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Technology, Lappeenranta
Degree Programme in Information Technology
Specialization of Communication Technology

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Data Analysis of an Application Upgrade – Quality Handbook Roadmap from Lotus Notes to MS SharePoint

Bachelor´s Thesis 2012

Tiivistelmä

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Työn tavoitteena oli analysoida ja dokumentoida laatukäsikirjan migraatio Lotus Notes alustalta MS SharePoint 2010:een. Opinnäytetyön toimeksiantajina olivat UPM IT sekä UPM:n tutkimus ja kehitys -organisaatio (T&K). Migraation kohteena oli R&D Handbook eli UPM T&K:n laatukäsikirjan kaikki voimassa olevat dokumentit ja niiden sisältö. Tavoitteena oli myös dokumentoida migraation aikana esiin tulleet haasteet ja pilottikäyttäjien kokemukset. Raportin tarkoituksena on siis toimia niin sanottuna tiekarttana tai tietolähteenä, kun yhtiössä mahdollisesti tullaan suunnittelemaan samankaltaisia migraatioprojekteja. Ideana oli myös tehdä yhteistyösovellusesimerkki Lotus Notesista MS SharePoint -alustalle siirtymisestä kyseiseltä alueelta.

Migraatio toteutettiin pilottiprojektina ja testaus suoritettiin järjestelmätoimittajan SharePoint-testiympäristössä. Itse tiedonsiirto Notesista SharePointiin tapahtui toimittajan toimesta. Projektin alussa tehtiin Handbook-dokumenttien määrittelyt ja tiedonsiirron jälkeen aloitettiin testaus. Projektin lopussa pyydettiin palaute testikäyttäjäryhmältä. Tiedonsiirto, sen vaiheet ja siihen liittyvät haasteet dokumentoitiin. Teoriaosuus koostettiin internetlähteistä ja Notes-osuuden tietoja kerättiin internetin lisäksi UPM R&D Handbook -laatukäsikirjasta.

Migraation aikana selvisi, mitkä olivat tiedonsiirron kannalta kriittisiä elementtejä. Laatukäsikirjan dokumenteissa oli esimerkiksi erilaisia objekteja, jotka eivät siirtyneet ongelmitta SharePointiin. Dokumenteissa ongelmia aiheuttaviin elementteihin tehtiin tarvittavat muutokset Notes-tietokannassa. Korjausten jälkeen ne siirtyivät SharePoint-alustalle oikeanlaisina. Testikäyttäjien kokemusten perusteella Handbook-sovellus SharePoint-alustalla tehostaa viestintää, helpottaa ryhmätyöskentelyä ja dokumenttien hallintaa verrattuna Handbook-sovellukseen Lotus Notes -alustalla. Työn lopullisena tuloksena voidaan kuitenkin pitää R&D Handbook-laatukäsikirjan sisältämän tiedon analysointia sekä migraation dokumentointia.

Asiasanat: Lotus Notes, SharePoint, laatukäsikirja, Handbook, migraatio

Abstract

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The goal of the thesis was to analyze and document the data migration of a quality handbook from Lotus Notes platform to MS SharePoint 2010. This study was commissioned by UPM IT and UPM Research & Development (R&D). The scope of the migration was consisted of valid documents and their content of R&D Handbook, which is a quality manual of UPM R&D. Another objective was to document the experiences of the pilot users and challenges, which showed up during the migration. The report is thus intended to act as so-called road map or a source of information when the company is planning similar migration projects. The idea of the project was also to be an application example of co-operation in the concerned area.

The migration was implemented as a pilot project and the testing of the new application was carried out in the SharePoint test environment served by the system vendor. Also the data conversion from Notes to SharePoint was conducted by the vendor. Data conversion itself and also the challenges faced during the migration were documented. At the beginning of the project the specifications of the Handbook documents were made and the testing was started after data conversion. At the end of the project, feedback from the test user group was collected. The information for the theory part was gathered mainly from the internet, some of the details related to Lotus Notes were also collected from UPM R&D Handbook.

There were some critical elements that showed up during the migration process. For example, different objects in the Handbook documents did not convert into SharePoint without problems. Corrective actions were made in Notes database. After the corrections, documents' content converted correctly in the SharePoint platform. According to the test users' experiences, the Handbook application in SharePoint enhances communication, and eases teamwork and document management compared to the Handbook application in Notes. In conclusion, the data analysis and documentation of the migration of R&D Handbook can be considered as the final result of this thesis.

Keywords: Lotus Notes, SharePoint, quality handbook, Handbook, migration

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Concepts

ACL	Access Control List specifies which users or system processes are granted access to objects and what operations are allowed on given objects.
AD	Active Directory, a user database and directory service containing information of users, computers and network resources created by Microsoft.
ASP.NET	A technology developed by Microsoft where ASP (Active Server Pages) uses server-side scripting to dynamically produce web pages and the .NET Framework is the infrastructure for the .NET platform.
DOCX	File extension when a document is created by Microsoft Word. File type is Microsoft Word Open XML Document: files are created using the Open XML format, which stores documents as a collection of separate files and folders in a compressed zip package.
Domino Directory	A database of users, servers, groups, and other entities created by IBM.
Lotus Domino	The server software of a collaborative platform developed by IBM.
Lotus Notes	The client software of a collaborative platform developed by IBM.
Metadata	Data about data. Metadata can be structural or descriptive.
MS SQL Server	A relational database server from Microsoft.
NSF	Notes Storage Facility, Lotus Notes database file format.
NTF	Lotus Notes templates file format.
nxrtf2.dll	A program used to export Notes Rich Text data in .rtf format in Windows operating system.
OLE	Object Linking and Embedding, a combination of data and the application needed to modify that data.
POC	Proof of Concept, evidence that demonstrates that a certain method or idea is feasible.

QF	Quality First, a solution from Innofactor which provides ready-made processes for routines related to quality management.
RTF	Rich Text Format, a standard for specifying formatting of documents, often used to transfer text files between different word processing applications and operation systems.
SharePoint 2010	A web application platform developed by Microsoft.
XML	Extensible Markup Language, a markup language for documents containing structured information.

1 Introduction – Business case of the study

In 2010 a program called UPM Workspace was started in UPM. The program renewed UPM's whole electronic working environment and enabled a new way of working. The program was running during 2010 and 2011 and the changes included, for example, operating systems and Office packages. Also a platform called Microsoft SharePoint was enabled to all UPM intranets and collaboration sites. All new electronic tools are now based on Microsoft technology. That means that the software and tools are more unified and they match each other which increases the usability of the applications. (1.)

R&D Handbook application – the Quality Management System – is used in UPM research centers mainly for quality purposes. At the moment, Handbook is an IBM Lotus Notes based application. UPM R&D Quality Manager wanted to start enhancing the Quality Handbook: should the Notes application be upgraded to the latest version or should there be a totally new application? Because of the UPM's decision that all tools and applications are based on Microsoft technology from now on, the idea of data migration to the SharePoint application platform was worth deeper consideration. For that purpose a pilot project called QF POC was started at the end of August 2011.

The aim of this thesis was to conduct a data analysis and documentation of R&D Handbook. The thesis report handles the reasons and background why the upgrade is needed. It also includes basic information about both Lotus Notes and SharePoint 2010 design. However, the migration itself and the issues which came up during the piloting are perhaps the most important and interesting parts of this thesis work. Data analysis and methods of the final product have their own sections in the report, too.

2 Background

R&D Management periodically conducts reviews of the status and suitability of the Operative System to describe UPM Research Center laboratory operations. After the management review in 2010 the target for the year 2011 was set to consider the collecting, archiving and managing quality information as a whole.

Currently, information is scattered in different files and databases, and in addition, databases need to be modernized. The archiving locations are, however, precisely defined in the R&D Handbook and the databases are working in moderation. The aim is to improve the information management related to quality issues and renew the databases in a more user-friendly direction. A discussion of quality databases' migration (Handbook, Auditing and Deviations applications) from Lotus Notes to MS SharePoint has been started with UPM IT. At the same time, an action plan for the structural change of Handbook document management system is intended to be made to match the current organizational model.

2.1 UPM – The Biofore Company

UPM is one of the largest manufacturers of pulp, paper and timber. UPM's businesses have been divided into three business groups: Energy and pulp, Paper, and Engineered materials. In 2011, UPM's sales exceeded 10 billion euros. These days, UPM has production in 16 countries and UPM is an employer for approximately 24,000 people. UPM shares are listed on the NASDAQ OMX Helsinki stock exchange. (2.)

UPM has created a new concept called Biofore. According to UPM's website, Bio tells about future orientation, sustainable solutions and good environmental performance, and fore comes from words forest and forefront. Forefront describes UPM's position at the forefront of development. In other words, UPM is combining the bio and forest industries. One of UPM's main objectives is to provide eco-friendly products, which are made from renewable raw materials and are recyclable. (3.)

UPM Research & Development

Research and Development is one of the UPM's global functions. UPM R&D is not only creating new products and businesses but also providing support for its different business areas. Biofuels, biochemicals, biocomposites and fibril cellulose are examples of the new products UPM has developed using forest biomass. For the moment, UPM has approximately 250 R&D employees in five research centers around the world (Figure 1). (4.)

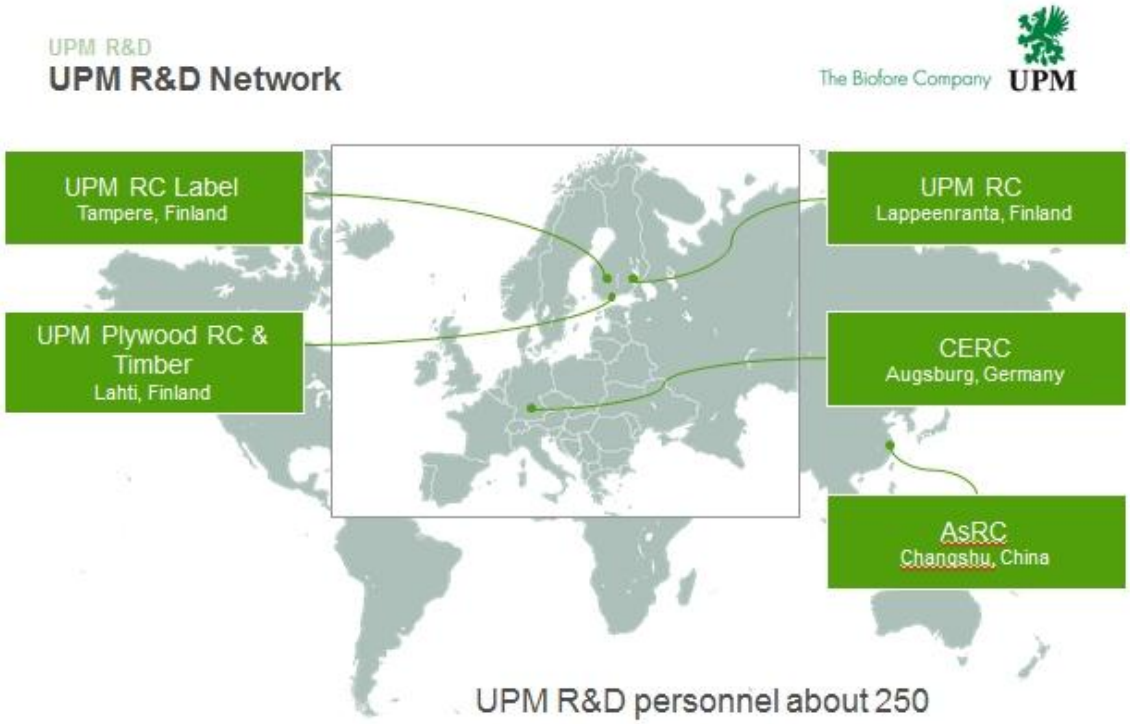


Figure 1 UPM R&D Network (4)

The laboratories of UPM Research Center (later UPM RC) in Lappeenranta are audited laboratories and internal audits are carried out once a year regarding the management system and laboratories. One example of the R&D services is an accredited optical calibration service, which UPM RC offers to UPM mills and research centers. Using the calibration service, it can be ensured that every brightness meter in UPM is on a same level, which in turn produces reliable test results. (5.)

Accreditation is a procedure to ensure a body's competence to carry out specific tasks. It is based on internationally agreed criteria for evaluating e.g. a laboratory's competence to conduct correct and reliable test results. Testing and research laboratories usually comply with the requirements of the standard SFS-EN ISO/IEC17025 in creating a quality system of their own. In Finland, accreditations are performed by the Finnish Accreditation Service (FINAS) of the Centre for metrology and accreditation (MIKES). (6.) The accreditation decision is usually made for four years and once the accreditation has been granted, periodic surveillance visits to the laboratory are made at least once a year. Therefore quality is of high importance and Handbook plays an important role in the quality process in UPM R&D.

2.2 Quality First for SharePoint

Handbook is one of the products of a software service company Innofactor Plc. Innofactor is a Finnish supplier focusing on Microsoft-based solutions and Innofactor was selected the Microsoft Country Partner of the Year 2011. Innofactor provides solutions for enterprises and public administration. It also supplies Microsoft cloud services to the global market. Innofactor is listed on the main list of the NASDAQ OMX Helsinki stock exchange. (7.)

Innofactor was chosen as the system supplier of the POC pilot because UPM and Innofactor have a long history together: the Lotus Notes based Handbook, which is currently used in UPM, is a product of Innofactor. Both the collaboration and the product have worked well. In addition, Innofactor has earlier experience in migrations between these different platforms, Lotus Notes and SharePoint.

The Handbook application is one of the elements of the quality management solution called Innofactor Quality First (QF). It is a modular solution designed for the organizations' quality work. Quality First consists of ready-made processes and elements for routines related to quality management. The user interface of Quality First solution is possible to implement either in SharePoint or in Lotus Notes/Domino environment. (8.) Quality First for SharePoint package consists of selectable modules, which are introduced in the following three chapters.

This thesis deals only with the Handbook module and the matters related to the migration of Handbook application.

2.2.1 Handbook

Handbook is the operating document management software that can be used as a quality, environmental and/or personnel manual. By means of a workflow facility, documents can be created, commented on, inspected, approved, published and periodically reviewed. Also version management and a variety of control, communication and linking possibilities are managed using the Handbook application. (9.)

2.2.2 Auditing

The Auditing application is used for the management of auditing planning, entry, questioning, reporting and audit processing. Audits can also be carried out in accordance with a plan, going through item questions and recording possible deviations. Tasks can be done concerning deviations when needed. That can be monitored with the help of the reporting function. (9.)

2.2.3 Deviations

Deviations, feedback, complaints and initiatives can be managed using the Deviations application where various feedbacks can be recorded and automatically controlled, for example by email or using forms from intranet or internet pages. Feedback processing can be carried out using the workflow feature. In addition, control and communication functions are included in the system. (9.)

2.3 Proof of Concept

A proof of concept (POC) is often used to demonstrate if a certain method or idea is feasible, or it can be a demonstration or a prototype, the purpose of which is to show how some concept or theory will play out in the real world. A pilot project is often started in the case of software development. In that case, the pilot can be a realization of the proof of concept and can operate as an initial rollout of a system into production. The pilot project may have limited resources or other restrictions as appropriate to the domain. The purpose of a

pilot is to test whether the system is working as it was designed while limiting business exposure. (10.)

2.4 QF POC pilot

The pilot project of MS SharePoint based Quality Handbook called QF POC was started at the end of August 2011. The name QF POC is an abbreviation of the concepts of 'Quality First' and 'Proof of Concept'. These concepts are explained in the preceding chapters 2.2 and 2.3. The duration of the pilot was one and a half months: from mid-October to the end of November in 2011 (Figure 2).

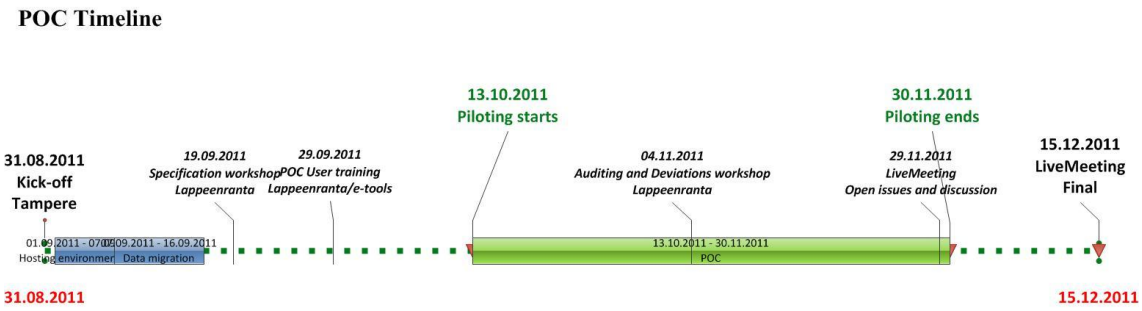


Figure 2 Timeline of the QF POC project

The purpose of the project was to migrate the data from the Notes Handbook application to the new SharePoint application. In other words, the idea was to test in a real production environment whether the system was working as it was designed, before the final implementation of SharePoint based R&D Handbook.

One of the pilot's goals was to gain knowledge of the functionality and suitability of the new application for UPM's R&D Quality area. In addition, challenges and other matters, which came up when converting data from Notes to SharePoint, are valuable knowledge for future actions. One goal was also to get information from the cost structure and implementation in general during the project.

The scope of the pilot consisted of full data from R&D Handbook excluding document versions with status 'old' and 'draft'. That meant all elements of Handbook, such as valid documents, their fields, attachments, links, ACL, graphics, tables and other objects.

The pilot was hosted as a service by the supplier. The service covered the application servers, pre-installed and configured SharePoint application and the data conversion. The test environment was running at a piloting server in Innofactor datacenter.

The members of the project group were employees from both companies: UPM and Innofactor. The group had six participants, three from both companies. The project manager was UPM IT Service Owner and the business owner of the project was UPM R&D Quality Manager.

For the test user group of the new application, a total of 13 employees were selected mainly from UPM research centers. This way the information about the new Handbook application was shared inside the company. There were three different user profiles, i.e. SharePoint Groups in the test application: owners, members and visitors. Visitors' role was to act as end users who had rights only to view the Handbook documents. Members tested the pilot environment, e.g. by creating documents and by trying out the functionality of the workflow feature. Owners acquainted themselves deeper with the SharePoint environment.

2.5 R&D Quality Management System (R&D Handbook)

In UPM research centers, the Quality Management System is used for preparing and administering the management handbook and standard operation procedures, and for providing and archiving documents. According to the quality document 'Research Centers' Quality Management System', the basis of the R&D Handbook is defined as follows:

UPM R&D Quality Management System and the documentation related to it are based on SFS-EN ISO/IEC 17025 Standard, General requirements for the competence of testing and calibration laboratories. Testing and calibration laboratories that comply with the International Standard will therefore also operate in accordance with ISO 9001 Standard. The aim of the documentation of the Quality Management System is to present research centers' policies and procedures in a documented written form. By means of the documentation employees are able to operate according to beforehand agreed procedures so that the requirements for competent tests and calibrations are fulfilled. (11.)

In UPM, the Lotus Notes based R&D Handbook application was implemented in 2001. Handbook contains different views and a user can make searches by selecting between categorized information, such as table of contents order, organizational unit, function, author or date. It is possible to attach, link, copy and paste text, pictures, spreadsheets, etc. to the Handbook documents. The Handbook application includes workflow management and a version control (Figure 3).

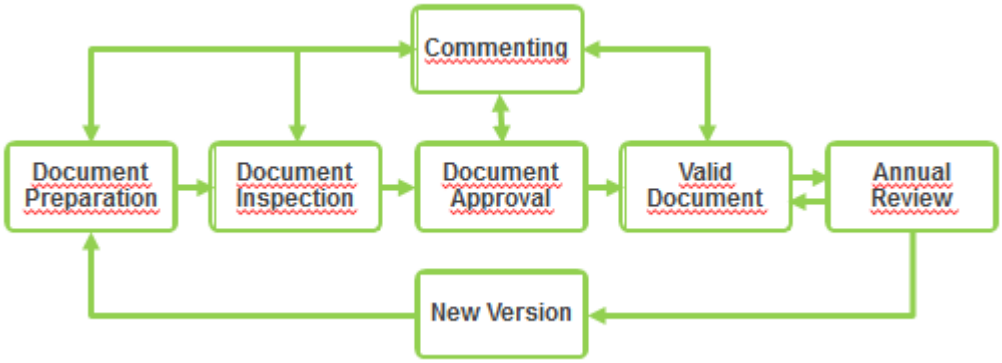


Figure 3 R&D Handbook workflow process of a document

The workflow management consists of the following phases: creating, commenting, inspecting, approving and reviewing a document. All comments are attached to the original document. Mailing lists are saved in the document forms and information on changes or changed documents can be sent on the basis of mailing lists by email. The system registers changed and unread documents by user names.

Access to R&D Handbook is also possible in the UPM intranet. Access rights can be defined on the basis of user profiles. Figure 4 and Figure 5 present the R&D Handbook user interfaces of Notes' client and a web application.

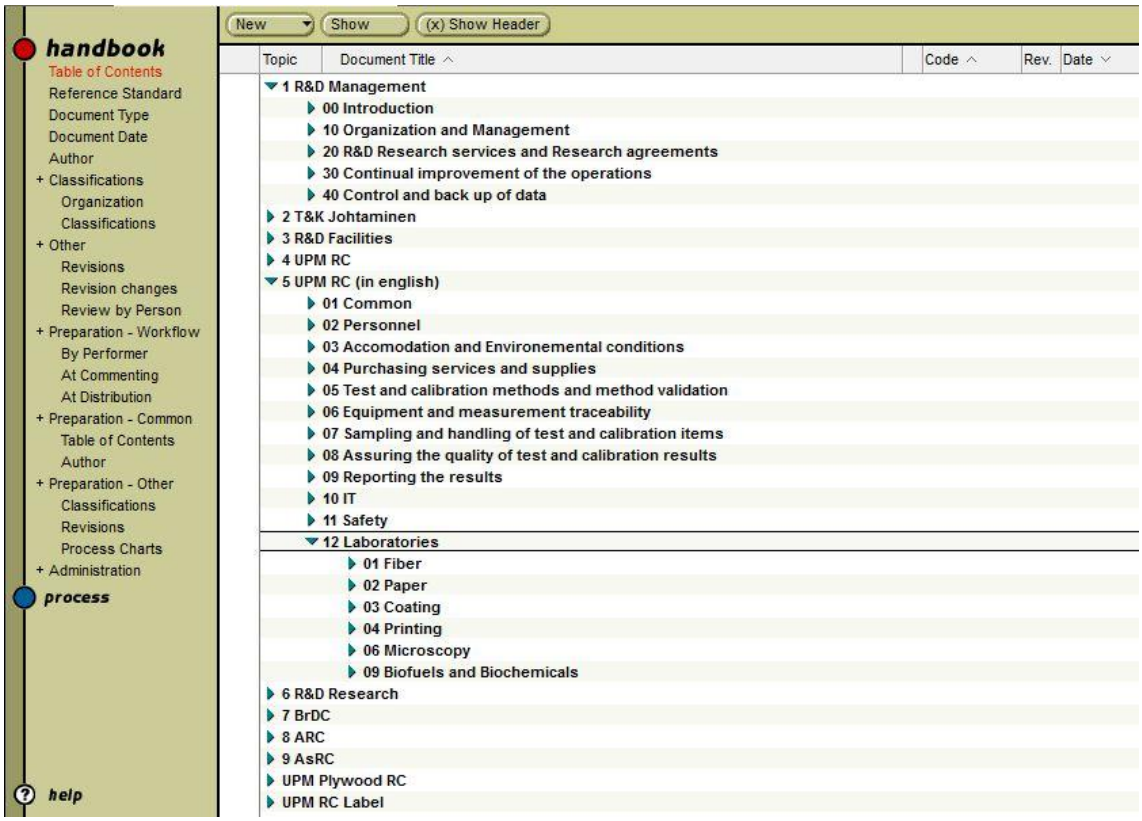


Figure 4 A screenshot of Notes' client side view from Table of Contents of R&D Handbook

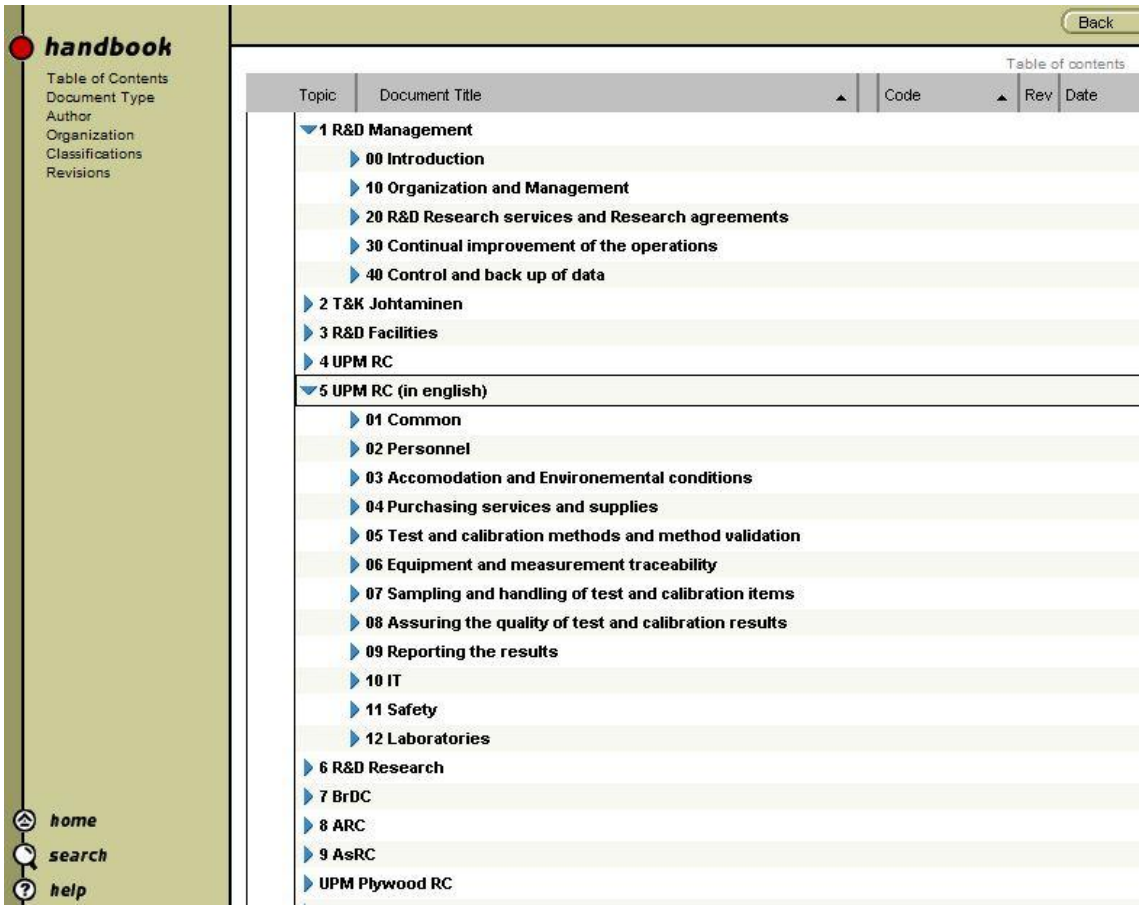


Figure 5 Web application – a screenshot of Notes R&D Handbook user interface

Using either application, document searches can be performed by the following views: Table of Contents, Document Type, Author, Organization, Classifications or Revisions. The applications are very much alike but the main difference between them is that there is no preparation-workflow facility in use in the web application for standard users. The user must have the WebEditorHB role in order to do the workflow actions. Due to this users can only view the documents when using the Handbook web application. In both applications users can sort the data in ascending or descending order by Document Title, Code or Date.

In Notes database, a document can be in one of the following states: ‘Old’, ‘Valid’ and ‘Under work’. The status ‘Old’ means that the document is not used anymore and it has been marked as archived. Also all earlier versions of each document belong to the ‘old’ archived documents. A valid document has gone through a workflow, a kind of validation, where the document has first been

commented by selected persons and after that inspected and approved. A document with the status ‘Under work’ is a draft version of a document; it can be a whole new one, or a new version of an already existing document, which has to be corrected.

R&D Handbook is a large database. Currently, the size of the database is about 2.5 GB (disk space) containing nearly 5,400 documents. R&D Handbook is also a global database having a lot of users in different countries. Consequently, the database contains documents in Finnish, English, German and Chinese.

3 Technical architecture and design of Lotus Notes and SharePoint 2010

IBM and Microsoft are multinational technology corporations that have both established their own collaborative platforms, IBM Lotus Notes/Domino and Microsoft SharePoint, each having different feature sets and limitations. Still, the companies share the same goal to enable organizations’ employees to work more effectively together. (12.)

3.1 Lotus Notes

Lotus Notes is the client of a collaborative platform originally released in 1989. Lotus Notes is the primary user-interface or client of the Lotus Domino/Notes suite that includes several components, such as email, calendaring and scheduling, address book, database, programming and web server. Domino is a web server and it is an integrated messaging and web application software platform. It provides an environment for creating web applications that support workflow, RDBMS (Relational Database Management System) connectivity, and collaboration. (13.) In UPM, Lotus Domino/Notes was implemented in 1992 and today it consists of thousands of applications.

Lotus is not a traditional relational database – it is a collection of unstructured data, combined with various design elements that allow accessing and manipulating that data. Notes differs from a relational database that it does not relate documents by field values. Notes documents can be related only by document

ID. It contains two parts; the first identifies the database and the second part is an ID for the specific document within the database. (13.)

A Lotus Notes database has a file extension of ".nsf". A database file can contain data, design elements and programming code. Each database file also has its own security in the form of an Access Control List (ACL). (14.) A template file instead contains the structure for the database: forms, folders and views but no documents. A Lotus Notes template has a file extension of ".ntf". Figure 6 illustrates a Notes database file.

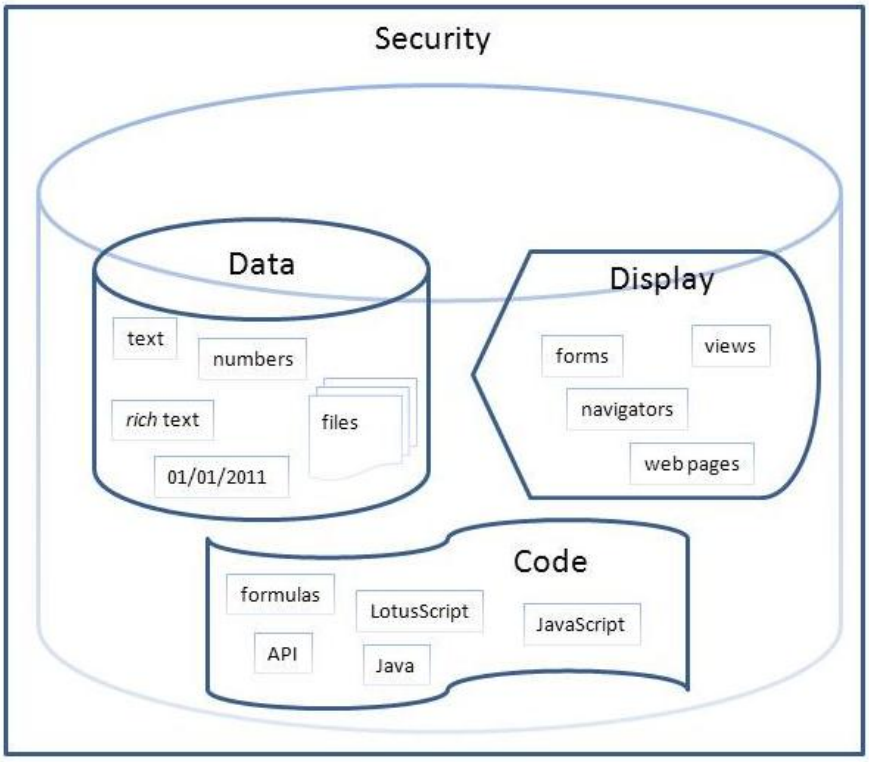


Figure 6 Notes Database File (.nsf) (14 modified)

A Notes database consists of several elements. For a start, there is a header where basic information about the database is contained. User data is held in documents, which are also known as data notes. Creating, editing and viewing of documents are controlled by form notes. The Notes' code is called filter notes and using filter notes, user input, data generation and controlling the flow and states of the application are validated. Data within a database can be organized into relevant subsets using indexes, i.e. view notes. Security information is

called ACL notes, which refer to Notes' Access Control List (see chapter 4.5.1). ACL notes are used for creating and controlling user rights and roles. In addition, there are other types of notes for holding various administrative and design information, for example help information. (15.)

The information in a note (or a document) consists of one or more items (or fields), which can be in any number of formats, such as text, numbers, dates, formatted rich text and file attachments (Figure 7).

Figure 7 The logical structure of a note (15 modified)

Each document has a header and a list of variable-length fields. The header holds general information about the document, for example the document's class and ID. The class can be document, form or view. The unique ID is essential for replication. Within the item list, each item has a name, attribute flags, a value and a value type. (16.)

Replication is an important feature of Lotus Notes/Domino. By means of the replication facility, databases are kept synchronized. That applies to both the design and the information inside the databases. The replication facility requires

no special programming, tagging, or other configuration. NSF files are identified by their replica IDs, and replicate files are kept synchronized by exchanging data, metadata, and application logic and design. Replication can occur between two servers, or between a client and a server. Replication may be a scheduled routine or a response to a user or programmatic request. (16.) Replication is also used to make a local copy, “a replica”, of a database on the user’s workstation where the data is modified offline. The changes are then replicated back to the server when the workstation is reconnected to the network. (17.)

3.2 SharePoint 2010

Microsoft SharePoint is software, which offers a web-based platform for different portal solutions, such as document management and web content management. SharePoint has a web-based user-interface and it is built on ASP.NET technology, with a SQL Server backend; it runs on Windows Server and uses Active Directory (AD) for authentication and permissions. (18.)

SharePoint 2010 was published in 2010 but the initial release was launched in 2001. SharePoint offers a so called ribbon user interface that is familiar to users of Microsoft Office 2007/2010. This interface provides a general user-interface for manipulating data, page editing ability, and the ability to add functionality to sites. SharePoint provides the ability to e.g. manipulate content in lists and libraries, pages, and sites. It also allows to copy, to create, to delete or, to rename lists and libraries, pages, sites, and Web Parts. The properties of managing user permissions and viewing document and page version histories are included in the SharePoint 2010 application, too. In addition, there is a possibility to manage definitions and properties of lists and libraries, pages, sites and webparts. (18.)

SharePoint may be used to create and manage intranet portals, extranets, websites, document and file management systems, workspaces, social networking tools, search engines, tools containing business intelligence, applications developed by a third-party, or it can be used as the development platform for web applications. (18.)

SharePoint is a platform and application framework. Many things can be done just by configuring the server and activating the desired properties. Every SharePoint site typically consists of libraries, lists, calendars, tasks, notifications, etc. Each of these objects is a customized expression of the basic list. Each list has a separate group of columns and views for the creation of the user interface. SharePoint has some pre-defined list and library definitions, such as Announcement Lists, Blogs, Contacts, Discussion Boards, Document Libraries, External Content (BCS = Business Connectivity Services) lists, Pages, Surveys, and Tasks. (18.)

Web Parts are modular and reusable elements and they allow to control over the content, appearance and behavior of the page. Web Parts can be inserted into defined areas in a SharePoint page where they can be arranged and used. (18.)

A SharePoint site may contain subsites, and subsites can contain subsites. Typically, all of the sites, lists, libraries, and any objects to be customized have to be created from scratch. Using templates, one template is created first and then the necessary objects are created from this template. SharePoint includes a variety of templates, such as column, list and website templates. Templates include blogs, MySites, collaboration (team) sites, document workspaces, groupwork sites and meeting workspaces. (18.)

The easiest way to change all SharePoint settings is using Central Administration (CA), because it has a graphical user interface. However, all settings can be changed also using the STSADM/PowerShell (STSADM = SharePoint Team Services Administration) commands that enable the administrator to perform administration tasks as easily and safely as possible. (19.)

Different SharePoint search versions offer different features, but all search engines contain the ability to search within documents, except in cloud environments, across external data sources, such as file systems (19).

4 Data migration

The NSF database files of UPM Notes Applications are stored in the Domino Application Servers. The R&D Handbook database consists of thousands of documents and the disk space used is now about 2.5 GB. In this pilot, only the valid documents were transferred to the SharePoint platform.

The data migration process was performed by the supplier. Prior to starting the migration, a choice between two data exporting options had to be made: the export using licensed software or export made by the supplier's application developer. The latter alternative was chosen because of its lower effect on the pilot's cost structure. Figure 8 presents the data migration scenario of the QF POC pilot.

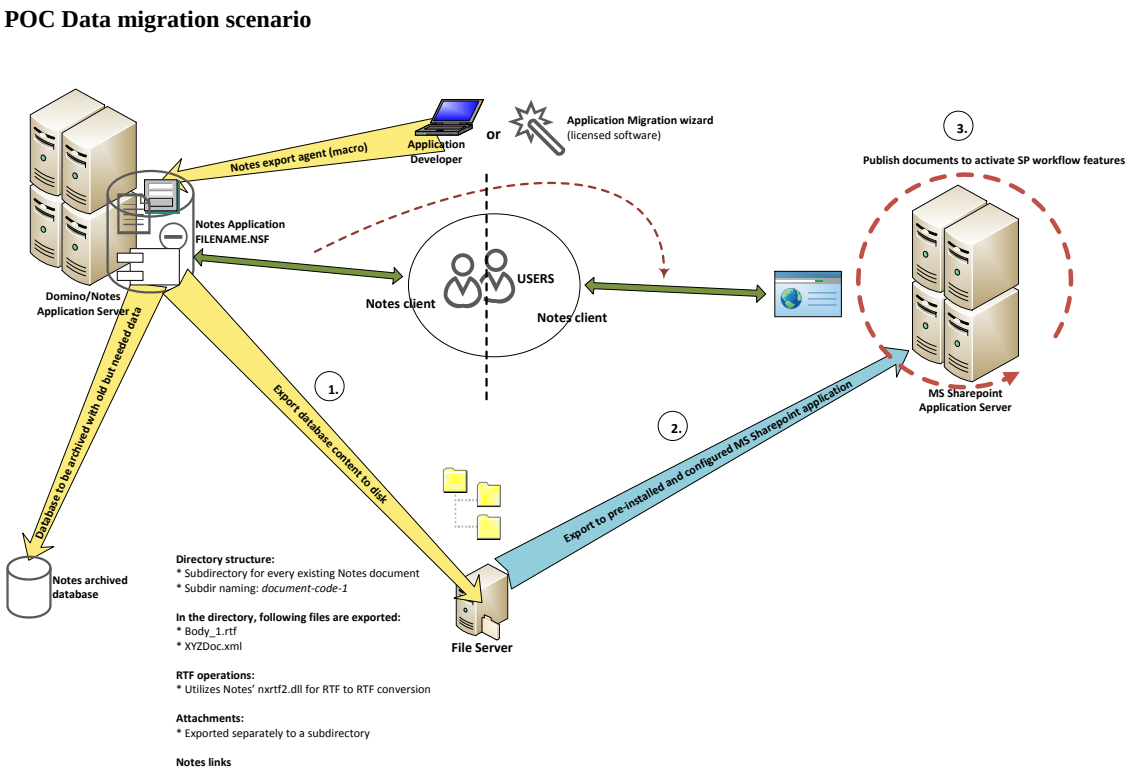


Figure 8 Data migration scenario of the QF POC pilot

The phases of the migration are described in chapters 4.1 – 4.4.

4.1 Notes database export

First, XML export was performed for the selected (valid) Notes documents of the Handbook using Notes export agent (macro). The documents were exported by the agent in the temp directory located in a disk where a subdirectory was created for every existing document. The naming of the subdirectory was carried out as “document-code-1“, e.g. document-00048-6. The code 00048 is the same code the document has in Notes added with a version number 6. The following files were then exported in this subdirectory:

- Body_1.rtf, date and time, file type ‘Rich Text Format’, size xx KB
- QualityDoc.xml, date and time, file type ‘XML Document, size xx KB

If the document had other attachments, like Word or Excel files, they were exported in the same subdirectory as separate files. The file QualityDoc.xml includes the exported Notes fields’ data (metadata) in XML-format. If the document had Notes RTF fields (Notes’ body), they were exported as separate .rtf files, in order to maintain the formatting of the fields. A Notes’ program called ‘nxrtf2.dll’ was used to converting the Notes RTF fields to RTF files. Nxrtf2.dll deals with the process, which manages Windows’ dll (dynamic link library) files and loads them into Windows memory (20).

After exporting the above-mentioned file structure from Notes, another program was activated. It read all the rtf files and converted them to docx files. The ‘body’ of the docx file was a base for the rtf file. The conversion of the rtf file to docx file requires either Microsoft Office Interop assemblies files or the Microsoft Office Open Xml Sdk 2.0 package. (21.) Export files can be copied from one place to another in the same way as a normal folder structure once the logic structure or directory of each document stays constant.

After docx conversion, a third program was activated. This program read over the file structure first, then it opened the xml file and created a feature table compatible with SharePoint. This table contained a metadata key and a value. The third program also sent both the file and the metadata to the SharePoint. (21.)

4.2 File export to SharePoint

The MS SharePoint application was pre-installed and configured in the MS SharePoint application server. From the file server the subdirectories and their files were exported to the SharePoint server.

In this phase the access from the server to the SharePoint destination environment was needed. This could be accomplished by sending the data over the network as a web service or by creating a direct connection to the SharePoint server. Depending on the amount of material to be exported, it may be easiest to copy the export folder with its files to a SharePoint server (a web server where web sites used by intranet applications are located). From the SharePoint server the files were loaded to the SharePoint application. In this case, the issues caused by the speed of the network could be minimized and the export of the data speeded up. (21.)

The challenges faced during this migration are gathered up and explained in chapter 4.6.

4.3 Publishing

When the data conversion from Notes to SharePoint had been successfully carried out, the exported docx files were seen in the SharePoint's workspace view 'In progress'. Before publishing, the document had to be checked so that the information and details in the document were correct.

The publishing process began when an approval workflow was started by marking a document approved. The approver's metadata, the information about the folder structure and publishing sites and other so called system information were updated on the document first. The system information comprises different actions, e.g. checking of the document IDs and writing on the document which workspace the approval was executed from. (21.)

The next step of the publishing process was the copying of the document, when the marked publishing sites on the document were looked through and when it was checked that an earlier version existed. If an earlier version of the document had been published, it would have been transferred to the archive folder.

At the same time, the document to be published was copied to the destination site and its metadata was checked so that the metadata of the copied document was exactly the same as the one in the original workspace document. (21.) When the publishing process was finished, the approved document was seen in the table of contents of the selected publishing sites.

The copying method enables a controlled way to produce the next document version. On the other hand, by means of the created copy it is ensured that the right version of the document is available to readers. In addition, this mechanism makes it possible to, e.g. produce a PDF conversion when publishing a document. That means that a word file locating in the workspace can be converted to the pdf format when copying and publishing it. (21.)

4.4 Archiving

During the QF POC pilot the R&D Handbook in Notes was normally in use and the old, but needed, documents were stored in the Notes database as archived documents. Only the valid documents were exported to SharePoint and that reduced the quantity of documents to be exported. In SharePoint, the archived documents are stored in an archive folder. When publishing a document in SharePoint and if an earlier version had been published already, the earlier version would automatically be transferred to the archive folder.

4.5 User admin and access rights

Access control refers to security features that control who can access resources in the system. In Notes' Handbook, there are seven access right levels in use: Manager, Designer, Editor, Author, Reader, Depositor and No Access, while in the SharePoint test site, only three roles were used for grouping users: Administrator, Editor and Reader.

4.5.1 Access Control in Notes

Every database includes an access control list (ACL), which Notes uses to determine the level of access that users and servers have to a database. Levels assigned to users determine the tasks that users can perform on a database.

Levels assigned to servers determine what information within the database the servers can replicate. (16.)

Only someone with Manager access can modify the ACL. The Designer and Manager of the database can coordinate to create one or more roles to refine access to particular views, forms, sections, or fields of a database. (16.)

Data concerning access control of UPM R&D Handbook was found using Notes' 'Database Access Control' feature. Figure 9 presents the different roles used in R&D Handbook.

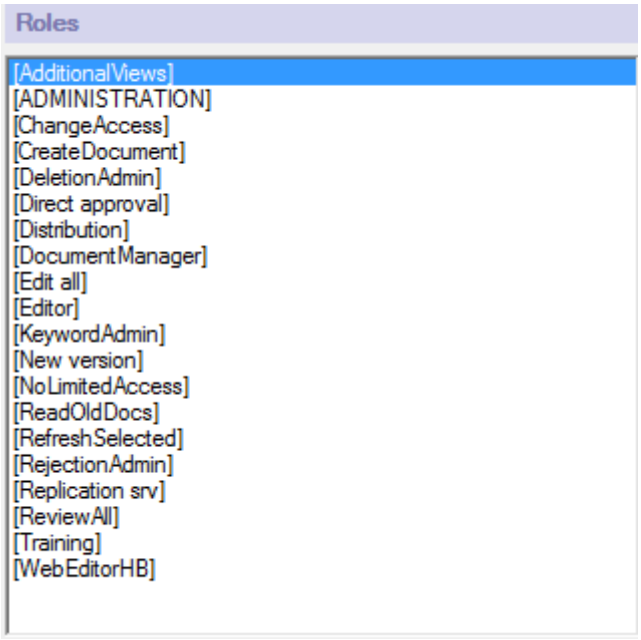


Figure 9 A screenshot of the roles of Access Right List in R&D Handbook

ACLs apply only to databases stored on servers, not databases stored locally. If a change is made to a local database and replicated to the server, replication honors the user's level of access in the ACL on the server. For example, Reader access does not allow creating new documents and if a new document is added to a local replica of the database using Reader access, the new document will not get added to the database when the local replica is replicated up to the server. However, database designers can enforce a consistent ACL across all replicas of a database, including local databases. (22.)

4.5.2 Domino Directory

The Domino Directory is a directory (a single database) created automatically when setting up the first server in a Domino domain. The created directory has the file name NAMES.NSF. The Domino Directory describes the users, servers, groups, connections, and access control information for a Lotus Domino domain. It is also possible to manually create a directory from PUBNAMES.NTF template. Clients and specialized servers such as mail and application servers use the directory servers to look up user, group and similar information. (23.)

4.5.3 Access Control in SharePoint

Access to SharePoint is based on a user's identity, typically maintained in Active Directory (AD). Three standard access right groups are delivered (automatically) with the site:

- Administrators – manage the site structure and user rights
- Editors – can create, edit and delete documents and items
- Readers – can view the site, documents and items

Active Directory Users and Groups are used to manage access to resources. For instance, when a user’s role changes, the administrator can review all the AD groups to which the user belongs from one place – Active Directory Users and Computers – and compare the user’s current entitlements to his or her new role. AD administrators can create an organizational unit for SharePoint groups and assign the permissions necessary to create and manage groups.

4.5.4 Active Directory

A directory service called Active Directory (AD) has been developed for Windows domain networks. Active Directory is a central location for network administration and security, and AD stores its information and settings in a central database. AD’s content can be split into two categories: resources and security principals. AD is used for authentication and authorization of users, groups, printers and computers etc. When new software needs to be installed or critical updates to be applied to an organization AD is used for that, too. For instance,

Active Directory verifies the user's password and specifies whether the user's role is a system administrator or a normal user. (24.)

Active Directory has a hierarchical tree structure. A site, forest, tree, domain and OU (Organizational Unit) are concepts of AD's framework – they can also be thought as objects or divisions in AD. A forest is the highest structure and it is a collection of trees that share a common global catalog, directory schema, logical structure, and directory configuration. A tree holds one or more domains that have their own namespaces. A geographic location that hosts networks is called a site, in other words, a site is a set of connected subnets. The difference between a domain and a site is that a site represents the physical structure of a network, while a domain represents the logical structure of an organization. Objects in a domain are grouped into organizational units (OUs), which are the lowest structure in AD. Organizational units are like containers in AD where users, groups, computers, and other organizational units can be placed into. An OU may contain other OUs but it cannot contain objects from other domains. (24.)

4.6 Challenges in the pilot

A few challenging issues were encountered during the piloting and they are discussed in the following six sub-chapters.

4.6.1 Links

Prior to exporting the data, little uncertainty appeared about how the links, especially the internal Notes links, would be transferred into the rtf file. When using the nxrtf2.dll agent, external web links seemed to be working and leading to the right web pages. A link leading to a file on UPM's network drives, for example a MS Excel file, was seen as a reference to a specific network drive (a directory path) inside the rtf file. The information of the internal Notes document link was seen in the rtf file as follows: Notes server + Notes database replica ID + Notes view + Notes document ID, for example Notes://C2256ACA0030210D/57CB8C57F2380C4E422563AA00361E75/50CF85438E14DFBCC225767700390D5E. Naturally, these kind of internal links refer to a document in Notes, not in SharePoint. One question is how these inter-

nal links will function in SharePoint as they are referring to the specific point of the Notes application. However, this functionality may not be the best way to handle this matter in long-term especially if the final Handbook migration from Notes to SharePoint is implemented in UPM R&D.

The better solution would be to form a new link leading to the right document inside SharePoint. But when building the link, several variables will be involved, and if the document is not published or not yet exported to SharePoint at the moment of the creation of the link, the formation of the link has to be 'guessed'. One option would be to handle the links afterwards since the documents have been exported to the SharePoint, but again, the problem would be the publishing of the document. (21.)

Technically, Notes and SharePoint have a major difference concerning the publishing process. In Notes, the document has the knowledge if the document is being published (= its status changes from draft to valid), whereas the published document in SharePoint is practically a copy of the workspace document in Publishing Site. In other words, the SharePoint documents are physically two different files while Notes has only one file. This feature in SharePoint enables the possibility to store the document in docx format in Workspace and in Publishing Site it can be saved just in pdf format (21).

Due to this difference of the applications, the document linkage is a challenging issue and there is a major risk that links will end up to an inactive state. There is still another issue concerning the functionality: the document link will not be active until the destination document is published. This may be a problem if the publishing of the destination document is done after checking the content of the link referring to the destination document. (21.)

4.6.2 OLE-objects

Embedded OLE-objects were one of the elements which caused problems while exporting the Notes documents. The objects were MS Equation formulas, FLW Presentations and Lotus 123 Worksheets. If the document had any of these objects, it prevented exporting the document. All Notes documents containing these objects had to be checked manually and in this pilot the number of such,

valid, documents was 69. If the old versions and documents in the state of ‘under work’ had been exported too, the number of the documents to be checked would have been over 200.

Equation Editor is one of the Microsoft Office products. It is a formula editor that allows users to construct math and science equations. There are two possibilities to fix the MS Equation formulas:

1. The object is removed first. Then the object is reimported in a document as attachment by using the command File/Attach; after that it can be exported like the other attachments.
2. The object is removed first. Then the object will be reimported or copied in a document as a picture, e.g. in JPG format; then it can be exported in RTF export files via RTF conversion.

In this case, equations were replaced with pictures by using the commands Copy/Paste, Special/Paste As Picture. There were altogether 163 MS Equation formulas to be corrected.

All OLE objects were manually fixed in Notes before the export. Normally this would be done by creating new versions for the concerned documents and then importing or copying the objects, but in this project the corrections were made with Manager access by editing the documents without versioning.

There was also a document containing three ‘Lotus 123 Worksheet’ objects. These objects should have been reimported in the Notes document as attachments. Because the Lotus 123 application was no longer used in UPM’s electronic environment and the objects did not open in Office applications they were just deleted and the problem was solved.

One Notes document had two OLE-objects called the FLWPresentation objects. Their application and class was not available but most likely they had been created using Lotus Freelance application. Figure 10 shows that the FLWs were drawings.

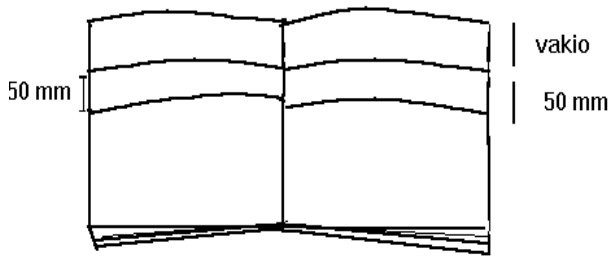


Figure 10 A FLWPresentation object in the Notes document

The FLWPresentation objects should be treated in the same way as MS Equation formulas: to reimport them into the document as pictures or as attachments. These objects did not exist among the documents to be exported while the document containing FLWs was a ‘draft’ version.

4.6.3 “Ghost” attachments/icons

The documents, which had so called ghost attachments, could not be exported to the RTF file because their content ‘Body’ field contained attachments that no longer existed in a Notes document (Figure 11). There were altogether six documents, which had that kind of attachments.

Figure 11 The icons of the ghost attachments in the Notes document

This problem appeared as icons in the Notes documents, which caused an error message “Note item not found” when trying to open them. In some point the location information of the attachment was lost from the Notes document and only these ‘empty’ icons had been left.

The disappeared attachments caused a problem in the XML export: the “Body.rtf” file could not be created from the document’s content because the export program ran to a failure due to those attachments. And of course, the

disappeared attachments were not exported when the export program could not catch/find them and transfer them into the temp file.

The solution to fix the problem was to go through the documents in Notes and manually reattach the needed files in the documents and remove the existing “ghost” icons. In practice, this could be done by creating new versions for the concerned documents and then reattaching the files. In this pilot the corrections were made with Manager access by editing the documents without versioning.

4.6.4 Keywords list

Keywords in Notes is a list of contents, a directory tree, which contains the titles of the directories and subdirectories. The Notes directory tree was useful in this pilot migration and the same directory structures were used for the test environment in SharePoint.

Documents can be distributed to separate publishing sites in the SharePoint based Handbook. Each publishing site may also have its own list of contents but other hierarchical lists are shared with the main publishing site. Due to this difference between Notes and SharePoint based applications, in SharePoint, each R&D unit got a site of its own based on Keywords List’s first level, e.g. Management, UPM RC and AsRC. Figure 12 and Figure 13 present the directory trees of UPM RC in SharePoint and in Notes.

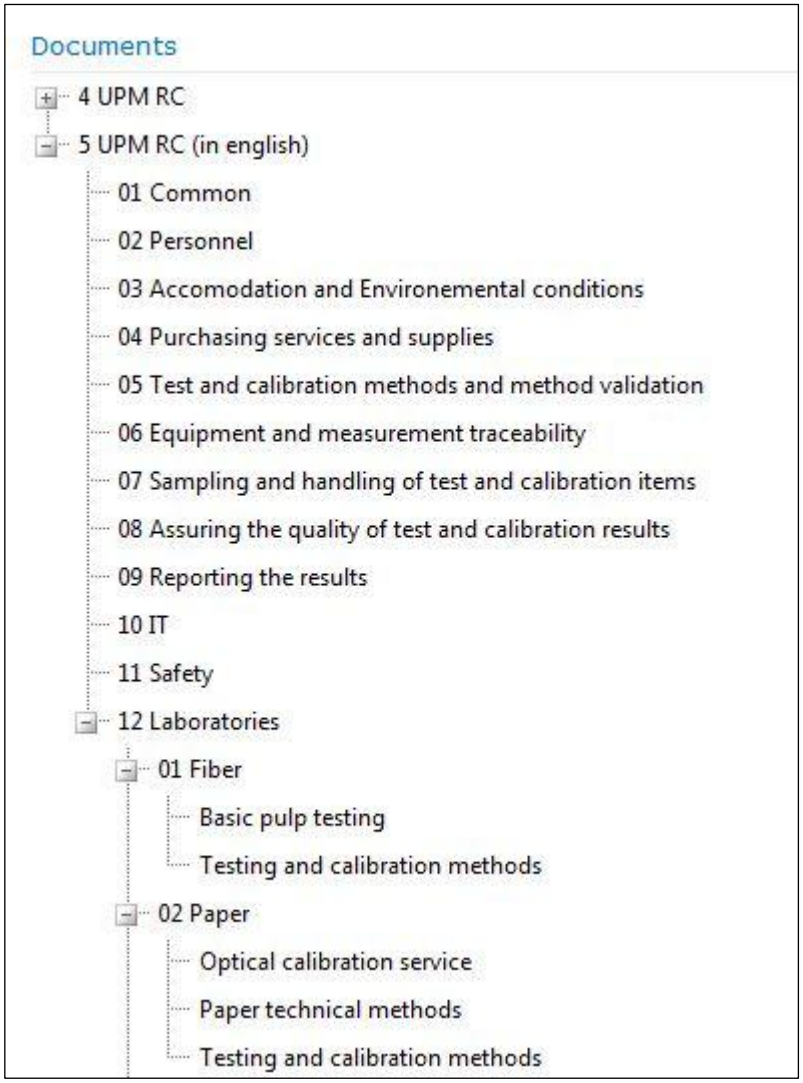


Figure 12 A screenshot of part of the UPM RC directory tree in the SharePoint test environment

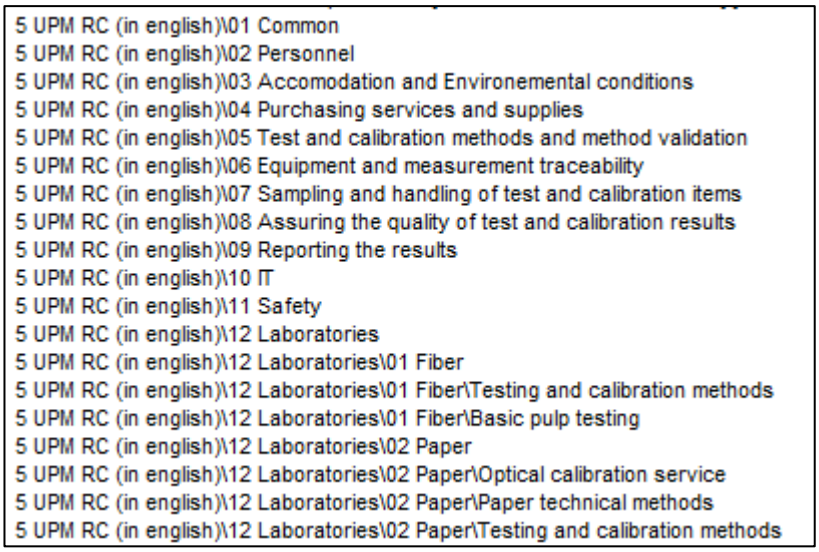


Figure 13 A screenshot of a part of Notes' Keywords List of directories relating to UPM RC

The directory levels that had no valid documents in Notes were not created in the export process and therefore those levels did not exist in the SharePoint test environment. In the pilot this was not a problem.

Probably the best option is to allow the system to build the directory tree so that the correct levels are created first and then the documents are attached to the corresponding levels (where they belong). After that, if some directory tree levels are missing they can be added into SharePoint manually. (21.)

4.6.5 Chinese documents

The export of Chinese documents was a kind of 'mystery' because there was nobody in the project group who had Chinese language skills. That was why after exporting, an example of a Chinese Word document was sent to Asian Research Center (AsRC) for evaluating if the Chinese characters were correctly converted. The feedback from AsRC was positive: the export into RTF format appeared to be successful.

4.6.6 Piloting environment

Working in the pilot environment had some challenging issues, too. The test environment did not entirely match up to the real environment and some of the

functions could not be performed in the test site due to its limitations. Occasionally the test environment was unavailable when the site was under construction. Few problems also occurred due to the network, as the piloting environment was running at the supplier's servers. One issue related to this network problem and Word application is described in chapter 4.7.1.

4.7 Testing

In this chapter, experiences and questions from the pilot's test user group are gathered and analyzed.

4.7.1 Office Word problem

One problem that showed up during the pilot concerned the creation of a new document and MS Office Word 2010 application. It was noticed that when a new document was created it could not be edited or saved in Word because the document opened only write protected. The problem could be caused by the Word's protected view or mode, which prevented the direct editing of the document (21). Users also faced problems when saving the document (causing error messages). Word 2010 cannot properly identify the web sites outside the organization's network in which case Word interpreted the pilot server as a stranger and handled the documents opened from the pilot environment in the same way as if they were anywhere else on the internet (21).

This feature of Word 2010 would likely not be an issue in the near-future if the final migration of the Handbook took place because the Handbook application would be so called on-premises software. That means that the SharePoint platform would be installed and run on computers and servers on the UPM's own premises.

4.7.2 Reference data

Also the idea of an extra site in SharePoint came up: a Standard change management site where all research centers' documents could be linked with the relevant standards (ISO, TAPPI, SCAN, etc.). The site would be visible and available to all Handbook users, too. A publishing site Standard change man-

agement was then added to the SharePoint test site with its own discussion area.

In this matter the problem was how the data of the Standard cell in Notes document's table would be exported authentically to the SharePoint metadata. Figure 14 below is an example of a table in Notes' test method document. The table is contained in Notes NTF template and the template is used as a base for test methods in UPM research centers.

Variable:	Standard:	Unit:	Measurement accuracy:
Grammage	ISO 536:1995	g/m²	3 significant numbers

Minimum sample size:	Number of parallel measurements:	Minimum amount of sample:	Determination range:	Uncertainty of measurement:
1000 cm^2	2	5 A4	0 - 500 g/m²	± 0.1 - 0.3 %

Figure 14 Information table in Notes' test method document

The data from this kind of a table have to be retrieved by coding the commands, the function of which can be like "read the data in the second cell on the second row". A remark for future actions is that the structure of the table in the document has to be constant and unchanging, otherwise the reading of the data will fail or the result will be incorrect data. (21.)

In the final migration the quality documents have to be checked anyway and it could be a good practice to add this standard information to the metacard of the concerned document by the author or inspector (21). There are also several test method documents that are written up e.g. on the basis of a manual of a device and therefore they may not refer to any official standard; then the standard information could be marked with a word 'Internal' in the metacard. Therefore, the reference standard information could also be a mandatory data in each document.

4.7.3 Workflow approval

When a document was rejected, its status stayed still as completed and if the commenting process was started afterwards, an announcement ‘Approve and publish document’ came in a custom task list (My Tasks). It can be confusing for users if the status ‘completed’ stays still under the column title “Approve and publish document”, although the document had not been approved but rejected. Unfortunately, this is a feature of Microsoft SharePoint application, which cannot be solved easily, and it will require some effort to try to find a way to fix this undesirable feature.

4.7.4 nxrtf.dll vs. nxrft2.dll

The Notes export agent has a significant effect on the visual and technical properties of the exported rtf file. The nxrtf.dll program is used for the earlier versions of the Notes application (before 6.5.5). When the rtf conversion is done using the later nxrtf2.dll program, the conversion result is better and more reliable. The next comparison between nxrtf.dll and nxrtf2.dll presents a few differences between these two programs.

Using nxrtf.dll in rtf conversion:

- Tables were without borders
- Some images were missing
- Some images were blurry and converted into black and white (originals were in color)
- Links were missing, only their titles remained
- Greek symbols among the text were not correctly converted

Using nsrtf2.dll:

+ Tables had borders
+ No missing images
+ Images had the same quality as the original ones
+ External links were active

+ Addresses of Notes' internal links were converted and located in their right places in the rtf file
+ Greek symbols were correctly converted

The comparison is presented in the table form in Table 1.

Table 1 Comparison between nxrtf.dll and nxrtf2.dll

Element	**nxrtf.dll**	**nxrtf2.dll**
Tables	- Tables without borders	+ Tables with borders
Images	- Some images missing, - Some images blurry and turned into black and white	+ No missing images, + Images with good quality
Links	- Links missing	+ Active external links + Internal links' addresses converted, + Internal links located in the right places
Greek symbols	- Greek symbols incorrect	+ Greek symbols correctly converted

4.7.5 General feedback

The feedback from the pilot's test user group was positive in general and the SharePoint test environment was considered user-friendly. Compared to Notes R&D Handbook the following observations or comments were made:

- The operating speed of the SharePoint application is faster.
- "Not responding" phenomenon is often met with Notes Handbook and then the Lotus Notes (email, other databases) refuses to work. If R&D Handbook is based on SharePoint it will bring no effect on other applications or databases in case it breaks (although the break down case is very limited).
- Quality First for SharePoint Handbook has very similar workflow to Notes Handbook so that people who are familiar with Notes Handbook can smoothly work with SharePoint based Handbook.

- It will give a common platform to share information, e.g. standard updating, new device utilization, method development and best practice sharing.
- The word processing using MS Word application will make it much easier to prepare and edit documents, e.g. typing errors will decrease because the spell checking is in use and special characters are available directly in Word.
- The directory tree and pull-down menus of SharePoint Handbook are good, likewise the publishing site for every research center is clearer than in the past in Notes Handbook.
- Quality First Handbook should replace Lotus Handbook and be put into use as soon as possible. It definitely will cost time and effort in the beginning, but it will bring benefits and save time afterwards, the same as LIMS (Laboratory Information Management System) which is used in UPM R&D.

5 End product

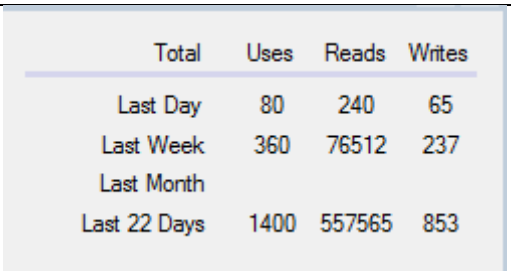
Chapter 5.1 consists of the data analysis of the R&D Handbook and methods used in analyzing the data. The second chapter 5.2 presents some visual and technical features of the R&D Handbook in SharePoint.

5.1 Data analysis and methods

A Notes' feature 'Database properties' included the basic information about the R&D Handbook, such as database size, quantity of documents, creation date and user activity data. Table 2 includes the data analysis concerning the R&D Handbook database.

Table 2 The basic information about the Notes Handbook database (situation in December 2011)

Size of the database	2.5 GB
Date of creation	19.09.2001

Number of the documents	5,400
Valid documents	1,184
User activity (on 13th of December)	

The elements used in R&D Handbook documents were analyzed by checking manually those documents, which caused problems during the data exporting from Notes to SharePoint. Table 3 below includes the data analysis concerning the R&D Handbook document. The number in the table's third column refers to the chapter where issues of the concerned element are handled.

Table 3 Elements inside the Notes documents

Element		**Reference**
Attachments		Chapter 4.6.3
Links	– External • web links • links to other applications – Internal • Anchor links • Document links • View links • Database links	Chapter 4.6.1
OLE objects	– MS Equations (mathematical formulas in presentation mode) – Lotus 123 Worksheets – Lotus Freelance FLWPresentations	Chapter 4.6.2
Tables		
Pictures		
Data formats	– Text – Numbers – Dates – Formatted rich text	

A more detailed analysis of the database would have required a special program to open the database structure as accurately as possible. For instance Design Synopsis is a tool that can provide a detailed blueprint of the database on its current state, for example, general database, replication and ACL information. (25.)

5.2 R&D Handbook in SharePoint

R&D Handbook in SharePoint was a piloting environment where the valid Notes documents were converted into Word documents and placed in the corresponding workspaces.

A specification workshop was held in September 2011 where the structure and the specifications of the SharePoint-based Handbook were discussed. Specifications covered the publishing and workspace sites, hierarchical structures and the metacard of the Handbook product. The metacard's metadata fields were dynamical and could be customized. The hierarchy structure, i.e. directory tree, in the SharePoint test environment was decided to be kept the same as the one in Notes with one exception: each research center had a site of its own (see chapter 4.6.4). Also R&D Management, R&D Research and Standard Change Management got their own sites. Therefore in total 8 workspaces and 9 publishing sites were created in the test site. The following figure 15 is a screenshot of the Welcome page of the test environment.

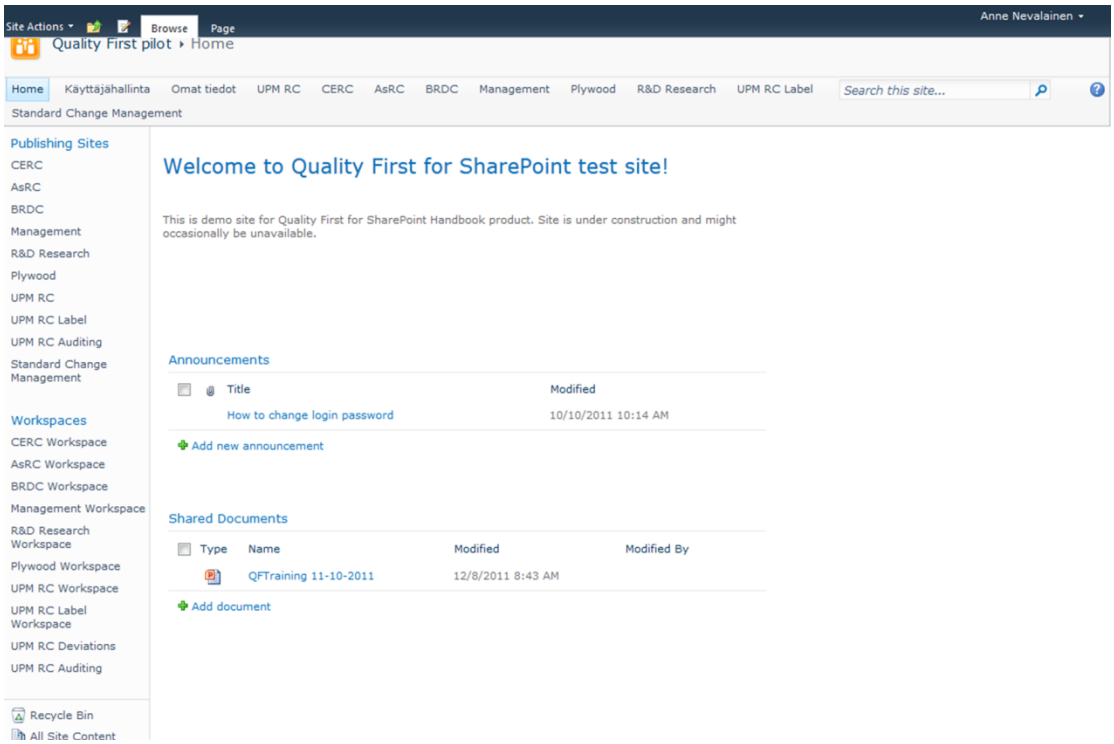


Figure 15 Welcome page of the Quality First test site

All published documents could be viewed on the publishing sites. The publishing sites were available to any user that had Read permissions, i.e. all test group members of the pilot could read published documents.

The workspaces were sites where unpublished documents were located, and the actual processing of the documents occurred. A document, which was not yet published, could be a new one and needed to be published or as in this pilot, a document had been exported from Notes to SharePoint and needed to be checked. After checking and saving the metacard, the information was written into the document.

The quality document itself was a MS Word file. The converted document had a customized header (Figure 16).

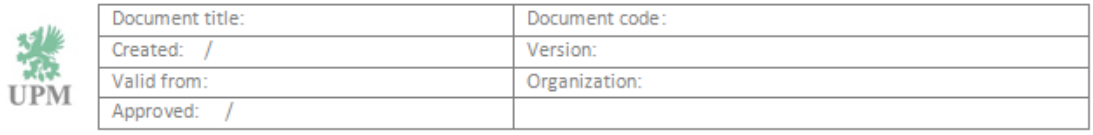


Figure 16 The document header of a Word template

The table fields of the header were formed using metadata information of the XML Document (Table 4).

Table 4 Metadata information exported from Notes' document and used in the header of the Word document

	Metadata (xml element)		**Metadata (xml element)**
Document title:	HB_DocTitle	Document Code:	HB_DocCode
Created:	HB_CreateDate	Version:	HB_DocumentVersion System
Valid from:	HB_ValidBegin	Organization:	HB_OrganizationIDs
Approved:	HB_ApproversGroup Date / HB_ApproversGroup		

The workflow feature in SharePoint Handbook was very similar to the one in Notes but in SharePoint there was no Inspection workflow (see Figure 3, chapter 2.5). The available workflow options were Approval and Publish, Direct approval, Review, Commenting and New version. When any of these workflows was started the information about the document's status was shown in the 'In progress' view of specified workspaces (sites).

A workspace view of a site consisted of the following Web Parts: New document, My tasks, My documents and Documents. In New document Web Part the user could upload existing documents and create new ones. My tasks Web Part included a list of tasks assigned to the user. My documents Web Part contained a table of those documents the user was appointed as an author. Documents Web Part was reserved for the table of contents of the concerned site, e.g. Table of contents of UPM RC (see Figure 13, chapter 4.6.4).

The pilot users of SharePoint test environment were divided into three SharePoint Groups: QF pilot Members, QF pilot Owners and QF pilot Visitors. A Member had a permission level ‘Contribute’; they could view, add, update, and delete list items and documents. An Owner had ‘Full Control’ permissions to the Handbook test site. A Visitor had a permission level ‘Read’, which meant that they could view pages and list items, and download documents. Only the Owners and Members had access to the workspaces.

The piloted Handbook application had the following key functionalities:

- Document; metainformation could be written inside a document.
- Metacard; a document’s property card that had to be filled before publishing the document.
- Workflows; Approval and Publish, Direct approval, Commenting, Review and New version.

Handbook also extended the basic SharePoint 2010 functionality.

6 Future updates and testing

The “philosophy” in the MS SharePoint environment is totally different than in Notes. One issue in the future is so called ‘patches’ or updates for applications or an application environment. In Notes, each Notes database has “a world of its own” but in the SharePoint environment every update has an effect on all applications. This leads to a situation where all applications have to be tested after updating the environment. These patches will be released and scheduled, so that the updating cycle will be repeated a couple of times during a year. When an update is released the SharePoint application is first tested in a test environment by UPM IT. The test environment is very much similar to the production environment. The testing of the application’s functions will be the responsibility of the application owners. In addition, if the application itself has to be updated between the environment patches, the testing has to be carried out again.

7 Summary

This thesis intended to provide a set of considerations for those members of organizations or functions in UPM who are going to migrate data from Lotus Notes platform to MS SharePoint. The scope of the migration was Lotus Notes based R&D Handbook, which is a quality manual of UPM Research and Development.

The Quality First POC project was started in autumn 2011 and the actual piloting of the SharePoint based R&D Handbook was carried out during October and November 2011. Because “the back-up system”, i.e. the Notes Handbook application was in use normally during the QF POC pilot, it was a risk-free way to test the functionality and feasibility of the new application to find out how it would suit for the UPM R&D quality work. The pilot was also started for minimizing the risk of problems when exporting Notes’ data. This was very reasonable because Notes documents contain rich text fields that can store pretty much anything: a single Notes document may have multiple rich text fields, each containing mixtures of formatted text, attachments and Object Linking and Embedding (OLE) objects. Several issues came up during the pilot due to the differences in platforms and their data structure.

After piloting it can be concluded that the migration will not happen by “pressing a button” but should require planning, resources and knowledge. However, this QF POC pilot had great benefits: the migration process became visible and the practices and guidelines faced during the pilot were documented.

To me, this QF POC pilot provided some benefits too. Because it was the first time for me to be a participant in this kind of a software project it was very educational, and among other things, my knowledge of project work and its practices increased a lot. I also got a very good idea of the functionality of the Quality First for SharePoint product.

In UPM, such migrations may be implemented also in the future and the experiences I have gathered during this pilot are of high importance – hopefully not only for me, but the UPM, too.

Figures

Tables

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