and fully tested before committing to operations;
- Encourage the use of real-time monitoring of systems where possible to automatically detect and notify support staff of operational problems, (eg, connectivity to Z39.50 servers, test ISO-ILL emails etc);
- Plan and notify partners about system maintenance downtime or moves or changes.
- Partners should be kept up to date with changes to standards. Etc. that may reflect on future planning and specification revisions.