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**INVESTIGATING DOCUMENT AVAILABILITY**  
**Ethnographic Study on a Technical Specification**

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## **ABSTRACT**

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Pro Gradu Thesis

This thesis explores document availability at Valmet Rautpohja by an ethnographic study of a technical specification. Main goal of the thesis is to study different requirements, meanings, perspectives, applications and existing work practices that different individuals and groups have on useful electronic archiving.

Theoretical sections of the thesis study ethnomethodology, computer-supported cooperative work (CSCW), information and process integration, electronic archiving and electronic document management systems. These concepts are also considered in respect of Valmet Rautpohja. Empirical data of the study is gathered by using an ethnographic method created by Richard Harper (1998).

Employees' requirements, meanings and perspectives emphasise the need to reduce the distribution of an abundant amount of paper and the need to create clear instructions and guidelines of what, how, where and for how long to archive documents. Enhancing information retrieval and seeking is also considered as an important requirement. Additionally, a common document space surrounding employees consists of private, public, computer-generated and non-computer-generated documents. This finding, along with recognising the diversity of work practices, file formats, applications, meta documents and the perspective of a virtual single point of access are suggested to be the key issues when deciding on how to proceed with document management and electronic archiving in Valmet Rautpohja.

**KEY WORDS:** ethnomethodology, ethnography, CSCW, electronic archiving, work practices

# TIIVISTELMÄ

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Tutkielma

Tässä tutkielmassa tarkastellaan dokumenttien saatavuutta tutkimalla etnografisesti yhtä teknistä erittelyä Valmet Rautpohjassa. Pää tavoitteena on tutkia työntekijöiden ja työryhmien vaatimuksia, merkityksiä, näkökulmia, käytössä olevia sovelluksia ja työkäytänteitä hyödyllisen elektronisen arkistoinnin perspektiivistä.

Tutkielman teoreettinen osuus paneutuu etnometodologiaan, tietokonetuettuun yhteyistyöhön (CSCW), informaation ja prosessin integraatioon, elektroniseen arkistointiin sekä elektronisten dokumenttien hallintajärjestelmiin. Näitä osatekijöitä pohditaan myös suhteessa Valmet Rautpohjaan. Empiirinen data kerättiin toteuttaen Richard Harper'n (1998) luomaa etnografista metodia.

Työntekijöiden vaatimukset, merkitykset ja näkökulmat korostavat tarvetta vähentää runsasta paperidokumenttien jakelua, luoda selvät ohjeet mitä arkistoida, mihin, miten ja kuinka kauan. Lisäksi tutkimus paljastaa, että työntekijöitä ympäröivä yleinen dokumenttiavaruus sisältää yksityisiä, julkisia, tietokoneella ja muilla tavoin luotuja dokumentteja. Tämän tuloksen lisäksi työkäytänteiden, tiedostomuotojen, sovellusten ja meta dokumenttien moninaisuus sekä näkökulma yhdestä virtuaalisesta käyttöliittymästä ovena kaikkeen informaatioon tulisi olla avainasemassa päätettäessä miten dokumenttien hallinnan ja elektronisen arkistoinnin puitteissa Valmet Rautpohjassa edetään.

**AVAINSANAT:** etnometodologia, etnografia, tietokonetuettu yhteistyö (CSCW), elektroninen arkistointi, työkäytänteet

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# **1. INTRODUCTION**

This chapter will describe the overview of this thesis. The first section will shortly illustrate the research background to this study. The second section will focus on presenting the research problems and the delimiting subquestions. The third section will give a short description of the organisation studied, Valmet Oyj. In the fourth section research objectives will be discussed, followed by the research approach in the fifth section. Research method and short introduction to research results will be presented in the sixth and seventh section. Finally, this chapter includes the description of the structure of this thesis.

## **1.1. Research Background**

Most of the information within organisations is in the form of documents. Documents are used to store history, capture the present and predict the future. Comprehensive document management is one of the most important challenges companies have today and it is also seen as one of the most essential competitive weapons. On the other hand, internal as well as external factors, such as business networks, internationalisation, competition and new technologies force companies to react to reorganise and manage the documents that they have produced.

Companies need to set strategies on how they will deal with and manage documents, as the amount of information, both manual and electronic, is abundant. During the current decade electronic documents and their management have aroused specific interest in different organisations (Päivärinta et al. 1997a). A lot of the knowledge within organisations is scattered in inconsistent electronic documents: these documents appear in incompatible, unintegrated and or paper archives (Päivärinta et al. 1997b). Thus,

decisions on how to manage and record the information, mindful of different forms, are strongly needed.

## **1.2. Research Problems**

The broad research problem of this thesis is as follows: How should Valmet Rautpohja proceed with document management to be using electronic archiving comprehensively in 2003?

Subquestions, that delimit the main research question, are:

- What kinds of requirements do different individuals and groups have on useful electronic archiving?
- What kinds of meanings do different individuals and groups have on useful electronic archiving?
- What kinds of perspectives do different individuals and groups have on useful electronic archiving?
- What kinds of applications do different individuals and groups have on implementing electronic archiving?
- What type of existing work practices do different individuals and groups have on archiving documents electronically?

## **1.3. Valmet Oyj<sup>1</sup>**

Valmet is the world's leading supplier of paper and board machinery and related process control. Valmet serves pulp, paper and packaging industries worldwide, by engineering and producing advanced and reliable process solutions, machinery and

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<sup>1</sup> Valmet Oyj and Rauma Oyj will merge on the 1<sup>st</sup> of July 1999. During writing this thesis the merger was not yet announced in public. Thus, the description of the company will only deal with Valmet Oyj.

services to support customers in their efforts to become winners in their businesses (Valmet Today 1998). Valmet Group operates in five business groups: Paper and Board Machinery (paper, board and finishing machines), Converting Equipment (machinery for the packaging and printing industries), Valmet Automation (applications and solutions used for measurement, control and information management of industrial processes), Valmet Power Transmission (industrial gears and hydraulic motors), and Valmet Automotive (specialises in the production of cars). (Annual Report 1998)

Valmet has production plants in Finland, Sweden, England, Italy, France, Canada and the United States, as well as a joint venture in China. The company has sales and service companies in all its main market areas: Europe, North and South America, Asia and Australia. (Valmet Today 1998)

Paper, board and tissue machines, stock preparation equipment, paper finishing machinery, converting equipment, air systems and service together with related process control and power transmission account for over 90% of entire Valmet Group's net sales. Group operations also include the assembly of special automobiles. Valmet Group net sales for 1998 were FIM 11.6 billion, of which exports and international operations accounted for 84 per cent. The Group had 12,680 employees at the end of year. (Annual Report 1998) Valmet's shares are traded on the Helsinki Exchanges (HEX) and New York Stock Exchange (NYSE).

As for document management in Valmet Corporation (Rautpohja) the following goals have been set to be the most important (November 1997):

- Assuring document availability
- Integrating information systems with each other and in respect of time
- Managing the whole document life cycle and
- Guaranteeing data security.

Several projects deal with document management, both manual and electronic, in Valmet Oyj Rautpohja. One of the key focuses for this thesis arises from the need to integrate the projects' goals to archive documents electronically.



### **1.4. Research Objectives**

The aim of this thesis is to investigate multimedia document availability in Valmet Rautpohja. The overall objective is to study different requirements, meanings, applications and perspectives that different individuals and groups have on useful electronic archiving and how these might be reconciled with each other in the context of computer information systems. To achieve these goals theoretical background will study current research on information and process integration, electronic archiving and electronic document management. Empirical study will focus on individuals and their work practices when processing a task – more specifically, when working with a certain document.

The research objective will be achieved by collecting relevant theoretical background and investigating a document career by an ethnographic method. From these two sectors, analysing and combining them, views, suggestions and assumptions can be made on how to proceed with document management in order to be using electronic archiving comprehensively at Valmet Rautpohja by the end of year 2003.

### **1.5. Research Approach**

The research approach will be at first deductive by starting with viewing the main processes in Valmet Rautpohja. After studying the main processes the most important process, or distinctly a process that involves many employees and crosses several organisational boundaries, is chosen and studied in detail. This decision is important in order to frame the study into a certain context. Also, crossing boundaries is of relevance – to follow a document that crosses organisational boundaries (and therefore involves many employees) gives rich data of the forms in which the document changes.

When one process is chosen from the main processes, decision will be made on what kind of documentation to follow. A map of documents from the chosen department will

be created and from that map one document that crosses several organisational boundaries will be chosen. It will be observed with ethnographic methods how this document goes through the organisation. This means that the document's career will be followed.

After observations and interviews, analysis will take place followed by suggestions for useful electronic archiving. Thus, the research approach will transform from deductive into inductive, as illustrated in FIGURE 1.

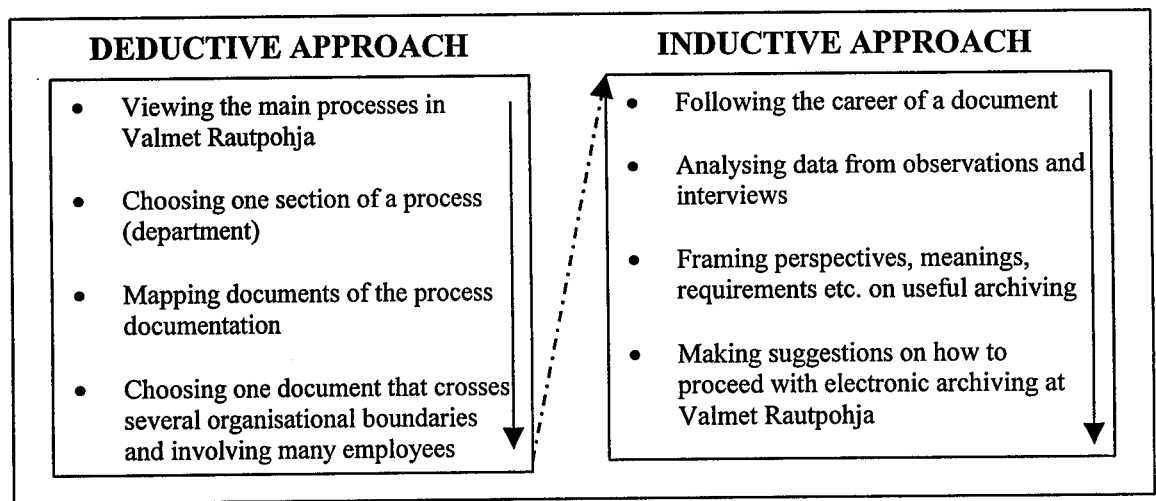


FIGURE 1. Research Approach.

## 1.6. Research Method

The research method of this thesis will be qualitative. From the vast field of qualitative research ethnography and workplace studies are chosen for methods. Ethnographic study will form the empirical part of this thesis. The ethnographic research is conducted by the methodology designed by Richard Harper (Harper 1998) and consists of the following steps:

- Choosing what information career to follow
- Going through ritual induction

- Undertaking observations and interviews
- Analysing gathered empirical data.

The method will be discussed in more detail in chapter 4.

## 1.7. Overview on Research Results

A life cycle of a specification includes many phases and involves many employees. A specification is compiled, negotiated on, edited, modified, initialled, distributed, revised, redistributed and finally archived. A specification is a boundary object (e.g. Star et al. 1989, 1991, Karsten et al. 1999) in nature – crossing many organisational boundaries and involving many employees. A specification is a pure example of a legal document and therefore the distribution is mostly in paper form. However, there are no reasons why the distribution and archival procedures of a specification *within* Valmet could not be electronic.

The requirements, meanings and perspectives on useful electronic archiving support each other: it was found in this study that eliminating the vast amount of paper distribution, enhancing information seeking, retrieval and creating clear and comprehensive instructions on how and where to archive digital documents, are the organisation-wide necessities.

It was also found during the study that the work practices, how people use different applications and which applications they prefer, are diverse. When it comes to creating and editing documents, there are two distinct views: some prefer Lotus Notes to Word and others vice versa. As a main theme surrounding the findings and observations was that of *common document space*. That space includes four kinds of documents: private, public, computer-generated and non-computer-generated documents that are all related. It was especially found out that a lot of documents in an organisation deal with invisible documents, those of private or non-computer-generated. Additionally, a specification generated a lot of other documents; *meta documents* to a specification.

As for suggestions on how to proceed, the most important task to do is to make decisions on what Valmet Rautpohja wants out of electronic archiving. There are many development projects on-going that relate to electronic archiving, some in a great deal, some just partly. I would see it as a waste of money and time if these projects were not combined in their views and aims toward document management and electronic archiving, or merely, toward an environment supporting them. Many of the projects, described later in this thesis, have been ongoing for years and have contributed to the aims of document management. I argue that there are already tools in use that would provide the basic requirements, meanings and perspectives of employees as they support the diverse work practices. If this direction is chosen, it is only a matter of correct instructions and guidelines and testing the environment against the views on common document space and meta documents. Technology, new systems or applications, may not always be the answer, especially, when it is already there. Even small changes, such as a search engine, may make a big difference.

### **1.8. Structure of the Thesis**

The thesis is comprised of six chapters in total. The second chapter will focus on describing and defining ethnomethodology, the theoretical approach of this study. This chapter mainly follows the views and thoughts of Harold Garfinkel, the founder of ethnomethodology. Different interpretations on ethnomethodology will close the chapter. This chapter will also report views on ethnomethodology in information systems design and especially shortly describing the methodological approach of this thesis, i.e. ethnomethodologically informed ethnography.

The third chapter will give an overview of the background perspectives of the study. The following concepts and fields of research will be discussed: Computer-Supported Cooperative work, Information and Process Integration, Electronic Archiving and Electronic Document Management. Above and beyond, it will be delineated how these fields of research have been utilised in Valmet Rautpohja and what kinds of electronic archiving related projects are currently underway.

In the fourth chapter the methodological approach and research setting will be presented in detail. The chapter begins with delineating ethnography and its origins. Secondly focus will be given on ethnography in information systems design and on what ethnomethodologically informed ethnography is. Finally, the methodology of this thesis will be discussed and presented thoroughly.

Research results will be presented in the fifth chapter. The structure of results follows the initial research problems: requirements, meanings, perspectives, applications and work practices. Suggestions on how to proceed with document management will close the chapter.

The last chapter will conclude the main points and limitations of this study and indicate possible future research.

## 2. THEORETICAL APPROACH

The world of 'social facts' is accomplished through members' interpretative work – activity through which actors produce and organise the very circumstances of everyday life (Denzin 1994). Ethnomethodology is a methodological and observational approach to understanding social order. Social structures are locally produced, maintained, and experienced as normal environments. Ethnomethodological analysis focuses on the interactionally unfolding features of social settings and structures, treating talk and interaction as topics for analysis rather than indicators of more sociologically 'important' underlying phenomena (Button (ed.) 1993). The theoretical approach of this thesis will be ethnomethodological and the aim of this chapter will be to outline the basic concepts and ideas behind it.

### 2.1. Ethnomethodology

Harold Garfinkel is considered as the founder of ethnomethodology. One of the founding works of ethnomethodology is his book 'Studies in Ethnomethodology' (1967) where he theorises the basis for ethnomethodology. 'The earmark of practical sociological reasoning, wherever it occurs, is that it seeks to remedy the indexical<sup>2</sup> properties of members' talk and conduct. Endless methodological studies are directed to the tasks of providing members a remedy for indexical expressions in members' abiding attempts, with rigorous uses of ideals to demonstrate the observability of organised activities in actual occasions with situated particulars of talk and conduct.' (Garfinkel 1967, 11). When defining ethnomethodology Garfinkel states as follows:

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<sup>2</sup> Indexical, in Garfinkel's view, means that statements people make are always dependent on the situation, context, conversation and so forth. So, a word used in conversation refers to a certain person, place or time *in that occasion* but can mean something else in another. Therefore, the usage of indexical expressions are relative to the speaker and the auditor should have some knowledge of the expresser, purposes, circumstances, previous course of conversation and alike to understand them.

‘I use the term ‘ethnomethodology’ to refer to the investigation of the rational properties of indexical expressions and other practical actions as contingent ongoing accomplishments of organised artful practices of everyday life’ (Garfinkel 1967, 11).

Garfinkel characterises ethnomethodology by three categories of practical sociological reasoning: (1) doing accounts in ‘common sense situations of choice’, (2) following coding instructions, and (3) common understanding. In addition to these categories Garfinkel concludes characterising ethnomethodology with recitation of study policies. The three categories are based on studies of work and will be shortly presented next.

### **2.1.1. Doing Accounts in ‘Common Sense Situations of Choice’**

The first study of work deals with Coroner’s Death Certificates (Los Angeles Suicide Prevention Centre (SPC) and the Los Angeles Medical Examiner-Coroner’s Office). Selected cases of ‘sudden, unnatural death’ that were equivocal between ‘suicide’ and other modes of death were referred with the request that an inquiry be done. The practices and concerns by SPC staff to accomplish their inquiries in common sense situations of choice repeated the features of practical inquiries that were encountered in other situations:

- Studies of jury deliberations in negligence cases.
- Clinic staff in selecting patients for outpatient psychiatric treatment.
- Graduate students in sociology coding the contents of clinic folders into a coding sheet by following detailed coding instructions.
- Countless professional procedures in the conduct of anthropological, linguistic, social psychiatric, and sociological inquiry. (Garfinkel 1967, 11-12)

When discussing the accounts in the case in question the following features in the work at SPC were recognised:

1. 'An abiding concern on the part of all parties for the temporal concerting of activities.
2. A concern for the practical questions *par excellence*: What to do next?
3. A concern on the inquirer's part to give evidence of his grasp of 'What anyone knows' about how the settings work in which he had to accomplish his inquiries, and his concern to do so in the actual occasions in which the decisions were to be made by his exhibitable conduct in choosing.
4. Matters which at the level of talk might be spoken of as 'production programs', 'laws of conduct', 'rules of rational decision-making', 'causes', 'conditions', 'hypothesis testing', 'models', 'rules of inductive and deductive inference' in the actual situation were taken for granted and were depended upon to consist of recipes, proverbs, slogans, and partially formulated plans of action.
5. Inquirers were required to know and be skilled in dealing with situations 'of the sort' for which 'rules of rational decision-making' and the rest were intended in order to 'see' or by what they did to insure the objective, effective, consistent, completely, empirically adequate, i.e., rational character of recipes, prophecies, proverbs, partial descriptions in an actual occasions of the use of rules.
6. For the practical decider the 'actual occasion' as a phenomenon in its own right exercised overwhelming priority of relevance to which 'decision rules' or theories of decision-making were without exception subordinated in order to assess their rational features rather than *vice versa*.
7. All of the foregoing features, together with an inquirer's 'system' of alternatives, his 'decision' methods, his information, his choices, and the rationality of his accounts and actions were constituent parts of the same practical circumstances in which inquirers did the work of inquiry – a feature of their efforts knew of, required, counted on, took for granted, used and glossed.' (Garfinkel 1967, 12-13)

The work of conducting inquiries was part of the day's work. The inquiries were thereby intimately connected to the terms of employment, to various internal and external chains of reportage, supervision, and review, and to similar organisationally supplied 'priorities of relevances' for assessments of what 'realistically', 'practically' or 'reasonably' needed to be done and could be done, how quickly, with what resources, seeing whom, talking about what, for how long, and so on.



Members were required in their occupational capacities to formulate accounts of how a death really-for-all-practical-purposes-happened. 'Really' made unavoidable reference to daily, ordinary, occupational workings. What members are doing in their inquiries is always someone else's business in the sense that particular, organisationally located, locatable persons acquire an interest in light of the account of whatever it is that will have been reported to have 'really happened'. (Garfinkel 1967, 14-17)

SPC inquiries begin with a death that the coroner finds equivocal as to *mode* of death. That death they use as a precedent with which carious ways of living in society that could have terminated with that death are searched out and read 'in the remains'; in the scraps of this and that like the body and its trappings, medicine bottles, notes, bits and pieces of clothing, and other memorabilia – stuff that can be photographed, collected, and packaged. Other 'remains' are collected too: rumours, passing remarks, and stories – materials in the 'repertoires' of whosoever might be consulted via the common work of conversations. These whatsoever bits and pieces that a story or a rule or a proverb might make intelligible are used to formulate a recognisably coherent, standard, typical, cogent, uniform, planful, i.e., a professionally defensible, and thereby, for member, a *recognisably* rational account of how the society worked to produce those remains. (Garfinkel 1967, 17)

Garfinkel finishes this first category of practical sociological reasoning by stating that 'SPC'ers must accomplish that decidability with respect to the 'this's': they have to start with *this* much; *this* sight; *this* note; *this* collection of whatever is at hand. And *whatever* is there is good enough in the sense that *whatever* is there not only *will* do, but *does*. One makes whatever is there *do*. – I mean: the *whatever* it is that he has to deal with, *that* is what will have been used to have found out, to have made decidable, the way in which society operated to have produced *that* picture, to have come to *that* scene as its end result. In this way the remains on the slab serve not only as a precedent but also as a goal of SPC inquiries. *Whatsoever* SPC members are faced with must serve as the precedent with which to read the remains so as to see how the society could have operated to have produced what it is that the inquirer has 'in the end', 'in the final analysis', and 'in *any* case'. What the inquiry can come to is what the death came to.' (Garfinkel 1967, 18)

### 2.1.2. Following Coding Instructions

The second feature of practical sociological reasoning in ethnomethodology is that of following coding instructions. This category is based on a study conducted in U.C.L.A. Outpatient Clinic in order to answer the questions like ‘By what criteria are its applicants selected for treatment?’ Garfinkel formulated and answered to this question by using a version of a method of cohort analysis. The activities of selecting applicants for treatment consisted of the following actions:

- First contact
- Intake interview
- Psychological testing
- Intake conference
- In-treatment.

Any path from the first contact to termination was called a path. Garfinkel illustrates these activities by a tree diagram as follows (FIGURE 2):

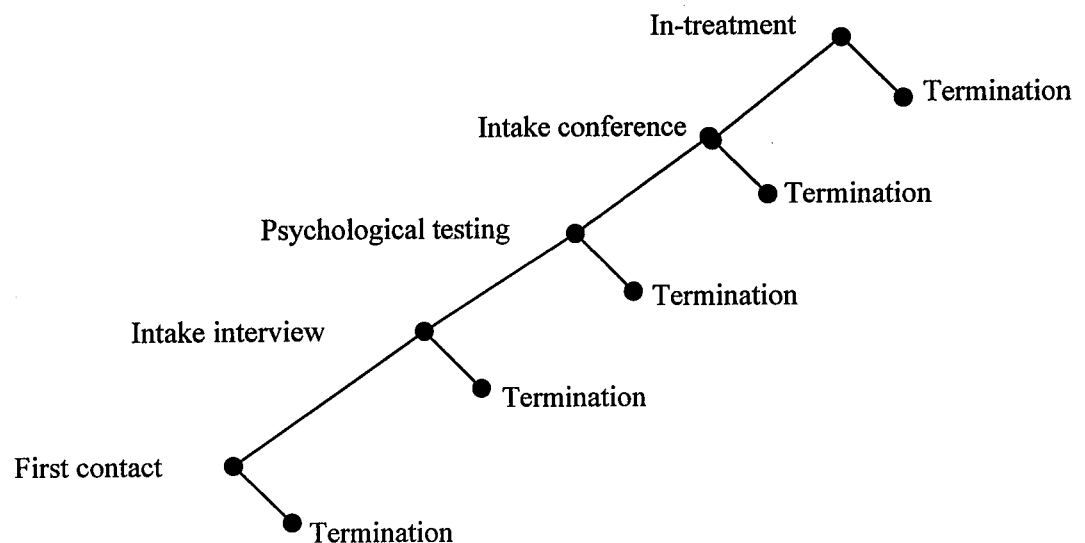


FIGURE 2. Career Paths of Patients in a Psychiatric Clinic. (Garfinkel 1967, 19)

The aim of this study was to know what characteristics of patients, clinical personnel, their interactions, and of the tree were associated with which career. In the study the most important sources of information were the clinic records, intake application forms and case folder contents. Garfinkel states that 'in order to obtain a continuing record of patient-clinic case transactions from the time of a patient's initial contact until he terminated a 'Clinic Career Form' was designed and inserted into case folders. Because clinic folders contain records that clinic personnel provide of their own activities, almost all of these sources of data were the results of self-reporting procedures.' (Garfinkel 1967, 19)

The preliminary work showed that in order to accomplish the coding, coders were conjecturing knowledge of the very organised ways of the clinic that their coding procedures were intended to produce descriptions of. This presupposed knowledge seemed, more interestingly, necessary and was most deliberately consulted whenever, for whatever reasons, the coders needed to be satisfied that they had coded 'what really happened'. *'This was so regardless of whether or not they had encountered 'ambiguous' folder contents.* Such a procedure undermined any claim that actuarial methods for interrogating the folder contents had been used, no matter how apparently clear the coding instructions were. Agreement in coding results was being produced by a contrasting procedure with unknown characteristics.' (Garfinkel 1967, 20)

The reliability procedure, when conducting the study, was treated as a problematic activity in its own right. The 'reliability' of the results was addressed by questions such as: How the coders had actually brought folder contents under the jurisdiction of the Coding Sheet's item? Via what practices had actual folder contents been assigned the status of answers to the researcher's questions? What actual activities made up those coders' practices called 'following coding instructions'? According to Garfinkel, 'Codors used the same *ad hoc* considerations in order to recognise the relevance of the coding instructions to the organised activities of the clinic. Only when this relevance was clear were the coders satisfied that the coding instructions analysed actually encountered folder contents so as to permit the coders to treat folder contents as reports or 'real events'. Finally, *ad hoc* considerations were invariant features of the practices of 'following coding instructions'. Attempts to suppress them while retaining an

unequivocal sense to the instructions produced bewilderment on their part.’ (Garfinkel 1967, 21)

When it comes to *ad hoc*ing, Garfinkel explains that ‘*Ad hoc*ing occurs (without, I believe, any possibility of remedy), whenever the coder assumes the position of a socially competent member of the arrangement that he seeks to assemble an account of and, when from this ‘position’, he treats actual folder contents as standing in a relationship of trusted signification to the ‘system’ in the clinic activities. Because the coder assumes the ‘position’ of a competent member to the arrangements that he seeks to give an account of, he can ‘see the system’ in the actual content of the folder. – Therefore, the coder recognises the folder content for ‘what it actually is’, or can ‘see what a note in the folder ‘is really talking about’’. Given this, if the coder has to be satisfied that he has detected a real clinic occurrence, he must treat actual folder contents as standing proxy for the social-order-in-and-of-clinic-activities. Actual folder contents stand to the socially ordered ways of clinic activities as *representations* of them; they do not describe the order, nor are they evidence of the order. It is the coder’s use of folder documents as *sign-functions* to which I mean to be pointing in saying that the coder must know the order of the clinic’s activities that he is looking at in order to recognise the actual content as an appearance-of-the-order. Once the coder can ‘see the system’ in the content, it is possible for the coder to extend and to otherwise interpret the coding instructions – to *ad hoc* them – so as to maintain the relevance of the coding instructions to the actual contents, and in this way to formulate the sense of actual content so that its meaning, even though it is transformed by the coding, is preserved in the coder’s eyes as a real event of the clinic’s actual activities.’ (Garfinkel 1967, 22-23)

### 2.1.3. Common Understanding

‘Sociologists distinguish the ‘product’ from the ‘process’ meanings of a common understanding. As ‘product’, a common understanding is thought to consist of a shared agreement on substantive matters; as ‘process’, it consists of various methods whereby something that a person says or does is recognised to accord with a rule. With his concepts of *Begreifen* and *Verstehen*, each with its distinct character as method and

knowledge, Weber provided sociologists an authority for this distinction.’ (Garfinkel 1967, 24-25)

Garfinkel continues explaining common understanding by referring to a study where students were asked to report common conversations by writing down both what the parties actually said and what they and their partners understood they were saying. ‘An analysis of students’ experiences in reporting commonplace conversation suggests that for either case, for ‘product’ or ‘process’, a common understanding consists of an inner-temporal course of interpretative work. Their experiences suggest some strange consequences of the facts that *in either case* a common understanding has necessarily an operational structure.’ (Garfinkel 1967, 25)

‘For the conduct of their everyday affairs, persons take for granted that what is said will be made out according to methods that the parties just to make out what they are saying for its clear, consistent, coherent, understandable, or planful character, i.e., as the ‘sense’ of what is said is to accord to what was said its character ‘as a rule’. *‘Shared agreement’ refers to various social methods for accomplishing the member’s recognition that something was said-according-to-a-rule and not the demonstrable matching of substantive matters. The appropriated image of a common understanding is therefore an operation rather than a common intersection of overlapping sets.*’ (Garfinkel 1967, 30)

Garfinkel further states that ‘In short, a common understanding, entailing as it does an ‘inner’ temporal course of interpretative work, necessarily has an operational structure. For the analyst to disregard its operational structure, is to use common sense knowledge of the society in exactly the ways that members use it when they must decide what persons are really doing or really ‘talking about’, i.e., to use common sense knowledge of social structure as *both* a topic and a resource of inquiry. An alternative would be to assign exclusive priority to the study of the methods of concerted actions and methods of common understanding. Not a method of understanding, but immensely various methods of understanding are the professional sociologist’s proper and hitherto understudied and critical phenomena. Their multitude is indicated in the endless list of ways that persons speak. Some indication of their character and their differences occurs in the socially available glosses of a multitude of sign functions as when we take note of

marking, labelling, symbolising, emblemising, cryptograms, analogies, anagrams, indicating, miniaturising, imitating, mocking-up, simulating – in short, in recognising, using and producing the orderly ways of cultural settings from ‘within’ those settings.’ (Garfinkel 1967, 31)

#### 2.1.4. Policies

Garfinkel finishes defining ethnomethodology by categorising different policies.

I use the term ‘ethnomethodology’ to refer to the study of practical actions according to policies such as the following (see below 1-4), and to the phenomena, issues, findings, and methods that accompany their use.

1. An indefinitely large domain of appropriate settings can be located if one uses a search policy that *any occasion whatsoever* be examined for the feature that ‘choice’ among alternatives of sense, of facticity, of objectivity, of cause, of explanation, of communality *of practical actions* is a project of members’ actions.
2. Members to an organised arrangement are continually engaged in having to decide, recognise, persuade, or make evident that rational, i.e., the coherent, or consistent, or chosen, or planful, or effective, or methodical, or knowledgeable character of such activities of their inquiries as counting, graphing, interrogation, sampling, recording, reporting, planning, decision-making, and the rest.
3. Thus, a leading policy is to refuse serious consideration to the prevailing proposal that efficiency, efficacy, effectiveness, intelligibility, consistency, planfulness, typicality, uniformity, reproducibility of activities – i.e., that rational properties of practical activities – be assessed, recognised, categorised, described by using a rule or a standard obtained outside actual settings within which such properties are recognised, used, produced, and talked about by settings’ members.
4. The policy is recommended that any social setting be viewed as self-organising with respect to the intelligible character of its own appearances as either representations of or as evidences-of-a-social-order. Any setting organises its activities to make its properties as an organised environment or practical activities detectable, countable,

recordable, reportable, tell-a-story-aboutable, analysable – in short, *accountable*. (Garfinkel 1967, 31-33).

As a conclusion, Garfinkel emphasises the importance of studying practical activities, practical circumstances and practical sociological reasoning and by paying to the most commonplace activities of daily life the attention usually accorded extraordinary events, seeking to learn about them as phenomena in their own right. The central recommendation of these phenomena is that the activities whereby members produce and manage settings of organised everyday affairs are identical with members' procedures for making those settings 'accountable'. Accountability, in Garfinkel's view, is being observable-and-reportable, i.e. available to members as situated practices of looking-and-telling.

## **2.2. Interpretations of Ethnomethodology**

Dan Shapiro has studied the relations between social sciences and CSCW (Shapiro 1994). He states that 'The founding works of ethnomethodology (e.g. Garfinkel 1967) explain that most mainstream social science sees itself as proceeding theoretically – that is, by proposing concepts and logical relations between them which abstract successfully from the state of things in the real world and help them explain them.' (Shapiro 1994, 418) In his view ethnomethodologists (in the wake of phenomenologists) claim that attempts to do this, theoretical conduct, fail for a variety of reasons. One is that the theoretical approach has to assume that the social order is an external 'given' which people 'enact' (although this is not contradictory with them doing so voluntarily). However, attempts to explore this reveal that people in fact construct their social order in radically creative ways in the very process of acting together. Shapiro explains that because of this, attempts by 'conventional' social science to explore the empirical implications of theoretical accounts fall down, because they are attempting to operationalise on the back of a set of 'common-sense' entities which are, in practice, being constantly remade in significant ways by members of the social order'.

Shapiro further explains that the ethnomethodological program proceeds by making certain strategic choices about how to do sociology. He states that in the relationships between theory, research, and phenomenon, ethnomethodology sees two possibilities. Firstly, it perseveres with attempts to theorise on the basis of concepts that cannot be adequate to their phenomena. Secondly, it follows the phenomena wherever they may lead. Mainstream social science chooses the former and ethnomethodology chooses the latter. Therefore, Shapiro argues that 'Hence, one of the most distinctive claims of ethnomethodology: that it is not driven by theory or explanation but by the stringent discipline of observation and description. In this it separates itself from 'mainstream' sociology and from the other (in effect, from all) 'Galilean' social sciences'. (Shapiro 1994, 418)

Button and Harper (1996a) approach the definition of ethnomethodology by stating that 'Ethnomethodology is a small dissenting voice in sociology where the study of work has been conducted under a number of different theoretical auspices' (Button et al. 1996a, 204). Button and Dourish (1996b) on the other hand state that 'Ethnomethodology turns away from the structures and theorising of traditional sociology concentrating instead on the details of the practices through which actions and interactions are accomplished. In this respect, designers have found ethnomethodology a richer resource for insights about the organisation of work than other, more theoretically oriented, sociological positions.

Ethnomethodology is being used to inform design through:

1. Fieldwork investigations that develop an understanding of work and organisations from the 'inside', providing innovative insights into the organisational situatedness or work and the methods and practices through which work activities and interactions are assembled and which may be used in the design of technology to support work; and
2. Developing and understanding of the temporal organisation of activities and interactions, revealing them to be a moment-by-moment organisation, and in so doing furnishing new concepts around which to generally consider the design of technology.' (Button et al. 1996b, 19)



Lucy Suchman (1987), on the other hand, approaches ethnomethodology by pointing out that ‘The premise that practical reasoning about action is properly part of the subject matter of social studies is due to the emergence of a branch of sociology named *ethnomethodology*. – To designate the alternative that ethnomethodology suggests – more a reformulation of the problem of purposeful action, and a research programme, than an accomplished theory – I have introduced the term *situated action*. That term underscores the view that every course of action depends in essential ways upon its material and social circumstances. Rather than attempting to abstract action away from its circumstances and represent it as a rational plan, the approach is to study how people use their circumstances to achieve intelligent action. Rather than build a theory of action out of a theory or plans, the aim is to investigate how people produce and find evidence for plans in the course of situated action. More generally, rather than subsume the details of action under the study of plans, plans are subsumed by the larger problem of situated action.’ (Suchman 1987, 50)

Suchman continues the discussion of ethnomethodology by arguing that the view of action that ethnomethodology recommends is neither behavioristic, in any narrow sense of that term, nor mentalistic. It is not behavioristic as it assumes that the significance of actions is not reducible to uninterpreted bodily movements. It is not mentalistic either, however, in that the significance of action is taken to be based, in ways that are fundamental rather than secondary or epiphenomenal in the physical and social world. Suchman explains that the basic premise is twofold: firstly, that what traditional behavioural sciences take to be cognitive phenomena have an essential relationship to a publicly available, collaboratively organised world of artefacts and actions. Secondly, the significance of artefacts and actions, and the methods by which their significance is conveyed, have an essential relationship to their particular, concrete circumstances. (Suchman 1987)

Suchman categorises the ethnomethodological view of purposeful action and shared understanding under five propositions:

- ‘Plans are representations of situated actions.
- In the course of situated actions, representation occurs when otherwise transparent activity becomes in some way problematic.

- The objectivity of the situations of our action is achieved rather than given.
- A central resource for achieving the objectivity of situations is language, which stands in a generally indexical relationship to the circumstances that it presupposes, produces, and describes.
- As a consequence of the indexicality of language, mutual intelligibility is achieved on each occasion of interaction with reference to situation particulars, rather than being discharged once and for all by a stable body of shared meanings.' (Suchman 1987, 50-51)

Suchman further states that 'More recently, ethnomethodology has turned Durkheim's maxim on its head with more profound theoretical and methodological consequences. Briefly, the standpoint of ethnomethodology is that what traditional sociology captures is precisely our common-sense view of the social world. Following Durkheim, the argument goes, social studies have simply taken this common-sense view as foundational, and attempted to build a science of the social world by improving upon it. Social scientific theories, under this attempt, are considered to be scientific insofar as they remedy shortcomings in, and preferably quantify, the intuitions of every-day, practical sociological reasoning.' (Suchman 1987, 57)

As a conclusion of this chapter, the following citation will describe well of the arena ethnomethodology addresses itself to:

'In contrast, ethnomethodology grants common sense sociological reasoning a fundamentally different status than that of a defective approximation of an adequate scientific theory. Rather than being *resources* for social science to improve upon, the 'all things being equal' typifications of common-sense reasoning are to be taken as social science's *topic*. The notion that we act in response to an objectively given social world is replaced by the assumptions that our everyday social practices render the world publicly available and mutually intelligible. It is those practices that constitute ethnomethods. The methodology of interest to ethnomethodologists, in other words, is not their own, but that deployed by members of the society in coming to know, and making sense out of, the everyday world of talk and action'. (Suchman 1987, 57)

As this chapter has discussed ethnomethodology, mainly based on Harold Garfinkel's views and theorising, I would like to point out that much of both Garfinkel's and Suchman's work is around documents and the practices that make documents intelligible and useful. From this notion we can easily find these studies relevant to Valmet, or any other organisation, as the interest is not in documents *per se* – but in useful, usable, attainable and accessible documents.

### **3. BACKGROUND PERSPECTIVES**

This chapter will define and outline the background perspectives of this thesis. Following concepts are discussed and defined: Computer Supported Cooperative Work (henceforth CSCW), Information and Process Integration, Electronic Archiving and Electronic Document Management.

CSCW is a research field of multidisciplinary views. Its contribution to computer science and information systems has been important e.g. as CSCW points out the need for understanding the social aspects that surround and occur when designing and implementing new technologies within organisations or communities.

Information and process integration and understanding it are very important to the framework of this thesis. To understand the links between information and processes is not only valuable to this research but largely for anyone who works with information – i.e. every person. To produce information, some kind of process is needed: that of business, production or even thinking.

Electronic archiving and the latest research results from that field are also essential for this study. To understand its features and possibilities, perspectives and meanings, views on current research will be given in this chapter.

Electronic document management covers all the above mentioned concepts. From CSCW come the methods, basic understanding of human behaviour in computerised environment. Document management includes the perspective of information and process integration. Electronic archiving is one of the key functions of any document management system.

### 3.1. CSCW

Trying to define CSCW is challenging. When looking at papers and research results within CSCW it is clear that there is not only one definition that can be accepted widely. Many authors, when defining CSCW, call it as an attempt rather than just definition. Why is it a challenge to define this term?

It is agreed that CSCW can be loosely studied by three semi-articulated characteristics (Hughes et al. 1991). Firstly, CSCW involves settings where two or more people interact through a computer. Secondly, CSCW deals with a particular class of system to service such settings. Thirdly, CSCW is interdisciplinary. This interdisciplinarity is one of the CSCW's strongest features. CSCW includes research areas e.g. from sociology, anthropology, psychology, computer science and organisational studies. When work practices and situations are studied, it refers directly to sociology - how people interact with each other in an environment such as an office while working and cooperating. From the field of computer science come systems and applications supporting interaction and work. Organisational studies are essential when a system or an application is implemented to a specific organisation. Research papers show that a lot of more research areas are included under the term or CSCW (See e.g. Bannon L., 1993: CSCW: An Initial Exploration).

CSCW includes many computer science notions and technologies such as human-computer interaction, networks, multimedia and virtual reality to name a few. According to Liam Bannon (1993), there are a variety of views on the nature of the CSCW field. Each of the views has been adherent and consequent for the development of the CSCW. Bannon distinguishes at least five different ways of viewing CSCW:

- CSCW as simply a loose agglomeration of cooperating and at times competing communities
- CSCW as a paradigm shift
- CSCW as software for groups
- CSCW as technological support of cooperative work forms and

- CSCW as participatory design (Bannon 1993, 6-7).

As a research effort that involves a lot of established disciplines, research areas and communities, CSCW is an arena of discordant views, incommensurate perspectives, and incompatible agendas (Schmidt et al. 1991, 11). This shows that CSCW has been and will be a subject of debate. However, different views and definitions should not be seen as a problem. Rather, CSCW should be viewed as an environment for dynamic changes, responses and innovations. It could therefore be argued that CSCW is an opportunity cost as it tries to and does combine two contradictory ideas or paradigms – human and technological. On the other hand, CSCW concerns the relationship between a social organisation and a technical system being implemented in that organisation. According to Mike Robinson (1991), following concepts seem to be basic to CSCW: Articulation Work, Situated Action, Unanticipated Use, Mutual Influence, Shared Information Space, Shared Material, Double Level Language, Equality and Flipover (See Robinson 1991: *Computer Supported Cooperative Work: Cases and Concepts*). Implementing these concepts forms a preliminary agenda for CSCW. Thus, the focus of the CSCW goal can be said to be the social interaction of people more than the technology itself.

### **3.1.1. Computer-Supported and Cooperative Work**

If we take the term itself under an examination, we can divide it into two parts: computer supported and cooperative work (e.g. Bannon et al. 1991). Cooperative work, or cooperation itself, is quite a complex term in CSCW (See e.g. Schmidt et al. 1992: *Taking CSCW Seriously. Supporting Articulation Work*). Simply, cooperation is a situation where at least two persons work together (in one form or another) to get a job done, to achieve a set goal and so forth. The word together is of great importance. It refers to a social setting where members of a cooperative task have to interact, communicate and to be aware of each other.

Organisations are becoming more and more distributed. Not only is a single organisation more likely to be distributed across multiple locations, or perhaps employ individuals working electronically away from a principal site, but also increasing moves

towards “outsourcing” and inter-organisation collaboration makes it more likely that work is being performed and accomplished through the collaborative activity of individuals at remote ends. Dourish (1996) states that ‘even within single or co-located organisations, the trend towards automation of tasks around explicit models of business processes places and emphasis within computational technology on collaboration and coordination. This is the area to which CSCW has addressed itself – the use of computer-based tools to enhance and facilitate the performance of collaborative work, potentially distributed in space or time.’ (Dourish 1996, 15)

### **3.1.2. Human, Social and Technology Factors**

Liam Bannon (1993) states that due to a number of changes in the field of information systems practice, in the environment of organisations, in technology itself and in people’s expectations have contributed to the emergence of and interest in CSCW (Bannon 1993, 3). He divides the changes in two categories: human and social factors and technology factors. Here we can see a connection to previously mentioned division; computer supported relates to technology factors and cooperative work to human and social factors. These social factors can again be divided into three parts:

- cognitive component
- affective component and
- behavioural component.

Cognitive component includes e.g. ideas and beliefs. The importance arises from having a belief that being in remote location or end is not disadvantageous for the work itself or for overall interaction; or having a strong belief in or preference to one application toward another. The aim of CSCW systems is to provide support for cooperating individuals who are distant and time dependent but it also is important to recognise the importance of mechanisms of interaction (Hughes et al. 1992). Also, a lot of research in CSCW has indicated the importance of co-workers maintaining a degree of mutual awareness of each other’s activity as essential to the coordination of interaction and

running of cooperative activities in the workplace (e.g. Bowers et al. 1995, 1996). Moreover, affective component includes emotions and feelings – or in computer science a feeling that some mechanism or tool contributes. Further, behavioural component, such as predisposition to act, strives us to use the tool.

### **3.1.3. CSCW and Valmet Rautpohja**

Many research projects have addressed the need for understanding CSCW and its contribution to computer technology at Valmet Rautpohja (e.g. Heilala and Tynys 1996, Hurskainen and Koskelainen 1998, Karsten et al. 1997, 1999). Supporting collaborative work with technology has been and will be of great importance within large corporations such as Valmet. Groupware tools, especially Lotus Notes, are used comprehensively in Valmet today. With close to 14 000 employees, Lotus Notes serves as the basic tool for collaborating: communication (email), shared documents and information (databases), access to Valmet Lotus Notes databases worldwide (common files and views) and also access to the Internet (Domino server).

However, possibly not only one tool will provide enough means to collaborate or cooperate. The main issue within cooperation (at Valmet or any other large company) deals with the social aspects – how people work together, interact and do their work. Moreover, how the chosen tool supports those specific cooperative actions is essential. At Valmet Rautpohja the process of offering, selling, producing and maintaining paper machines is cooperation in a large scale. Each of the steps is accomplished by collaborating in smaller groups bearing the large context in mind. This process is conducted by using computer technology to the fullest. One of the most important objectives is to assure document availability between and within different geographical locations of Valmet Corporation. Additionally, quite a lot of the selling is carried out at customer's sites. Therefore, salesmen need to have access to a lot of data when travelling in order to offer a competitive deal for a prospective customer.

Among the most recent objectives at Valmet Rautpohja is to design and define an environment that would support cooperation, especially problem solving in a context of



employees at remote ends. The star in the sky that leads the way is the thought of a collaborative or trouble-shooting environment of some sort. The key features of that research is to create a platform where specialists can discuss and work together when trying to solve specific problems. File and information sharing as well as correct records are the main issues. One of the most important objectives is to provide the specialists communication tools in order to support the cooperative actions.

As we can see, based on these few examples, a lot of the research and work at Valmet includes the features of CSCW. CSCW's contributions to the computerised environments have been seen as useful and beneficial. This is the main reason why CSCW was chosen as the overall perspective to this thesis.

As this chapter has discussed, CSCW is a research field of different sciences, disciplines and perspectives. This multidisciplinaryity is one of CSCW's strongest features as combining various, and even contradictory, views and perspectives accomplish in debates on what is essential, meaningful and influential for research and computer utilisation. This force should be (and is) converted into novel applications and interpretations. From the antitheses arise new answers to old questions.

### **3.2. Information and Process Integration**

A project was conducted at Valmet Rautpohja by the students at the University of Jyväskylä (VALTA-project) where the data streams of different departments were studied. Hence, that project also studied information and processes. The results of that project are utilised in this study and therefore notions of information and process integration are included in this thesis. However, to understand the links between information and processes as well as their integration it is advisable to start with considering the following concepts: documents, processes and metaprocesses.

### 3.2.1 Documents (Document Information)

To start a discussion about documents it is advisable to collect some definitions of what a document is. David Levy defines a document as talking things. He states that

‘[Documents] are bits of the material world – clay, stone, animal skin, plant fibre, sand – that we have imbued with the ability to speak. They are surrogates or agents we create to speak for us or on our behalf’ (Levy 1998, 153).

On the other hand, Thomas M. Koulopoulos and Carl Frappaolo define a document as follows:

‘The document is a collection of information, authored for the purpose of transferring and preserving knowledge. Its manifold forms allow it to be a universal metaphor, information repository, and vehicle for knowledge dissemination’ (Koulopoulos et al. 1995, 28).

They, however, discuss the definition of a document by questioning the general assumptions. First of all they state that a document has little to do with paper. This claim can quite easily be understood as documents are so strongly referred to paper. A piece of paper is only one form of a document or one way of looking at a document. Koulopoulos and Frappaolo further say that ‘[document] is a metaphor that we are all very familiar with, but it is also a very limited one. So the very first thing we must do is strike from our minds the idea of a document as a page of paper’ (Koulopoulos et al. 1998, 28).

According to Charles Osborn (1998) documents can be dealt with in two ways: documents record work and documents aggregate performance. He further states that ‘it would be more precise, of course, to emphasise that documents record data rather than work, but this distinction misses two important points. First, at the operational level of many organisations, documenting a task is an integral part of performing a task. Indeed, in many knowledge-intensive businesses, the documents *are* the work. Second, many

organisations still employ techniques for document handling and information management that date from decades when physical documents represented the only alternative for managing collective knowledge' (Osborn 1998, 33).

Documents, or information contained in documents, can function as a bridge between an information system and business system. This occurs only if documents are properly designed. There are two important mechanisms that documents are equipped with to support the bridging function as illustrated in the FIGURE 3:

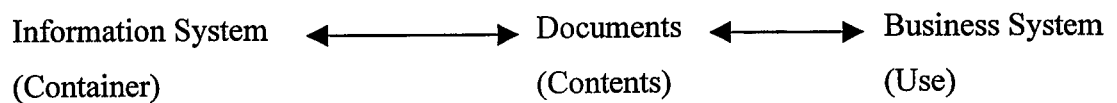


FIGURE 3. Document as a bridge between Information and Business systems (Wakayama et al. 1998, 2).

As this simple figure shows, the information system is the container of documents. This figure does not commit itself on the form in which the documents are in the information system. Secondly, the documents are seen as the contents of the information. Business system uses the contents from the container, i.e. documents from the information system.

In addition to the notions about documents above, Wakayama et al. (1998) define documents, or merely document information, in an organisational setting as information structured to represent its use intent. Documents, although still largely in paper form, are equipped with two mechanisms to convey 'use intent' of the data they carry, namely metadata and data aggregation. Metadata, or data about data, is actually a very common form of data in workplaces. According to an estimate (Wakayama et al. (1998)), 70 to 90 % of documents used in organisations are forms and their filled-out instances. Also, another estimate states that well over 70 % of the all information that an organisation uses is in document form. Therefore, it can be said that most documents are accompanied by metadata and that typical business deals with an abundant amount of it. However, documents can be said to be structure-intensive, with an intricate web of

conceptual links among data items and metadata items. In addition to these views Koulopoulos and Frappaolo state that ‘according to a survey 90 % of people still would print online information in paper form’ (Koulopoulos et al. 1995, 29).

Wakayama et al. (1998) continue their discussion about documents with presenting some new ideas from the industry practice in document management in the context of deploying middleware capabilities: document reusability and intentional documents. By document reusability they do not mean document reuse. Document reuse implies accepting existing document components. Controversarily, document reusability demands existing components to be redesigned at their creation for optimal reuse opportunity in other (possibly remote) processes. Their claim is that document reusability introduces a process perspective into document design and this is seen as a critical point.

### 3.2.2 Processes

Processes appear in many different contexts: processes in computer systems, natural phenomena, manufacturing assembly lines and information retrieval to name a few. Processes that are of interest in this thesis are those of human activities in organisational setting. However, Wakayama et al. (1998) define a process as a collection of related concepts (such as activity, input, output, customer, performance measure, resource, constraint) for generically representing business systems. The generality of the process vocabulary is quite important when addressing business integration issues across functional boundaries. To generally understand business systems it is also essential to realise that it is people and organisations that actively attempt to change and improve existing processes. A simple process (FIGURE 4) can be illustrated as follows:

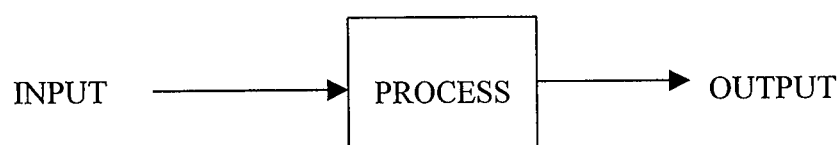


FIGURE 4. A Simple Process.

This figure can represent a production or a service process. It is the business activities involved that define whether it is production or service in question. Here we can see a connection to coordination theory as described by Malone and Crowston (Crowston 1991, Malone and Crowston 1993, 1994). Coordination theory implies a process analysis with three key features: processes, subprocesses and activities. 'Each contributes to building tighter linkages between strategic intent and actual business practice in ways that enable electronic documents within a workflow to guide as well as record tasks and activities. – First, coordination theory suggests that all processes are inherently multi-level: any process is itself made up of subprocesses and any subprocess represents a collection of activities. – Document creation is intimately connected with accomplishing real work'. (Osborn 1998, 38-39) A basic illustration of coordination theory and its elements are presented in FIGURE 5.

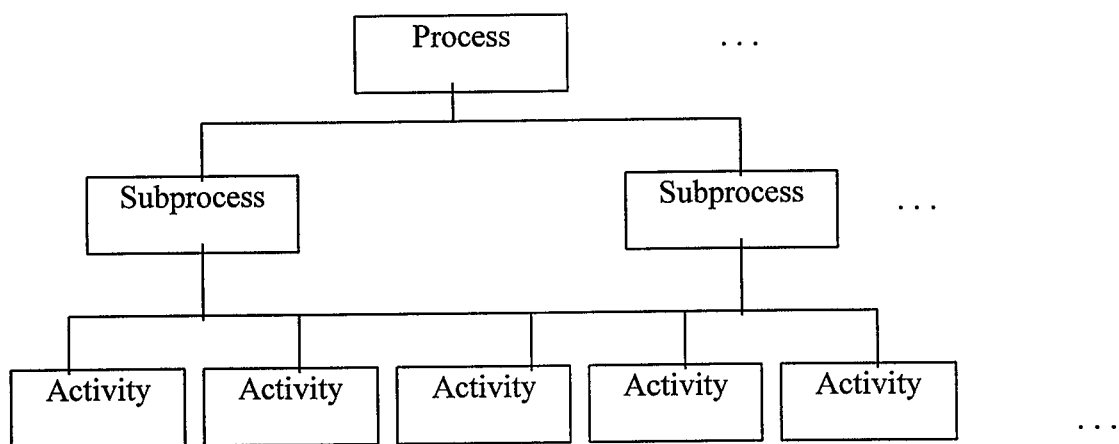


FIGURE 5. Three Elements of Coordination Theory. (Osborn 1998, 39)

To integrate documents and processes it is beneficial to add metaprocesses, i.e. process improving processes, to the discussion. The basic assumptions and notion on metaprocesses will be discussed in the next chapter.

### 3.2.3 Metaprocesses

The idea of metaprocess is practised in many organisations. From a business point of view, organisations and enterprises have developed means to be aware of their actual processes and practices. From a social science perspective, there are many research communities that study people in organisational settings to develop insights into the way people actually get their work done. One example of metaprocess is that of 'Kaizen'. Kaizen originates itself from Japan and means continuous, sustainable development. A typical Kaizen metaprocess starts with solicitation of improvement ideas from the people involved in that process. A proposed idea goes through a well-defined metaprocess of various activities for example evaluation, feedback, and award. The following figure (FIGURE 6) illustrates the basic Kaizen idea:

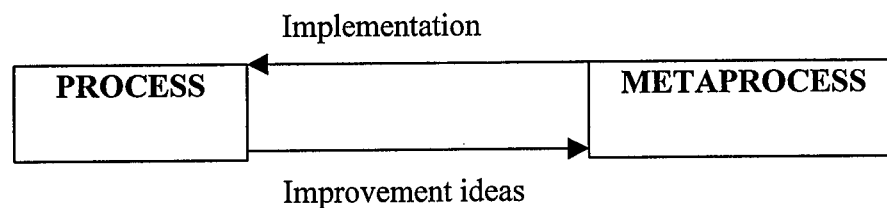


FIGURE 6. A Kaizen System.

Kaizen is associated with small, incremental changes, as opposed to discontinuous changes involving major innovations. Kaizen changes typically involve physical resources in the process such as tools, equipment, and facilities. They occasionally address more structural aspects of the process even across departmental boundaries. However, Kaizen and innovation are often taken as opposing concepts, where incrementality is the defining characteristic of Kaizen. More fundamental in this discussion is though a system of organisational dynamics based on process – metaprocess interactions.

Even though many advocates of process innovation prescribe innovation (meta) processes, the Kaizen ideology is far more explicit about metaprocess implementation. Actually, a more careful characterisation of Kaizen seems to be in its practice of organisational dynamics based on process – metaprocess interactions. The framework

based on process – metaprocess interactions is able to address, beyond documents and processes, a set of issues organisational and social nature such as change initiation and implementation, work-force education and training, and evaluation and recognition of individual contributions. (Wakayama et al. 1998)

### 3.2.4. Information Ecology

‘Our fascination with technology has made us forget the key purpose of information: to inform people. All the computers in the world won’t help if users aren’t interested in the information generated. All the telecommunications bandwidth won’t add a dime of value if employees don’t share the information they have with others. Expert systems won’t provide useful knowledge if the knowledge changes too fast to maintain – or if system designers can’t even find experts willing to surrender what they know. Information and knowledge are quintessentially human creations, and we will never be good at managing them unless we give people a primary role’ (Davenport 1997, 3).

This excerpt supports the statements given before in this thesis: the computers are to support people in their work, they should not be considered important by themselves. Also, the importance of the social setting and interactions are emphasised in the excerpt – information is useless if it is not talked about, referred to, used, or managed.

Davenport (1997) further states that ‘The status quo approach to information management – invest in new technologies, period – just doesn’t work. Instead, managers need a holistic perspective, one that can weather sudden business shifts and adapt to ever-changing social realities. This new approach, which I call *information ecology*, emphasises an organisation’s entire information environment. It addresses all of a firm’s values and beliefs about information (culture); how people actually use information and what they do with it (behaviour and work processes); the pitfalls that can interfere with information sharing (politics); and what information systems are already in place (yes, finally, technology).’ (Davenport 1997, 3-4)

Information ecology is about how people create, distribute, understand, and use information at its centre. According to Davenport, managers who take an ecological approach believe that

- 'Information is *not* easily stored on computers – and is not 'data'.
- The more complex an information model, the less useful it will be.
- Information can take on many meanings in organisation.
- Technology is only one component of the information environment and often not the right way to create change.' (Davenport 1997, 5)

What, in my opinion, is useful in this chapter, in this context, is Davenport's (1997) views on information management processes. Consider the following: 'I've spent much of the past decade telling managers that they should view work as a process. Once you've thoroughly described a process such as order management – including its various subprocesses or steps – you can then improve it incrementally or change it radically. Information management is no different; it is a structured set of work activities that comprise the way in which companies capture, distribute, and use information and knowledge. Viewing information management as a process may seem elementary; yet to date, few organisations have taken such a systematic approach. More important, identifying all the steps in a given information process – all the resources involved, all the people who affect each step, all the problems that arise – can point the way to changes that really make a difference.' (Davenport 1997, 134)

These arguments do not only support the views on information, or document, management, recognising and understanding work practices but also the method to be used in this study. Therefore I wanted to bring about Davenport's notions on information ecology and management as they, in fact, are included in the context of this thesis.



### **3.2.5. Information and Process Integration at Valmet Rautpohja**

The reason for including perspectives from information and process integration to this thesis raises from a research project conducted in Valmet Rautpohja (VALTA-project). Students at the University of Jyväskylä carried out VALTA-project during spring 1998. The goal of the project was to study and define the data streams in different departments. The project outlined the documents, or information and data streams, used and delivered in those departments. In fact, this task could also be defined as a study of information and process integration.

Data gathered in VALTA-project has also been used in this thesis. Especially useful were the defined document streams as well as the overview of different processes. When studying and discussing useful electronic filing I argue that the perspective of information and process integration is of great relevance because no information or documents are useful without a specific context. Also, the surrounding environment – information and the process that it illustrates or uses, composes the context.

## **3.3. Electronic Archiving**

This chapter outlines the basic ideas and perspectives of what electronic archiving or filing is. There is an abundant amount of information available about document management in general but the information concerned only on electronic archiving is not yet that comprehensive. Electronic documents have been around for decades already and naturally they have been saved and preserved ever since in files and folders, discs and so forth. During the last decade the key concern has been indicated toward electronic archiving – how to file and preserve information and documents so that they would be easily found and used and that their life cycle would be long enough. This research trend can be widely understood as a common belief is that today it is almost only computers that we use to produce documents in business environments.

### 3.3.1. Preserving Electronic Documents

We can expect electronic documents to continue to proliferate. Continuous technological developments and innovations within computers and information technology field increase the speed and decrease the cost of memory and processing. It can even be said that computers are considered indispensable to information storage and retrieval. (Kranich 1998) 'A decade ago, most archivists thought about electronic records issues much the way that librarians do today – as a problem of documenting and preserving data files in specialised repositories. Since then networked computing has transformed the mechanisms of business communications and archivists have increasingly adopted the view that records, whether paper or electronic, are the carriers and documentation of the everyday transactions of business. As such, the fundamental issues regarding record capture and retention, whether in paper or electronic form are their identification, classification by provenance, and retention in context of use so they can be understood. Only when these challenges have been successfully met will questions of how or where to keep records or how to provide access to them arise. Thus the 'archives' as files in need of retention, and the 'archives' as repository, are issues only after what are currently the most difficult challenges of day-to-day recordkeeping have been satisfied.' (Bearman et al. 1997)

Douglas Kranich (1998) approaches the discussion about preserving electronic documents by considering both advantages and disadvantages of electronic documents. He states that

'There are numerous advantages to converting documents to electronic format such as production and access speed, access precision, quick response, decreased cost and space needs, links with other works, reformatting and copying fidelity, and search and retrieval enhancements. There are also liabilities attached to electronic documents, including the need for equipment and trained personnel, the cost of conversion and its incompleteness, possible lack of privacy during use, equipment and format changes, preservation issues, and the difficulty of storing linked

documents. Of these disadvantages, preservation is one of the most pressing' (Kranich 1998, 285).

David Levy (1998) also supports this last argument by saying that 'preserving digital information is a difficult and poorly understood problem' (Levy 1998, 152). Why is digital preservation such a problematic task?

The problem of digital preservation can be approached by two perspectives. Firstly, there is a difference in survival between digital and durable surfaces. Paper, and other durable surfaces, can last hundreds even thousands of years whereas information encoded in digital form is unlikely to survive more than a decade or two. The reasons for this are widely known – digital storage media, e.g. floppy discs, CD-ROMs and file servers do lose their charge quite quickly. Digitally stored documents can only guarantee the accuracy of their data for short periods of time. However, even though the data would remain accurate, there is no guarantee that the software and hardware systems with which the documents were first produced and made accessible will survive. The history of digital systems is one of fast obsolescence and a lack of backward compatibility. Document standards, such as HTML<sup>3</sup> and SGML<sup>4</sup>, have been claimed to partially resolve the problem of digital preservation (Levy 1998).

Secondly, the current inability to preserve digital information is a major impediment to the adoption of digital forms on a grand scale. David Levy (1998) states that 'while there are certainly uses for digital information which do not require that the materials survive for more than a decade (just as there are many short-term uses for paper), the possibility of creating real digital libraries and digital archives containing materials of enduring value depends on finding ways to preserve digital documents for hundreds, and very likely thousands, or years' (Levy 1998, 152). Thus, as came out with earlier, paper documents are those that can and are preserved for hundreds of years. Is not then logical to claim that in fact with digital preservation intentions and objectives are to achieve the same – preservation for centuries?

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<sup>3</sup> HTML = Hyper-Text Markup Language

<sup>4</sup> SGML = Standard Generalised Markup Language

As a continuation to the discussion about paper and its power, Harper et al. (1995) state that 'Observation of any organisational setting only serves to confirm that the most pervasive, ubiquitous artefact in support of collaborative work is paper. Even in 'high-tech' research environments, paper is everywhere. We write on it, read from it, stack it, and file it. We also bring it to meetings, exchange it, distribute it, and discuss it. Far from replacing paper, the emergence of new, digital technologies appears to have encouraged its proliferation, easing the creation of paper copies from digital or paper forms. What is it about paper that makes it such an integral part of work? Why has the paperless office not arrived?' (Harper et al. 1995, 1)

Harper and Sellen (1995) believe that two significant reasons for the persistence of paper in the workplace relate to the role of paper in supporting collaborative work practices. They summarise the reasons as follows:

- 'Paper has physical properties that make it particularly well suited to supporting some important aspects of collaborative work. Any other medium or collaborative tool does not satisfactorily provide these particular properties.
- Organisational work practices in a variety of domains have evolved hand-in-hand with the use of paper. Paper has helped to shape work practices, and work practices have been designed around the use of paper.' (Harper et al. 1995, 1-2)

However, if we turn the discussion to the digital era, Thomas Koulopoulos and Carl Frappaolo (1995) start their discussion about electronic documents by addressing the changes in views about information management. They state that 'today the information industry is experiencing a transformation as our view of information management changes radically from an isolated task to one that cuts across all dimensions of an organisation. With the ability to capture, store, retrieve, and distribute vast amounts of information from individual to individual and workgroup to workgroup, we are pushing the boundaries of existing computing infrastructures and challenging current models of information processing. The result is a paradigm shift away from information systems as an isolated discrete discipline to information systems as a fundamental component of every business and social institution' (Koulopoulos et al. 1995, 1). They continue by discussing the new metaphors and problems that arise from this transformation. The most powerful metaphor is the electronic document. The electronic document is

according to their view a rich and new type of data that can virtually take any form: text, image, video or virtual reality. Further, documents, from electronic publishing to multimedia, have elevated the intimacy between man and machine. Documents, in their view, are therefore means to empower individuals.

Koulopoulos and Frappaolo (1995) call the new environment of information systems, infrastructure and individuals as *a single point of access*. This paradigm, also called as the missing box, will be discussed in more detail next.

### **3.3.2. Single Point of Access**

The single point of access focuses on a user-centric information system that provides access to all information within one interface. Single point of access is also called as a paradigm shift. It is useful to bear in mind though that nearly each new technology or method is at first described as a paradigm shift. However, Koulopoulos and Frappaolo (1995) explain the basic idea of single point of access by going through the three paradigms of computing: the black box, the blue box and the missing box.

#### **3.3.2.1. The Black Box**

The black box is also known as the data processing paradigm. The earliest paradigm of information processing concentrated on the process or the program. Information was dealt with at the lowest levels within highly structured algorithms and registers. The black box, or the very first paradigm of information systems, can be described as the von Neumann model of processing. It consisted of an input, a process, and an output. It was isolated from other systems and traversing its boundaries to work with other information systems was not an option or a requirement. The purpose of the process was to calculate or tabulate data and to extrapolate trends. (Koulopoulos et al. 1995)

### 3.3.2.2. The Blue Box

The second paradigm was that of the database. The database was the one that shifted the focus from the process to the data management. From the data management point of view evolved hierarchical network databases, relational databases, the idea of the enterprise computing with the corporate information repository. Ultimately, Koulopoulos and Frappaolo state that, 'from this evolved client/server computing models as the walls around data structures came down' (Koulopoulos et al. 1995, 6). Also, programs became secondary, as did coding.

### 3.3.2.3. The Missing Box

Koulopoulos and Frappaolo state that 'In today's information management systems the concepts of the central data repository has all but vanished' (Koulopoulos et al. 1995, 7). By this they mean that end users do not care where the information physically comes from. However, users do care that the information is appropriate, accurate, truthful – in short – is from a trusted source. 'In this paradigm end users require a single point of access through which information of any source and any form can be easily accessed, manipulated, and transmitted. This paradigm is known as the *Missing Box*' (Koulopoulos et al. 1995, 7).

The missing box illustrates the current paradigm that has an expanded focus that regards the database as the hub of an information gathering process, rather than a simple repository. The database is tasked with managing the collection, interpretation, and presentation of disparate information sources without regard to their origin or format (Koulopoulos et al. 1995).

### 3.3.3. Electronic Archiving Related Projects at Valmet Rautpohja

This chapter will outline and describe the main projects that are related to electronic archiving at Valmet Rautpohja. Following projects are shortly presented and discussed: Archival Intent, Catia Archive Project, Product Data Management Project and Technology Information Centre Project. The projects and their scopes are illustrated in the FIGURE 7. Also, when it comes to DMS and TIC Pilot Scope, the ovals illustrate to which projects and units they address themselves to.

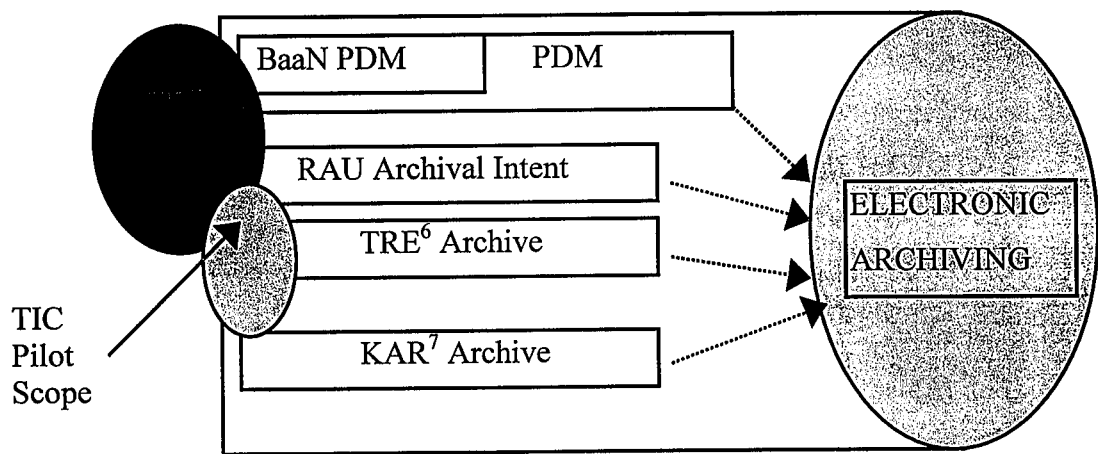


FIGURE 7. Electronic Archiving Related Projects at Valmet Rautpohja.

Even though the framework within electronic archiving at Valmet Rautpohja is larger, including e.g. Tampere and Karhula archives, this chapter will only concentrate on the four projects mentioned above. This defining is done to keep the focus on Rautpohja only.

<sup>5</sup> DMS = Document Management System

<sup>6</sup> TRE = Tampere

<sup>7</sup> KAR = Karhula

### 3.3.3.1. Archival Intent

The targets of the Archival Intent are all the departments and functions at Rautpohja. The aim of the project is to learn a new way of managing personal and departmental material, both manual<sup>8</sup> and digital. One major part of the project is also to regulate or direct the archival instructions so that they fulfil the legal rules as well as departmental needs.

The main objective of the Archival Intent is to manage all documents, manual and digital, through their whole life cycle. The second objective is to achieve an order when it comes to abundant amount of material. A partial objective of the project is to activate the information created and gained during the last few decades as well as to dispose of material that is not relevant or usable anymore.

Tasks of the project can be listed as follows:

- Mapping of archives at Rautpohja
- Planning of solution models or patterns
- Selecting of information systems and suppliers
- Regulating archival tasks

The project vision is to provide a data warehouse for the use of people at Rautpohja as well as other divisions of Valmet. When it comes to manual archives the project has four tasks:

- Departmental projects
- Archiving application
- Archival instructions
- Terminal archive.

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<sup>8</sup> Manual material in this context means all the paper material that exists in personal and departmental usage. Manual material is dealt with folders, books etc. so single documents are not of issue here.



The first departmental project was launched in January 1997. The pilot was carried out at the Project Department. There are all together 24 projects to be carried out. Currently (June 1999) there are approximately 20 projects either finished or ongoing. The aim of the manual part of the project is that all departments and factories are gone through within Archival Intent by the end of 1999.

### **3.3.3.2. Catia Archive Project**

Catia Archive Project was launched in order to file drawings electronically. In the first phase of the project the aim has been to file and print Catia drawings from Catia workstations. The filing system used is called Document Manager (DMS) and is provided by a company called Ravalik Oy in Tampere (DMS will be discussed in more detail in chapter 3.4.2.). The pilot project was launched on the 25<sup>th</sup> of March in 1998 in the Head-Box Factory.

The workflow of the archiving and printing goes as follows: the designer fills in the document data the system requires. The drawing is then ready for distribution. The heading drawing type information is saved into the archival database. The drawings can be printed from either XMAN (BaaN in the future) or Catia workstation to a chosen printer. The system does not commit from which system the drawing order comes from as long as the order is in the right format. The system also supports different level access control.

The second phase of the project will include the following features:

- Viewing drawings via PCs.
- Recording and printing of scanned drawings.
- Recording of other CAD-systems' drawings (.hppl).
- Recording of other CAD-systems' blueprints (.dwg).
- Automatic creation of dxf-files based on customer drawing lists or on request.
- Customer drawing management.

- Installation drawing management.
- EDI connections.

### 3.3.3.3. Product Data Management Project

The Product Data Management (henceforth PDM) means a way to operate for controlling all data connected to the product. The product data includes, for instance, drawings, bills of materials, technical specifications, calculations, customer feedback, and reports.

The product data management system is a computer program that helps the users to find the product data they need. The product data are created and updated using the tools suitable for each purpose, such as BaaN, CATIA, AXES, and Lotus Notes.

The PDM Project integrates documentation, information and material flow. The following picture clarifies this integration (FIGURE 8):

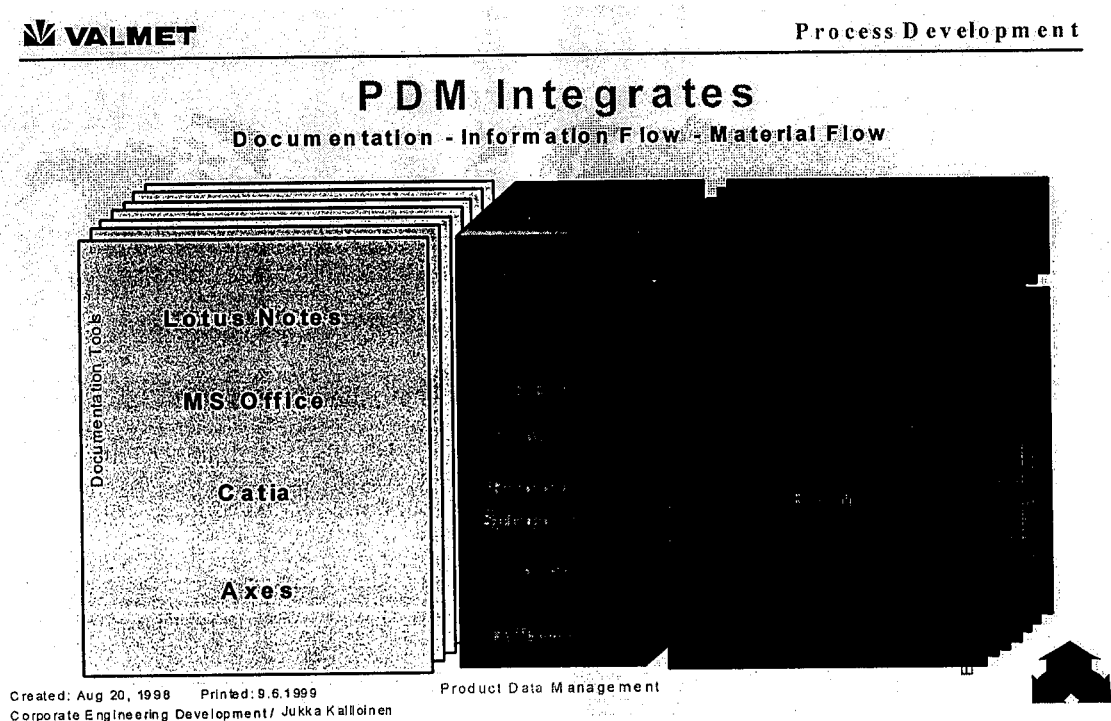


FIGURE 8. PDM – Integration of Documentation, Information and Material Flow.

The PDM project sees into the future as follows (Vision 2002):

- All relevant information processing, storing, transfer and archiving is carried out in electronic form.
- Users, customers and partners from any location within a defined security framework universally access information (corporate knowledge).
- Cumulative know-how and knowledge is structured, utilised and is common for the whole corporation within a defined responsibility framework.

#### **3.3.3.4. Technology Information Centre Project**

Technology Information Centre Project (henceforth TIC) was launched in May 1998. The idea of TIC, and where it addresses itself to, is based on the two following issues: TIC aims at managing both the electronic and manual material at Valmet Rautpohja and also managing the archives of Valmet Tampere unit.<sup>9</sup>

TIC also serves a solution for a need to transfer archives into electronic form. There is a global need for knowing where the *right* information is and how to find it. Therefore, the question is also about information sharing. Tools and networks for to share information are already in use – it is the means, practices and commitment that are absent.

The basic ideas of TIC are:

- TIC is a suggestion for how to manage information.
- TIC is a concept with several integrated concepts (TIUser, TIStructure, TIInterface and TITools).
- TIC provides a mutual, workable and secure way of storing information.

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<sup>9</sup> The image or drawing archive was closed down in Tampere during summer 1998. That material was moved to Rautpohja right after the close down.

- TIC does not modify the information or the ways it has been produced; it provides a way of managing the information.
- TIC basic ideas are not technology dependent.
- Scalability.
- Global usage.
- Simple methods and processes.
- Adaptable.
- Boundary object to all data and information.

Services that TIC provides are archiving (both manual and electronic), printing of archived documents (drawings, images, etc.), scanning from paper and microfilms and maintenance of archives.

The project phases are as follows:

1. Scanning of drawings in Tampere and Rautpohja. Drawings will be stored in DMS.
2. All the drawings and archival functions will be transferred to Rautpohja from Tampere.
3. Enabling the global usage of TIC.

At present (June 1999) the project is in its first phase. Drawings are being stored and paper drawings being scanned to DMS.

### **3.4. Electronic Document Management Systems**

There is an abundant amount of different Electronic Document Management Systems (henceforth EDMSSs) available in the market today. In this study I will not focus on presenting or comparing any of them, merely the concentration will be on the perspectives to bear in mind when designing an EDMS. This defining is done in order to give some guidelines on how Valmet Rautpohja should approach and proceed when deciding on the future of its document management.

‘Now in the digital era the relationship of document management and organisational information management is fuzzier than it used to be when paper was considered almost as the one and only medium for documents. In the 1990's, new ideas and technologies for electronic document management (EDM), such as document imaging, hypermedia, Internet, CAD/CAM (Computer Aided Design / Manufacturing), SGML (Standard Generalised Markup Language), XML (eXtensible Markup Language), have brought a number of possibilities to rethink work and business. New *document genres*, i.e. socially enacted communicative purposes and forms of documents, are being introduced along with the diffusion of digital media; e.g. virtual communities, digital broadsheets, several new genres in the Web, collaborative document genres in groupware and others. Document genres may constitute *genre systems*, where certain document genres are interrelated with each other in a particular community to contribute to a common communicative process.

It is not a surprise that the contemporary literature in information systems (IS) research carries a rich collection of implicit connotations for a "document" hence lacking a solid theoretical foundation and commonly accepted terminology to support both the research and development of electronic document management systems (EDMSs). The concept of a "document genre" offers an elegantly established theoretical lens to view organisational information management. Especially, it sensitises the dual nature of recorded information; on one hand representing socially enacted meanings and purposes related to the information utilised or produced by human beings in organisational contexts and, on the other, being able to crystallise technological features needed for the technical processing and storage of that information thus bridging social and technological design.’ (Tyrväinen et. al 1998, XX)

#### **3.4.1. Designing an EDMS**

Kouloupoulos and Frappolo (1995) start the discussion on designing an EDMS by stating that ‘The basic objective of any new information system is the automation of tasks and processes in order to increase an organisation’s productivity in working with its information resources. In the case of an electronic document management system, this

fundamental objective remains unchanged. However, the advent of complex work environments, increased dependency on networked workgroups, and the physical nature of the electronic document require that we revisit existing assumptions about structured information systems and current methods of analysis and design. The considerations, methodologies, and analytical techniques that are presented in this text have been developed to address the specific nuances of implementing an EDMS.' (Kouloupoulos et al. 1995, 247). The focus of their approach will be on defining the role of workflow in the design effort. This, in their view, will act as the foundation of an EDMS.

According to Kouloupoulos and Frappaolo (1995) 'The first step in implementing EDMS is developing and understanding of the obstacles that implementers face. These revolve around the three primary areas of infrastructure integration, process redesign, and organisational or human factors. Each of these areas accounts for a significant component of EDMS analysis.' (Kouloupoulos et al. 1995, 248). They categorise the design process of EDMS into three phases:

1. 'The first phase, defining the existing business process and technology infrastructure, is accomplished through a technique referred to as the System Schematic. It provides a comprehensive definition of the current components that make up the tasks and information systems used in the organisation prior to the application of EDMS and workflow. It uses graphic representation of the present system's technology infrastructure and the flow of information within the present structure. This provides a clear framework for the decision and examination of problems and alternative solutions.
2. The second phase identifies the areas of weakness and inefficiency. Important in this phase is also the establishing the timing of each business cycle to target areas of potential productivity improvements. The methodology used for this phase is called *Time-Based Analysis*. It focuses on the element of timing, which is absolutely essential to proper workflow analysis and the most often ignored aspect of many approaches that use traditional data flow modelling techniques. By using Time-Based Analysis, it is possible to achieve quantum gains in productivity without massive reengineering.
3. The third phase, development of new process models uses an enterprise modelling technique called Stair Step. The Stair Step model provides a context for identifying

the most appropriate sequence of precisely defined workgroup applications, the first of which will be the pilot application. It stresses an incremental approach to developing enterprise workflow systems. Stair Step takes into consideration the complexity of large workflow applications and the dynamic nature of most enterprises. It recognises that expectations must be regulated and results quickly demonstrated for the technology to gain favour among both users and management. Ultimately, Stair Step provides a foundation of experience on which to build enterprise applications; today, this is the most difficult ingredient of all to find for any EDMS application and workflow in particular.' (Koulopoulos et al. 1995, 249-250)

However, Tyrväinen et al. (1999) approach the issue of designing EDMS as follows: 'Many business organisations are reacting to the tightened and globalised competition with major changes in organisational designs caused by business process reengineering and other development initiatives. The changes have been directed especially towards lateral and flexible organisation architectures utilising emerging information technologies. Hence there also emerges an increasing need to implement the management for existing and novel organisational document genres in digital media supporting information needs caused by these changes. According to our experience, many EDMSs developers in organisations seem to be confused with the pace of constant organisational change, salient technological opportunities and the different connotations of EDM because of lacking theoretical and terminological means to unify their 'technological frames', i.e. the understanding of relevant features of EDM technology for their organisation. As a project manager starting a large inter-organisational, industrial EDM development project phrased it:

*"Please, tell me what, by and large, is a document to be managed?"*

Some methods and approaches have already been reported for the adoption of EDM. They are typically tailored for domains, such as in the public sector, that have long traditions utilising paper documents. Anyhow, these methods do not problematise the notion of a "document" very deeply for the development of organisation-wide EDMSs or document type definitions to standardise document structures. This seems quite logical, because the most document genres in such domains are well, and often

explicitly, established with long traditions of legal and administrative work, even in the level of a national culture. - However, the adoption of new EDM technologies in the public sector may often be hindered because of political issues strongly intertwined with the development of work and document management overriding the interests for efficiency and effectiveness aspects.’ (Tyrväinen et al. 1999) Their view, all told, suggest that the analysis of organisational document genres would promote the design and deeper understanding of EDMs in organisational contexts. (See Tyrväinen et al. 1998, 1999 for further discussion on genre theories).

In conclusion to this narrow glance at EDMs, designing an EDM needs understanding of the following:

- Infrastructure integration
- Understanding of workflow
- Awareness and understanding of document genres
- Awareness and understanding of social factors, work practices and organisational settings.

### **3.4.2. Document Manager at Valmet Rautpohja**

As any other company, Valmet Corporation also has a serious need for managing its documents – both manual materials (papers, folders, etc.) and documents in electronic form. To get started with this goal, Valmet started Catia Archive Project in 1996 to store or file pictures electronically. The system used for this purpose is called Document Manager (henceforth DMS) and is provided by a company called Ravalik Oy in Tampere. DMS is an Engineering Document Management System initially aimed at Catia and Helix drawings and pictures. Currently Ravalik also provides a DMS for all documentation (excluding Lotus Notes documents).

In short, with DMS one can save, find, link and access company’s document and data storage quite easily. DMS supports storage of all types of documents, regardless of their



file format. DMS manages document storage, fast searches, version control, approval processes, users and rights, printing and viewing and all document types:

Supported systems and other requirements are Windows 95 (MC), Windows NT (MC), IBM and HP UNIX/Motif, Progress Client and DB Server (Progress, Oracle..)

### 3.4.2.1. Main Functions of DMS

DMS can be illustrated by the following figure (FIGURE 9):

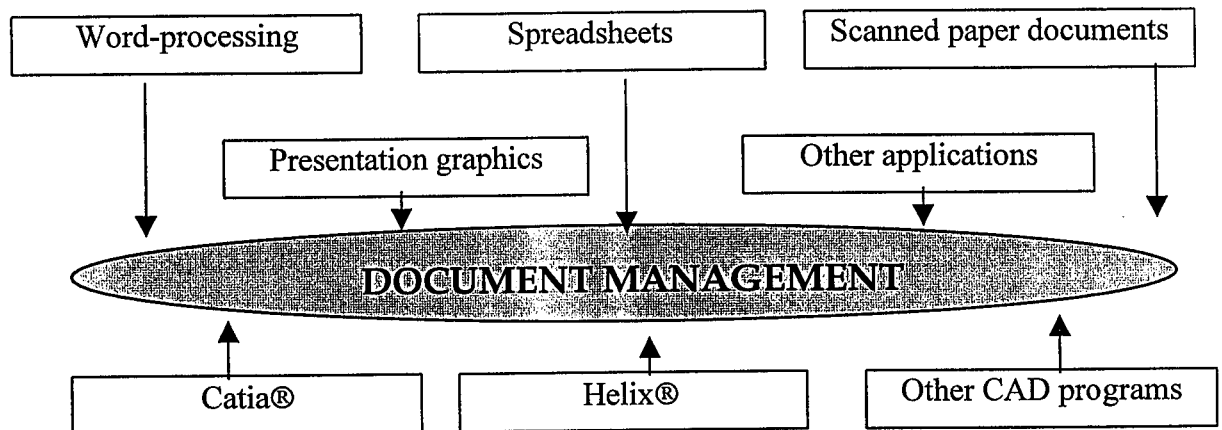


FIGURE 9. Document Management – Data and Change Management.

As I previously mentioned, DMS was first introduced in Valmet Oyj Rautpohja in order to archive drawings and pictures. Currently the system is used for this purpose only. However, DMS also supports filing other document formats – those of MSOffice (Word, Excel, and PowerPoint) and others. However, DMS does not support archival of Lotus Notes files and documents.

Main functions of DMS are:

- Archival of documents with user-supplied data
- Revision control
- Approval management

- Swift retrieval of archive documents using simple or sophisticated search criteria
- Viewing and plotting of archive documents
- Ability to run custom applications against archive documents
- Feedback system
- Automatic filling of title block with database data for CATIA and Helix Drawings
- Configuration and administration application.

Documents can be searched by drawing number, using wild cards (1234\*) and by searching documents with database information. Revision control includes CheckIn and CheckOut. Only one user can operate with the original at one time. Users see who is the owner or creator of a document and the system systematically produces a new revision number when a document is edited. This feature enables tracking to the original drawing. A user also has to give obligatory information when checking in an edited version.

Approval management provides possibility to define approval stages. Also, user rights are identified in the application. In addition, the configuration of DMS can be modified while DMS is still in use. Modifications and additions can be made to the original configuration. The most common configurations made during use are adding users, assigning users to groups, changing rights or a group and adding locations and volumes. The administrator of DMS can also view and edit drawing information, delete and unlock drawings, view and delete alerts including alerts deleted by other users.

### 3.4.2.2. Architecture

The architecture of DMS can be illustrated by the two following figures (FIGURE 10 and FIGURE 11):

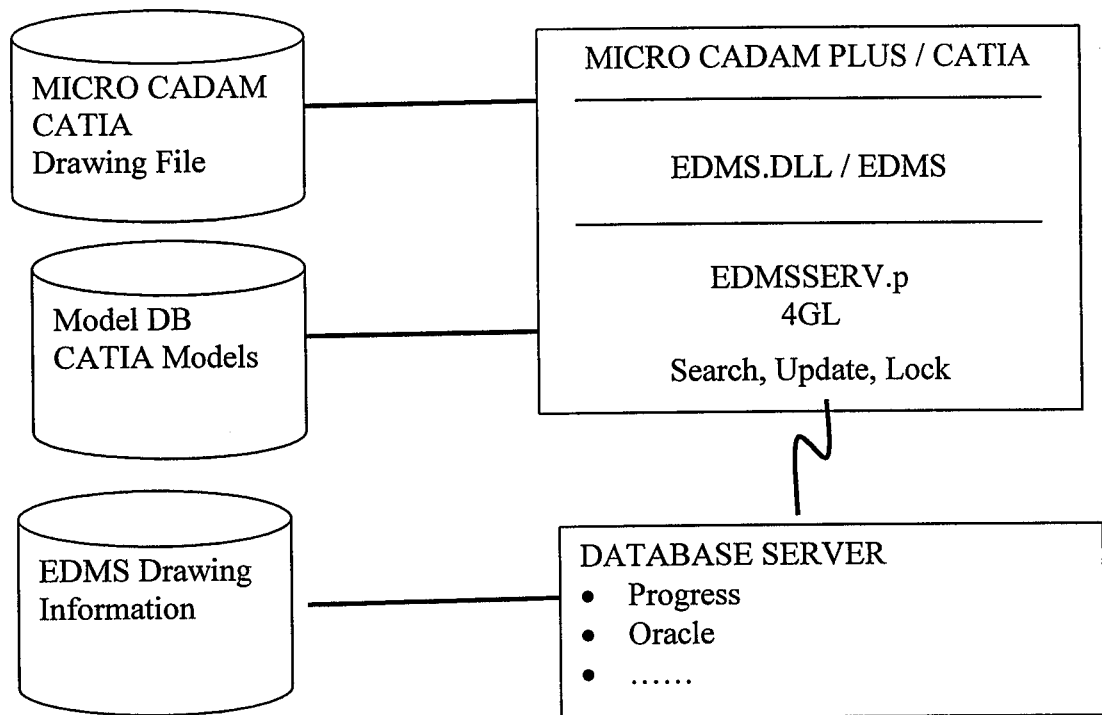


FIGURE 10. Architecture (1).

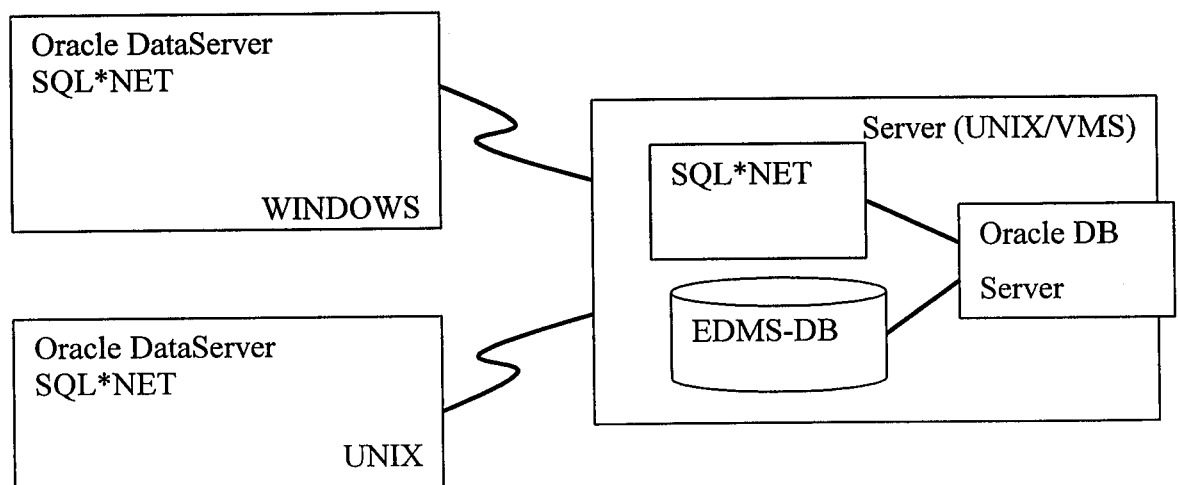


FIGURE 11. Architecture (2).

Catia and archiving servers are physically two different things. This backs up the archives if something happens to either of the servers. If the archiving server is broken drawings can still be printed out and plotted through Catia server. Functions can still be assured by making both of the servers as high usability servers by placing another computer by side to them.

#### **3.4.2.3. Usability**

DMS is used in Valmet Rautpohja in order to archive digitally designed Catia drawings and pictures. Catia drawings are archived from Catia work desk. The designer fills out the needed information of his/her drawing and after saving the picture to the archive it is usable and deliverable by others.

DMS does not care from which system the drawing order comes from as long as it is in the right format. For this reason, any operations management system is easily linked to DMS. Initially DMS was tailored for usage in Catia V4. Currently the DMS is also used for archiving scanned drawings and pictures. Catia images as well as scanned ones can be viewed at any PC also (if required AutoVue viewer is installed).

In the next phase of the project DMS will also support the archival of CAD documents (.hpgl, .dwg). Also .dxf file will be either automatically or manually done from a customer's drawing. The aim is also to manage customer and installation drawings with DMS and create EDI connections.

## **4. METHODOLOGICAL APPROACH AND RESEARCH SETTING**

This chapter illustrates the methodological approach and research setting of this study. First, ethnography will be defined and discussed, with focuses on ethnomethodologically informed ethnography and ethnography in information systems design. Secondly, the method used, i.e. how the empirical part of this study was carried out, will be described and narrated in detail.

### **4.1. Ethnography**

Ethnography derives from efforts by anthropologists and others to record the culture of exotic and often primitive foreign tribes. From the origins of that work, the term ethnography has denoted a commitment to the empirical recording of these cultures, often taken to exemplify humankind in its pure form, before they vanish or become modernised (Thomas (ed.), 1997). Ethnography has been interpreted and defined in various ways ever since. The current variant of ethnography includes extended participant observation at a chosen field site. The observer tries to become a part of that site – to be accepted by those studied. The rationale is that a prolonged period of intense immersion in the culture best enables the observer or ethnographer to experience the world of the subjects, and that way to grasp the significance of their languages and actions for studied artefacts or functions. Ethnography, in simple terms, is therefore a way of looking at how people do their work. On the other hand, Charles Bantz defines ethnography as the study of and representation of people (“ethno and graphy”). He further states that ethnography is interesting in all practices of people – how people relax, how they talk, how they do work, how they build a relationship and so on

(Herndon et al. (eds.) 1997). Lucy Suchman and Randall Trigg give another description of ethnography:

‘Ethnography, the traditional method of social and cultural anthropology, involves the careful study of activities and relationships between them in a complex social setting. Such studies require extended participant observation of the internal life of a setting, in order to understand what participants themselves take to be relevant aspects of their activity. Importantly, this may include things that are so familiar to them as to be unremarkable (and therefore missing from their accounts of how they work), although being evident in what they can actually be seen to do’ (Suchman et al. 1991, 75).

In practical terms, it is claimed that ethnography refers to forms of social research that has the following features:

- a strong emphasis on exploring the nature of particular social phenomena, rather than setting out to test hypotheses about them
- a tendency to work primarily with “unstructured” data (i.e. data that has not been coded at the point of data collection in terms of a closed set of analytic categories)
- investigations of a small number of cases, or maybe just one case, in detail
- analysis of data that involves explicit interpretation of the meanings and functions of human actions, the product of which mainly takes the form of verbal descriptions and explanations, with quantification and statistical analysis playing a subordinate role at the most. (Denzin 1994, 248)

From these views presented above following conclusions can be made:

1. Research orientation of the ethnographer is such that behaviour is linked to the setting. Orientation must be subjective, as subjective interpretation is important. The researcher becomes part of the research situation.

2. Hypotheses are as general questions. The researcher therefore needs some background on the organisation studied as well as the case (or information process as in this thesis).
3. There are no statistics.
4. Data gathered consists of observational statements, interviews, artefacts, multiple methods and triangulation – cross-validation.
5. Generalizability is not a specific target of research.

When viewing ethnography there are three different trends that has to be considered (Harper, 1998). The first trend was the development of research into the social impact of computing. This trend did not derive from anthropology and/or sociology – these disciplines viewed that impact as little more than a continuation of trends that were better explicated with reference to class structures and power. Also reference to these classic concerns resulted in computing and computers disappearing from the view of those studies. The second trend, which partly is built on the first trend, consisted of a set of seminal publications that were a kind of clarion call for a new interpretative, loosely sociological or anthropological approach to requirements capture. The third trend deals with the experiences and changing attitudes of organisations themselves. (Harper, 1998, 52)

#### **4.2. Ethnomethodologically Informed Ethnography**

Ethnomethodologically informed ethnography originates from ethnomethodology. Ethnomethodology is seen as a determinedly unconstructive enterprise; it rejects explanation, as construed in constructive analysis and model building and instead places methodological emphasis on the rigorous description of the ways in which situated action is produced everyday. This notion is regarded as the point where the ethnomethodologically informed ethnography approach exacts considerable analytic purchase.

As Crabtree et al. (1997) states: ‘Ethnomethodologically informed ethnography helps identifying the subtle and often unremarked cooperative aspects of work, the small scale

constellations of assistance and deployment of local knowledge that enable the work to be accomplished: that is, the method's focus is on the interdependence of work activities and those who are party to them, rather than viewing as a single discrete task. - In the field of CSCW ethnomethodologically informed ethnography has achieved prominence as a contributor to the design of distributed and shared systems.' (Crabtree et al. 1997, 222).

The method used in this study follows the approach of ethnomethodologically informed ethnography.

### **4.3. Ethnography in Information System Design**

Research has established that ethnographic studies give important value and information when designing information systems (e.g. Suchman et al.1991, Star et al. 1994, Heath et al. 1996). Studying and observing people and what they do gives rich data of social and work practices. In an organisational setting ethnographic study can also outline the constellations of interaction (Salvador et al.1997). Constellations of interaction refer to people who are dependent on each other work-wise. This means e.g. that person A contacts person B and C when dealing with a problem X. If person A deals with problem Y, s/he will contact person C and E. Constellations are social networks that are not reported in the official organisational figures and tables. These constellations serve an important subculture to the official one. Ethnography can reveal these networks and point out their importance and also the effective use of them. Not only networks are revealed – more importantly the real work practices that occur. How do employees do their work? From whom and where do they gather information?

‘Work practice is a concept that is being used more and more within the design community as it recognises that the ways in which people organise their work is important for the design of systems to be introduced into the work-place’ (Button et al. 1993, 263). However, work practice is not a simple and unambiguous concept. Button and Harper (1993) further state that ‘Ethnomethodological studies of work have



continued this interest<sup>10</sup> and have emphasised the practices through which work is organised in its unfolding course, and it is this emphasis that we can find in much of Suchman's (1987) work. The use of concept work practice to characterise this emphasis could, however, be ambiguous to those designers who are attempting to explore its relevance for design, for, as we have intimated, work practice has a well established place in the sociology of work, describing amongst other things the rule book formulations of work as well as the situated responses to contingent circumstances. Thus, if we take Garfinkel's study of the coders, the formal rules that were given to the coders might well be considered by some to be the work practices of the coders, and they would pay no, or at the most little, attention to the *ad hoc* practices of applying the rules. Thus, depending upon the sociological stance taken, work practice may refer to very different orders of work organisation' (Button et al. 1993, 265).

Button and Harper (1993) studied the introduction of two systems that were intended to support and partially automate two sets of existing work practices. The first study was of a sales order and invoicing system introduced into a furniture foam cut manufacturing division. The second study was an examination of a crime reporting system in an U.K. police constabulary. They argue that in the first example the systems failed to support the work practices in question. However, 'from the point of view of the systems designers, the system *did* support the work practices, indeed it was explicitly built around the work practices of the division *as the designers understood them*. A description of these practices as used for the design were founded in the formal documentation of the jobs, the records of the work, in the narratives of users and purchasers and in observations of work, rather than analytic explications of the lived work of participants' (Button et al. 1993, 266-267).

In the second study the situation was similar. 'As with the sales and order processing system we examined, the problems resided in the incompatibility of the system with the lived-work of the police. This was because in designing the system around the formulations of work practice discovered in the formal documentation of their work and

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<sup>10</sup> Button and Harper (1993) refer here to Garfinkel's study of coders where it was found that in practice it was not possible to exhaustively and explicitly stipulate the coding rules. It was through the implementation of the *ad hoc* practices that coders achieved their work of coding. The formalised account of the work of coding as applying the rules omits the very practices that organise that work.

in police narratives, the designers failed to recognise that crime reporting and documentation is itself a work activity that is achieved in improvised practice. That is, crime reporting is itself lived-work.' (Button et al. 1993, 274)

The point and importance of work practice in information system design is that 'if designers are to incorporate an understanding of work practice into the design of computer systems, then work practice has to be grounded in *analytic explications* of work that can reveal the practices through which members orderly handle the contingencies of their work situations. – The radicalisation of design with respect to work can be achieved in grounding design in analytic explications of activities and interactions are contextually managed as orderly courses or work. If designers are to embrace the concept work practice they must also embrace an *analytic* mentality towards work.' (Button et al. 1993, 279-280)

As stated before, ethnography has been regarded as a useful research method when dealing with information systems and applications, especially when dealing with design. However, opposing arguments also exist. For example Hughes et al. (1994) state that 'ethnography has acquired some disputed prominence as an important new method of "requirements elicitation". More specifically, it is a response to the need for an adequate analysis of the sociality of work and organisation to underpin large-scale interactive system design' (Hughes et al. 1994, 429). On the other hand, they say that ethnography is a much richer method than previous studies and reports of design experiences would have us believe. The experiences of ethnography within systems design are limited and mainly confined to small-scale settings and of highly focused activities. Based on these statements it is probably not too strong to say that to design a useful system one has to understand the real work practices that the system is supposed to support. After all, systems and applications are designed to help, assist and support people in their work and tasks. If those tasks and work, and more importantly how they are done, are not studied, how are we to design any assisting or supporting system?

Hughes et al. (1994) have categorised uses of ethnography within design as follows:

- *Concurrent ethnography*: Design is influenced by an on-going ethnographic study taking place at the same time as systems development

- *Quick and dirty ethnography*: Brief ethnographic studies are undertaken to provide a general but informed sense of the setting for designers.
- *Evaluative ethnography*: An ethnographic study is undertaken to verify or validate a set of already formulated design decisions.
- *Re-examination of previous studies*: Previous studies are re-examined to inform initial design thinking.

To give a brief insight to these different roles of ethnography in design the roles are collected together in TABLE 1.

TABLE 1. Outline Feature of the Different Roles of Ethnography in Design. (Hughes et al. 1994, 437)

| <b>Roles<br/>Features</b>         | <b>Concurrent<br/>Ethnography</b>                             | <b>Quick and Dirty<br/>Ethnography</b>                     | <b>Evaluative<br/>Ethnography</b>                                     | <b>Re-assessment of<br/>Previous Studies</b>                   |
|-----------------------------------|---|--|---|--|
| <b>Detail of work</b>             | Dependant on focus of study                                   | Outline understanding                                      | Dependant on initial design / model                                   | Dependant on previous studies                                  |
| <b>Type of design information</b> | Informing prototype through different stages of development   | Overview of domain of work to inform initial design        | Check implications of design from initial model                       | Motivation and scope of design                                 |
| <b>Duration of study</b>          | 12-13 months, balanced use of study / debriefing              | 2-3 weeks of study prior to analysis                       | Analysis of original model, 2-4 weeks of study prior to re-assessment | No fieldwork but costs of reanalysis                           |
| <b>Influence of field site</b>    | Strong and unpredictable                                      | Greater ability to select field                            | Dependant on field site and previous model                            | -----  |
| <b>Design / Study relation</b>    | Driven by study   | Driven by study  | Driven by initial design / model                                      | Driven by outline design                                       |
| <b>Form of system</b>             | Interactive workplace systems with emphasis on detail of work | Interactive workplace systems and overall system structure | Interactive workplace systems and overall system structure            | General platforms to support a range of different applications |

#### 4.4. Methodology

The methodology of this thesis follows the ethnographic method created by Richard Harper (Harper, 1998). Harper (1998) studied documentation in the International

Monetary Fund and illustrates clearly and systematically in his book how the ethnographic study can be conducted. There is abundant amount of research papers on ethnographic research but none of them describes the used method – the steps needed to conduct the study - thoroughly. Among the literature on ethnography is e.g. Werner et al.'s book *Systematic Fieldwork: Foundations of Ethnography and Interviewing* (1986), where he discusses the different aspects on conducting ethnographic fieldwork. However, Harper gives the first detailed guidelines of how to do ethnographic study in an organisational setting. This is the reason why Harper's method was chosen and applied in this thesis. The method basically has four steps:

1. Information careers
2. Ritual induction
3. Undertaking interviews and observing work
4. Analysing the data

The first step, information careers, means following the career of information through an organisation. First the main processes of an organisation are studied broadly – this means that the ethnographer needs to get a view on the processes. Secondly, one process is taken under the spotlight and studied carefully. All the documents involved in that process will be illustrated e.g. in a map. In fact, that map describes the data flow of the chosen process. Thirdly, one document within that data flow is chosen. The document should be such that its creation and editing either involves many employees and / or crosses several organisational boundaries. This is important for the issue of how the document transforms when moving from one person to another, from one department to another.

Going through ritual induction means the process of how to get accepted by those studied. This is a very crucial point of the research as an ethnographer has to be regarded as 'one of us' instead of 'one of them'. Ritual inductions can mean a task done, working at late-hours, getting accepted by a certain employee etc. Ritual induction is therefore a process of becoming accepted in the community of the fieldwork. When accepted by those studied the data gathered (i.e. information from the observations and interviews) can be regarded as more profound. The ethnographer is not interested in what people should be doing or how things should be done. Instead, he or she is

interested of the real work, what the employees really do. To obtain truthful and correct information the ethnographer should concentrate on finding out what the ritual inductions might be and on going through them. Without this step the ethnographic study can easily be misled as the observations and interviews do not support the real work done in the studied field.

The third step, undertaking observations and interviews, accomplishes the empirical data of the research. Observations mean that the ethnographer physically follows the document career – i.e. all what happens to the document, what people do when creating or editing it, whether employees refer to other documents or technical pictures and specifications. When observing, and based on the surprises that occur during the physical follow-up, the ethnographer undertakes the interviews. When interviewing, the ethnographer is again interested of what people really do when it comes to the chosen document. Additional information can also be obtained when interviewing – background information, employees expectations and perspectives to name a few.

Analysing the gathered data is the last step of ethnographic study. Observations will be combined in order to contemplate behaviour and work practices. Figures and tables will be presented to support the data. Relative conversation analysis will be conducted based on the interviews. The clips from the interviews will illustrate subjective views and perspectives. After analysing the data assumptions and conclusions will be made.

As a research method, ethnography will focus and concentrate on the real behaviour of people, i.e. how they do their work. From that point of view, in addition to gathered background information and data, suggestions can be made on how to proceed with resolving the research questions.

#### 4.4.1. Information Careers at Valmet Rautpohja

To get started with the information careers at Valmet Rautpohja *the first step* was to map the main processes. These processes are illustrated in FIGURE 12.

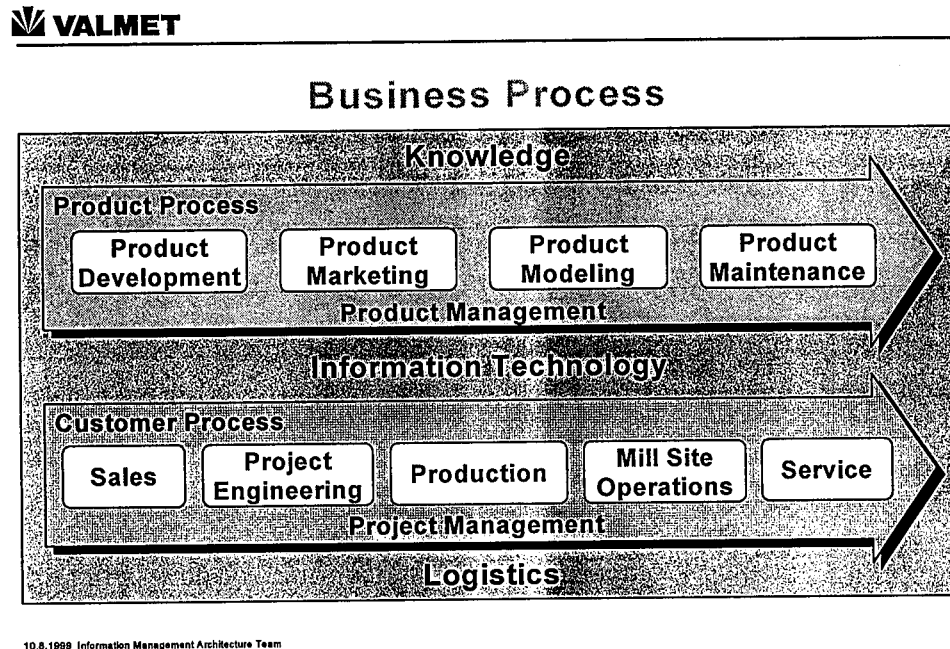


FIGURE 12. Main Information Processes at Valmet Rautpohja.

As it can be seen in FIGURE 12, main processes can be divided into two: product process and customer process. The product process consists of product development, product marketing, product modelling and product maintenance. This process forms the agenda for product management. The customer process includes sales, project engineering, production, mill site operations and service. The customer process is also the field of project management. In addition, knowledge, information technology and logistics form the framework, or rather the supporting stream, of the main processes.

*The second step* consisted of choosing the particular process what to study. From the views of the main processes I framed the information career into the process of 'enforcing a project'. The process of enforcing a project is the process that starts with the sales department, goes through project engineering and semi-ends at production.

That particular process was chosen as within this process the artefacts, or documents for that matter, do cross several organisational boundaries during their life cycle.

The process of enforcing a project consists of the following steps as illustrated in FIGURE 13: managing the project, project planning, procurement, delivery, installation and starting. Managing the project phase takes care of e.g. the specifications, invoicing and project prognosis. Project planning consists of resource planning, drawings, confirmation of orders, progress reports etc. Procurement phase means contacting different Valmet factories in order to obtain needed parts of the deal. Delivering the products forms the fourth step including delivery plans. The last step is installation and start-ups that occur at the customer's site.

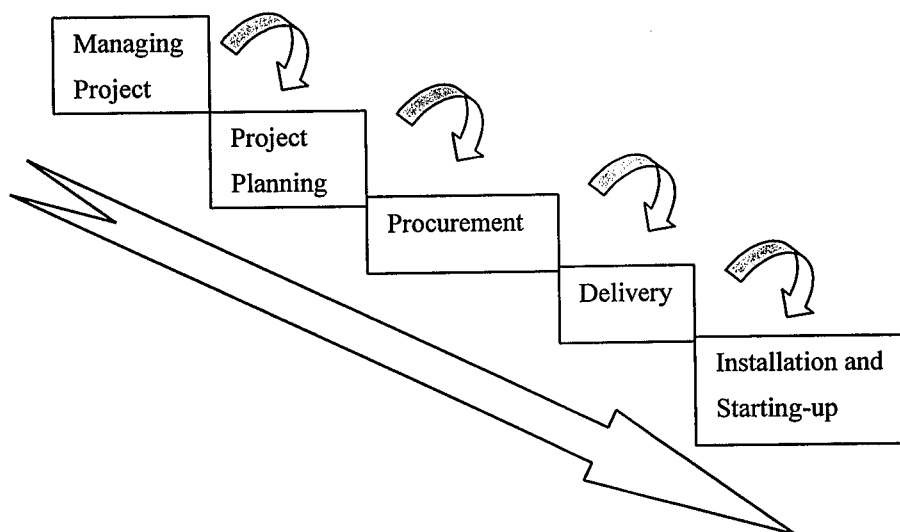


FIGURE 13. Process of Enforcing a Project.

*The third step* was to map all the documents that are included in this chosen process. Mapping the documents was created by using the VALTA-project material and also talking to a few people in the project department. Several options appeared during the discussions: different sorts of reports and documents. One document particularly seemed to cause problems and was talked about a lot: a specification. When looking at the document map, a specification seemed to be part of nearly every department's documents. Clearly, it therefore crosses several organisational boundaries and thus involves many employees. Therefore, a specification was chosen as the document career to follow.

*The fourth step* was to decide a certain technical specification, a document. Talking with a few more people at the Project Department, and going through several options, the specification of the UPM-Kymmene Chapelle Darblay's paper machine 6 rebuild in Grand-Couronne in France seemed the most favourable. The reasons for choosing this particular specification were as follows:

- The project is underway. The first contacts with the customer were made in summer 1998 and the start-up of the rebuilt machine is scheduled for October 1999. It is essential to choose a case where the work is still going in order to observe the work practices in action. There would have been several other options but they would not have met the requirements of this thesis and ethnographic study – observing what people really do to the chosen document.
- The rebuild of paper machine 6 in France is not a large project. By this it is meant that the deal does not include the whole paper machine, only rebuilding of certain parts. This fact also makes the specification smaller in pages. This was seen as favourable to the thesis (time limits, scope of thesis, etc.).
- The project popped up in more than one discussion. Therefore, it could be assumed that it was not only a typical project but might also include some problems and differences compared to most projects.

As the document was chosen, the next step in the ethnographic study was to go through ritual induction.

#### **4.4.2. Ritual Induction at Valmet Rautpohja**

Before starting to work on my thesis I had been working for Valmet for four months. I was responsible for carrying out archive projects in six departments. Working with people in different departments gave me valuable information on work practices, organisational culture, and on general ways of operating. I was also able to establish a useful contact network. When working I did more than was required (e.g. I helped the departments to make inventories on their manual material, I spent hours in their



archives sorting out the material). This was appreciated and reported. I see this as a way of going through ritual induction.

In addition to my work experience at Valmet, I had a place or a post at Rautpohja that I used when working on the thesis. Therefore, I was seen and heard and could be also contacted. This, in my opinion, influenced the easiness of contacting people for interviews and further information for the thesis. Also, when interviewing and observing, some of the interviewees knew me, had seen me, had heard about me. This was a very important point in being accepted 'as one of us'.

Third point on ritual induction is that I am still working for Valmet. I am convinced that having a work status itself constitutes much of the necessary ritual induction, at least in Valmet. Another important point is that electronic archiving is something people talk about. Departments and factories have started to plan how to archive electronically as no instructions have been given from the corporate level. This means that the interviewees were *truly* interested in the interviews. They wanted to highlight the problems, describe what would a useful archiving system be like, and much more. Thus my work status, and history over the summer and autumn 1998, constituted my 'ritual induction' in the sense that Harper (1998) intended.

#### **4.4.3. Undertaking Interviews and Observing Work at Rautpohja**

The interviews were undertaken during March, April and May in 1999. The interviewees were chosen from the distribution list of the confirmation of order of CHAP6REB project (see APPENDIX 1). The list was very useful in more than one sense as it was easily seen from the list which documents were delivered to each person. In this case naturally those persons that received the specification were of interest.

The distribution list includes special marks for specific documents. The mark used is asterix (\*) and the amount of asterices specifies different delivery. If no asterices followed a person's name, it meant that she or he had received the whole basic

specification without any confidential information. The different amount of asterices after names meant the following:

- \* - production and quality guarantees
- \*\* - delivery contract and/or acknowledgement with pricing information
- \*\*\* - schedules

Interviewees were chosen from each category. Also, one person that received three copies of the specification was chosen for interview. This was seen as an exemption and therefore regarded as interesting.

11 people were interviewed and they had the following status:

- Sales Manger
- Sales Assistant
- Team Assistant (2)
- Project Manager
- Project Assistant
- Master Scheduling Engineer
- Group Leader (2)
- Capacity Planner
- Chief Designer

The interviews were semi-structured in nature. However, following questions were asked from each interviewee:

- Job description
- How she or he receives the specification
- How is she or he involved with modifying the specification and
- Where does she or he preserve or file the specification.

Other questions in the interviews were interview-driven, i.e. clarifying questions of persons' descriptions, more detailed questions on surprises, questions concerning

observations and work practices and alike. The interviews, and discussions, led the question formation. All interviews were recorded and afterwards typed.

Observations were started already in August 1998. Observations were collected to note books and typed afterwards to a file for further usage. Observing people at work continued through autumn 1998 and winter 1999. Additionally observations were made also when interviewing.

Observations were focused on work practices when it comes to document modifying, document filing or archiving and information retrieval.

#### **4.4.4. Analysing the Data**

‘An ethnography is written representation of a culture (or selected aspects of a culture). To write an ethnography requires at a minimum some understanding of the language, concepts, categories, practices, rules, beliefs, and so forth, used by members of the written-about group. These are the stuff of culture, and they are what the fieldworker pursues.’ (Van Maanen 1988, 13). ‘By far the most prominent, familiar, prevalent, popular, and recognised form of ethnographic writing is the realist account of a culture – be it a society, an occupation, a community, an ethnic enclave, an organisation, or a small group with common interest. – Of all the ethnographic forms discussed in this book, realist tales push most firmly for the authenticity of the cultural representations conveyed by the text.’ (Van Maanen 1988, 45)

The gathered data of this study consists of recorded (and later typed) interviews<sup>11</sup>, hand-written notes during interviews and observations and general information accessible in Valmet Rautpohja (files, databases, reports etc.). Analysing the data can be illustrated as follows:

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<sup>11</sup> The interviews were held in Finnish so the excerpts from the interviews have been translated to English. The aim has been to try and keep the descriptions as accurate as possible, and not to let the translation interfere and change the initial meanings, metaphors, descriptions, nuances and so forth.

- Reading, and going through, all the material gathered, marking interesting and surprising excerpts in interviews and observations.
- Drafting the document's, that was of interest, career and life cycle.
- Narrating the different phases in the life cycle, as the interviewees described.
- Answering the research questions based on interviews and observations.

Therefore, I try to form as realistic account of the information process and documentation as possible. In the excerpts I use purely the exact descriptions of interviewees, i.e. how they describe they do their work and the tasks related to the specific document. Observations, on how people *really* do their work compared with how they *say* they do their work, are added to the sections, when applicable.

## 5. RESEARCH RESULTS

In this chapter I will present the results that were found during the ethnographic study. To remind the reader, the initial research problems were:

How should Valmet Oyj Rautpohja proceed with document management in order to be using electronic archiving comprehensively in 2003?

Subquestions, that delimit the main research question, are:

- What kinds of requirements do different individuals and groups have for useful electronic archiving?
- What kinds of meanings do different individuals and groups have for useful electronic archiving?
- What kinds of perspectives do different individuals and groups have for useful electronic archiving?
- What kinds of applications do different individuals and groups have for implementing electronic archiving?
- What kinds of existing work practices do different individuals and groups have for archiving documents electronically?

As an overall theme during this study, I found that there are a lot of documents in the organisation that are not viewed as proper or real documents. By this I mean that there is a belief that if documents are not generated by a computers, they are not real. If we take any person, his or her desk and work practices what to observe, we notice that there are notes, yellow stickers, pieces of paper on the walls etc. to which a person refers to when working. Based on these observations and thoughts, the results will be reported around the issues of private versus public documents and computer-generated versus non-computer-generated documents. In my view, these documents share and form a *common document space*, which will be discussed in more detail later.

However, first I will explain and describe the artefact that I followed – the technical specification. I will also outline the process and tasks that are included when creating and modifying it. After the description of the process I will report the results as categorised in the research problem followed by suggestions on how to proceed.

### 5.1. Technical Specification

Technical specification is an appendix to an offer and a contract, and therefore is legal in nature and binds both the buyer and the seller. Technical specification includes detailed description of all the technical specifics, i.e. the concept of the paper machine. Layout drawings of the machine are also included in the specification. Depending on the amplitude of the deal, the specification can consist from hundreds to thousands of pages and the deal as a whole includes the same amount of drawings. Also, a technical specification generates other documents - documents that inform about the specification. Such documents are e.g. offer lists and minutes of changes. In addition to these official documents, specification often accompanies other documents, such as notes, supplements or yellow stickers.

The specification is part of Engineers, Designers and others daily work. It is the document that tells what is sold and what is to be designed and manufactured. During any paper machine project modifications occur when it comes to technical details. These include for example additional sales or exclusions. As one interviewee put it:

*I-4<sup>12</sup>: And a technical specification alters through the whole project – or I mean the deal alters all the time.*

Today the technical specification is distributed within and outside Valmet in paper. (See APPENDIX 2 for the contents of a standard specification).

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<sup>12</sup> I-4 stands for interviewee number 4. Please see page 69 for explanation of interviewees' statuses. E stands for ethnographer, interviewer.

## 5.2. Life Cycle of a Technical Specification

In this paragraph I will depict in simple terms the life cycle of the technical specification based on the specification I studied (CHAP6REB). First I will outline the process and thereafter explain the steps in the figure (FIGURE 14).

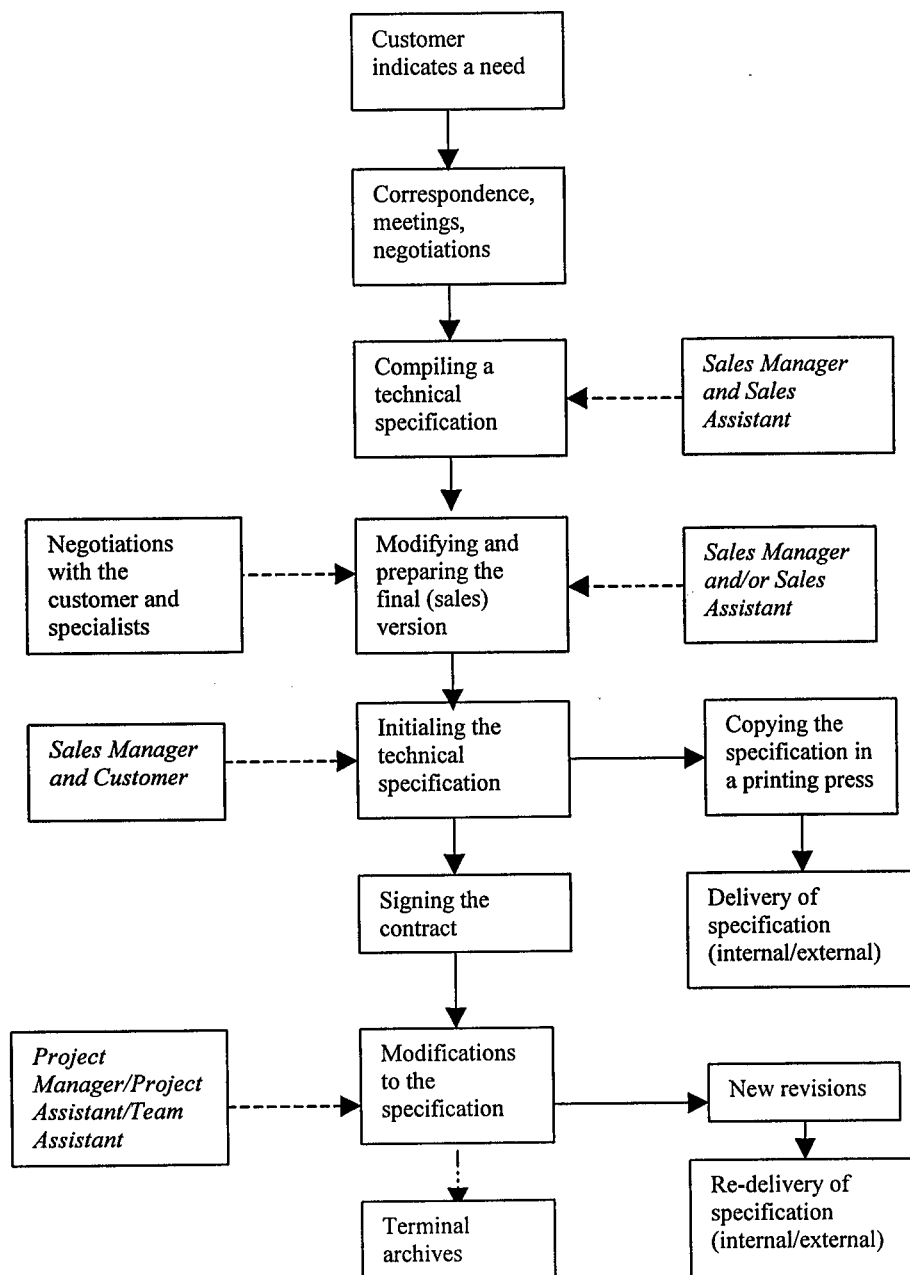


FIGURE 14. Simplified Life Cycle of a Technical Specification.

### 5.2.1. Indicating Need

A paper machine project initially begins by customer specifying a need. Valmet Sales Department responds to that by an offer. A technical specification is part of an offer and therefore forms an important part of decision-making. There are several tasks to do, and several documents to create, before starting the offering process. First of all a job number needs to be created followed by offering number. After these numbers have been created and saved in several places, a project is put into an offer list.

An offer list is a list of all the new or ongoing offers. The list is created weekly and indicates the priorities of offers. The first page of the list is the offer list of previous week and shows all the offers that have been delivered. The other pages of the list consist of offers and the dates when they should be delivered to the customer. Each of the offers is also indicated by its scope. Every week on Monday there is an offer meeting where the list is thoroughly considered and each of the offers is prioritised. The prioritising is done so that the pricing personnel can work accordingly.

This phase was rather routinised when it comes to work practices. Sales Assistant did not seem to refer to additional documents, other than Market Database, when opening job numbers and alike. However, they did write the created numbers down to pieces of paper, for further reference. They used these pieces of information when creating *meta information*, *meta documents* of the offer, such as offer lists, even though the information would have been available in the databases. I see this as part of making work easier and faster. Referring to the overall theme of these results, this phase is mainly about creating public documents (public to the sales department, not organisation-wide). However, *invisible* documents (notes, lists, etc.) are also created, for employees' own purpose, own usage. They, in my view, fall into the category of private *and* non-computer-generated documents.

After these tasks the process is ready to proceed to the next step, compiling a technical specification.



### 5.2.2. Compiling a Technical Specification

Compiling a technical specification consists of different phases and can be carried out in different ways as the following interview excerpt shows:

*E: So... when a new deal is in the air, a specification can be compiled based on an old offer...and then starting to modify that?*

*I-2: Yes, yes...so that we won't start with a pile of white paper ...no no. Instead it is always based on something, either on an offer or then that of standard specification. And often specifications are combinations...like one part from this offer, another from that... a specification can even be a combination of a five different specifications. And then...well after the sales manager has compiled the specification...it sometimes looks so messy and awful – Markku listens there with burning ears – well but...hmm...well then I get it as a pile of papers and then I start modifying it to the format so that we can send it further.*

*E: You have some sort of a template?*

*I-2: No, I start the way that...well as this is the beginning, the paper machine section, it can be from three different...we have, I don't know if I-1 showed you this, but we can see here from the footer where this document is [shows the footer in a specification]. So this footer is the first thing I look at...and I go there to open the document, then I find the right page and then I just copy – paste...and then I paste it to an empty page where I...*

*E: Start compiling it?*

*I-2: Yes, compiling it...so I copy the parts that the sales manager wants to be included in the specification, and then paste it into a blank page. And that is where I start compiling the specification.*

*E: Yes...yes...*

*I-2: This is...this is very important that it is correct [points at the footer].*

When observing Sales Managers in their work, they started to compile the specification according to what the Team Assistant explained. One Sales Manager copied the sections of an old specification, an old offer that were to be rebuilt in the new offer. He worked on the document by pen, marking changes and additions. He also borrowed another specification from the terminal archives, and looked through specific sections of the head-box. By referring to that document he changed the sections in the copied version. By doing so he changed the status of a computer-generated document to a non-

computer-generated. In this phase, a specification is also private in nature, private to the Sales Manager and Sales/Team Assistant only. This observation was done when following the work practices of a rebuilding project. Unfortunately, I do not have any observations on work practices when compiling of a totally new specification. However, according to the interviews and other discussions, Sales Managers agreed on what the above excerpt states. Anyway, it is just a statement, and can not be tested against the work practices, not at least in this thesis.

There are also other people, other than Sales Manager and Sales Assistant, involved with compiling the technical specification. If the specification includes parts of automation, engineers in Automation Department will check on the specification about the technical details. They make the changes to the specification by pen. They also, as observed, refer to old specifications and new concepts when checking the technical details. However, Sales Department (mainly Team/Sales Assistant) takes care of the computerised editing and typing. She receives the corrections to the specification mainly in either paper (with notes) or, in some cases, by e-mail (provided that the changes are done electronically).

### **5.2.3. Modifying and Preparing the Final (Sales) Version of the Specification**

As stated before, a specification is a combination of detailed description of the paper machine concept and layout drawings of the machine. Therefore, some parts of the specification may come from other Valmet units than Rautpohja. When modifying and preparing the final sales version of the specification, this may cause problems.

*E: Ok...well, when I interviewed I-1, he told me that corrections to the specification are made by pen...and he also mentioned that sometimes some corrections can't even be made by computer. Have you faced such phenomena?*

*I-2: Hmm...maybe something like...hmm...well we are responsible of the paper machine concept right? So but a paper machine consists of a lot of other devices too like air equipment etc...so they come from other units. And they are sent as e-mail attachments.*

*E: Yes.*

*I-2: Yes, and often it is so, even though everyone in Valmet should be using the same systems and programs, well not always but many times, so that the file they send to us is not compatible with our systems here. So...we can't modify it or sometimes not even open it. It is quite...and then parts of the documents come by fax so those we can't modify at all. But anyway, there are not that many such documents anymore...so that we couldn't modify them.*

When modifying the specification, Sales Assistant looks at changes and notes on the paper version and changes them into the electronic version. Sales Manager has added information to the specification by pen so at times the Sales Assistant needs to go back to him and ask for clearance. Also, as stated in the interview excerpt, additional documents, those that can not be included in the specification in electronic format, are also added to the specification during this phase. This is done by adding empty pages to the specification and later including (copying) the needed documents to the right places. This task is rather straightforward and in this phase Sales Assistant does not seem to refer to any other public documents. Once again, here we deal with both private and public documents. Private document is the specification with notes, as it is only for the work of the Sales Assistant. It becomes public once the Sales Assistant has finished the modifying. After all the editing is done, the specification is ready for initialling.

#### **5.2.4. Initialling the Specification**

The next step in the specification's life cycle is the initialling. By initialling it is meant such a procedure that both the customer and the Valmet representative (Sales Manager) initials (writes the initials of their names) on each page of the specification. This procedure makes the specification to be the final, agreed and delivered concept of the paper machine. However, this does not mean that changes would not appear during this phase.

*I-2: Initialling means that each page is initialled. And then sometimes something can be written to the specification during the initialling. It will remain there, as it is, the pages with notes won't be edited or re-typed.*

Unfortunately I did not had a chance to observe the initialling and therefore I do not have any observations on work practices to add here. However, as stated in the excerpt,

if changes are wanted to the specification during initialling, they will remain there and no new electronic version will be created. Initialed version is where the responsibility of sales department, when it comes to compiling and editing the specification, ends. After this, the specification becomes public crossing several organisational boundaries.

#### 5.2.4.1. Copying the Specification

When a customer and Valmet have agreed on the delivered concept of a paper machine, on the deal, the specification is copied in a printing press. The initialling is not a prerequisite for copying, merely the agreement of what is to be sold and delivered.

*I-2: After the sales manager has looked it through and said that it can be sent to the customer. Then the specification is sent to the printing press (Yliopistopaino). So...usually we send three copies to the customer, sometimes even more, then one copy is sent to our sales office in Europe. If the paper machine is to be sold to France, we send one copy to sales office in France. And one copy will stay here with me for archival. And then normally the sales manager wants one copy. So, it is usually about five copies minimum but could also be several dozens of folders that we need.*

As we see here, the copying is outsourced, as the photocopy department of Valmet Rautpohja no longer copies such large series such as specifications. Once a specification is ready for copying, Sales Assistant puts a note on the pile of papers stating how many copies is needed of the version and when should the copies be back at Rautpohja. This short and simple note is again an account of informal, private document that is not computer-generated. It was, as observer, a piece of paper attached to the specification or sometimes even only a yellow sticker.

*I-2: Yes, so we'll deliver the specification there and when we get the copied specifications back, we'll start doing folders out of them.*

*E: Yes.*

*I-2: And then, folders like these [points at CHAP6REB folder on the desk] are sent then to the customer. We'll add everything to the folder, such as interleaves, drawings, covers...it is quite a job!*

However, only customer, sales office and sales department are those parties that will receive an official deal folder(s). Within Valmet, the specification is delivered in piles of paper, as the following chapter points out.

#### 5.2.4.2. Delivery of the Specification

After a specification is copied in the printing press, and all the needed drawings, covers, interleaves, the contract and appendices are included in the folder, it is delivered to the customer. Inside Valmet specification and other documents are delivered in paper.

*I-2: So yes. Well, this confirmation of order is given in the first meeting and if the sales manager wants, some additional information also. And this contract is then delivered in a later stage.*

*E: Yes.*

*I-2: And then it [contract] goes to all of these [shows a list of people in an appendix to a confirmation of order].*

Here again there is a *meta document* to specification, that of appendix to a confirmation of order. In the appendix (please refer to APPENDIX 1) there are names of all the people that received the specification of CHAP6REB, the contract, both of them or parts of them. This appendix is public in nature and is also computer-generated. There are also small asterices after names indicating what kinds of documents (without pricing, with schedules, etc.) people will receive.

When it comes to distributing the specification, one example drew my attention. One group leader received three copies of the CHAP3REB specification. When interviewing him, he explained the reason for the 3-copy-delivery as follows:

*I-9: Yes...it is because I am a group leader of three divisions within fluid design....so the divisions are hydraulics design, pneumatics and lubrication.*

*E: Ok...so you receive the specification in paper right?*

*I-9: Yes...every chief engineer receives his own copy of the specification....so in general...here in our department it works so that we group leaders take...well we*

*have this secretary who takes care of these specifications and makes them into project folders... to every chief designer...and then the chief designer takes care of the folder...so I could say that I delegate my responsibility of the specification to the chief engineer.*

Another group leader (I-10) pointed out that they actually receive four paper copies of the same specification.

As we can notice from the excerpts, delivery of a specification is about distributing a lot of paper. The specification of CHAP6REB was distributed to 68 people inside Valmet Rautpohja (please refer to APPENDIX 1), in addition to the customer (several copies), sales office in France, and the copies kept in sales department. Another 38 people received a *meta* document of the specification, that of guarantees, schedules or confirmation of order.

#### **5.2.5. Signing the Contract**

The specification is normally initialled before the contract is officially signed. However, sometimes it can be done simultaneously, as one interviewee describes:

*I-4: Well normally...the initialling is done before...I mean the specification is initialled before signing the contract. That is for practical reasons... The events of signing contracts are usually very august ceremonies, especially in Central Europe. So both the customer and our sales manager sign the contract. Sometimes the specification is initialled in the same ceremony though.*

To remind the reader again, a specification is an appendix to the formal contract. Other appendices consist of standard conditions of contract, pricing lists, schedules, layout drawings and brochures.

#### **5.2.6. Modifications to the Specification**

Any specification is modified and edited during its life cycle. Therefore, a specification is not a static document, as it will go through often several revisions. Also, research has

established that a specification is a true boundary object (Hurskainen and Koskelainen 1998).

When a contract is signed, the responsibility of the deal and project is transferred from sales department to project department. Therefore, also modifications to the specification are done in the project department from there on.

*E: Ok, right. And the initialled version of the specification is the last one?*

*I-4: Well it is the last one that we work on. And then responsibility of modifying and correcting it transfers to project department. And a technical specification alters through the whole project – or I mean the deal alters all the time. That means that a customer wants something more to be included in the deal or then something to be removed...I'm talking about these +/- lists. And then there is also...minutes of specification are one document. I don't know how largely it is still used today, but in the beginning of the 1990's it was...and it included specification's position number, like in what part of a specification the edited part was. So practically initialled specification was not edited afterwards or delivered within organisation. But the customer naturally received all the revised pages.*

Here, again, is a notion of another meta document of a specification – those of +/- lists. They are both public and compute-generated in nature. Project Managers, in this phase, are responsible for all the modifications to the specifications. A Team Assistant generally does the physical document editing, but sometimes the Project Manager does the editing himself.

*I-5: So...Technical specifications are revised when changes occur. In general, responsibility of changes is that of the project manager's and assistant's. I think Word is pretty awkward to use...I prefer Notes. Actually, there has been a pilot here about keeping the specification in Notes all the time...so there it is easily seen when the specification is revised [revisions in different colour, asterix indicating revision]... Well but about how it is done now...well I collect small changes and then revise them at the same time...but if there were big changes, I'll edit the specification right away. When it comes to CHAP6REB, there haven't really been major changes. The deal consisted of a lot of options, so mainly it's been either accepting or rejecting the options.*

When observing a Project Manager in his daily tasks, I noticed that when revising specifications he referred to minutes of meetings (another meta document to a specification). In the project meetings the changes are discussed and decided and revisions to specifications are based on them. Usually (or as it was indicated by a sales

assistant, how it *should* be) the team assistant works on the new revisions, as the next chapter explains.

#### 5.2.6.1. New Revisions

I chose a Team Assistant for an interview and who to observe as she was in the distribution list of the CHAP6REB documents and also, as a sales assistant pointed out, a Team Assistant is the one responsible for the new revisions to the specifications. However, as the excerpt shows, this surprisingly was not the case.

*I-7: I always receive the confirmation of order. I think...I believe that the project manager receives it in paper right?*

*E: Yes.*

*I-7: So in fact, I know nothing about them [specifications] until they need revising.*

*E: All right.*

*I-7: But I really haven't had that kind of a task lately...revising is what has been difficult...I guess the specifications are in the Lotus Notes today?*

*E: Well yes, at least the latest ones.*

*I-7: Latest projects...well because dealing with the specification has been somewhat difficult, because you have to keep...I remember...was it...I wonder what project it was in the past [looks at folders in bookshelf]...well there I needed to keep the page numbers the same but I still had to include revisions to it...then I received it attached to an email...*

*E: Yes.*

*I-7: ...the whole specification...so it was terrible to work on it as it consisted of hundreds of pages...*

*E: Yes.*

*I-7: So it was a Word document attached to an email...and then I tried to do all the revisions and especially the corrected pages...well it was practically...well I even had to use correction fluid to keep the pages organised [laughs].*

*E: All right [laughs].*



Even though the interviewee had not worked on revisions for some time, her descriptions of revising were delightfully surprising, and useful in pointing out the problems that may arise when editing specifications. Also, a document that *should* be public, was transferred into private as the Team Assistant saved the revised copy in her own disc space.

#### 5.2.6.2. Re-delivery of the Specification

The revised pages of a specification need to be distributed within Valmet so that all parties are up-to-date of how or what has been changed. However, the customer does not receive paper copies of revised pages or alike. Customers are informed about changes in project meetings.

*E: Ok. And a specification alters during the project...so details of what has changed...do those pieces of information go directly to chief engineers or is it distributed through you?*

*I-10: Partly they come to me and I distribute them further...or should I say that when a new revision of a specification appears, it is delivered to me.*

*E: Ok.*

*I-10: And then I go and take them to chief engineer.*

*E: And the revision is distributed in paper?*

*I-10: Yes, in paper, at least today. Even though we can find the specification from TASMAN-database, it is still distributed in paper. And then there might be drawings and such that are sometimes difficult to be dealt with electronically.*

As we can notice here, it is totally up to chief engineers to keep the specification up-to-date. This inevitably makes us wonder how accurate and in real time the specification folders in Valmet Rautpohja are? I am not saying that the people are not reliable – I am just wondering how comprehensive the physical distribution of paper is. However, it depends on the Project Managers how they will inform about changes (majority in paper, minority by email). Despite the media, the question of comprehensive distribution still remains. However, when informing about changes, the revised pages

included additional documents, those of pieces of paper, yellow stickers or alike (or if delivered via email, a short message). These observations refer again to the notion on private and invisible documents. These pieces of information were informal, stating e.g. 'Please revise the specification with these pages. More soon. Regards, N'.

### **5.2.7. Terminal Archive**

As we notice from the descriptions above, a specification is delivered within Valmet in paper. Therefore, there are tens of copies of the same specification in Rautpohja and they are kept in departmental or personal archives during the project. Once the project has passed an active phase within departments, the specification is sent to terminal archive. In the terminal archive the specification will be preserved, as long as stated in detailed information of each archival unit. Usually, specifications are preserved for an unspecified amount of time (in practice this means that they are kept in archives for a long time). However, as contracts are preserved permanently and as specifications are appendices to contracts, at least one copy of the specification remains in the archives.

Folders that are kept in terminal archive can be borrowed by using an archival application. Thus, a specification remains active through its whole life cycle. The activity only changes toward the end, as once in terminal archive, no modifications or revision is carried out. Therefore, activity is only about physically relocating the specifications between the terminal archives and the employees.

## **5.3. Requirements for Electronic Archiving**

In all interviews it appeared that one requirement for electronic archiving is to get rid of the abundant distribution of paper. Dealing with hundreds or thousands of pages is not convenient or easy. Therefore, the first, and possibly the main, requirement is to make the distribution and archival of material easier. However, one should bear in mind

though that a specification is a legal document. It needs to be signed officially, so at least one copy of it most likely will remain in the form of a paper.

Another major requirement for electronic archiving is that of proper instructions and guidelines. This concern was discussed in most interviews and was also overheard. As I interviewed people from different departments, a common issue talked about was that of where they save departmental and organisational documents. Another issue was that of not having any corporate level instructions on how to archive documents electronically.

As there is no (visible or usable) rules or guidelines on electronic archiving, departments have been working their own ways of dealing with electronic documents. This, in my view, is only a logical correlative of imperfect instructions.

*E: So how is it in your department? Do you use L- and O-drives<sup>13</sup> for archiving and saving documents?*

*I-10: O-drive is our battle field at the moment...now it is our aim to start using L-drive as archive...where we would put...I just threw away a slide [goes through a litter basket and takes a slide out of it]...so, we would use the L-drive like this, as a project directory...and this would consist of all the automation department...so software design, electricity design and fluid design. And underneath those categories would be diagrams, part catalogues, things that are our products...texts, manuals and other information that is needed during a project.*

*E: Ok.*

*I-10: So it is our intention to move those documents to L-drive...and it would then serve a purpose of some sort of an archive. And then we would have there also our own customer directory so that we know that this and that has been sent to the customer...but...and then we of course have H-drive and Axes...Axes has its own server but I don't know where it actually is.*

As departments have faced the problem of where to preserve digital documents, they have started to act and develop their own ways of dealing with the issue. This is not a bad thing, however, if electronic archiving should be comprehensive, it should also be unified in the diversity of practices. To remind the reader, a single point of access provides users with the access to all information within one interface. Why could not

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<sup>13</sup> The disc space within Valmet is organised so that each employee has a private disc space in H-drive (and naturally in C). There are other disc spaces available for departmental usage; those of L and O, with limited access rights.

such an ‘virtual interface’ e.g. be that of a search engine? Well-defined, it would retrieve the information or document a user needs, no matter what the diverse formats. Another easy way could be that of using bookmarking for both personal and public needs. I argue that if decisions on digital preservation are not made in the very near future, it will be even harder to design an acceptable, useful and comprehensive environment for electronic archiving, or document management for that matter. If departments will continue in organising their own way of electronic archiving, after a while it might be more difficult to adapt to a new (unit or corporate-level) way of digital archiving or that of virtual single point of access.

#### **5.4. Meanings on Useful Electronic Archiving**

As already mentioned in requirements for electronic archiving, making the distribution of documents more efficient is also seen as an important meaning. An interviewee describes the salience of this as follows:

*I-2: Yes...but if I should think about how to enhance things...it appears so that just the thing that how this specification is distributed all around Rautpohja...and as that initialled version can't be distributed electronically...but as this is distributed as a document consisting hundreds of pages, it could be that most of the people who receive this don't need the whole specification...it may be that all they need is only two pages and the rest they can put to the litter basket. So, there should be some enhancement to be done.*

Another meaning of electronic archiving according to interviews and observations was that of improving information seeking and retrieval. Seeking information from Lotus Notes is seen widely as a problem – there are so many databases and so many documents and indices are not in all cases considered as well-organised.

#### **5.5. Perspectives on Useful Electronic Archiving**

Perspectives on useful electronic archiving support again both the requirements and meanings described before. People are aware of the problems and somewhat abortive

tasks of distributing paper organisation-wide. However, they agree that paper documents are the way things have been carried out and how they still will be in the future. Legal documents, such as contracts and agreements, are to be preserved in paper format, at least today and possibly also in the future. I therefore argue that paper will remain powerful and mostly used artefact in business environments.

However, there is clearly a perspective to somehow enhance and rationalise the current way of operating. Personal bookshelves, departmental archives and such alike are filled up with folders and boxes of paper. There is therefore a true need to rationalise the preservation and distribution of paper documents as it is also the physical space for preserving papers that is becoming finite.

## 5.6. Applications

To start a discussion about applications, let us first take a look at Valmet's system architecture. Valmet system architecture is divided into eight categories (as illustrated in the FIGURE 15):

- Customer Manager (Market database; consists of information and details of Valmet's customers)
- Sales Manager (technical specification creation, configurator, SIM, Excel-based costing and pricing tools (XDSAS), sales model utilisation)
- Enterprise Resource Planner (BaaN, Trade 2000, InTime, Hyperion, MSProject, Tax Planner, Scala, Projector, Human Resource applications)
- CAE/CAM (Catia, Axes, Alma, AutoCad, FEM (technical calculations), Nestix, Exapt, MasterCam, VisiCam, other CAD-systems)
- Data Manager (manual and electronic archives, directory structures at discs, RoadRunner, Catia and Axes component libraries, ModMaster, ItemMaster, Product Structures, CID, Number Generator, Tasman, other Lotus Notes based small applications, model documents for sales and deliveries (VCD, VPD)
- Single Source of Data (local applications specific data and databases)

- Infrastructure (external interface management, ValNet, LAN, Lotus Notes, MS Office, System Management, Systems Management Centres, e-mail (Lotus Notes))
- External Interface Manager (Spareparts Manuals, Automation@Store, Remote Diagnostics, Machine Manuals, Vendor Communication Management)

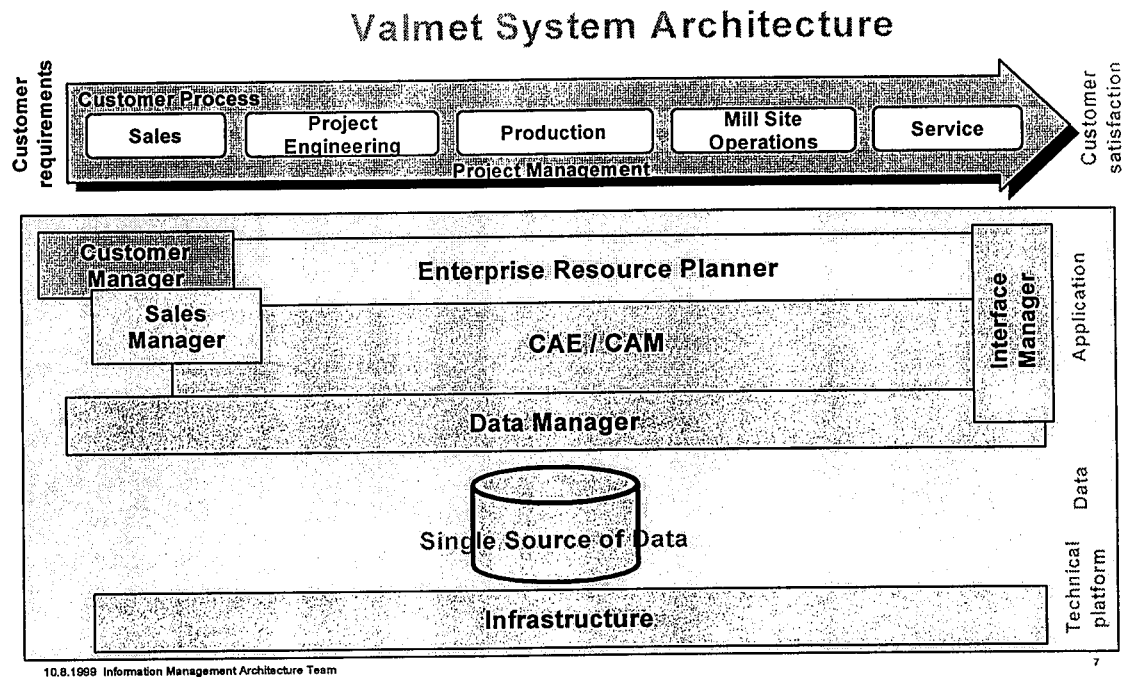


FIGURE 15. Valmet System Architecture.

As we notice, there are several applications used for creating, producing and managing documents. The most important application for communication and document sharing today is Lotus Notes. Lotus Notes is used comprehensively within Valmet and the tendency is that everything, memos, reports, even specifications, should be preserved in Lotus Notes databases and that it should be used as an environment of distributing documents and information.

There is a constant development ongoing to design applications to be used in Lotus Notes. Today Valmet Lotus Notes databases exceed the figure of 2000. Here only those that directly refer to specification and the initial process of enforcing a project will be discussed.

First of all, all project information, correspondence, memos, reports and likes are created or imported to a Lotus Notes application called Tasman. Tasman, if simplified, is a project folder in electronic format. It consists of for example interleaves, indexing and possibility of expressing different document types as the FIGURE 16 shows:

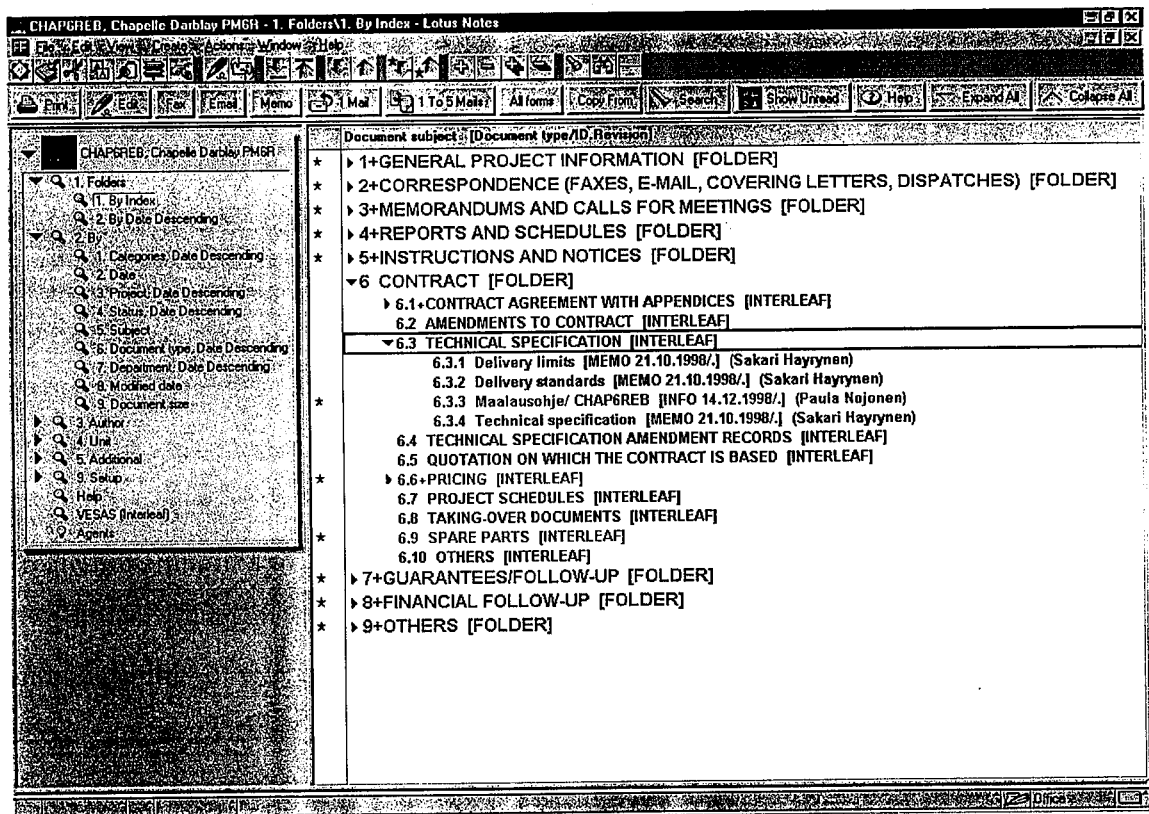


FIGURE 16. Tasman Database of CHAP6REB –project.

All projects within the last 5-6 years have their own database. All project databases look alike; they have the same interleaves. However, they can also be modified if a project so insists. Documents in Tasman also include attached files, such as Word documents, Excel worksheets, MS Project schedules and so forth. Today some projects also have the specification in Word attachments in the database. Using an inbuilt viewer people can view, detach or launch the attachments.

The sales department has started its own development project to design a database similar to Tasman. This application is called the RoadRunner. The aim of it is to support the same functions as Tasman does. Therefore, as sales department is in question, it can be viewed as a contract folder in electronic form. One of the key points in having

similar databases with similar functions in both sales and project departments is the delivery of material. As stated before, once the sales department have done their share of selling a paper machine or rebuilding, the material and responsibility is given to the project department. Today, most of that activity is about handing piles of paper and folders from one department to another. To rationalise this, these two similar databases will make a big improvement to electronic archiving as well as to transferring databases over organisational boundaries, as it is not, and will not be a problem today.

However, Lotus Notes should not be the only focus here. As described above, the amount of different applications is copious. Microsoft Office products form another largely used group of tools too, so do the engineering applications. As this study has revealed, Lotus Notes and Word as word processors are competing of preference. This discussion continues in the next chapter, where some of the work practices are described.

## **5.7. About Work Practices**

In Rautpohja, there appears to be two distinct views and practices when compiling and preserving documents. The first one is using Lotus Notes close to everything when producing documents and the second one about using Word. As work practices refer to how people do their work, the two notions on used applications is one of the major distinctions. I see this as important in considering how to proceed with document management. Other people obviously have internalised the initial purpose of Lotus Notes – that of groupware. Those people see it beneficial to use Lotus Notes comprehensively, to produce all documents in that environment. That way the document sharing is also provided, so is the information on who has created and edited the documents. Others, on the other hand, find it hard to use and utilise Lotus Notes. Those people prefer using other applications for document production. I can understand this view quite easily, as for example, a lot of people see Word is far more sophisticated word processing tool. I believe that this is one of the major distinctions on views of useful electronic archives. However, DMS used for archiving drawings in Valmet Rautpohja supports the archival of for example Word documents, but does not support



the filing of Lotus Notes files. Yet again, could not we think of Lotus Notes as an electronic archive itself? How about private and non-computer-generated documents?

When working on projects in Rautpohja, I came across one special event on work practices. I was having a meeting with a lady whose responsibility, among others, is to provide new employees with telephones and to take care of number changes, phone extensions etc. I noticed a big drawing on her desk, on top of other papers and folders, and asked what that was. She told me that it is the drawing of all the phone plugs in Rautpohja and that she needed that for her work. I also noticed pencil notes on the drawing and when asking how she updates the drawing, she answered that by pencil and eraser, as she does not have the ability and skill to use the application the drawing was created by. However, she told me that there would be training available but she has not bothered to participate as the pencil and eraser work as well. This reminds us of the fact that even though technology is available, it does not necessarily mean that people will use it.

Other work practices that I found important were those of how and where people save the documents they have produced. Each employee at Rautpohja (provided that they have their personal desktop within Lotus Notes) has their personal drive, H-drive, where they can archive documents. Naturally also personal computers' hard discs are used for the same purpose. The usage of drives and the work practices of archiving documents are diverse. One example of the usage of the drives goes as follows:

*E: Ok... but if we go back a bit...like when you have modified the specification, do you save it to the project department's drive or...?*

*I-7: Well I think, that those that I've worked with...that...well this is actually what I consider very bad that...I don't think I have saved them anywhere, only to my own...I mean...or then to L-drive so that others could read that too...But I have delivered the revised one...I haven't put it to anywhere, like project's drive or such... [Opens her own H-drive and shows the contents of it] I have probably put all such things here that haven't...well this is how I receive the specification [shows an email message with an attachment]. Well but I have saved it here...look...not probably a wise thing to do though...but yes I've saved it to my own drive...and then done the revising.*

*E: Well yes, ok.*

*I-7: I just haven't found out any better place where to keep it.*

As this is only one example, and probably an exemption to some extent, we can presume the work practices of document archival to be fluctuating. However, in this particular case, I suggest that this occasion of not knowing where to save the revision, would not have happened if there were proper instructions on where certain documents are to be archived – so that they, and the latest revisions, would be attainable and usable.

When observing people seeking and retrieving information, or documents, I noticed the following: in most of the cases, people firstly looked for information in physical folders in their bookshelves (especially in the case of a specification), notes on the walls and folders, rang to another employee or asked the fellow employee in the same office (if colocated). If they did not find the information, or did not get the verbal answer, they then went looking for the piece of information they needed (primarily) from Lotus Notes. I do not think this is something unusual, merely it is how people are *used* to seeking information (provided that they have a *feeling* or they *know* that the information can be found from paper documents). Also, people tend to, and are used to, making notes and remarks on paper, more than footnotes or alike to electronic documents.

Anyhow, there was one occasion where I noticed a person nearly exclusively using Lotus Notes. There were hardly any folders in his bookshelf, or piles of paper on his desk. When interviewing him he constantly showed me different documents from the Lotus Notes databases, how he has organised the databases, how he keeps track on the new or revised documents and so forth. He, in my view, used Lotus Notes comprehensively and effectively, both as a tool for creating and archiving documents. Funnily enough though, among the very few folders in his bookshelf, were the specifications of his three current projects.

As I pointed out earlier, a lot of people find it hard to find information from Lotus Notes. After all I would like to emphasise that the resistance toward Lotus Notes as an environment for information seeking is not that much question of people and their skills. I argue that it is Lotus Notes, or merely the amount of databases and the poor indexing and categorising, that does not *support* the seeking and retrieval. I believe that rationalising the amount of databases, and creating clear categories and indices based on what users *consider* useful and easy-to-use, that would contribute to more effective

usage of Lotus Notes. However, there is a limit to this process. As also mentioned earlier, work practices are diverse, inevitable and important. A new environment for electronic archiving should support those work practices of personal views (relevant to different roles and tasks) that take advantage of personal meta-organisation (i.e. yellow stickers, to-do-lists, electronic bookmarks, etc.). One could say that the amount of databases correlates to the diversity of work practices, at least to some extent.

Based on the observations on work practices during my employment at Valmet Rautpohja and writing this thesis I found out that there are more to the documents than those generated by computers. I have been referring to this notion earlier and will now go into more detail of that finding. As I explained, in my view there are four kinds of documents in an organisation: public documents, private documents, computer-generated documents and non-computer-generated documents. These all documents are related and my suggestion is that they form the *common document space*. The common document space can be illustrated in the following way (FIGURE 17):

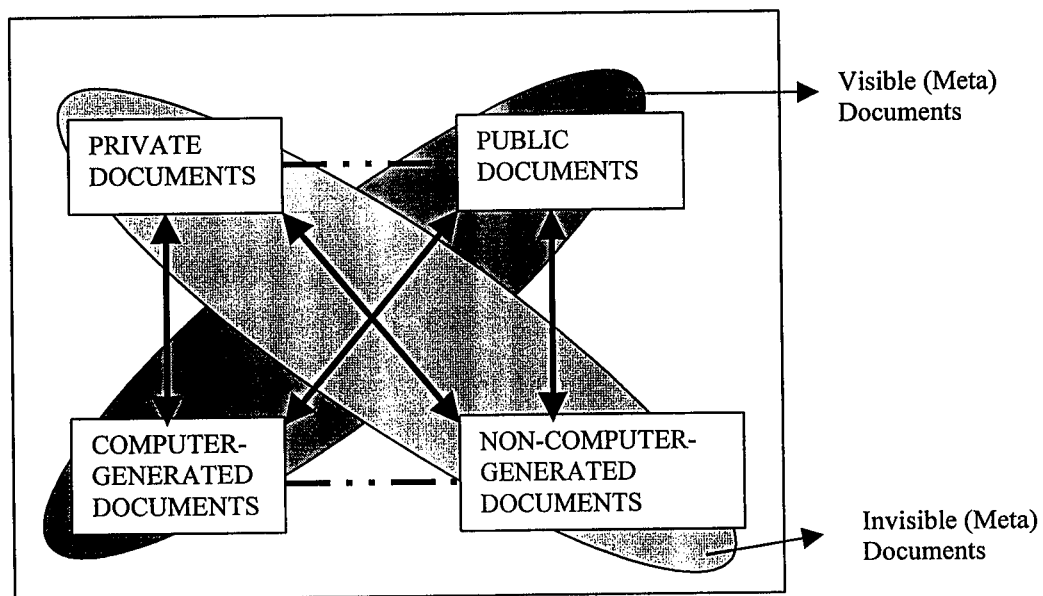


FIGURE 17. A Common Document Space.

Private and non-computer-generated documents form the concept of invisible (meta) documents. They are only seen by their creators or by a limited number of employees (e.g. those of a department). These documents can also be computer-generated but a lot of documents around employees' desks are not (those of yellow stickers and alike). Invisibility in this sense also refers to work practices. In this case, work practices are

also invisible, as not too many people are aware of other employees' private or non-computer-generated documents. Based on my observations, a lot of documents around employees *are* private in nature.

Visible (meta) documents on the other hand are public in nature and are usually computer-generated. These documents also make work practices visible – notions on who has created or edited a document. In my view, this simple illustration of documents could also be considered as a prerequisite for an electronic archiving. The question therefore is whether a system or an application support or disrupt the concept of common document space? Also, does a system or an application support linking of documents to their meta documents? As depicted earlier in this section, a lot of documents serve the purpose of a meta document to a specification. I would see it beneficial if the linking of these documents would also be beneficially provided (See further about hyperlinking e.g. Grønæk et al. 1992).

## 5.8. Suggestions on How to Proceed

As the interviews and the observations show, there are three major enhancements to do when it comes to electronic archiving:

- Finding ways of reducing the distribution of an abundant amount of paper.
- Finding ways to ease the information seeking and retrieval.
- Creating clear instructions and guidelines to the approach of electronic archiving.

One approach could be that of finding suitable and tailorable software from the markets. Another approach could be that of utilising both the ongoing development projects in Rautpohja as well as the existing tools. When it comes to the first approach, the following arguments can be made:

- Finding software for electronic archiving can not be a problem as there are a lot of applications available in the markets and they are, most likely, tailorable to meet Valmet's requirements and needs.
- Deciding on the file formats to be used can not be a problem, as most archival applications support using of a wide range of file formats. And there is always the option of using different software for different archiving. However, as discussed in chapter 3, preserving digital documents is a constant concern (how to ensure that the documents can be accessed, edited and so forth also in the future). No matter what the decision, this concern will remain.

The second approach to electronic archiving is that of combining the efforts of all the development projects. A lot of money and time have been consumed in the development projects discussed in chapter 3 (and those were only few examples). My suggestion, therefore, is as follows:

- Valmet Rautpohja should use the results and resources of ongoing development projects in order to create a feasible electronic archiving environment.
- Existing tools should be viewed as potential, usable and tailorable tools for archiving environment as they *support the work practices today*.
- Feasible guidelines should be created on *what* to be archived *where* and *how*.

Based on the interviews and observations, employees do not necessarily need a new application for electronic archiving. What they need are clear and concise instructions on how to operate with saving and filing as they are *content* with the existing tools and file formats. The problem in fact is merely about enhancing information seeking and retrieving. As discussed earlier in this chapter, simple, well-known and 'easy' concepts could make a difference – e.g. a search engine or bookmarking. One should bear in mind that Valmet deals with the diversity of work practices, applications and file formats. To provide a virtual single point of access perspective, the notions of the *existing* tools that support *current* diversity should be taken into consideration as one possibility of how to proceed.

My intuition is that multiple databases, file formats and applications will not (and should not) go away as they match the needs of employees and business. Thus, a system (or an environment) needs to be designed that makes those databases, file formats and applications accessible and usable and thereby supports the current diverse work practices. I believe that this approach (let's call it virtual single point of access) would eventually accomplish in meeting the requirements that were listed initially as goals for document management in Valmet:

- Assuring document availability
- Integrating information systems with each other and in respect of time
- Managing the whole document life cycle and
- Guaranteeing data security.

Assuring document availability will be easy if people *know* where the documents are, where and how to look for them, where and how to find them. Integrating information systems is a very large task (especially when considering Valmet systems architecture) but if e.g. a search engine would be considered as useful, it would not need to focus on the file formats – documents would be found by other criteria. Additionally, not only information systems are to be integrated, but also departmental practices, ways in which documents have been created, distributed, shared, managed and so forth. Managing the whole document life cycle would not be a problem if, again, people *knew* where to archive certain documents, how long to preserve them, how and when to dispose them. Also digital documents should be disposed, as are the paper archives, when they have fulfilled their legal requirements and have become useless. Finally, guaranteeing data security is as much of a social as a technical task.

As discussed in chapter 3, the four electronic archiving related projects share mostly the same goals, combined and concluded as follows:

- Document management
- Electronic archiving
- Information retrieval and availability
- Cumulative knowledge and know-how.

Document management should take the common document space perspective into consideration, not only the public and computer-generated documents but also private and non-computer-generated documents. Electronic archiving calls for proper instructions and guidelines – what to archive, where, how and for how long. Information retrieval and availability could be provided and supported by designing a virtual single point of access. By combining the resources, efforts and results from the electronic archiving related projects at Rautpohja, cumulative knowledge and know-how would be achieved.

My suggestion therefore is that by combining the knowledge and practice from the development projects, and by clearly defining the requirements and needs for a virtual single point of access, by recognising the need for diverse work practices, file formats, applications and meta documents, and by thorough instructions, Valmet Rautpohja will be using an electronic archiving environment comprehensively in 2003.

## 6. CONCLUSIONS

The aim of this thesis was to investigate document availability in Valmet Rautpohja. Overall research problem addressed the question of how Valmet Rautpohja should proceed with document management to be using electronic archiving comprehensively by 2003. The research problem was approached by studying the requirements, meanings, perspectives, applications and existing work practices different individuals and groups have on useful electronic archiving. To achieve this aim, theoretical sections study ethnomethodology, CSCW, information and process integration, electronic archiving and electronic document management systems. Additionally, these concepts were also considered with respect to Valmet Rautpohja.

An ethnographic study was conducted by following a document's career. The ethnographic method consisted of four steps as defined by Richard Harper (1998): Firstly, the career of information was followed through an organisation. One document was chosen from the process and the document studied was the technical specification of CHAP6REB project. This particular document fulfilled the requirements of crossing many organisational boundaries, involving many employees. It also was considered as a good choice because the project is still ongoing. Considering ritual induction formed the second step followed by the third step, undertaking interviews and observing work. The last step in the method consisted of analysing the data.

When it comes to different requirements, meanings and perspectives, it was found in this study that employees' basic needs are those of getting rid of the abundant distribution of paper. Second main finding was that of absent clear instructions and guidelines which documents to archive, how, where and for how long. Additionally, users called for ways of enhancing the information retrieval and seeking.

When observing employees in their daily activities it was found out that the work practices are diverse, so are the applications they use and documents' file formats. This



diversity also applies to documents that surround the employees. There are a lot of private and non-computer-generated documents that are essential for an employee to get a job done. These documents are invisible to other employees, and thereby make the work practices also invisible. On the other hand, public documents and those generated via computer are also part of the concept of common document space. Those documents are visible in nature and are the ones that make work practices visible. Additionally, it was found that a specification generated a lot of meta documents which also are either visible or invisible, depending on their statuses of computing.

There are a lot of different development projects ongoing in Valmet Rautpohja that aim at document management and electronic archiving. It is surprising that the mutual goal is not shared and combined in a more comprehensive matter – each of the projects work and contribute on their own small area. However, based on the empirical data, users do not seem to need additional applications for electronic archiving. Diversity of applications supports employees' different work practices and needs. Therefore, suggestion for one possible way of proceeding would be that of a virtual single point of access perspective. This perspective could be provided e.g. by a search engine that would ignore the different file formats. Thus, documents could be retrieved by other criteria. Usage of bookmarking facility would also enhance the linking of different documents with each other and their meta documents.

This study has several limitations. One limitation is that the ethnographic study was not holistic. Observations and interviews were not conducted at customer sites or at different units within Valmet. Also, as this was my first time conducting ethnographic fieldwork, I might have ignored some surprisingly important phenomena when observing. Interviews, therefore, played a larger role in the empirical study. However, this refers to lessons learnt as if I would conduct another ethnographic study, I would do it in a different way. Additionally, one could have approached the research problems also by other methods. One approach could have been that of studying different applications in detail. In my view, the ethnographic study suited well for the requirements of the thesis – knowing what the actual work practices of employees are gives an essentially important data when trying to support the people in their daily tasks.

These limitations correlate also to the findings. However, I believe that I was able to answer to the research problems sufficiently. Also, I believe that the concept of a common document space as well as the virtual single point of access perspective give useful and usable views on how Valmet Rautpohja should proceed with electronic archiving. Additionally, the finding that a lot of documents around employees are private in nature, and often also non-computer-generated, is also supported by Mark Ackerman and Christine Halverson (1998). However, the findings in the thesis do not support generalizability. One should recall that generalizability is not a specific target of ethnographic research. The target is to describe the ways people behave, interact and work in a specific context.

The basic question of document management or electronic archiving, in my view, is about managing and retrieving useful, usable, attainable and accessible information. New technologies may not always be the answer – supporting people in their work may only be a question of small changes and even slightly different perspectives. It would be interesting to further develop the concept of a common document space and the virtual single point of access perspective by conducting further ethnographic studies. It would be challenging to study these issues with reference to current research on collaborative virtual environments. Documents form a large part of individuals daily environments of work, study and home. This notion remains whether collaborating in real or virtual environments.

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T 5473 SYMPRESS II -PUR.OSAN UUSINTA  
T 5474 KUIVATUSOSAN UUSINTA  
T 5477 AUTOMAATIO  
T 5478 MUUT LAITTEET  
T 5479 ASENNUS, KÄYNTIINAJO JA  
KOULUTUS

3730

H Kajander/ARä

26.11.1998

## UPM-Kymmene Chapelle Darblay

### PM 6:n uusinta

Asiapaperit tarkoittaa hankintasopimusta liitteineen (tarvittaessa karsittava)

\* = tuotanto- ja laatutakuut; \*\* = hinnallinen tilausvahvistus ja/tai hankintasopimus

\*\*\* = Aikataulut

#### TYÖTILAUS

| OSASTO | YKSIKKÖ/TEHDAS                         | ASIAPAPERIT                                | TIL.V.+TAKUUT*<br>AIKATAULUT*** |
|--------|--|--|---------------------------------|
| 3151   | <b>Karkeasuunnittelu</b>               |  | L Leinonen                      |
|        | Toim.ajat/proj.aikat.                  | J Parantainen                              |                                 |
| 3421   | <b>Suunnittelu/konseptisuunnittelu</b> |  | E Yli-Kokko*                    |
|        | Perälaat., viiraosa                    |  | A Haavanlammi*                  |
|        | Puristinosa                            |  | T Pirinen*                      |
|        | Kuiv.osa,SymSizer, kalanteri, rullain  |  | V Korhonen*                     |
|        | Tuotannonsuunnittelu                   |  | R Eresmaa***                    |
|        | Laitossuunnittelu                      | M Kupari                                   |                                 |
|        | Prosessisuunnittelu                    | K Kokkonen*                                | A Suonperä*                     |
|        | Höyry- ja lauhdej.                     | T Laaksonen                                |                                 |
|        | Projektisuunnittelu                    | J Pudas                                    |                                 |
|        | Aikataulusuunnittelu                   |  | R Eresmaa***                    |
|        | Käyttö- ja h.-ohjeet                   | H Similä                                   |                                 |
|        | Asiapap.kopiointi                      |  | Anne Nurminen***                |
|        | Käännöstyöt                            | P Rytinki                                  | K-M Oinonen***                  |
| 3400   | <b>RAU tuotantoyksikkö</b>             |  | H Siltanen                      |
| 3407   | <b>Hitsauskoordinaattori</b>           |  | E Tikka                         |
| 3251   | <b>Perälaatikkotehdas</b>              |  | H Hyvönen*                      |
| 3251   | Tuotannonsuunnittelu                   | P Holopainen                               |                                 |
| 3254   | Projektisuunnittelu                    | K Kokko                                    |                                 |
| 3221   | <b>Viira- ja pur.tehdas</b>            |  | M Hirsimäki*                    |
|        | Levyverstas: levytyö, palkit, rungot,  |  |                                 |
|        | vesikalusteet,                         | K Kainulainen (tekn. eritt.+laivausaikat.) |                                 |
|        | Viira                                  |  |                                 |
| 3221   | - Tuotannonsuunnittelu                 |  | M Kivikangas***                 |
| 3223   | - Sisäinen kauppa                      |  | Pertti Maunula*                 |
| 3204   | - Projektisuunnittelu                  | S Kiviranta                                |                                 |
|        | Puristin                               |  |                                 |
| 3221   | - Tuotannonsuunnittelu                 |  | M Kivikangas***                 |
| 3223   | - Sisäinen kauppa                      |  | Pertti Maunula*                 |
| 3224   | - Projektisuunnittelu                  | M Alakoski                                 |                                 |
| 3205   | Kokoonpano                             |  | H Paanala                       |
| 3205   | - Valmistussuunn./viira                | M Virtanen                                 |                                 |
| 3205   | - Valmistussuunn./pur.                 | P Kontio                                   |                                 |

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| OSASTO | YKSIKKÖ/TEHDAS                          | ASIAPAPERIT        | TIL.V.+TAKUUT*<br>AIKATAULUT*** |
|--------|---|--------------------|---------------------------------|
|        | <b>Komponenttituotanto</b>              |                    | E Rytky                         |
| 3291   | <b>Kuivatusosa- ja -sylinteritehdas</b> |                    | O Hyvärinen                     |
|        | <b>Kuivatusosa</b>                      |                    |                                 |
| 3294   | - Tuotannonsuunnittelu                  |                    | A Laaksonen***                  |
| 3294   | - Projektisuunnittelu                   | O Häikiö           |                                 |
|        | <b>Kuivatussylinterit</b>               |                    |                                 |
| 3291   | - Tuotannonsuunnittelu                  | S Kangasniemi      | Ismo Nieminen                   |
| 3274   | - Projektisuunnittelu                   | E Skantz           |                                 |
| 3278   | Viistoleikkurisuunnittelu               |                    | K Björn                         |
|        | <b>Hoitosillat</b>                      |                    |                                 |
| 3421   | - Tuotannonsuunnittelu                  |                    | K Nääsilä***                    |
| 3226   | - Projektisuunnittelu                   | T Peura            |                                 |
| 3281   | <b>Erilliskomponenttitehdas</b>         |                    | H Nikula                        |
|        | Tuotannonsuunnittelu                    |                    | R Eresmaa***                    |
| 3284   | Erilliskomp.proj.suun.                  | M Saari            |                                 |
| 3286   | Erilliskomp.valmistus                   | Rauno Laitinen     | Petri Mattila***                |
| 3351   | <b>Imu- ja valurautatelatehdas</b>      |                    | A Kontiainen                    |
|        | Tuotannonsuunnittelu                    |                    | K Kalho***                      |
| 3360   | Imu- ja valurautatelas.                 | J J Järvinen       |                                 |
| 3365   | Imu- ja valurautatelav.                 | J Niininen         |                                 |
|        | Tuotannonsuunnittelu                    |                    | K Kalho***                      |
| 3351   | Imutelaosto                             |                    | Pasi Poranen                    |
| 3353   | Sym-telatehdas                          |                    | M Alaniemi-Tero                 |
| 3353   | Sym-telaosto                            |                    | P Rutanen                       |
| 3358   | Sym-telasuunnittelu                     | T Siltala          |                                 |
| 3366   | Sym-telavalmistus                       | J Ryytänen         |                                 |
| 3471   | <b>Automaatio</b>                       |                    | P Liukkonen*                    |
| 3471   | Automaatiokonseptit                     |                    | J Järvinen                      |
|        | Automaatiokummi                         | H Mölsä            |                                 |
| 3474   | Tuotannonsuunnittelu                    |                    | K Saarentausta***               |
| 3474   | Fluidi- ja voitelujärj.                 | Marko Vainio 3 kpl |                                 |
| 3474   | Sähkö                                   | J Ahola            |                                 |
| 3474   | Järjestelmät                            | S Röyskö           |                                 |
|        | <b>Valmet Automation,</b>               |                    |                                 |
|        | Tre (VAT)                               | Juha Koistinen     |                                 |

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**TYÖTILAUS**

|               |                       |                    |   |
|---------------|-----------------------|--------------------|---|
| <b>OSASTO</b> | <b>YKSIKKÖ/TEHDAS</b> | <b>ASIAPAPERIT</b> | <b>TIL.V.+TAKUUT*<br/>AIKATAULUT***</b> |
|---------------|-----------------------|--------------------|---|

|             |  |                               |                                      |
|-------------|--|-------------------------------|--------------------------------------|
| <b>3321</b> | <b>Automaatiotehdas</b>                      |                               | J Renko<br>J Vanhanen<br>J Lusma*,** |
| <b>3701</b> | <b>Projektihallinto</b>                      |                               |                                      |
| { 3702      | Projektipäällikkö                            | H Kajander*,**                |                                      |
| { 3701      | Projektiassistentti                          | A Inkinen*** (tekn. erittely) |                                      |
| 3701        | Tiimiassistentti                             |                               | P Nojonen                            |
| 3702        | Hankinnat                                    |                               | E Huovinen**                         |
| 3703        | Asennus(valv.)                               | P Aspinen                     |                                      |
| 3704        | Takuut (news)                                |                               | J Antikainen                         |
| 3701        | Referenssien hallinta                        |                               | R Ojanperä*                          |
| 3704        | Käyntiinajo                                  |                               | A Niemi                              |
| 3704        | Koulutus                                     | M Kallinen                    | S Pakkanen                           |
| 3705        | Prosessianalyysit                            |                               | K Luostarinen                        |
| 3701        | Kate- ja kustannusseuranta                   |                               | S Kovanen**                          |
| <b>3000</b> | <b>Talous/maksuliikenne 3723</b>             |                               | P Jääskeläinen**                     |
| 3721        | Myyntilaskutus                               |                               | E Heikkinen**                        |
| 3721        |  |                               | Anja Ahonen**                        |
| <b>3460</b> | <b>Materiaalihallinto</b>                    |                               | A Holmalahti**                       |
| 3460        | Hankinnat                                    |                               | P Seppänen                           |
| 3462        | Vientihuolinta                               | K Kolima**                    |                                      |
|             | Pakkaus, lähetys                             |                               | H Kokki                              |
| 3206        | - Lähetys suunnittelu                        | E Rutanen                     |                                      |
| 3206        | - Lähetys                                    |                               | Kari Lehtonen                        |
| <b>3730</b> | <b>Myynti</b>                                |                               | P Soikkanen**                        |
| 3733        | Tarjoustoiminta                              |                               | I Ollila**                           |
| 3735        | Keski- ja E-Eurooppa, Iso-Britannia, Afrikka |                               | J Ihanainen**                        |
| 3733        | Hinnoittelu                                  |                               | E Östman**                           |
| 3733        | Tarjoussuunnittelu                           | A Östman                      |                                      |
| <b>3382</b> | <b>Huollon tuotetehtas</b>                   |                               | K Karhama                            |
| 3380        | Sisäinen kauppa                              |                               | P Savolainen***                      |
| 3380        | Karkeakuormitus                              |                               | T Rask                               |
|             |  |                               | P Ruotoistenmäki                     |
| <b>3754</b> | <b>Varaosapalvelu</b>                        | P Lakka                       |                                      |
| <b>3140</b> | <b>Laatu</b>                                 |                               | P Jerkku                             |
| 3730        |  |                               | P Vauhkonen                          |
| 3141        | Tarkastus                                    | P Ruhanen                     |                                      |
| 3100        | Voimansiirto                                 | V Panttila                    |                                      |
| 3761        | Service                                      | Pentti Hämäläinen             |                                      |
| <b>3100</b> | <b>TIEDOKSI</b>                              |                               | V-P Laukkanen*,**                    |



## SPECIFICATION Index

Paper Machine

June 29, 1999

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Paper Machine

**SPECIFICATION**      **LPMP000245.5.S**  
02.30.10 Operational spares

S Häyrynen/SHä

October 5, 1998

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\* rev. October 20, 1998

APPENDIX S2-E

**UPM-KYMMENE  
CHAPELLE DARBLAY  
GRAND COURONNE  
PM 6 REBUILD**

Specification No. LPMP00245.5.S

Paper Machine

S Häyrynen/SHä



**SPECIFICATION**      **LPMP000245.5.S**

02.30.10 Operational spares

October 5, 1998

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Paper Machine

**SPECIFICATION**      **LPMP000245.5.S**  
02.30.10 Operational spares

S Häyrynen/SHä

October 5, 1998

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\* rev. October 20, 1998

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