

eContent Programme

reUSE digital master files of printed publications

(eContent Project No. 11173)

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Evaluation framework



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Confidentiality:

Executive summary

According to the project proposal, the main objective of reUSE project is that national and university libraries, which are already involved in preserving printed material (deposit copy), also gather the digital master files which had been the basis for printed publications. In this regard two main benefits will be possible: digital content which is nowadays lost will be long-term preserved and the digital content which is distributed over thousands of public sector organizations could be directly accessed in a centralized way via established information channels in the libraries world.

The project is reaching three main goals:

- to set up four digital repositories in Austria, Estonia and Germany. These repositories will be filled with the digital pendants (or master files) of printed publications edited by public sector institution. These repositories will guarantee long-term availability of the digital content. Moreover, the digital content will be made directly accessible via the Internet and via electronic library catalogues.
- to exploit the digital content with added value services such as print-on-demand, and
- to set up an evaluation framework for reviewing the results of the project and to create transparent and objective data for the further exploitation of the model on a European level.

The evaluation which is developed under the Work Package 3 (WP3) will take in consideration the project outcomes and compare them with the project objectives.

The main purpose of this document is to present a complete evaluation framework which will be focused to gathering as much information as possible about the new service of depositing digital master files and electronic publications developed in demonstrators institutions.

Since there has been no standard or generalized methodology for evaluation of digital repositories, a specific evaluation framework has been developed. Following issues are evaluated from different aspects: repositories, organizational environment

and long-term preservation availability. Overall aim of the evaluation is to make user-centred repositories which will be at the same time most efficient in technical and organizational regards. Evaluation results will provide valuable information to the interested parties that would like to implement similar repositories in their countries.

The basis of the evaluation framework is a table, which describes relevant evaluation attributes and methods of gathering data on them. It was also the starting point of our evaluation. The multi-attribute evaluation will be combined with a SWOT analysis which will be possible after comparing the data on different repositories.

The implementation of the WP3 is scheduled from July 2004 to December 2005 and the partners in charge of the evaluation are NUK (coordinator), the University of Ljubljana (LJU) and the German National Library (DDB).

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1. Introduction

The main objective of reUSE project is to set up digital repositories in national and university libraries of partner's institutions in Austria, Estonia and Germany in order to preserve digital master files which had been the basis for printed publications edited by public sector institutions. These repositories will guarantee long-term availability of the digital content, which will be made directly accessible via the Internet and via electronic library catalogues. The digital content will also be exploited with added value services such as print-on demand.

The development of the repositories will be reviewed and evaluated in order to create transparent and objective data for the further exploitation of the model on a European level.

Since the evaluation has to be objective and comprehensive, for this purpose it was necessary to develop an overall evaluation framework.

In this document we present a complete evaluation framework which is focused in gathering as much information as possible about the new service of depositing digital master files and electronic publications developed in demonstrators institutions.

Since there has been no standard or generalized methodology for evaluation of digital repositories, a specific evaluation framework has been developed. Following issues are evaluated from different aspects: repositories, organizational environment and long-term preservation availability. Overall aim of the evaluation is to make user-centred repositories which will be at the same time most efficient in technical and organizational regards.

The basis of the evaluation framework is a table, which describes relevant evaluation attributes and methods of gathering data on them. It is also the starting point of our evaluation. The multi-attribute evaluation will be combined with a SWOT analysis which will be possible after comparing the data on different repositories.

Objectives of the evaluation survey are:

- to set up criteria and guidelines for the maintenance of digital repositories based on existing models;
- to create a framework for evaluating the three demonstrators;

- to carry out an intensive test phase; and
- to publish a survey about the results.

The implementation of the WP3 is scheduled from July 2004 to December 2005, and the partners in charge of the evaluation are NUK (coordinator), LJU and DDB.

The work will consist of the following tasks:

Task 1 – Preparation of the evaluation framework

- To make investigations towards the criteria which will be applied for evaluating the demonstrators.
- To draft a framework for evaluation.
- To carry out pre-tests for enhancing the test methodology.

Task 2 – Implementation of the survey

- To instruct and support the implementers about the test framework.
- To carry out the survey.

Task 3 – Collection and processing the outcomes of the survey

- To evaluate the results.
- To publish a final report based on the results of the evaluation.
- To prepare in cooperation with WP5 Public relations dissemination material based on the evaluation reports.

2. Proposed evaluation methodology

The evaluation will take in consideration the project outcomes and compare them with the project objectives, which are: to set up trusted digital repositories in Austria, Estonia and Germany for collecting, preserving and making available digital master files from printed publications edited by public sector bodies; and to create added value services in order to exploit these data collections. It should also analyse the impacts and benefits from the new services in the local environment.

In this regard, the evaluation will be focused on:

- organizational aspects of the repository management,
- the digital repositories developed by the demonstrators (WP1) from their technical and content point of view,
- the long-term preservation strategies planning (WP1), and
- the services, including value added services to the users (WP2 and WP4) and their impact and benefit in the local environment.

These four topics should be evaluated from different aspects. There is no methodology in the literature which would encompass all aspects in this specific case. Since the existing methodologies are mainly centred in specialized research topics we had to decide whether we should define our own methodology which would be based on an interdisciplinary approach; or use various methodologies independently (Dini, Scix, Indra...etc.).

We decided to develop a new integrated methodology and combine two approaches:

- Multi-attribute evaluation, based on different standards and methodologies; and
- SWOT analysis of the three repositories.

For the multi-attribute evaluation we consulted different standards and methodologies and extracted the relevant attributes for the purpose of the evaluation. In this regard, for the definition of evaluation attributes and criteria of the Organizational aspects we used DINI methodology. For the evaluation of the technical aspect of the repository and evaluation of services we used the experiences of the European project SciX, which produced an extensible assessment and evaluation report. The coordinator of the project was the Faculty of Civil and Geodetic Engineering of the University of Ljubljana, which is one of the evaluators in this project. We consulted several standards related to usability and software quality as well, i.e. ISO/IEC 9126 (internal SW quality), ISO 9241-11 (usability), ISO 13407 I (human centered design processes for interactive systems), ISO 12207: (Software lifecycle processes), and ISO 14721 (OAIS).

The SWOT analysis will be possible only after finishing the detailed analysis of all the aspects of the repositories and their services through questioners.

The services of the repository could be seen through different types of users. However, in the initial stage of the evaluation we will concentrate on two types of users: the developers of the repository and librarians. In a second phase, when the repositories will come into public use, we shall make a survey of its users.

The evaluation framework will follow the next few steps:

1. Define the attributes for evaluation
2. Select the appropriate methods for measuring them
3. Implement the evaluation and survey according to WP schedules
4. Analyse the results
5. SWOT analysis of the repositories
6. Write the final report

The evaluators of LJU and NUK differed regarding the approach to be taken in the development of the evaluation framework, i.e.:

1. to use different methodologies in whole for different aspects of evaluation, or
2. to integrate different methodologies using parts of them for the purpose of the evaluation, building a new more comprehensive evaluation framework, for which we prepared a table of attributes.

At Vienna meeting (19 November 2004) it was decided to continue with the development of a combined methodology. The attributes were considered together with the project partners and their comments and suggestions were included. As consequence a revised evaluation framework table was prepared, which is shown in next chapter.

3. Evaluation table

I. Organizational aspects						
Attributes	Evaluation topics	Detailed topics	Expected input	Instruments	Practice	Self-evaluation
1. Policy	Existence of a public policy	Policy regarding: <ul style="list-style-type: none"> • standards • operation of the repository • content • management • rights and obligation of operators of a repository • rights and obligation of authors and/or editors • services • LTP • Metadata 	Policy statement including: <ul style="list-style-type: none"> • Standards, functional and technical quality • Procedures for the operation of the repository • Content selection criteria • Procedures for the management of the repository: authenticity control, cataloguing, subject indexing, archiving, access... • Definition of services: access, downloading, print-on demand... • Clear strategy regarding Long Time Preservation (LTP) • Responsibilities regarding LTP • Metadata type specifications: <ul style="list-style-type: none"> • Descriptive • Structural • Technical • Administrative • Rights • Preservation • Other 	Presence or absence of policy statements		

2. Content providers support	Guidelines for content providers.	<ul style="list-style-type: none"> • Formats • Design • Data transfer • Metadata 	Guidelines specifying: <ul style="list-style-type: none"> • Preferred formats • Document design • Procedures for data transfer • Metadata from content providers 	Presence or absence of guidelines elements		
3. Legal aspects	Clearly defined all copyright holders and copyright arrangement with them.	<ul style="list-style-type: none"> • Legal foundation for archiving • Type of rights • Right owners 	<ul style="list-style-type: none"> • Type of copyright arrangement (agreement, contract...) • Copyright arrangements regarding the rights: <ul style="list-style-type: none"> • to store, • permit public access, • and use LTP practices. • Identification of relevant rights owners and other stakeholders with an influential interest in what rights are negotiated. 	Specification of all detailed topics.		
4. Staff	Number of staff members dealing with the repository and their professional profiles. Influence on decision-making	<ul style="list-style-type: none"> • number • professional profile • affiliation • organizational level/situation (chart) 	<ul style="list-style-type: none"> • number • professional profile • affiliation • organizational level/situation (chart) 	Comparative survey and analysis of the staff involved in the repository		

II. Technical aspects						
Attributes	Evaluation topics	Detailed topics	Expected input	Instruments	Practice	Self-evaluation
5. Quality issues	Functionality <i>The capability of the repository to provide functions which meet stated and implied needs when it is used under specified conditions.¹</i>	Logs and Statistics:	System generated usage statistics and reports	Questionnaire 2 – 5. Procedural accountability		
		Security	<ul style="list-style-type: none"> • Server Security (process of limiting actual access to the database server itself) • Database Connections (restricted access from remote locations) • Restricting Database Access (Trusted IP addresses, Server account disabling, Port access security, ...) 	Questionnaire 2 – 4. Security		
	Reliability of the repository <i>The capability of the repository to maintain its level of performance when used under specified conditions.</i>	Data protection Data recovery	<ul style="list-style-type: none"> • Fault tolerance • Data recovery options • Protection measures • Number of backups • Frequency of backups • Backup system and media used • Distributed locations for backups 	Questionnaire 2 – 4. Security		

¹ The definitions are based on the standard for software product quality ISO/IEC 9126-1 described by Nigel Bevan: Quality in Use: Meeting user needs for quality. In: Journal of System and Software, 1999.

	<p>Efficiency</p> <p><i>The capability of the repository to provide the required performance, relative to the amount of resources used, under stated conditions.</i></p>	Guidelines for efficiency measurements	<ul style="list-style-type: none"> • Response time • Search time • Hardware and system resources • Number of concurrent searches 	Questionnaire 2 – 1. Repository design		
	<p>Maintainability</p> <p><i>The capability of the repository to be modified. Modifications may include corrections, improvements or adaptation of the software to changes in environment, and in requirements and functional specifications.</i></p>	Application maintenance	<ul style="list-style-type: none"> • Documentation, • Manual, 	Questionnaire 2 – 1. Repository design		
			<ul style="list-style-type: none"> • No. and profession of staff required (No. of work hours spent on the maintenance of the repository) • Training needed 	Questionnaire 2 – 1. Repository design		
	<p>Flexibility</p> <p><i>The capability of the repository to adapt to new conditions and requirements.</i></p>	Possibility of format extension	<ul style="list-style-type: none"> • New version of metadata formats • New file formats 	Questionnaire 2 – 3. Technical and procedural suitability		
		System upgrades	<ul style="list-style-type: none"> • New workflows • New storage system • New database • New application server 	Questionnaire 2 – 3. Technical and procedural suitability		

6. Technical specifications	Standards	Used standards: <ul style="list-style-type: none"> • For repository • For client support 	<ul style="list-style-type: none"> • OAIS • OAI-PMH 2.0 • User interface to the web repository: • Web Content Accessibility Guidelines 2.0 • W3C standards (SOAP) 	Questionnaire 2 – 2. OAIS compliance and 3. Technical and procedural suitability Questionnaire 4 – Organizational aspects		
	Software	Software license used	<ul style="list-style-type: none"> • open source software • commercial software 	Questionnaire 2 – 1. Repository design		
7. Repository & System Administration	Access to collections by user types	Types of access rights given to users of the repository	<ul style="list-style-type: none"> • System administrator. • Content administrator(s). • Content producer. • User (logged in and has access to all of the repository content). • Visitor (access to free content only). • Other? 	Questionnaire 2 – 6. User friendliness		
	User administration	Limit access	<ul style="list-style-type: none"> • At file level • At object level. • At collection level 	Questionnaire 2 – 4. Security		
		Registration, authentication & password administration	<ul style="list-style-type: none"> • Customizable user profile and other functions of interface. • Authentication method. 	Questionnaire 1 – 1. Repository design Questionnaire 2 – 6. User friendliness and 4. Security		

	<p>Content submission administration</p>	<p>Multiple collections within the same instance of the system</p>	<ul style="list-style-type: none"> • Allow multiple collection within the same instance • Different submission parameters for each collection. 	<p>Questionnaire 2 – 6. User friendliness</p>		
		<p>Submission stages</p>	<ul style="list-style-type: none"> • Segregated submission workspace (Provides a separate pre-public workspace that stores incomplete and/or pre-approval stage content submissions.) • Submission roles (Provides for a configurable set of review functions and administration within a repository.) • Configurable submission roles within collections (Some systems apply the same roles and process across all collections in the repository. Others specify these functions at the collection level, allowing different collections within one instance of the system to offer different submission and review processes.) 	<p>Questionnaire 2 – 6. User friendliness</p>		

		Submission support	<ul style="list-style-type: none"> • Notification for submitters. • Notification for content administrators. • Personalized system access for registered users • View pending content submissions • View approved content • View pending content administration tasks • Distribution license 	Questionnaire 2 – 6. User friendliness		
8. Content management	Document / object formats & Content import & export	File submission management	<ul style="list-style-type: none"> • Storage of data objects • Upload compressed files • Upload from existing URLs • Upload from portable media. • Volume import for objects • Volume import for metadata • Volume export/content portability • Approved file format function • File formats ingested • Submitted items can comprise multiple files 	Questionnaire 2 – 3. Technical and procedural suitability and 6. User friendliness		

	Metadata		<ul style="list-style-type: none"> • metadata schemas • Support for extended metadata • Metadata review support (quality control process) • Metadata import / export • Temporarily disallow metadata harvesting • Add/delete metadata fields • Set default values for metadata • Support Unicode character set for metadata 	Questionnaire 2 – 3. Technical and procedural suitability		
	Updating and Indexing	Support for real time updating / indexing of the repository	<ul style="list-style-type: none"> • Real-time updating of accepted content • Real-time indexing of accepted content 	Questionnaire 2 – 1. Repository design		

Attributes	Evaluation topics	Detailed topics	Expected input	Instruments	Practice	Self-evaluation
9. Services	Search capability	Full text search of selected publications:	<ul style="list-style-type: none"> • Boolean logic • Truncation / wildcards? • Word stemming 	Questionnaire 2 – 7. Services		
		Search all descriptive metadata	<ul style="list-style-type: none"> • Boolean logic • Truncation/wildcards • Word stemming 	Questionnaire 2 – 7. Services		
		Search selected metadata fields	<ul style="list-style-type: none"> • Metadata fields that can be searched 	Questionnaire 2 – 7. Services		
		Search functions	<ul style="list-style-type: none"> • Simple search • Advanced search • Search history function • Provides the total number of searches 	Questionnaire 2 – 7. Services		
		Additional search function:	<ul style="list-style-type: none"> • Highlights the search term within the results • Link to the full record 	Questionnaire 2 – 7. Services		
	Presentation of search results	Browse search results by:	<ul style="list-style-type: none"> • Author • Title • Journal source • Publisher • Language • ISBN, ISSN • Rating • Issue date • Relevance • Type of material • Institution • Collection • Subject 	Questionnaire 2 – 7. Services		

	Advanced services	User interface	<ul style="list-style-type: none"> • Interface supports multiple languages • Access for disabled people • Modify user interface "look & feel" • Ability to save records during a session in to a "book bag", and download and email them. • News for the end users about new features, new added works, announcements of conferences etc. • Frequently Asked Question lists provide commonly requested answers on a particular topic. 	Questionnaire 2 – 7. Services and 6. User friendliness and 1.		
	Value-added functions	Content oriented value added functions	<ul style="list-style-type: none"> • Print on demand -Open access e-print archives and servers. 	Questionnaire 2 – 7. Services		

			<ul style="list-style-type: none"> • Summary / Abstract available. • Make HTML embedded in search results records viewable and linkable. • Table outlining how different fields of data are indexed / explanation of search protocols. • Content is indexed by Google & other search engines. • Cross archive search services and aggregators. • Ratings permit registered users to evaluate any of its documents. • Series allows the creation of a series of works; for example a particular conference track could be in one series, papers related to a particular topic in another; the series may be overlapping. • Additional options (equations, similar subjects, citations, etc.) 			
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III. REPOSITORY FROM USER'S PERSPECTIVE					
Attributes	Evaluation topics	Detailed topics	Instruments	Practice	Self-evaluation
10. Recognition	Functionality Suitability	<ul style="list-style-type: none"> • Users' immediate recognition of the different elements of the interface. • Providing the user with sufficient information so they understand the scope and currency of coverage. For example: "What results will be retrieved: links to the source collection-level only, direct links to digital objects, links to analog objects, links to resources available to restricted users?" • Understandability of the interface and of the task 	Questionnaires for end-users; logs and statistics		
11. Performance and efficiency	Accessibility User help Productivity Controllability?	<ul style="list-style-type: none"> • User help always accessible and basic instructions always visible • Nr. of procedures for access • The rate of success in achieving the tasks • For external users • Free • Not free 	Questionnaires for end-users; logs and statistics Response time will be measured		
12. Personal and subjective perception	Conformity with user expectations	<ul style="list-style-type: none"> • Perception of the interface • Perception of the new services 	Questionnaires for end-users; logs and statistics		

	User satisfaction Suitability for learning	<ul style="list-style-type: none"> Bring information on issues that are not directly related to objective usability, but with the subjective perception of it. it reflects the level of motivation and expectations a user has on a given system, and it also influences directly on the overall performance. 			
13. Error tolerance	Error tolerance	<ul style="list-style-type: none"> The problems encountered during the process provided valuable information on the usability of the whole sequence and flow 	Questionnaires for end-users; logs and statistics		
14. Suitability for individualization	Possibility for individual adaptations of interface	<ul style="list-style-type: none"> Receiving news, new documents... 	Questionnaires for end-users		

Objectives for the part »Repositories from the user's perspective«:

- More targeted comparative studies are needed to understand what and how users seek and find information across a variety of open access and proprietary sources. In short, for most end users, it is not yet clear where these new tools fit into their search and discovery strategies, nor have most imagined building a personal digital library or collaborating with colleagues in virtual workspaces.
- In order to gain its goal the repository should be user friendly.
- To find out if the repository is useful to users.

Sources:

User centered design standards:

- <http://www.usability.serco.com/trump/resources/standards.htm#9126-2>
- ISO/IEC 9126 for internal SW quality
- ISO 9241-11 for usability
- ISO 13407 I for human centered design processes for interactive systems
- Assessment and overall evaluation in the SciX project
- A survey of digital aggregation services <http://www.diglib.org/pubs/brogan/>

Lee, Raymond M: Unobtrusive methods in social research

IV. MONETARY ISSUES					
Attributes	Evaluation topics	Detailed topics	Instruments	Practice	Self-evaluation
15. Impact on local environment	Positive / negative impact on local environment	<ul style="list-style-type: none"> • Increased use of the services • Positive attitude of the users to the services 	Questionnaires for end-users; logs and statistics		
16. Cost-benefit analysis	<ul style="list-style-type: none"> • Perceived quality • Benefits of value added services • Cost/benefit ratio 	<ul style="list-style-type: none"> • Ratio between number of access to the document and number of access to printed publications • Time needed for processing master files vs. time needed for processing printed materials. • Staff/hours dealing with master files in the repository. • Additional financial resources required for the maintenance and operating of the services. • Indirect benefits (user satisfaction, free library materials acquisition... etc.) • advanced services vs. traditional services 	Questionnaires for end-users, operators of the repository, managers; logs and statistics		

V. SWOT ANALYSIS OF THE REPOSITORIES (qualitative and quantitative analysis based on the evaluation framework from I.-V.)				
	UBI, UBG, I3S3	NLE	UBER	ONB
Strengths				
Weaknesses				
Opportunities				
Threats				

4. Selection of appropriate methods for measuring the evaluation criteria

Digital repositories may have different architecture but there are certain standards that they have to follow in order to provide quality services to the users and secure a long-term preservation of their collections. In the evaluation process we will analyze every repository and find out whether they follow adopted standards and fulfill user expectations according to predefined evaluation criteria.

Special emphasis will be done on long-term preservation, which is very important for the deposit institutions of digital collections.

For measuring every attribute defined we will use qualitative or quantitative methods. They will include:

- surveys
- questionnaires
- interviews
- comparative analysis
- cost-benefit analysis
- site visits
- meeting with partners in the project
- other methods.

The SWOT analysis will be based on the multi-attribute analysis and will consider the strengths, weaknesses, opportunities and treats of the three repositories independently.

5. Questionnaires

Five questionnaires were produced for each separate focus group of our survey. They are attached in their full in **Annex 1**. Here follows a short description of each questionnaire:

- Questionnaire 1. Services
Author: Mateja Šmid (LJU)
Expected distribution to end-users: June and September 2005.
- Questionnaire 2. Technical aspects of the repositories
Authors: Matjaž Depolli, Darko Majcenović (NUK),
Expected distribution to developers together with log statistics in June 2005.
- Questionnaire 3. Repository and services
Authors: Mateja Šmid (LJU), Alenka Kavčič-Čolić (NUK)
Expected distribution to content providers in October and November 2005.
- Questionnaire 4. Organizational aspects and cost-benefit analysis
Author: Alenka Kavčič-Čolić (NUK),
Questionnaire for Librarians and/or operators of the repository will be distributed in September 2005.
- Questionnaire 5. Organizational aspects
Author(s): Alenka Kavčič-Čolić (NUK),
Interview with top managers will take place in October and November 2005.

6. Evaluation framework time table

According to the Kick-off meeting of Luxembourg we planned that the first data on the repositories will be available in month 9th (end March 2005). However, some of the repositories will need more time than the foreseen. We shall start collecting the data for the main evaluation survey as soon as the repositories will be finished. The four repositories are expected to be completed in month 15th (end of September 2005), which means that the evaluation "hot period" will last from month 12 (June 2005) till month 15 (September 2005). From October to December we shall produce the Final report (See Table 1).

PROJECT DEVELOPMENT	TIME SPAN	WP3 - EVALUATION FRAMEWORK	TIME SPAN
Start of WP3 - Evaluation framework	Months 1-18	Set up evaluation framework methodology	Months 1-8 (July 2004 - Feb. 2005)
WP1 - Digital repositories	Months 1-9	Gathering data	Months 9 - 12 (Mar. - June 2005)
		Hot evaluation period	Months 12-15 (June - Sept. 2005)
		Final report	Months 15-18 (Sept. - Dec. 2005)
WP2 - Ongoing services	Months 7-21	Gathering data	Months 9 - 12 (Mar. - June 2005)
		Hot evaluation period	Months 12-15 (June - Sept. 2005)
		Final report	Months 15-18 (Sept. - Dec. 2005)
WP4 - Exploitation & value added services	Months 4-7	Gathering data	Months 9 - 12 (Mar. - June 2005)
		Hot evaluation period	Months 12-15 (June - Sept. 2005)
		Final report	Months 15-18 (Sept. - Dec. 2005)
National report of Slovenia	Months 3-18	National report	Months 3-18 (Sept. 2004 - Dec. 2005)
WP5 - Awareness and dissemination	Months 1-24		Months 1-24 (July 2004 - June 2006)