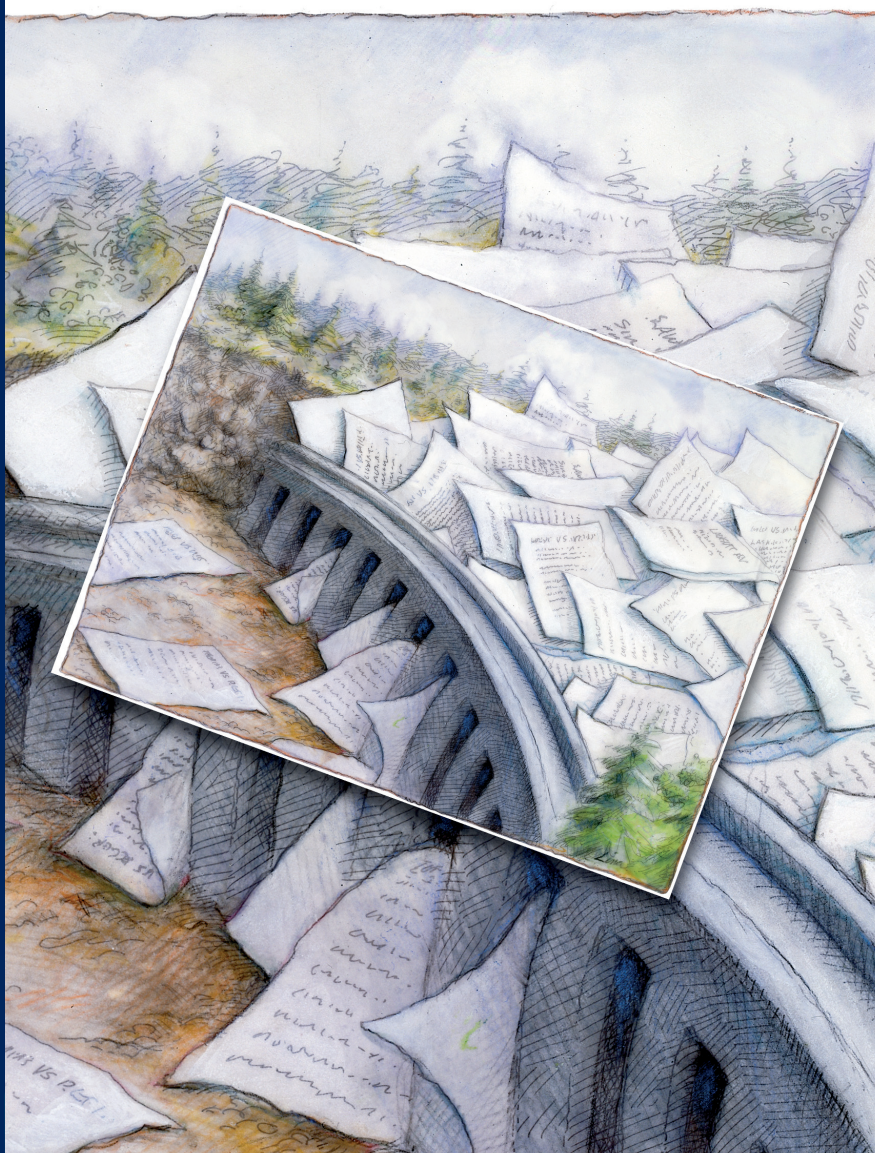
KSENIA IASTREBOVA

Managers' information overload

The impact of coping strategies on decision-making performance



MANAGERS' INFORMATION OVERLOAD

The impact of coping strategies on decision-making performance

MANAGERS' INFORMATION OVERLOAD

The impact of coping strategies on decision-making performance

Overbelasting van informatie bij managers
De impact van het hanteerbaar maken op het resultaat van besluitvormingsprocessen

Thesis

to obtain the degree of Doctor from the
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by

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During my stay in Rotterdam, I have met many nice people who became my friends and companions. They helped me to tolerate food of the university restaurant during the lunch breaks and made me feel myself "at home."

To meet a person of your life, sometimes it is necessary to change the continent. That's how I met Mike, the line-editor of this thesis, my partner, and farther of my daughter.

Ksenia Iastrebova

Rotterdam, January 2006.

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Chapter 1

Introduction

1.1 Research background

At the beginning of the 20th century, a key characteristic of information was its scarcity (Standage, 1998, Shapiro and Varian, 1999). The few information sources, high costs of information production and re-production, and a relatively stable socio – economic environment resulted in the modest growth of information supply. Moreover, the high degree of fragmentation of early societies, the existence of territorial and economic borders between nations, the low level of education, and the dominance of social institutions (e.g. local governments, church etc.) that performed the functions of information gatekeepers, all restricted the transmission and accumulation of information. The 20th century brought some dramatic changes in terms of volume of information and communication and their diversity, driving society towards the information age that is characterized by novel economic, social, and ethical rules. The amount of information produced annually has been constantly increasing (see Box 1). The problem of having too little information has been transformed into a problem of having too much information and has generated feelings of deficiency in the face of constantly increasing information flows. Initially, information overload was understood as the side effect of "sensation overload", humans' deficiency in front of the inflows of new information and diminishing ability to reflect on the changes in environment. Being treated initially as a specific "city disease," it has expanded eventually into all spheres of human life and posed demands for significant behavioral adjustments (Klapp, 1986).

From one perspective, research on information overload is embedded deeply in theories of human information processing. Since human cognitive resources are strictly limited, the human information processing capacity is also bounded. Although varying among individuals, the limit of information processing capacity lies somewhere between five and nine distinct information cues ("the magic number seven, plus or minus two", Miller (1956)). Recently, research attention has been drawn away from the pure information processing limit to the "communication limit" that defines the maximal number of connections the individual can meaningfully maintain (Jones, Ravid, and Rafaeli, 2004; Odlyzko, Tilly, 2005). Thus, contrary to the logic of Metcalf's Law, which postulates that the value of a network increases

twice as fast as the number of connections in the network, the more recent studies claim that the network gains value from reductions in numbers of ties, placing the communication margin at about 150 contacts (150 is known as the Dunbar number[1]).

From another perspective, information overload is essentially an organization issue. Organizations not only define information supply, but they determine the formal and informal rules of information processing. Despite the fact that the rationality assumption lies behind the vast majority of organizational studies, some research indicates that organizational information processing often cannot be defined by using the classic, rational choice, models. Rather, information processing should be defined as a highly symbolic and political process that has a number of meanings distinct from the ones derived from the rationality assumption (e.g., Feldman and March, 1981).

Finally, information overload is regarded as a technology–related phenomenon. The recent advances in information –communication technologies (ICTs) have underlined all major organizational and social changes. Therefore, ICTs were not only seen as the means to increase the accessibility of information and allow virtually everyone to gain access to the infinity of information, but also were identified as the major reason for information overload and, at the same time, the only potentially powerful countermeasure against information overload. (Schultze and Vandenbosch, 1998). In theory, ICTs are designed to cope with the imperfections in human decision-making. However, the unintended consequences of technology use, among which information overload is central, undermine significantly the gains from it utilization (Hiltz and Turoff, 1985), and challenge the rational decision-making model that establishes the principles of system design. In particular, the following issues seem to be critical. First, an increase in the amount of information does not always lead to an increase in its value. The quality of information is essential. Second, while most computer-based information technologies support the production, transmitting, and processing of structured, standardized data, “high quality” unstructured information is of a paramount importance in the course of decision-making (Simpson and Prusak, 1995). Third, although technology supports effectively structured business processes and standard operations, the unstructured, essentially chaotic social processes, such as, for instance, the internal communication, are of equal importance. In all, this produces a gap between the individual information – communication needs and the information available.

[1] http://www.lifewithalacrity.com/2005/02/dunbar_triage_t.html

Consequently, there seems to be sufficient evidence that information overload, the modern disease of the business world, makes business success fragile, defeating the giants and making "the brightest stars" fall (The Economist, 2002) . The aim of this study is to contribute to the understanding of how managers can take advantage of the ever-increasing supply of information instead of experiencing frustration and stress. In this research, we intend to develop, test, and refine a conceptual model of decision-making introducing the assumption of information overload.

1.2 Prior research on information overload and human coping

Information overload is a relatively new theme of study, in which academic interest is generated and stimulated by the practice. In the past decade, a number of articles on information overload have been published in academic and non-academic journals. All these studies approach information overload differently, both in terms of the conceptualization and the method. Therefore, besides the common claim that information overload is an undesirable state that has significant negative consequences on individual decision-making and overall organizational performance, very few parallels between the studies can be identified. The research produces mixed, often controversial, and generally incomparable results.

At the same time, the range of problems, collected under the label of "information overload", is constantly expanding, from psychological dysfunctions and stress to the issues of spam filtering and organizational system design.

We have outlined a number of possible reasons for the high fragmentation and incompatibility of research results, such as:

- ***The lack of agreement on the basic definitions, such as definitions of information and information load.*** In some studies, the quantitative approach to defining information prevails and information load is equal to the number of information cues. In others, the definition of information embraces both the quantitative and qualitative aspects. Thus, some researchers believe that variation in information load must be ascribed to the changes in number of distinct information cues only (e.g., Casy, 1980; Shields, 1983; Chewning & Harrell, 1990). Others claim that quality of information determines the actual information load regardless of its quantity (e.g Simpson & Prusak, 1995). In Appendix 1, we

present a condensed analysis of a selection of articles that illustrates how differently information overload is defined.

- ***Methodological variations that lead to incompatible research designs and incomparable research results.*** At first, information overload research was dominated by the experimental methods that focused on the effect of variations in information load on decision quality [e.g., Schroder et al., 1967, Snowball 1980, Schields, 1980, 1983 etc.]. Most of the studies in this group were built on the notion of "magic number 7, plus or minus two" and the framework of Schroder et. al. At the later stages, the researchers have adopted different methods such as surveys, mathematical modeling, and archive data analysis, though experiments still remain the most often used one. Only a few qualitative studies that explore the nature of a multifaceted phenomenon are available.
- ***Different units of analysis make the research results incomparable.*** In the course of the literature study, we have found a number of different units of analysis, such as individual, group, organizations, and application (e.g., email, groupware, particular decision support system etc).
- ***Different focus areas and consequent grounding of research in different academic domains.*** Earlier in this chapter, we have already discussed several possible approaches to the study of information overload and human coping. In particular, the study of information overload and coping is included in the research agenda of cognitive psychology, management science, organizational behavior, accounting, management information systems, and computer science.

Though the problem of information overload and the need for coping strategies originate from the empirical domain and are intrinsic to the contemporary business environment, we have observed that existing research has limited practical implications. The possible explanations are as follows:

- ***The predominance of experimental research excludes the decision-making context from the research set-up.*** Laboratory experiment, by definition, implies a certain degree of control over behavioral events. At the same time, information overload is a context-contingent phenomenon that not only originates from the context, but also should be treated within the context. Information overload

reveals itself in the context and because of the context, therefore, reconfirming the need for the contextualist type of studies.

- ***Students, as the subjects of experiments, cannot always be a valid approximation.*** Although the involvement of students in experiments is an accepted practice, it produces certain limitations and constrains the interpretation of research results. The problem of information overload is particularly critical for managers, who perform non-trivial information processing and complex decision-making tasks on a daily basis. Students, lacking decision-making and managerial experience, cannot be expected to exhibit behavior similar to that of experienced managers.
- ***The lack of integrated perspective on information overload and human coping***. The lack of studies that attempt to develop an integrated perspective, makes the research fragmented and of limited value for practitioners.

1.3 Research objectives and research question

The objectives of this research are twofold. First, we aim to attain theoretical clarity of the concept and improve the model of managerial decision-making by introducing realistic assumption of information overload. Second, guided by the assumption that that the value of the decision-making study is determined by its significance for the practitioners, we aim to design the practical recommendations, such as a collection of coping strategies.

With respect to the former, we intend to reconsider significantly the conceptual framing of information overload. To do this, we accumulate and systemize the potentially relevant research discourses and, thus, ground the study in the existing theoretical frameworks. With respect to the latter, we create a collection of relevant recommendations and evaluate their potential limitations and applicability across the different contexts.

Therefore, we have formulated two research questions:

(1) What is information overload? - its structure, major components, and determinants.

(2) How do individuals relate their own coping structures to broad organizational and technological measures to be able to adapt to the situation of information overload?

To address the first research question, the following sub-questions have been formulated:

- How can information overload be defined, distinguished from, or related to similar concepts such as data overload, communication overload, work overload, and interaction overload?
- What are the factors that cause information overload?
- How do these factors relate to each other?

Similarly, to address the second research question, the following sub-questions have been stated:

- What are the coping structures that people apply to adapt to the increasing information load?
- How do these coping structures evolve?
- How are the individual coping structures linked or related to the organizational and technological adaptive measures?

1.4 Expected contributions of the thesis

We expect to contribute to the academic research on information overload and establish practice-relevant implications. First, we expect to improve the understanding of contemporary decision-making, and so include realistic assumption of information overload in this research. Based on theoretical and empirical discourses, we develop a conceptual model of information overload that depicts and explains its structure, major components, and interactions among the various factors.

Second, we suggest a theoretical model of human coping, in which we elaborate on the notion of coping structure, the rules and resources involved, and the limitations and prospects of its utilization. Similarly, we focus on how the individuals relate and combine coping structures in an attempt to adapt to the ever-increasing information load.

Third, by deliberately emphasizing the technology component we unfold new facets that contribute to the debate on the role of technology in mediating the organizational processes and individual –level work practices.

As mentioned before, the results of current research are expected to have value for management practice. Correspondingly, based on the theoretical discussion and guided by empirically tested tools, we develop approaches to diagnosing the problem of information overload. We further suggest the collection of possible coping strategies that comprise both organizational and individual-level changes.

Text Box 1. Amount of information produced: year 2003

Source: The Research Project "How much information 2003?" conducted by the School of Information Management and Systems, The University of California at Berkeley

Senior Researchers: P. Lyman and H.R.Varian

Web source: http://www.sims.berkeley.edu/research/projects/how-much-info-2003/

- About 5 exabytes of new information was produced in year 2002. (If digitized, the 19 million books and other print items in the Library of Congress would contain about 10 tetrabytes of information. Half a million new libraries of the size equal to the Library of Congress will accommodate 5 exabytes of information).
- Almost 800 MB of recorded information is produced per person each year. This is equivalent to 30 feet of books;
- The amount of new information stored on paper, film, magnetic, and optical media has almost doubled in the last three years (2000, 2001, and 2002). The pace of growth is approximately 30% per year;
- Paper information represents only 0.01% of new information recorded in all media;
- Office documents account for 85.5% of world original print information flow (the share of newspapers is 8.5%, books – 2.3%); in addition, this study does not consider the documents generated and disposed of yearly without recording;
- The consumption of office paper has increased significantly (contrary to the notion of the paperless office). This can be explained by A) introduction of laser / inkjet printers (replacing matrix printers); B) increased speed of laser printing accompanied by the decreased printing costs;
- About half of all mail (paper mail) is junk mail;
- Information flows transmitted through electronic formats contain 3.5 more information than in storage media. 98% of this is the information sent and received through telephone calls.
- The World Wide Web contains about 17.3 exabytes of information on the surface, 17 times the size of printed collection of the Library of Congress;
- Email generates about 400 000 terbytes of new information each year. Approximately 31 billion emails are sent daily and this figure is expected to double by 2006.
- About 30% of daily mail is spam (unsolicited mail). This figure is expected to increase to 50% in by 2007.

- The average American uses the telephone 16.7 hours per month, listens to radio 90 hours per month; watches TV 131 hours per month;
- About half of the US population uses the Internet more than 25 hours a month at home plus more than 74 hours a month at work.
- When on the Internet the users are engaged in the following activities:

Send email	52%
Get news	32%
Use a search engine to find information	29%
Surf the web for fun	23%
Look for hobby information	21%
Do the research for job	19%
Research product /service before buying	19%
Check the weather forecast	17%
Send an instant message	14%

Text Box 2. Amount of information: uneasy statistics

Source: Wurman R.S. (1989). Information anxiety, New York: Doubleday Books

- A weekday edition of the *New York Times* contains more information than the average person was likely to come across in a lifetime in seventeenth-century England.

- More new information has been produced in the last 30 years than in the previous 5,000. About 1,000 books are published internationally every day, and the total of all printed knowledge doubles every eight years.

- In one year the average American will read or complete 3,000 notices and forms, read 100 newspapers and 36 magazines, watch 2,463 hours of television, listen to 730 hours of radio, buy 20 CDs, talk on the telephone almost 61 hours, read 3 books, and spend countless hours exchanging information in conversations.

1.5 The structure of the thesis

The structure of the thesis is depicted in Figure 1. This thesis consists of eight chapters. In the current chapter, we have introduced the topic of research by explaining the research background and motivation. We then discussed briefly the current state of research on information overload and indicated the need for further investigations. Next, we have formulated the research objectives and research questions. The explicit explanation of the expected research contributions followed.

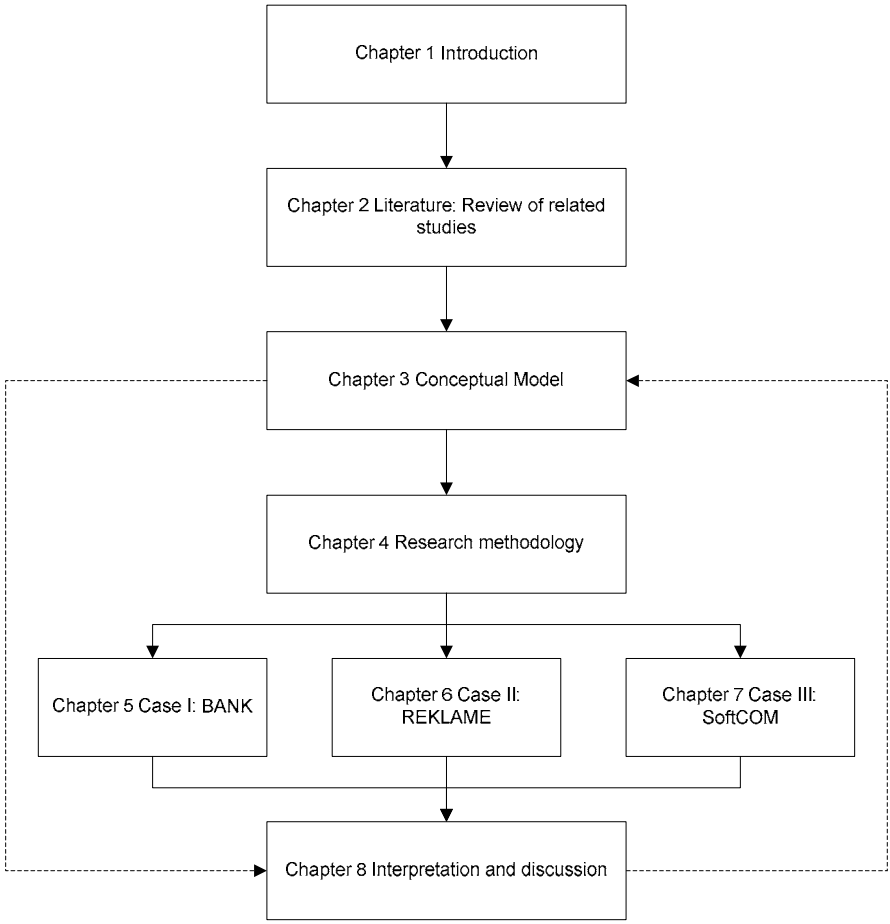


Figure 1. Structure of the thesis

In ***Chapter 2,*** we provide a review of studies on information overload, coping studies, and related concepts. Since individual decision-making is the focal point of the current study, we

start the chapter with a brief introduction on decision-making theories. Next, we place information overload into the decision-making framework by challenging the assumption of full rationality. In the next section, we outline the theories that have influenced our understanding of human information processing and directed our attention to the problem of information overload. To present the existing research results, we classify all studies on information overload and human coping into several groups. In particular, first, we consider the studies that perceive information overload as a function of personality characteristics. Second, we present a summary of the studies that define information overload as a situation-contingent phenomenon. Third, we draw attention to the studies that investigate the composite effect of the first two phenomena. We conclude the chapter by looking at the research that links information overload with various organizational and technology issues.

In ***Chapter 3,*** we develop a conceptual model consisting of two interlinked parts: information overload study and study of human coping. The conceptual model has been finalized on the basis of the results of the literature review and our own reflections on the topic. We claim that understanding the nature of overload and its structure is strictly necessary and must precede the discussions on coping. Therefore, we first elaborate on what is information overload and develop its structural model. Second, we build up the theoretical perspective on human coping. Finally, we link them together. The research design is discussed in detail in Chapter 3.

In ***Chapter 4,*** we explain the research method. In all, the research methodology is defined on the basis of the theoretical frame. We present the logic behind the choice of method, discuss the stages within the actual research process, and pay specific attention to the process of data analysis and to the linking the empirical findings with the theoretical constructs.

In ***Chapters 5, 6, 7,*** we present the empirical findings. In Chapter 5, we discuss the case of Division Intermediary, BANK[2]. In Chapter 6 we present the case of REKLAME Holding. Finally, in Chapter 7 we define the case of SoftCom, the Netherlands. In an attempt to increase the clarity of the presentation of empirical research results, we use a uniform format for the three cases. Thus, the cases start with a short description that provides the background information about the company and its major strategic moves. Next, we present a detailed analysis of the organizational context. The individual profiles, that unfold the task-related and human-related perspectives on information overload, are developed and finally placed into the broad organizational context. The human coping with information overload is

[2] The names of the companies have been changed to preserve their commercial interests.

studied next. By applying the model of structuration, we frame the empirical findings and disclose the relations between the types of coping.

In ***Chapter 7,*** the cross-case analysis is conducted and the conclusions are presented. As depicted in Figure 1, we relate the results of the field of study to the conceptual model and, in so doing, verify, sharpen, augment, or change the initial conceptual framing. Final remarks on research contribution and limitations are made afterwards. The implications for further research as well as practically relevant recommendations are then discussed in detail.

Chapter 2 Literature Review

In this chapter, we present a review of the studies on information overload and human coping, discuss the research results, and define the critical gaps in the existing literature. First, we demonstrate that information overload is rarely treated as an independent theme. Second, the simplistic nature of research set-ups explains the limited explanatory power of decision-making models and, thus, their restricted practical relevance. Third, the research often produces contradictory results that are neither generalizable, nor can be used as the basis for further investigations.

The chapter is organized as follows. First, we present a brief outline of the theories on individual decision making. We adopt the descriptive approach to decision-making and, thus, assume bounded rationality, the existence of various limitations on human capacity to process information, and satisficing rather than maximizing behavior. We further discuss the theories that framed our understanding of information overload and that motivated our further inquiries, such as signal detection theory, information theory, and the information processing theory of decision- making. All three investigate human information processing and suggest ways of looking at information overload.

Second, we discuss the evolution of research on information overload by looking at the studies that either explicitly refer to the concept of information overload or can be logically extended or linked to it. We divide the literature into two broad categories: individual level decision-making studies and organizational studies. In an attempt to systemize diversity and to increase the analyzability of research results, within the former we define three approaches to explaining behavioral variations, such as personlogism, situationism, and interactionism. Within the latter, we distinguish between the studies that classify information overload as an organization-contingent phenomenon, and the studies that associate information overload with the technology.

2.1 Decision making studies: approaches to individual decision making

Decision-making is a cognitive process of reaching a decision [Concise Oxford Dictionary, 10th edition, 2001]. In Figure 2, we depict the theoretical approaches that are employed for the investigation of individual decision making. The following classification was extracted from the works of Mock and Driver (1975), Wright (1985), and Walsh (1995) (see Figure 2).

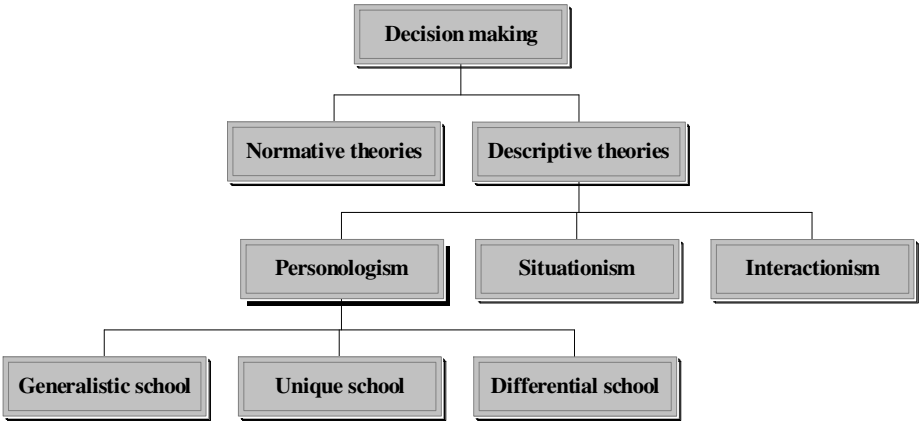


Figure 2. Theoretical perspectives on decision-making

According to the classification of Driver and Mock (1975), we distinguish between two mainstream theoretical approaches to decision making. The first one, the **normative approach**, emphasizes the knowledge relating to values. It focuses on the evaluation of decision quality. The decision outcome is compared with the outcome of the exemplar, optimal decision-making process and, on that basis, evaluated. The better is the fit between the optimal and the actual outcomes, the higher is the score of the decision-making process.

Rational decision-making, a prevailing decision-making paradigm, is, obviously, the most representative within the normative approach (see Table 1). The fundamental assumptions of rational decision making state, first, that complete information is available, second, that the decision-maker is rational and capable of processing the information available, and, third, that all alternatives can be evaluated and ranked in accordance with objective criteria. The alternative with the highest rank is always preferred to all the rest since it is optimal and provides maximal gain to the decision-maker.

Although an extensive number of indisputable contributions of the normative approach exist, its basic limitations should be kept in mind. Thus, "the theory of rational behavior is a set of propositions that can be regarded either as idealized approximations to the actual behavior of men or as recommendations to be followed" (Marschak, 1974, p.1). Moreover, "it is misleading to propose a normative theory specifying that people maximize expected utility if they are unable to process the large amounts of information that confront them in complex situations" (Taylor, 1984, p.4).

Assumptions / Theories	*Normative theoretical framework: Rational decision-making*	*Descriptive theoretical framework: Behavioral decision-making*
1. Information availability	Complete information available;	Incomplete information;
2. Decision-maker	Rational, able to effectively process information;	Bounded rationality is accepted; due to cognitive limitations not all information can be processed;
3. Selecting among decision alternative	The maximization criteria is applied; The alternative with the highest rank is always selected;	The "satisfactory" criteria is applied; No objective criteria exist, decision-maker operates in terms of his/her perception of the problem area; The selection of alternatives is subject to individual variations;

Table 1. *Decision-making: rational versus contextual perspective*

Therefore, the **descriptive approach,** which aims at obtaining an insight into how people actually make decisions and how they use information, has proved to be more germane for the investigation of "real-life" decision making.

Behavioral decision making describes all behavioral processes that underlie human decision making, from the problem recognition to the choice and execution of the solution (Simon, 1960; Taylor, 1984; Wright, 1985). Behavioral decision-making assumes the bounded rationality of the individual, and claims that, instead of selecting the optimal alternative, individuals tend to select the satisfactory ones. The systematic deviations from rationality, as defined within the normative decision-making studies, are subject to research (see Table 1).

Behavioral decision-making focuses on cognitive processes that constitute managerial decision making. Managers are approached as knowledge workers whose primary task is to process information. A knowledge structure, as defined by Walsh (1995, p.281), is "a mental template that individuals impose on an information environment to give it form and meaning", and is a primary concept within cognitive decision making. It is argued that individuals can either apply the top-down (theory-driven) approach, when existing knowledge template frames current information processing, or the bottom–up (data-driven) approach, when data guide information processing and new knowledge frames are developed and further institutionalized. Obviously, both approaches have advantages and disadvantages. The former provides a reasonably efficient ways of coping with high information load, but at the costs of possible misinterpretation and sticking to the old, invalid frame. The latter allows for interpretive flexibility, but makes the individual vulnerable to the

ever-increasing information load. Cognitive decision-making addresses such issues as the content and structure of knowledge frames and their construction, use and evolution.

Naturalistic decision-making investigates the process of decision-making in natural conditions, claiming that competing approaches tend to fall into the trap of oversimplicity and can be of a limited value for real-life decision-making. Thus, they attempt to capture the complexity of real-life decision making by explicitly addressing the issues of time pressure, uncertainty, ill-defined goals, social interactions, and involvement. It is claimed that the quality of a decision is conditional. Therefore, the decision made by the expert is considered as an ultimate benchmark (Bazerman, 2001).

Alternatively, the ***descriptive framework*** (Figure 2) splits up into three schools, each focusing on different aspects of human decision making (Wright, 1985). **Personologism** assumes that the individual characteristics of the decision-maker are the main sources of behavioral variation. They affect the choice of decision-making behaviors and determine the approach to processing information.

Situationism, by contrast, supports the belief that the environmental factors play the crucial role in determining human behavior in general, and decision-making in particular. **Interactionism** combines the relevant outcomes of the first two, and investigates the composite effect of the personality characteristics of the decision-maker and the environmental determinants on decision-making performance.

The personologism approach to decision-making can be further sub-divided into three groups, each based on the different perceptions of the decision-maker (Driver & Mock, 1975). The first one, the so-called "generalistic" school, says that as far as man are essentially the same, even a small sample is representative and the results of investigations can be generalized to the whole population. Correspondingly, the behavioral recommendations that proved to be successful for the small group should be equally effective when applied to the randomly chosen individual.

The second stream, a "unique school", by contrast, claims that each decision-maker processes information in unique way. That is why the general laws or recommendations might not be applicable. What is effective for one decision-maker can fail with another.

Within the integrative approach, the so-called "differential school", an attempt to find the compromise between the boundary perception of human nature and information processing features is made. It is claimed that despite the indisputable differences, all decision-makers

can be placed into several groups according to similarities in cognitive patterns exhibited in the course of information processing. Depending on the aim of the research, various criteria for the classification of decision-makers, such as decision-making style, cognitive style, intolerance to ambiguity, can be applied.

2.2 Framing theories

At the preliminary stages of research several theories, such as signal detection theory, information theory, information processing theory of decision-making, and the theory of human information processing, contributed to our understanding of information overload and served as the frame for the formulating of research design. They supplied the first insights into the nature, the structure, and the antecedents of information overload. In the section below, we discuss particularly relevant concepts and findings.

2.2.1 Signal detection theory

Signal detection theory, initially adapted from applied physics and incorporated into decision-making studies, investigates decision –making under uncertainty. At each point of time, there are two discrete states of the world: signal and noise. Signal refers to relevant information; noise to irrelevant information. The decision-maker, first, must detect the signal, distinguishing it from the noise and, second, produce the response. The detection of the signal is complicated due to the constant presence of noise and the often unclear definition of the signal. As a result decision-makers can either (1) detect the signal when it is present ("hit" trial in the terminology of signal detection theory) (2) fail to detect a signal when it is present ("miss" trial) or (3) detect the signal when it is not present ("false alarm" trial) (4) detect no signal ("correct rejection" trial).

To detect the signal, the decision-maker applies the detection criteria. The detection criteria utilized differ among the decision-makers. This difference explains the fact that two equally knowledgeable decision-makers having the same information can come up with different solutions. The utilization of biased detection criteria results in a response mistakes.

The receiver operating characteristic (ROC) is a function that plots the receiver's responses at different intensities of signal. There is a threshold rate that corresponds to maximum perceptual sensitivity of the person. However, the agreement on what is the exact value of maximum perceptual sensitivity has not been reached yet.

The signal detection theory framework is particularly favored in the investigation of human information processing and performance in vigilance tasks. Formally, the vigilance task is defined as a task where a human operator is required to detect signals over a long period of time and the signals are unpredictable and infrequent. Based on the results of empirical investigation, it is claimed that, first, a human's ability to detect a signal decreases over time (vigilance decrement), and second, when the level of noise is high and the frequency of a signal is low the ability to detect the signal gradually falls.

Since the ability to detect the signal is a skill, it can be trained in the same way as other human skills, claim the proponents of signal detection theory. Correspondingly, it is recommended to build up a clear idea of what the signal can be, to attempt to vary the speed of the signal detection process, combining the high-speed and low-speed intervals, and to participate in various training programs that teach how to detect the signal and how to distinguish the signal from noise.

The logic advocated by the signal detection theory can be easily applied to the studies of information overload. Thus, at each point of time, all information is defined either as relevant or irrelevant. Moreover, the amount of irrelevant information often exceeds the amount of relevant information. The goal of the individual is to select the relevant information while filtering the irrelevant. There is no objective definition of relevance. Consequently, the decision-maker's selection procedures are based on perceived rather than on objectively defined relevance. The information acquisition is, in a way, a vigilance task that requires monitoring and filtering of incoming information within certain time frame. As the number of irrelevant cues goes up, the decision-maker's ability to distinguish relevant information first converges to a certain threshold value and, then decreases.

2.2.2 Information theory

Information theory further extends the concept of information overload by focusing on information transmission. Information theory is articulated in the works of Shannon [Shannon &Weaver, 1949, 1963]. In general, it is a formal mathematical theory that provides an extremely rich apparatus for formalizing information transmission and communication. In the summary below, we draw extensively on the work of Wickens and Hollands (1994), who applied information theory to investigate human information processing and human performance.

Information transmission and the capacity of communication channels are the key concepts of information theory. The individual is compared to a conventional information channel,

defined in terms of transmitting capacity and bandwidth. It is argued that at each point of time four different clusters of information can be distinguished: (1) information that is presented by a stimulus; (2) information presented in response; (3) transmitted information; (4) lost information.

As the amount of information presented by the stimulus increases, the amount of information transmitted does not increase in the same proportion, but asymptotically approaches a threshold value. The reason why information transmission diminishes as the amount of information goes up is the limited transmitting capacity of the channel. This idea was first formalized and advocated by Miller (1956).

In the case of multidimensional judgments, dimensions can be classified as either orthogonal or correlated. For the correlated dimensions, the degree of redundancy varies from zero to one. The greater the number of orthogonal dimensions transmitted, the greater will be the overall information transmitted. At the same time, the greater the number of correlated low-redundant dimensions transmitted, the less will be the information loss.

Two cognitive resources are involved in information processing such as attention and working memory. They define the information processing capacity of human and are strictly limited. Additional strain is imposed when the cognitive resources must be divided among several tasks. Naturally, the maximal performance is obtained when all cognitive resources are devoted to one particular task. Performance drops significantly when the cognitive resources must be shared among the different tasks. Therefore, the problem of allocation of cognitive resources becomes central. There is no single classification of allocation strategies. The findings can only be summarized in a set of recommendations that can improve the efficiency of allocation of cognitive resources. The recommendations are as follows:

- Automatic processing does not require significant cognitive resources. That is why, while performing an automatic action, the individual can shift the cognitive resources to other tasks without significant loss in performance.
- The individual must divide tasks into two groups: primary and secondary. The primary tasks always require more cognitive resources to be involved.
- The principal of cross-modal sharing is preferred. The principle claims that only the tasks that require different cognitive resources can be shared efficiently (e.g. different types of attention or different parts of working memory). The inter-modal sharing often leads to significant losses in performance and decision-making quality.

2.2.3 Information processing model of decision making

On the basis of signal detection theory and information theory, Wicken and Hollands (1994) formulated the information processing model of decision making. This model builds up the connection between cognitive processes, which take place in the human mind and underline information processing and decision-making.

The information processing model of decision-making includes several stages that must be considered in a process rather than in a sequence of discrete stages. Each stage places demands on certain cognitive resources and provides an indication of the role of attention and memory for human information processing and decision-making.

First, the decision-maker selects which cues to process by filtering out the rest. The process of *selection* imposes a certain strain on both memory and attention. Since selection is guided by rules or reasoning, the appropriate mental frames must be activated and extracted from the long-term memory, the internal repository of knowledge. At the same time, the selection procedure imposes a considerable strain on selective attention.

The next stage is *diagnosis*. The cues that were selected at the prior stage are now processed and evaluated. Initially, cues are given a meaning. The information is considered through a prism of previous knowledge and experience and interpreted in the light of the current situation. Again, the appropriate frames are elicited from the long-term memory and further applied to the currently available information. *Cognition*, a mental activity rather different from perception in that it requires more time and mental effort and utilizes the resource of short-term memory (working memory), is the next step of diagnosis. Since working memory is an unstable repository of mental processes, cognition is highly vulnerable to disruptions when the attention resources are diverted to other mental activities. Attention is highly demanded throughout the entire diagnosis (Wicken and Hollands, 1994, p.12).

The *choice of action* is the next step. As most decision-making theories suggest, the choice of action is a complex process that implies the comparative analysis of expected outcomes and risks. The evaluation of outcomes and risks is conveyed on the basis of the prior experience adjusted in accordance with the individual's perceptions of the context. The long-term memory is actively involved again.

The *execution of action*, the last step, demands few cognitive resources, requiring attention only. The feedback that the individual obtains from the environment in response to his/her actions affects the future cue selection, diagnosis, and choice of action since it can alter the knowledge frames. In general, knowledge frames are stable, even rigid.

The information processing model of decision-making provides valuable insights into the allocation of cognitive resources, and reveals the effect of interruptions on the overall performance. It also emphasizes the role of mental frames, the stable templates that the decision-maker uses in the course of sense-making.

2.2.4 Human information processing systems

Numerous decision-making studies have addressed human decision-making through the prism of information processing. Most of the studies based their reasoning on findings on human cognition that confirmed the existence of a stable relationship between the level of arousal of the human brain and information processing efficiency. This relation was often illustrated by an inverted U-shaped curve suggesting that information processing efficiency achieves its maximum at the moderately-high level of arousal (e.g. Berlyne, 1960). One of the most influential works that investigates decision-making and addresses the issues of limited human information processing is the research of Schroder et al. [1967], which proposed the idea of the **human information processing system** (HIPS) and formalized the relation between environmental complexity and information processing. Human information processing was defined as a composite function of two factors: content complexity, the number of dimensions that must be processed, and integrative complexity, the complexity of integrating rules applied.

Environmental complexity consists of primary and secondary properties. Among the primary properties one can name information load, information diversity, and rate of information change (information complexity). The set of secondary properties includes noxity, "the severity of the adverse consequences of behavior" (Schroder et al, 1967, p.32), eucity, "the amount of reward or promise given by an environment" (Schroder et al., 1967, p.32), and the degree of involvement or interest in the task environment.

The authors stated that the information processing function is likely to have the inverted U-shaped configuration. The information processing maximum corresponds to a certain level of environmental complexity. Moreover, they claimed that information processing differs significantly among individuals (see Table 2). Some individuals are more capable in information processing than others. Therefore, the maximum of information processing efficiency is uniquely defined for all decision-makers. Similarly, information overload occurs at differential levels of environmental complexity. While some individuals report the feelings of overload, others still process information without justified difficulties. The family

of information processing curves was used to illustrate this discrepancy in information processing among individuals.

The authors distinguished between two polar types of individuals: integratively simple and integratively complex. Graphically, the higher curve (CURVE I, Figure 3) is associated with the integratively complex individual. The lower curve depicts the dynamics of information processing efficiency for the integratively simple individual (CURVE II, Figure 3). As is shown in the graph, CURVE II achieves its maximum at the lower level of environmental complexity as compared to CURVE I. In other words, an integratively complex individual (CURVE I) is able to accommodate greater environmental complexity without losses in information processing efficiency.

However, the conclusion that integratively complex decision-makers would always outperform integratively simple decision-makers is incorrect. Schroder et al. suggest that decision-makers with high integrative complexity track more types of information, prefer complex information cues, and produce decisions of higher levels of complexity. At the same time, they acknowledge the necessity of further empirical investigations to reach extra conclusions.

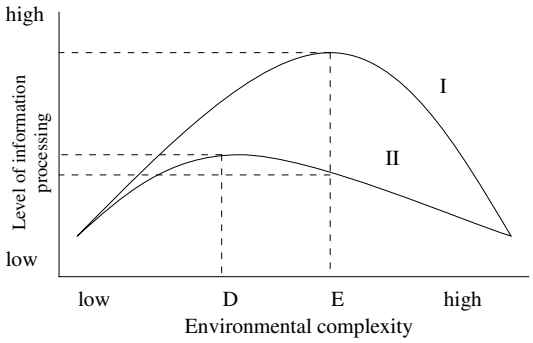


Figure 3. Environmental complexity and information processing (adopted from Schroder et al.)

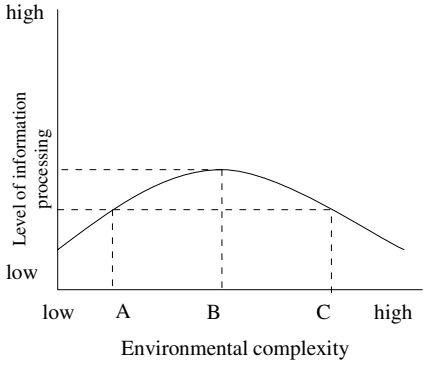


Figure 4. General relationship between environmental and behavioral complexity (adopted from Schroder et al.)

The deviation from the optimal point in both directions decreases the information processing efficiency. Accordingly, the shift in environmental complexity due to the changes in information complexity, degree of noxity, or degree of eucity leads to the overload, followed by the consequent decrease in information processing efficiency (shift from B to C, Figure 4).

When the level of environmental complexity is either extremely low or extremely high the difference in information processing of integratively complex and integratively simple individuals becomes insignificant. Therefore, under the conditions of overload all individuals are likely to utilize similar information processing techniques and similar approaches to information processing.

In brief, the signal detection theory suggests the distinction between signal and noise, where signal can be related to the relevant and noise to the irrelevant information. The objective of the individual is twofold, to detect the signal but, at the same time, to filter noise. This task is non-trivial since the individual's ability to detect the signal is diminishing. In information processing theory, the individual is compared to the information transmitting channel that has the pre-set bandwidth (or, information processing capacity). The individual's cognitive resources and efficiency of their use determine the information processing capacity. The information load depends not only on the number of information cues but on the number of non-redundant dimensions within each cue. Therefore, redundancy shifts up both the information load and the losses in transmitting the non-redundant information. In the model of the human information processing system, the findings from the previous two theories are summarized in the integrative framework. To describe the diminishing information processing capacity, the notion of information overload is introduced. In the information processing model of decision-making the stages of information processing are mapped onto the stages of decision-making and the utilization of cognitive resources is discussed.

2.3 Previous research on information overload

In this section, we outline the major findings on information overload and related issues and describe the "state of the art." The distinctive characteristics of information overload studies are their poor comparability, high heterogeneity, and fragmented nature. To organize this, we use the classification presented earlier in the chapter. In particular, we suggest that all the studies under examination presuppose that either personality, or situational factors, or the interaction between these two, result in information overload and lead to the declines in

decision quality. While originally developed for the decision-making studies in general, we argue that it is equally applicable to the studies of information overload and other relevant issues. The classification is applied as follows:

1. Personlogism: the research that defines information overload as a result of interplay among various personality characteristics (e.g., Dermer, 1973; Driver and Mock; 1975, McGhee et al., 1978, Kahneman and Tversky, 1974, 1982, 2000; Wickens, 1992; Just & Carpetner, 1992);
2. Situationism: the research that approaches information overload as a situation-contingent phenomenon. (Peters et al., 1984; Hahn et al., 1992; Joslyn and Hunt, 1998; Stocks and Tuttle, 1998; Tuttle and Burton, 1999; Speier et al., 1999; Seshradi and Shapira, 2001);
3. Interactionism: the research that defines information overload as a composite effect of both personality and situational factors (Snowball, 1980; Iselin, 1988, Chewning and Harrel, 1990, Kirmeyer, 1988;);

We conclude the section with an analysis of studies that go beyond the three categories. In particular, we consider the studies that include organization in the research frame. In this case, the organization is approached either as a context for the individual decision-making, or as an independent unit of analysis. Of particular interest are the studies that consider information overload as a technology – contingent and technology- mediated phenomenon. We conclude the section by presenting an overview of the latter.

2.3.1 Personologism

Within **personologism,** it is assumed that the individual characteristics of the decision-maker are the main source of behavioral variation. From this perspective, information overload is a product of the interaction among various individual characteristics of the decision-maker such as cognitive style, personality make-up, decision-making style, structural complexity, experience, and intelligence. It is claimed that, to large extent, information overload is explained by the limited human capacity to process information. Information processing capacity is either augmented or lessened when the positive or negative effect of certain personality factors is present.

Most of the researchers from this group stand on the positions of the differential school. They acknowledge the uniqueness of each human being, but, at the same time, claim that all

decision-makers can still be grouped in accordance with the particular criteria. What is valid for the whole population will be valid for each population member. Therefore, the research results obtained for the sample from the population can be generalized to the whole population.

We have organized the relevant research outcomes into three sub-groups: (1) studies that investigate decision-making style as antecedent to human information processing, (2) studies that investigate attitude to uncertainty as antecedent to human information processing, and (3) studies that investigate biases as antecedent to human information processing.

Decision-making style as a source of behavioral variation

Mock et al. (1972) investigated the effect of decision style (or decision-making approach, in the terminology of the authors) on information processing and decision-making performance. The starting point of their analysis was that different decision-makers utilize dissimilar information processing techniques. Correspondingly, they distinguished between two polar types of decision-makers:

- Analytics decision- makers, who use analytical tools to process information, rely on quantitative algorithms, formalized models, and mathematical logic. They reduce the complex problem into a set of smaller, often one-dimensional, problems.
- Heuristics decision-makers who base their conclusions on common sense, intuition, and screening of environmental changes. They consider the problem as such in its integrity and complexity.

The research results suggest that different decision-makers tend to utilize different decision-making strategies. However, analytical decision-makers outperform the heuristics decision-makers in decision accuracy, but at the expense of decision time. Since decision quality is a composite function of decision accuracy and decision time, the effect of decision style on decision quality is still ambiguous.

Driver and Mock (1975) continued the research on decision-making styles. They defined decision style as the combination of decision focus, the number of alternatives elaborated, and the amount of information that the decision-maker accumulates (see Table 2).

Decision style	*Description*
Decisive decision style	Minimal data used and one solution produced;
Flexible decision style	Minimal data used but multiple interpretations are acknowledged;
Integrative decision style	Maximum data used and multiple interpretations considered;
Hierarchic decision style	Maximum data used but reduced into s single possible interpretation;
Complex decision style	Combination of Hierarchic and Integrative styles;

Table 2. *Decision-making styles*

They suggest that the decision style is characterized by the dominant patterns of information search (how much data is acquired) and use (how many alternatives are considered). When information load is high, the dominant pattern is abandoned and the non-dominant style emerges. In particular, decision-makers exhibit a preference towards simple information structures and basic approaches to information processing.

In line with the expectations, the results of the experiment demonstrated that decision styles that imply the use of maximum data tend to score higher in terms of information processing efficiency. Not only do they acquire more information, but they also process more information effectively. Moreover, they demonstrated an extended capacity to accommodate complex information. As a result, on average, they come up with a decision of higher accuracy and, thus, of higher quality.

However, as the authors note, not only the quality of decision per se is important. Sometimes decision time becomes crucial. The most surprising findings were obtained with regard to decision speed. Contradicting the expectations, it was found that decision styles can be ranked in the following sequence starting from the slowest: Decisive, Complex, Integrative, Flexible, and Hierarchic. The authors tried to explain the slow path of Decisive decision-makers by explicit reference to the concept of information overload. Driver and Mock suggested that Decisive decision-makers are easily overloaded when information input is high or complex due to the lack of experience of processing comparatively large information sets. The question why Complex, Hierarchic, and Flexible decision makers seemed to be less overloaded than the Decisives and the Integratives was not covered within the study.

Surprising as it may sound, all decision-makers repeatedly revealed the preference to collect more information than required. This finding is of a great potential interest for information overload studies since it suggests the idea of voluntary overload.

McGhee et al. (1975) conducted an experimental study that aimed to investigate the effect of decision-making style and individual tolerance of ambiguity in decision-making performance. Despite the fact that this study does not cover information overload, it was particularly valuable for our research design as it demonstrated the limitations of personality constructs.

For decision-making styles, the classification of Driver and Mock was adopted and individuals were divided into several groups accordingly. McGhee et al. hypothesized that, first, the decision-makers who belong to multiple-solutions decision groups (Flexible, Integrative, and Complex) will elaborate on the significantly larger number of alternative solutions; second, the decision –makers who belong to the group with maximal data use (Integrative, Hierarchic, and Complex decision-makers) will collect significantly more data.

With respect to the individual tolerance of ambiguity, it was claimed that in cases when the environment is ambiguous those individuals who are characterized as intolerant of ambiguity are expected to collect significantly more information.

Analyzing the results of the experiments McGhee et al. (1975) realized that none of the predictions were actually supported. Consequently, they concluded that "personality alone does not account for much of variance in a decision maker's behavior" (McGhee et al. 1975, p.696). Only when personality factors are taken together with the task characteristics, can the valid predictions on decision-making be done. Thus, they recommend that both the individual characteristics of the decision-maker and the task characteristics must be included in research design.

Later, Huber (1983) also critiques the use of cognitive style as the basis for the management of information or decision support system research. He claims that the theory of cognitive styles is underdeveloped. It produces multiple and often conflicting approaches to the conceptualization and measurement of major constructs. Therefore, the results of research are often mixed and ambiguous.

Attitude to uncertainty as a source of behavioral variation

Apart from decision-style studies, much research has been done to reveal the effect of an individual's attitude to uncertainty on information processing. The questions about how much information the individual collects and what information the individual needs to reach a conclusion can be answered if attitude to uncertainty is considered.

Dermer (1972) conducted studies of information processing as a function of individual attitude to uncertainty. He placed the decision-maker at the continuum between tolerant and

intolerant of uncertainty. Analyzing the results of the experiments Dermer concluded that all individuals tend to require more information than they can process effectively when they qualify the situation as ambiguous. Moreover, the individuals intolerant of ambiguity generally appraise more information important than individuals tolerant of ambiguity.

Fisher (1996) used the framework proposed by Dermer. He attempted to elucidate what would be the effect of change in degree of uncertainty in terms of information processing. He classified all individuals as internal and external in accordance with their attitude to contextual events. Thus, internals, in his opinion, believe that all events occur due to their own will and efforts, while externals, by contrast, explain everything by the path of destiny, luck, and chance. He found out that externals try to obtain more information as environmental uncertainty increases, while internals can get along with a smaller amount of information, relying on "self-generated analysis". An interesting co-finding of this work is that when environmental uncertainty was high the source of information appeared more important than information quality.

Decision biases

To make a decision under uncertainty, one should be aware of the probability of certain events. Numerous empirical studies have demonstrated that most respondents recognize probabilistic information as complex and difficult to comprehend. To overcome the complexity generated by the probabilistic outcomes, decision-makers tend to employ a number of standard heuristics that, on average, provide a satisfactory decision path, but, at the same time, can result in systematic and significant errors. In a series of works, Kahneman and Tversky (1974, 1979) introduced the concept of heuristics, outlined three types of heuristics, and explained the consequences of their use.

Representativeness refers to the degree to which an object or event is representative of a certain class. If A is highly representative of B, the probability that A belongs to B is high. However, when the representativeness is high, decision-makers often neglect prior probabilities and misjudge the actual probability of an event. The range of possible errors is specified as follows:

- *Ignorance of sample size*: people tend to accept the existence of the "universal distribution", the distribution that is similar for all samples drawn from a population despite the size of the sample;
- *Misconception of chance*: the common belief that deviation in one direction is compensated for by the deviation in the opposite direction, so the equilibrium is

restituted. If translated into the decision-making terminology, decision-makers tend to think that errors cancel each other out. This paradox is known as "the gambler's fallacy" and "the law of small numbers."

- *Rare perception of predictability*: People tend to ignore base-rate frequencies and make predictions on the basis of "favorableness". This is particularly true for the situations when specific, however worthless, evidence is given. For example, when one is asked to predict the profit of several firms having no profit-related information but only general descriptions of the firms, the higher profit will be forecast for the firm that had the most plausible description.
- *Illusion of validity*: the illusion of validity occurs when a reasonable fit between the prediction and given information is observed.

Availability heuristics implies that people base judgments on the information that can be easily retrieved from their minds rather than on complete information. As a result, the most recent and vivid occurrences guide the decision-making, while the actual information is not fully considered. Correspondingly, decision errors occur. There are a number of factors that contribute to the availability, such as:

- *Familiarity*: the more people are familiar with the object, the easier it is to retrieve the information about this object;
- *Salience*: salient information is easy to retrieve;
- *Time*: recent occurrences are more available than occurrences from the past.

The last heuristics, **adjustment and anchoring**, suggests that people make estimates by starting from an initial value that is adjusted to yield the final answer. The most serious shortcoming of adjustment and anchoring is that the probability of failure can be underestimated. In addition, decision-makers become overconfident in their knowledge and capabilities.

In Table 3, we provide a summary of findings on personlogism. Three factors dominated the personality perspective on information overload. First, decision-making style provides valuable insights into how much information the individuals collect and how they process this information. It is argued that decision-making style can explain the difference in the individuals' vulnerability to information overload.

Personality factor	*Evidence from existing research*
Decision-making style	Individual decision-makers indeed have the dominating pattern of problem solving and differ in the amount of information they process to finalize the decision. As information load increases managers change the dominating pattern into a simplistic one. The ultimate effect of decision-making style on decision-making performance is ambiguous. The relation between decision making style and information overload is rather intuitive. In particular, decision-makers who collect more information presumably are effective in terms of information processing and thus less vulnerable to information overload.
Attitude to uncertainty	When individuals qualify situations as uncertain, they collect more information that they actually use. Moreover, the ones intolerant of uncertainty perceive more information as relevant. When uncertainty is high, the source of information becomes crucial.
Biases	In order to cope with uncertainty and increasing information load individuals tend to utilize decision frames that are often biased. Thee frames however allow them to simplify the decision problems and build up analogies with the previous experience. In general, biases often cause decision faults.

Table 3. *Personlogism: summary of research results*

Second, the attitude to uncertainty that is enacted in information acquisition can also be considered a factor of information overload. The intolerance of uncertainty stimulates the information acquisition, and thus affects the individual's vulnerability to information overload. Finally, the idea of biases can be related to human coping. In particular, biases represent the "ready-to-use" mental frames and facilitate the process of sense-making in the situation of information overload.

2.3.2 Situationism

Situationism assumes that a variety of situational factors cause behavioral variations. Information overload, correspondingly, is a situation-contingent phenomenon. Under the decision-making framework the situation, or the combination of circumstances at a given moment, is associated with the task environment. In the section below, we build up the links between the task characteristics and information overload.

One way to look at task is to define it as the transformation of certain input into the predefined output. Within the information processing approach to decision-making, the input is information; the act of transformation is the underlying information processing activities; the output a decision of a certain quality.

With regard to input, the actual amount and quality of information are central. Analogously, the act is defined in terms of activities that should be performed, their sequence, the

complexity of the underlying mental processes, and the time frame. Information overload mediates the input-output relationship, having a stable negative effect on decision quality.

In the section below, we first examine the studies that investigate the effect of information load on decision quality. In these studies, information overload is defined as a function of information quantity only. We focus on the transition mechanisms that transform information overload into the decision inefficiencies. Second, we look at studies that include other task-specific variables in the decision context. Among them time constraints and task complexity are cited most. Third, we conclude the section with a summary of the major research results.

The research on effect of information load on decision quality

O'Reilly (1980) attempts to evaluate the negative effect of information overload on individual performance within a given organizational setting. He mentions that studies of information overload are often based on objective measures of load and processing capacity, while failing confine the "subjective appraisals, capturing not only judgments about ability to process but also preferences for rate of processing and satisfaction with the processing task. […] This suggests a need for studies of objective overload, such as those conducted in the laboratories, as well as investigations of perceived overload, such as those that might be done in field settings'' (O'Reilly, 1980, p. 685). In all, he acknowledges the importance of situational factors and attempts to incorporate the broad decision-making context into the study.

The assumption that motivated the research design states that job satisfaction significantly affects the individual's performance. O'Reilly hypothesized the existence of a relation between the perceived degree of information load and job satisfaction, from one perspective, and between information load and performance, from another. He found that overloaded individuals reported themselves as being more satisfied in terms of job and internal communication. At the same time, the evidence suggested that there exists a strong negative effect of information overload on performance. Thus, the performance of overloaded individuals is significantly lower. At first glance, these findings seem to be in a conflict. O'Reilly attempts to resolve it by claiming that both short-run and long-run perspectives must be considered. Accordingly, the individuals who report underload will perform better in the short-run. At the same time, since the underload has a strong adverse effect on job satisfaction, in the long–run, the performance will decrease. The same logic is applied to the individuals who reported themselves overloaded. While the immediate performance is somewhat lower, the long –run performance is expected to be higher due to the high job

satisfaction. O'Reilly suggested the balancing of internal information flows as a countermeasure against information overload. Hence, he admitted that further research is necessary.

In addition, O'Reilly argued that some individuals are more vulnerable to information overload. He defined three socio-metric roles, i.e. isolates, participants, and group members, using the number of social links as a criterion. As expected, the isolates were often subject to information underload. However, no other inferences could be made with respect to relation between the communication role and degree of overload.

Casey (1980) defines information overload as the "decline in user performance due to the assimilation of additional information" (pp. 36-37). It is believed to cause losses in decision-making efficiency and effectiveness. Decision quality is operationalized via the decision accuracy and decision time. The results indicate that adding additional information does not change the quality of the decision but rather results in decision delays. This, in turn, confirms the existence of information overload. Interestingly, the lack of filtering strategies has been observed.

The comparative analysis of individual and group decision making is accomplished in the work of Stocks and Harrell (1995). In particular, the individual and group response to increase in information load is the focus of the study. Based on existing research in the area, Stocks and Harrell assume that the judgment quality of groups will always be higher than of individuals. Moreover, when the information load increases, so does the gap between the group and individual decision accuracy. As a result, they predict that groups always outperform individual decision-makers since they have higher information processing capacity and are less sensitive to the increase in information load. The results of the experiment indicate that, indeed, the quality of judgments differs at moderate and high information load. Furthermore, the significance of this difference increases as information load goes up. At all levels of information load, groups utilize more information cues, which is consistent with the predictions about higher information processing capacity. "The individual participants appear to have experienced moderate information processing difficulties with increased information level, as the quality of their judgments does not appear to have benefited from the availability of additional information. […] Groups experienced few information processing difficulties with increased information level since the quality of their judgments apparently benefit from the availability of additional information" (Stocks & Harrell, p.697, 1995).

Stocks and Tuttle (1998) included the information format in their analysis. They claim that the information format determines the decision-maker's ability to process it. They hypothesized that numerical data is harder to process, so information overload occurs at earlier stages.

Similarly, Hwang and Lin (1999) expanded the definition of information load and included the notion of dimensionality. They hypothesize that information overload is a function of information dimension. They further define information as a composite of information diversity and information repetitiveness. The results of the experiments supported the proposition that both diversity and repetitiveness have a negative effect on decision quality by increasing information load.

In all, we have outlined four factors that define the information load and, in so doing, determine the degree of information overload. The effect of these factors on information overload is depicted in Figure 5.

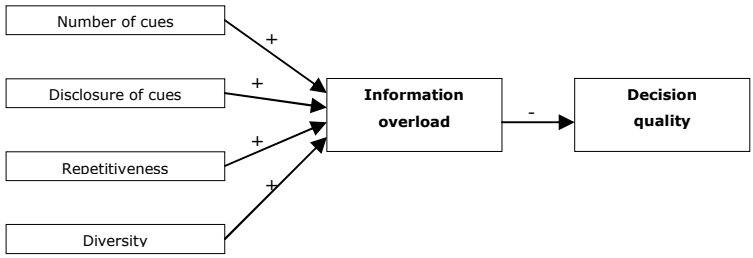


Figure 5. Characteristics of information load and degree of information overload: summary

The research on the effect of task complexity on decision quality

Parkinson's Law states that work will expand or contract to fill the amount of time available for it, since people choose their effort levels to be appropriate to the task at hand and the amount of time they have available to accomplish those tasks (Northcote Parkinson, 1957). In many empirical studies, it is demonstrated that both excessive time pressure and absence of time pressure decrease the performance. That is why efficient time allocation should be a primary goal in task management. Peters et al. (1984) expand the notion of time constraint and claim that it consists of two elements: (1) time constraint imposed by the current task; (2) the overlap of time constraints of several tasks.

Based on empirical evidence, the authors concluded that manipulation of task deadlines could affect the individual's perception of task difficulty. In line with previous research, they concluded that, even though time pressure can boost performance, "[…] reduced levels of motivation can be expected for persons who have long history of working in a severely constraining working setting" (Peters et al., 1984, p.298).

In investigating the effect of time pressure, not only the time available for the current task but also the number of tasks that must be performed during a certain time frame must be considered. Accordingly, Radner and Rothschild (1975) develop a formal conceptual model of managerial resource allocation. The logic of the model is fairly simple and complies with common sense. Since the manager's resources are strictly limited, he makes the decisions about how to allocate them among the multiple tasks. The efficiency of allocation affects the ultimate performance and, thus, is of particular importance. It is assumed that the manager derives allocation rules from prior experience. The activities that are currently attended by the manager improve, while the neglected activities deteriorate.

Three distinct types of time-allocating behaviors are suggested (Radner and Rothschild, 1978, p.360):

- Constant proportion: the scenario in which manager allocates a constant amount of resources per unit of time;
- "Putting out fires": the scenario, in which managers allocation resources to a task that has the worst performance (applied on a daily basis);
- Staying with a winner: the scenario in which the manager allocates resources to the task that has the maximum performance.

At each point of time, the manager attempts either to survive by keeping the tasks at a level that is above the threshold, or to achieve a certain growth rate. To satisfy these goals, he selects one of the three types of behavior mentioned earlier. Performing multiple tasks simultaneously implies constant switching from one task to another. Since information overload is a product of scarcity of cognitive resources, interruptions that impose additional cognitive strain are often a primary reason for information overload.

According to Speir et al. (1999), the interruption is an extremely generated, randomly occurring, discrete event that breaks the continuity of the cognitive focus on the primary task and typically requires immediate attention and insists on action (p.22) Despite being rather stimulating when the task is simple and the cognitive strain is low, interruptions cause

significant losses in decision quality in the complex task, exhausting limited cognitive resources.

Speir et al. (1999) assume that, at one point of time, the person is occupied with the primary task and a number of secondary tasks. Interruption has two effects on task performance. First, it takes time from the main task. Second, it consumes additional time and mental efforts to restore the attention back to the task after the interruption has occurred. Intuitively, interruptions differ in the strength of their effect. A number of factors determine the strength of the effect. The most immediate ones, the ones that dominate the effect on cognitive processing, are interruption frequency and the diversity of content to which the attention was brought in the course of the interruption, as compared to the content of the main task. The higher the frequency of interruptions the greater the time which the decision-maker needs to withdraw from the main task. Similarly, the greater the diversity of content to which the attention was channeled, the greater additional time and mental efforts are required to restore the mind back to the main task.

At the same time, one can outline the "social" characteristics of interruptions, such as the person who generated the interruption or the actual form of interruption (e.g., telephone call, a person walking into the other's office etc.). The effect of the social characteristics of the interruption is not that straightforward and can hardly be confined within traditional experimental research design.

Speir et al. (1999) demonstrated that, when task complexity is high, the non-interrupted environment should be preferred. Moreover, the frequency of interruptions and their content determine the strength of effect that interruption has on decision-making performance.

Hahan et al. (1992) explicitly refer to the phenomenon of information overload and speculate on the conditions antecedent to it. Information overload is conceptualized as a tradeoff between the demands imposed by information load and the limited processing capacity (working capacity, in the terminology of the article) of the unit. Hahn et al. claim further that working capacity alters when time pressure increases, since people are no longer able to execute control over it. However, they expect that units with high working capacity will perform better. The empirical evidence supports the proposition that information overload occurs only when time pressure is present. "Our conclusion is that it is only under conditions of time pressure that a certain amount of information has the effect of being too much, in the sense that decision quality suffers" (Hahn et al., 1992, p.376).

In order to manipulate working capacity they introduced the concept of involvement, assuming that "[…] higher level of involvement makes possible a greater working capacity

of information processing" (p. 368). This pattern was not observed in a real data set, questioning the validity of the approximation of working capacity by the degree of involvement.

The main findings are summarized in Table 4. In all, the existing research suggests that not only objective but also subjective information load defines the actual degree of information overload. Moreover, information load is a function of both the number of information cues and the degree of disclosure of each cue. Information overload is a positive function of time pressure. That is why it can only be considered within a time-constrained environment. Interruptions increase the degree of information overload since they disrupt the process of sense-making and impose additional demands on an individual's cognitive resources and time.

Situational factor	*Evidence from the empirical research*
Perceived information load	Perceived, rather than objective, information load affects the individual's vulnerability to information overload. Although overloaded individuals report themselves as being more satisfied with the job, a strong negative relation between the perceived information load and performance exists.
Objective information load	Information load is defined not only by the number of information cues per se but also by the number of dimensions disclosed in each cue.
Group versus individual decision-making	Due to the fact that groups have higher information processing capacity, they outperform individuals at all levels of information load.
Time constraint	Information overload can only exist in a time-constrained setting. Time is a scarce resource. The efficiency of time allocation determines the ultimate performance.
Interruptions	Interruptions contribute to the information overload. The frequency of interruptions and their content determine the strength of the effect on information overload.

Table 4. *Situationism: summary of research results*

2.3.3 Interactionism

Under interactionism, neither personality characteristics nor situational factors alone can explain the behavioral variations. The interaction of the two and the combined effect is crucial. From this perspective, information overload is a non-linear function of a variety of personality and situational factors. Only the overlap of certain personality characteristics with certain situational characteristics produces the state of overload.

Traditionally the studies of interaction possess some higher explanatory potential; however, they require sophisticated research design. Only a few studies of information overload can actually be placed within this category. And even these studies investigate comparatively simple interaction pairings. The section below reflects on the relevant research results. The list of independent variables can be found in Table 5.

1. Expertise – information load – time

Snowball (1980) hypothesized that both information load and expertise affect decision quality. Expertise was defined as "[…] knowledge, derived from the past experience and training, that the individual is able to bring to the judgmental task" (pp. 324-325). Information load was considered a function of the number of information cues and time available for processing.

Expertise empowers the individual with the heuristics that help to eliminate the complexity of incoming information, to select the general approach to data analysis, and to apply the methods of data analysis. However, according to previous findings in the area of human cognition, heuristics often become the source of decision biases. This is particularly important for the studies of decision making under uncertainty, since the higher the complexity and ambiguity of information load, the greater is the chance that information perception will be guided by the previous experience and the knowledge frames than by the data in hand.

The experiments demonstrated that "the expertise factor appears to have had most impact on subjects' perceptions…" (Snowball, 1980, p.330). The effect of time constraint and information disclosure, besides being in line with the hypothesis, did not prove to be statistically significant.

Two findings deserve our particular attention due to their potential importance for information overload studies. First, "although not statistically significant, the effect of time reductions was in the direction of reduced dispersion of prediction" (Snowball, 1980, pp.334-335). Putting it differently, in the setting where time pressure is high individuals will make somewhat similar decisions. Snowball proposes two complementary intuitive explanations for this finding. First, since information load is a positive function of time pressure, increased time pressure results in the increased information load. This pushes individuals towards simplistic information processing strategies, increasing the similarity of the final results. Second, individuals under stress do not advocate extreme solutions and stick to average, "normal" alternatives.

Next, “confidence intervals […] tend to narrow as the time available for processing was reduced […]” (Snowball, 1980, p.335). As before, Snowball draws on the utilization of simplified information processing strategies and claims that the use of these strategies makes the individuals less confident in their decisions.

Iselin (1988) claims that while performing tasks people tend to learn. As they learn they accommodate more information. Moreover, if the task is performed on a repeated basis the learning effect will accumulate and outweigh the negative impact of increasing information load. Correspondingly, not only decision-making experience but also task learning is the important antecedent of decision-making performance. Decision accuracy is a positive function of both prior experience and task learning. Decision time is the negative function of both.

Information load is operationalized by including the number of repeated dimensions and relative diversity of cues into research framework. As depicted in Figure 6 and Figure 7, decision accuracy is an inverted U-shaped function of the number of repeated dimensions, while decision time is a U-shaped function of the number of repeated dimensions.

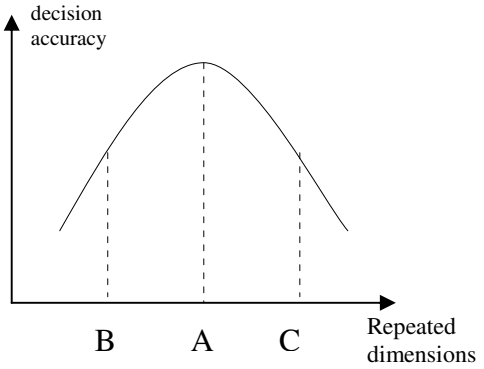


Figure 6. Decision accuracy as a function of information quantity

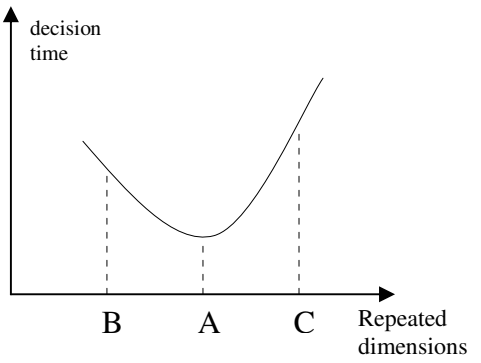


Figure 7. Decision time as a function of information quantity

It is argued that, initially (point B, Figure 6), while the number of repeated dimensions is low the individual experiences a boredom effect, so decision accuracy is comparatively low and decision time is high. Thus, adding the repeated dimension both improves decision accuracy and reduces decision time, since the boredom effect is eliminated and the greater number of inferences can be made and incorporated into the decision. Analogously, when the number of repeated dimensions increases substantially (point C, Figure 6) the decision accuracy will fall and decision time will shift up. This happens because individuals tend to panic and the cognitive constraint becomes binding. The maximum decision accuracy and minimum decision time (point A, Figure 6, Figure 7) are achieved at a certain number of repeated dimensions.

Diversity of information is expected to have a somewhat different effect on the decision accuracy and decision time. In particular, the higher the diversity of information cues, the lower the decision accuracy. At the same time, the higher the diversity, the more time is required to process information cues. The results of the experiment confirmed the findings of Schroder. They also indicated the need to undertake extensive research on the boundary between personologism and situationism so as to explicate the effects of the interaction between them.

Chewning & Harrell (1990) investigated the discrepancy in decision quality between the overloaded and non-overloaded individuals. The amount of domain-related knowledge is expected to affect the individual's capability to process information. The proposition that overloaded decision-makers should perform worse was confirmed by the results of the experiment. The poor decision-making performance under information overload was registered in terms of decision consistency, agreement with the composite judge, and agreement with the mean (average) decision. The interesting finding of this study is the fact that "individual could experience information overload without being aware this it has occurred" (Chewning & Harrell, 1990, p.537). In other words, overloaded decision-makers actually integrate a smaller amount of information cues into the decision than they think they do.

In the study of Kirmeyer (1988) the effect of task interruption and behavior pattern utilized on decision-making performance is investigated. The concept of role overload, having too much to do in time available, rather than information overload, is used.

Correspondingly, there are two lines of reasoning in the article. First, the study claims that interruptions must be considered as a primary reason for overload. In response to an interruption, the decision-maker utilizes certain task processing strategies to cope with

competing task demands. Therefore, the study investigates the connection between the interruptions, the resulting task processing strategy, and the perceived degree of overload.
Three distinct types of task processing strategies in response to the external interruptions are specified:

- *Sequential processing:* the individual starts to process the task only when all the previous tasks have been accomplished;
- *Preemtion:* Due to the interruption the individual abandons the current task and devotes all resources to the new task;
- *Simultaneity:* the individual divides resources among several tasks;

In general, the significant effect of interruption on load was justified. Accordingly, the results of the study demonstrate that preemption and simultaneous addressing of several tasks causes the subjects to appraise the work as overloading. The exact mechanism of how interruptions are actually transformed into the overload was not specified; however, some suggestions concerning the problem of distraction of attention and the efforts to restore attention back were made.

Second, besides the situational factors, some personality characteristics can define the degree of overload. In particular, the behavior pattern can be antecedent to the perceived information overload. Two behavioral patterns were extracted from the relevant literature and introduced into the study set-up. Type A behavior pattern is characterized by impatience, high competitiveness, preference towards working alone, strong negation of task delays. Type B behavior pattern, on the contrary, implies patience and willingness to accept time delays. The individuals who exhibit Type A behavioral pattern perceive themselves as overloaded at earlier stages.
The composite effect of both interruptions and behavioral type was captured by the following conclusion (Kirmeyer, 1988, p.627):

> *Subjects who faced more frequent interruption and were more extreme, such as Type As, more readily appraised their work as overloading and, in turn, took coping actions to reduce the duration, scope, and number of work demands.*

A number of coping mechanisms have been suggested, such as reducing time spent on each task, delaying task fulfillment and postponing the deadlines, and reducing the quality of performance.

Author	*Independent variables*
1. Snowball, 1980	Expertise Disclosure variation Time constraint
2. Iselin (1988)	Repeated dimensions Relative diversity Decision-making experience Task learning
3. Kermeyer (1988)	Behavioral pattern Type of interruptions
4. Chewning, Harrell (1990)	Information load Domain-related knowledge

Table 5. *Interactionism: independent variables studied*

In Table 5, we list the variables that have been studied in the interactionist manner. Most of the studies investigated the combined effect of information load, time constraint, and experience on degree of information overload. While the first two are perceived as the factors increasing information overload, the latter is suggested as the mediating factor that, to certain extent, eliminates the negative effect of the other two.

2.3.4 Organizational studies

The investigations of information overload within the organizational context leaded to the development of the concept of organizational information overload, an imbalance between the organizational information processing requirements and the information processing efficiency (e.g., Schneider, 1987). The theory of organizational structure (e.g., Galbraith, 1973; Lloyd et al., 1975; Mackenzie, 1975; Schulz, 2001; Kerbs, 2002), media richness theory (e.g.,Tushman and Nadler, 1978, Daft and Lengel, 1986), and social information processing theory (e.g., Sherlblom, 1988; Lea and Spears, 1992; Walther, 1992) all provide helpful insights into organizational information processing and information sharing.

In compliance with the stated research objectives, in Chapter 2 we include the most relevant concepts and findings only. We first address the organizational theories that study organizational information processing in terms of requirements and capacity. Next, we apply this framework to describe the studies of information overload defined as an imbalance between requirements and capacities. Finally, we outline the relevant concepts and findings that suggest alternative explanations to the organizational information overload.

The media richness theory is an attempt to formulate the information processing theory of organization and to answer the questions of how organizations process information and why

do they do it. The organizational information processing theory departs from the theories of individual information processing in claiming that organizational information processing is not a simple aggregation of the processes that typically occur at the individual level, but rather it is a complex construct with a great variety of forces and contingencies involved. The theoretical framework was elaborated in the work of Tushman and Nadler (1978) and developed further by Daft and Lengel (1985).

The basic assumption of media richness theory postulates that an organization is a complex information processing system that collects and processes information to reduce uncertainty[3] and equivocality[4]. Uncertainty and equivocality can be either internally or externally driven. The organizational structure and technology are the internal sources of uncertainty and equivocality. The degree of uncertainty and equivocality determines the actual information needs of the organizations in terms of the amount and type of information.

Tushman and Nudler (1978) claimed that the function of organizational structure is to facilitate and optimize information collecting, processing, and dissemination. Organizations differ in the efficiency of information processing due to discrepancies between information processing capacities of the given organizational structures. The organizational information processing capacity is a function of the organismic-mechanistic nature of the structure of subunits, and coordination and control mechanisms applied. Organismic, in other words, highly connected, structures have a greater capacity for information processing, however are less controllable. At later stages, the social network theory confirms a similar idea claiming that highly connected structures are efficient in terms of information processing since they eliminate the single break-down points.

To evaluate the overall organizational information processing capacity, the nature and the types of connections among the subunits must be considered. The interdepartmental relationships are defined in terms of the degree of departmental differentiation and the strength of dependence among the departments. Correspondingly, high differentiation increases equivocality, while the strong interdependence increases the uncertainty.

Daft and Lengel (1985) developed seven structural mechanisms that either reduce the uncertainty by increasing the amount of information transmitted, or reduce the equivocality by increasing the richness of transmitted information. To develop this classification, they first rank communication media in accordance with their richness, with face-to-face being

[3] Uncertainty is the difference between required and available information (Daft and Lengel, 1986, p.556)

[4] Equivocality is uncertainty of meaning that is expressed by the existence of a large number of conflicting and multiple interpretations (Daft & Lengel, 1986, p.556)

the richest and numeric documents the leanest communication media. Further, they define seven structural mechanisms and claim that group meetings are most efficient for reducing equivocality, while rules and regulations are the best in coping with uncertainty.

For instance, when both difference and interdependence between departments are high the structures with a high capacity to reduce equivocality (e.g., group meetings, integrators) as well as the structures with a reasonable capacity to reduce uncertainty (e.g., rules and regulations) must be utilized simultaneously. By contrast, when departments are both independent and functionally different, the structures that draw intensively on the lean media (e.g., rules and regulations, reports) and transmit low amounts of information can be applied.

Technology, as was mentioned earlier, is the second internal source of uncertainty and equivocality, as it defines the central task characteristics such as task variety and task analyzability. Thus, task variety[5] is positively correlated with the degree of uncertainty, while task analyzability determines equivocality. For instance, when task variety is high and task analyzability is low, structures that allow for rich media are preferred.

In the work devoted to organizational information processing, Schneider claims that the complexity of organizations increases as they grow in size (Schneider, 1987). She also draws on the media richness theory and argues that both internally and externally driven uncertainty and equivocality increase in time. The nature of interdepartmental links becomes more complex, and so does the need for coordination and control. Similarly, task diversity rises, while task analyzability decreases. The external environment becomes more complex and thus less analyzable and predictable. As a result, the existing mechanisms fail to accommodate the constantly increasing need for processing great amounts of rich information.

Information overload at the level of the organization exists when the following symptoms are observable (Schneider, 1987, pp.144-145):

1) *Primary symptoms*: loss of boundaries between roles, priorities, tasks, functions, high emotionality and irrationality, increased political activity;
2) *Secondary symptoms*: restrictions on information processing, increased control and centralization, rationalization and legitimating.

The consequences of organizational information overload are described as follows (Schneider, 1987, p. 148):

[5] Task variety –the frequency of unexpected and novel events that occur in the conversion process (Daft & Lengel, 1985, p.563)

The inability to process information creates a situation of self-generating escalation as it increases the inability to select out the relevant information and subsequently increases the distraction by irrelevant and interfering cues.

Luckily, organizations adapt and adjust to the internal and external changes by developing coping mechanisms. These mechanisms range from standardization and formalization of information and communication flows, information management initiatives, to training of personnel and reorganization initiatives. These coping measures, despite being targeted against information overload and being effective in the short-term, often produce unintended consequences and affect negatively the organizations' ability to interpret the strategically important information in the long-run.

Extensive research has been done in the field of organizational and group boundaries. In all, boundaries serve to protect the group members from external information overload. Aldrich and Herker (1977) note that "boundary roles are a main line of defense against information overload" (p. 218). They refer to the individuals who span group boundaries as gatekeepers of information. The major function of gatekeepers is to determine what information is and is not relevant or necessary for the rest of the group. Further research (Ancona, 1990; Ancona and Caldwell, 1992) identified four distinct boundary-spanning roles: the ambassador, who represents the team externally; the task-coordinator, who coordinates technical and design issues; the scout, who gathers information; and the guard, who protects against the release of information.

Valuable insights into organizational information processing are provided in the work of Feldman and March (1981). Their main claim is that organizations systematically collect more information than they use. Much of the information gathered has little decision relevance and much of the information is collected after the decision has been made. Collecting the information proactively is done to justify the decisions made. Moreover, the requests for the information are often filed regardless of how much information and which information is already available. Therefore, most of the internally available information is ignored and not taken into account. These seemingly ridiculous patterns tend to illustrate the actual way of information use in the organizations. Among the reasons for the repeated inconsistency in information use, the following can be named:

(1) Organizational information overload and the resulting inability to process incoming information;

(2) The poor quality of collected information and lack of relevant information and thus its inapplicability in decision-making;

(3) Alternative formulations of organizational information processing and decision-making and thus acceptance of alternative objectives and methods to fulfill these objectives;

To justify this "alternative rationality" of organizations, Feldman and March suggest three additional explanations for the repeated misuse of information. First, there are strong incentives to underestimate the costs of collecting information and overestimate the benefits of having this information. In other words, it is always preferred to produce and collect more information than to be blamed for overlooking the potentially relevant issues. Second, there has been observed a practice of surveillance information collecting: collecting of information in "just in case" mode. Third, information is a means of gaining and sustaining power and control. Thus, it is deliberately misinterpreted, manipulated, fabricated, or avoided.

In all, the additional explanations as to why organizations collect more information than they use are suggested. In so doing, the non-conventional wisdom of organizational information processing and organization rationality is advocated. Feldman and March emphasize that information processing in organizations is socially constructed and highly symbolic, rather than formalized and rational. Therefore, the information overload is a voluntary, inevitable state.

2.3.5 Technology studies

There are a number of studies that define information overload as a technology-contingent phenomenon. The studies in the group can be organized into two main categories. The first cites the advances in information and communication technologies as the primary reason for information overload. The second, while acknowledging the effect of technologies on information overload, focuses on functionalities of modern technologies that have the potential to decrease information overload and improve human information processing and communication. Technology is considered as a tool to structure the information and communication streams and to avoid information overload.

In an attempt to systemize the relevant findings, we split the latter group further into two streams, the applied and the technical research perspectives. The applied stream embraces the wide range of studies that evaluate the functionality and the use of existing information communication technologies such as, for instance, the studies of the use of electronic mail, groupware applications, decision support and management information systems. The studies that reveal the process of development and testing of agents that perform the functions of

intelligent information search, filtering, and retrieval are placed into the technical research stream. However, a complete review of these findings is not in line with the stated research objectives; therefore, we restrict it to the main concepts and ideas.

Information overload as the function of technological advances

Technology, in its most general meaning, is one of the most often cited factor of information overload (e.g., Farhoomand and Drury, 2002). The proliferation of the Internet, electronic mail, and various communication applications in day-to-day life positions the problem of information overload at the top of the academic and applied research agenda.

A considerable number of the studies investigates the use of electronic mail and the reasons for the email –induced information overload (e.g. Mackay, 1988, Hall, 1998, Wilson, 2002, Farhoomand and Drury, 2002). Electronic mail is an application designed to automate the exchange of messages and facilitate the communication and information interchange (Laudon & Laudon, 2004). The application has inbuilt functionalities that presumably should help users to structure, organize, and filter the incoming information. However, instead of gaining advantages from structured communication and information exchange, users get frustrated with the amount of incoming information. The information is both solicited and unsolicited. Since two parties, the recipient and the sender, are involved, the problem of information overload can be discussed from two perspectives: from the perspective of the recipient and from the perspective of the sender.

Mackay (1988), in her pioneering study of email use, stands on the position of the user and develops the insights into why the inbuilt functionalities often tend to be neglected. She states that individuals differ significantly in terms of email use; therefore, what is valued by one is not accepted by another. Correspondingly, the in-built standard features that are characterized by a low degree of flexibility satisfy the actual patterns of email use only in some rare cases. As Mackay puts it: "[m]ail systems should be designed to accommodate diversity" (p.396).

Based on observed patterns of email use she distinguishes two boundary types of email users: prioritizers and archivers. Prioritizers tend to delegate the function of email management and, as a consequence, are willing to undertake the risk of missing relevant information. They ascribe high value to the control over the email system and try to maximize the efficiency of email use by defining the number of times they check email, by omitting and deleting the messages. Archivers, on the contrary, address all messages thoroughly, feeling the risk of missing important information. In so doing, they are willing to

utilize the message categorization, storage, and retrieval tools. When using electronic mail, they tend to exploit actively the subscription lists, store large amount of data, apply a complex system of folders, and, as a result, experience difficulties with finding information.

However, even if the recipient is proficient in terms of email management, there still is the risk of information overload. The issues of junk mail and the unauthorized mailing have been popularized by the mass media (see for instance the recent article in The Economist, August 18, 2005). Here, despite the fact that the information strain lies on the recipient, the behavior and intentions of senders are in the focus of research (e.g., Hall, 1998, Wilson, 2002).

Within the organizational context, the effect of technology on the individual, group, and ultimate organizational performance is crucial. Besides the new horizons for information processing and communication that technology opens to the end users, it is a source of many side effects, among which the information overload is the most silent. As Hiltz and Turoff (1985) frame it:

> *The volume and pace of information can become overwhelming, especially since messages are not necessarily sequential and multiple topic threads are common, resulting in information overload. Information overload presents itself first as a problem, than as a constant challenge to be overcome, Intensive interactions with a large number of communication partners result in the mushrooming of the absolute amount of information and the number of simultaneous discussions, conferences, and other activities that goes well beyond normal coping capabilities (p.680).*

The relation between technology and information overload was thoroughly addressed in the work of Schultze and Vandenbosch (1998). They pointed out that, while being able to catalyze and exacerbate information overload, technology can certainly counteract some negative effects of it, empowering the user with a number of beneficial features such as asynchronous communication, classification and retrieval tools, and virtual communities. They emphasized the temporary character of information overload and introduced the notion of coping mechanisms, showing that individuals tend to establish a set of rules or procedures that help them to avoid extreme pressure of increasing information.

Earlier, Hiltz and Turoff (1985) also mentioned that users experience information overload at a certain level of proficiency of technology, use and are able to both adjust to technology and customize the technology reducing the information overload. They found that technology-induced information overload peaks at the intermediate levels of use (Hiltz and Turoff , 1985, p. 681) and explained it by the fact that the novices, in a desire to be fully informed, engage in too many informing and communication activities.

As time passes, individuals develop coping mechanisms that help to organize and structure the information and communication flows (Hiltz and Turoff, 1985). With experience, individuals learn how to resolve the trade-off between overwhelming oneself with the amounts of incoming information and missing potentially important information.

Schultze and Vandenbosch (1998) made a distinction between two types of coping strategies: human coping strategies (personal tools of information selection and limiting the number of entries) and technological coping strategies (the use of inbuilt functionalities). However they observed that: "[If] there is too much too much information in LotusNotes database (the database of the groupware under the study), managers are likely to ignore it altogether than to try to pick out what is relevant to them" (Schultze and Vandenbosch, 1998, p.144).

Technology as a way to structure information and communication streams to avoid information overload

Technology can be defined through the functionalities it supports. These functionalities are both restricting and enabling and are subject to individual appropriation. As was discussed in the previous section, technology, undoubtedly, is one of the reasons for information overload. At the same time, as Schultze and Vandenbosch (1998) put it: "Paradoxically, technology has also been called upon to provide mechanisms that enable us to cope with the information glut it has helped generate" (p.127).

Among such mechanisms, one can name the capacities to collect and organize data from various sources, to apply analytical modeling and data analysis, to store and retrieve data, to filter data, to communicate and share data. The evaluation of the efficiency of the inbuilt capabilities has been on the research agenda of the academic community for many years already.

Ultimately, technological solutions are still insufficient to prevent information overload (e.g. Hiltz and Turoff, 1985, Bergel, 1997, Frahoomand and Drury, 2002). From one perspective, as numerous studies have concluded that the patterns of technology use and appropriation differ significantly among users, the standard inbuilt features that possess a certain inflexibility and rigidity can hardly satisfy the diversity of demands (e.g, Hiltz and Turoff, 1985; Mackay, 1988). Moreover, since what is irrelevant for one individual can be of enormous value for another, the utilization of the standard functionalities increases the risk of missing potentially important information. From another perspective, the inefficiency of current technical capabilities can be overcome by the implementation of alternative design

solutions (e.g. Denning, 1982, Tsichritzis et al., 1982, Palme, 1984, Losee, 1989, Frahoomand and Drury, 2002).

Two particular technical functionalities – information retrieval and information filtering – have become a separate research field that draws extensively on the apparatus of computer science. Belkin and Croft (1992) outlined the characteristics of exemplar information filtering systems, such as:

- The systems are designed for unstructured and semi structured data;
- The system input is textual, image, voice or video data;
- Filtering systems involve large amounts of data;
- The system input comes from remote, often external, highly heterogeneous sources;
- The individual profiles, the description of preferences, are used as a basis for filtering. They are stable, however may change slowly;
- The filtering systems are applied to remove data rather than to find data.

They concluded that information filtering and information retrieval systems are pretty similar and thus can benefit from each other. Both information filtering and retrieval are associated with the concept of artificial intelligence[6]. Intelligent agents, the software packages developed on the basis of codification of stable, repeated human behaviors, are often used in the area of information filtering. Most straightforwardly, they can filter the incoming mail or the results of searches in the Internet. The widely acknowledged drawback of the utilization of such agents concerns the risk of omitting novel, potentially interesting information that was not indicated in the profile, and, at the same time, of being overwhelmed by information that is already well-known to the user and thus cannot be of a high value. As a result, the use of both information filtering and information retrieval applications to improve information processing and decision making is still negligible (e.g. Farhoomand and Drury, 2002).

Technology and information overload: beyond the scope of single technology

All the studies considered in the previous sections approached the problem of information overload within a context of the single technology: electronic mail, groupware application, or web application. However, in contemporary organizations the problem of information overload is not only application-contingent, but is rooted in and is linked to the entire technological platform: in compatibility of application, the sufficiency of applications, the

[6] Artificial intelligence is an effort to develop computer-based systems that can emulate the human behavior in that they can learn natural languages, accomplish tasks, and engage in decision-making, capturing and codifying human expertise (Laudon and Laudon, p.327)

quality of each application, etc. In a series of works devoted to information overload and related issues, Sorensen and Kakihara (2002), Sorensen, Mathiassen, and Kakihara (2002) Kakihara and Sorensen (2002), Mathiassen and Sorensen (2002), have elaborated an integral framework that categorizes IT artifacts into four types, each related to a certain type of overload (see Table 6). The IT use is a criterion for the proposed classification.

Type of technologies	*Type of overload*
Transacting technology: supports organizational information management in terms of information production, distribution, and general management	Information overload: information processing requirements exceed information processing capacity;
Interpreting technology: supports individual information production, transmitting, retrieval, filtering, classification, linking etc.	Structure overload: technology unnecessary restricts the information processing and communication via structural constraints or inflexibilities;
Connecting technology: supports individual communication	Interaction overload: the number of requests for interaction exceeds the individual capacity for interaction;
Collaborating software: supports the distributed work processes via the provision of shared work space, coordination and collaboration mechanisms, and mutual awareness functionalities	Transaction overload: the individuals are engaged in an excessive number of transactions that could be handled effectively via different communication media

Table 6. *Type of technology versus type of overload*

2.4 Conclusion

Besides being rather an outspoken issue, the academic research on information overload is still very limited and definitely insufficient. Moreover, the research field can be qualified as fragmented, lacking a common basis in terms of conceptual and methodological apparatus. With only a few exceptions, there have been attempts to ground research in the existing theoretical framework and bridge the research results with the results of previous studies. One possible explanation is the lack of consensus on basic definitions, such as information, information load, processing capacity etc. and the use of different variables and incompatible measurement scales in accessing them (see Textbox 1 with the list of all definitions of information overload for an illustration). For instance, the critical methodological issue for the positivist research is one of measuring information overload, since both objective and perceived overload exists. With respect to this, some of the scales have not been used before and thus require testing and reaffirmation, while others produce conflicting results. This makes the comparison and generalizing of research results difficult if not impossible.

Many studies tend to adopt an unnecessarily simplistic view of the problem of information overload, such as expressing it only as a product of the increased number of independent information cues. As Jacoby (1984) puts it, "inability of the traditional overload research paradigm […] to capture and model the real world" is observed in the field of information overload studies (p. 432). Since a significant fraction of research has adopted the experimental research design and assessed the effect of variation in the number of information cues on the objective and perceived degree of information overload, the effects of the immediate and broad decision-making context were not included into the research design. Moreover, since undergraduate and graduate students who lack decision-making and managerial experience rather than managers were involved in the experiments, the validity of conclusions can be always questioned.

Surprisingly, most research on information overload dates back to the end of the 1970s – beginning of the 80s, with only a few studies in the last couple of years. We attempted to find a pattern that indicates how the studies of information overload and related issues have evolved in time. In so doing, we expected to observe a correlation between the development and proliferation of the advanced information communication technologies and interest in the topic of information overload. Surprisingly, there was no supportive evidence found. Furthermore, we also expected that, while initially the experimental research would dominate, it would soon be replaced by other research methods more suitable for theory

development, validation, and expansion. Yet again, we have not observed any consistent pattern that would explain the choice of research method.

Finally, very few studies have addressed the issue of coping, providing no or insufficient explanation of how people adapt their behavior in the light of ever-increasing information load, and how they can gain advantages, instead of despair and frustration, from the dramatically enhanced availability of information. The existence of this gap, although not beneficial for the field in general, provides us with the strong motivation to undertake the research. That is why we structure the thesis as consisting of two interlinked parts. First, we address the problem of information overload. Second, we develop the lens to consider the issue of human coping and adapting.

Text Box 3. Defining information overload

Information overload:

1. ***the state*** in which the volume and speed of incoming stimuli with which an individual has to cope (i.e. information load) is beyond his or her processing capacity.(Hiltz, Turoff, 1985)
2. ***the decline*** in user performance due to the assimilation of additional information (Casey, 1980)
3. ***the failure*** to achieve a balance between the information processing requirements of the task and the information processing capacity of the unit (O'Reilly, 1980)
4. ***the decrease*** in task performance following an initial increase as a function of increasing information load (Hahn, Lawson, Lee, 1992)
5. ***the state*** when the information processing demands on an individual's time for performing interactions and internal calculations exceeds the supply or capacity of time available for such processing. (Schik, Gordon, Haka, 1990)
6. ***the receipt*** of more information than is needed or desired to function effectively and further the goals of an individual or organization (Losee, 1989)
7. ***the condition*** in which the information processing requirements exceed the information processing mechanisms available, so that the organization is unable to adequately process information (Schneider, 1987)

Chapter 3 Conceptual Model

In this chapter, we define the analytical lens of the research as a set of ontological and epistemological standpoints on which the conceptual framework rests. The analytical lens serves as a template for sense-making and guides the research design and execution. In particular, we advocate the choice of a ***contextualist research perspective***.

We further present the conceptual research model. According to the research objectives, we have divided the thesis into two interlinked parts (see Figure 8):

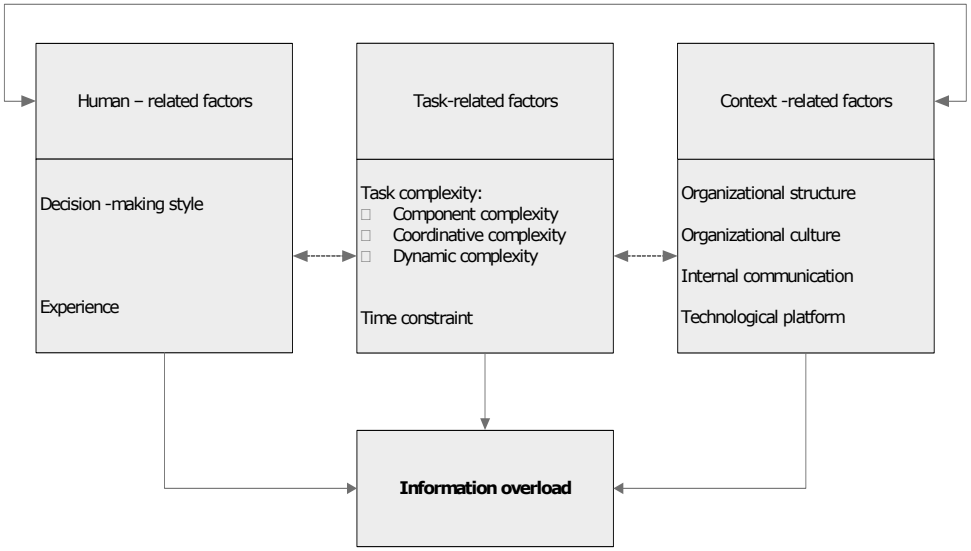
1) Conceptual model of information overload;
2) Conceptual model of coping.

First, we provide the definition of information overload and outline its structural properties. Second, we move to the concept of coping, a set of actual behaviors that individuals perform in response to information overload. The parts of this research, although different in terms of conceptual framing and method applied, are interlinked, since only after knowing the actual properties of information overload one can develop the coping structures and strategies.

With respect to the first, we suggest a definition of information overload as a process. We visualize the conceptual frame of information overload as consisting of three building blocks: the human–contingent, task-contingent, and context-contingent theories. We describe how the interaction among the three evolves. Modeling is done in a positivist fashion, with a number of propositions formulated.

With respect to the second, we start with a definition of human coping behavior. The conceptual model, in which structuration theory and adaptive structuration theory are applied together, is presented next. A brief outline of reference theories, structuration and adaptive structuration theory, and the rationale behind the choice is presented at the beginning of the section. Since the conceptual framework was developed in an explorative manner, aimed at gaining deeper insights and establishing a solid theoretical basis for further research, no propositions are formulated, rather a way of thinking about human coping is suggested.

FOCUS AREA I: INFORMATION OVERLOAD DEFINED



FOCUS AREA II: HUMAN COPING DEFINED

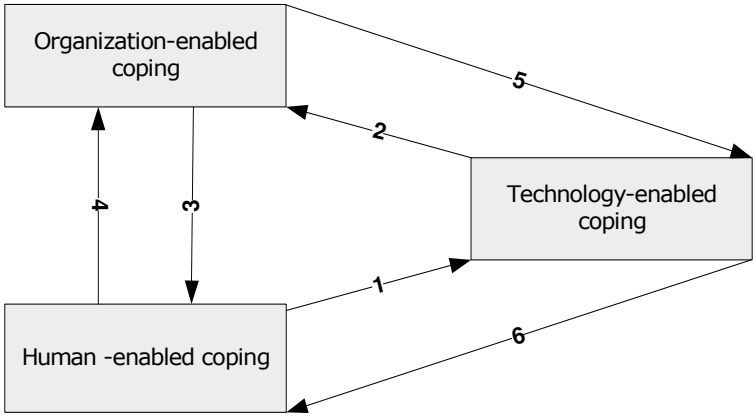


Figure 8. Conceptual research model

3.1 Contextualist theoretical lens

The contextualist research approach was first introduced by Pettigrew (1985, 1990), and has gained significant attention among MIS researchers since then (see Walsham, 1993). Pettigrew claims that process and context are equally important and should be considered in concert. Not only is process enabled and constrained by the context but also the process shapes the context itself. According to Pettigrew, the contextualist research model consists of two layers: vertical and horizontal. The vertical analysis aims at capturing the structural levels of analysis and their interdependencies. The horizontal analysis aims at tracing the process development at a certain time horizons connecting past, present, and future. As Pettigrew (1990, p.269) explains it: "Look for continuity and change, patterns and idiosyncrasies, the actions of individuals and groups, the role of contexts and structures, and processes of structuring." The outline of the principles of contextualist research and the way it is applied in this thesis is summarized in Table 7 below.

3.1.1 Vertical analysis

Following the guidelines for contextualist research, we outline several levels of analysis: individual, group, organization, and industry. We further suggest that all the levels are interconnected and should be considered through an ongoing interplay (Figure 9). Thus, we examine how the individual decision-making is embedded in and affected by the group context. Next, we include the organizational context in the analysis. Finally, by acknowledging that organizational changes are deeply rooted in and dictated by the broad industrial context, we explain the effect of the environment. At each level, we define structures that enable and constrain actions. Therefore, we perceive context not as the "passive" background against which actions take place, but as an "active" intermediating and regulating environment that defines actions and, at the same time, is changed by these actions.

We argue that under certain conditions the problem of information overload can migrate from one level to the next. Migration is bi-directional. Thus, individual information overload when accumulated can transfer to group and organizational level.

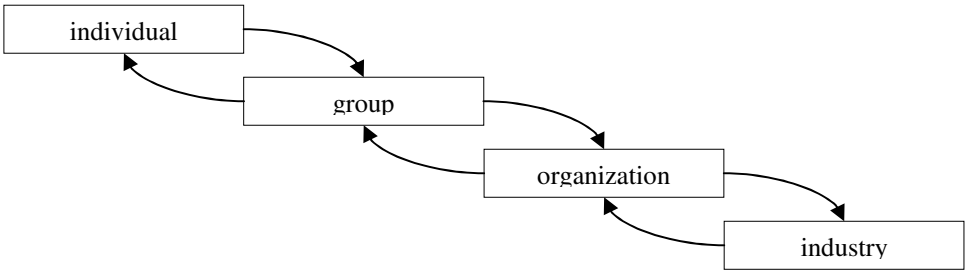


Figure 9. Contextualist lens: the interplay between different level of analysis

The examples of the shifts are straightforward. By definition, the group, the distinct organizational design entity, is an assemblage of individuals according to the certain criteria (e.g., result, accomplishment, area of expertise). Consider the situation when the group is relatively small. In that case, the performance of each group member is crucial. Similarly, if one individual cannot accommodate information load, it spreads across the group members. When accumulated, it results in group– level information processing inefficiencies and fallacies. Similar processes occur when groups and organizations are considered, and the performance of each group is crucial.

At the same time, organizational information overload can go down to the level of group and individual. When organizational information overload occurs, the information–communication fallacies impede efficient information transmission and communication, having an impact on groups and individuals.

Ultimately, the conditions under which information overload migrates from one level to another are of particular importance. In an attempt to build and formalize the migration patterns, we could not really rely on existing research endeavors. As discussed in Chapter 2, the literature on information overload is rather fragmented and insufficient, and rarely goes beyond the scope of individual information processing. What we were able to do was use the existing results in combination with common intuition to suggest the directions and conditions of migration and refine this intuition in the course of data analysis.

With regard to human coping, we similarly delineate human-enabled and organization-enabled coping, which are complementary and mutually reinforcing.

3.1.2 Horizontal analysis

In this research, we trace how the problem of information overload has evolved over time. In particular, we focus on the antecedent conditions that determined the evolution, the strength,

and the nature of the problem. We associate the information management practices inherited from the past with the current information management challenges.

3.1.3 Causal Relations

In line with the contextualist framework of Pettigrew, we assume that causal relations are neither linear nor singular. That is why three competing explanations of information overload, personality–contingent, task-contingent, context-contingent, are not taken in isolation but rather used as the building blocks for the interaction theory. The same logic is applied to coping, assuming that three types of coping can be studied through the prism of ongoing interaction.

Element of contextualist research model	*Explanation (Pettigrew, 1990)*	*Applied within the current research framework*
Vertical analysis	Refers to the interdependences between higher or lower levels of analysis upon phenomena to be explained at some further level. Context is not just a stimulus environment but a nested arrangement of structures and processes where subjective interpretations of actors perceiving, comprehending, learning and remembering help shape process.	Individual, group, organizational, and industrial level of analysis The migration of information overload from one level to another and back enabled and constrained by the intrinsic features of these levels. The ongoing interaction between human-enabled and organization-enabled coping mediated by technology.
Horizontal analysis	Refers to the sequential interconnectedness among phenomena in historical, present, and future time.	Focus on antecedent conditions from the past and their effect on current state of information overload.
Causal relations	Causation is neither linear nor singular. Changes have multiple causes and are to be explained more by loops and than lines.	Connecting three rival explanations for information overload and coping and building up the interactionist perspective.

Table 7. *Contextualist research: summary of ideas*

3.2 Conceptual framing of information overload

3.2.1 Process definition of information overload

The objective of this research project is to explore the effect of information overload on managerial decision-making and disclose the outcomes of certain coping behaviors applied in the course of decision-making.

In the simplified "black box" model, decision-making is defined in terms of information processing categories (see Figure 10). The input, more often information load, is described through a number of qualitative and quantitative characteristics. In so doing, we use a broad notion of information that includes not only quantifiable information but also verbal information that is communicated during the interactions among people and is introduced by the broad information environment (refer to Textbox 1 for the discussion on data, information and knowledge). Therefore, following Schick et al. (1990), we define information as all inputs processed to gain understanding. Modern decision-makers are confronted with complex information, of diverse types and formats. Thus, to reduce the notion of information load only to its quantifiable fraction, such as information bits, or numbers of rows and columns, for instance, would be a misrepresentation of reality that alters the validity of the conclusions.

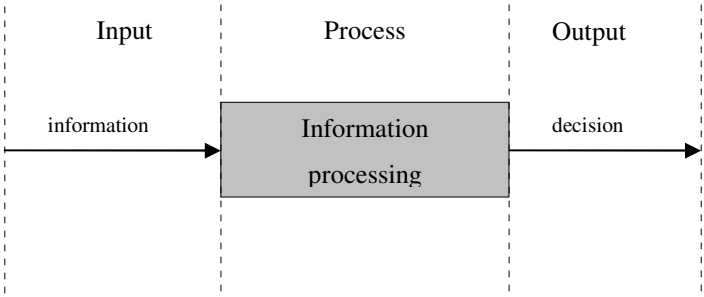


Figure 10. The "black box" model of information processing

Information is further transformed into an output, a decision of a certain quality. Information processing, bounded by the given processing capacity, mediates the input – output relation. The imbalance between information processing requirements, the difference between the given information load and information processing capacity of the unit, leads to a situation of information underload / overload challenging the ultimate decision-making outcome. The situation of underload will not be considered in the thesis.

As discussed in the literature review, moderate rather than excessively high or low levels of information load lead to the optimal task performance, meaning that neither information underload / overload states are favorable for decision making performance (for the detailed

discussion refer to Chapter 2). The available empirical investigations have proved the existence of a negative relationship between degree of information overload and decision quality justifying the actuality of the problem. However, while the attempts to demonstrate the negative effect of information overload on decision quality certainly exist, research which investigates the causes of information overload, its nature, the consequences for decision making, and which introduces the principles and guidelines of information filtering strategy, is still missing.

Text Box 4. Data, information, and knowledge

The Concise Oxford definitions of data, information, and knowledge are as follows:

1. ***Data:*** facts and statistics used for reference; things known or assumed as facts making the basis of reasoning;
2. ***Information:*** facts or knowledge provided or learned as a result of research or study; what is conveyed or presented by a particular sequence of symbols, impulses etc.;
3. ***Knowledge:*** information and skills acquired through experience or education; the sum of what is known; true justified belief as opposed to opinion; awareness or familiarity gained by experience;

While all three are different concepts, they can only be defined in relation to and in comparison with each other. The compromise on how to make a distinction between knowledge, information, and data has still not been found. One approach is to place data, information, and knowledge into a pyramid or hierarchy (e.g., Boissot, 1998). First, data, the largest in size entity, is transformed into information, the smaller entity, by executing a number of cognitive computations and assigning it a relevance value. Since the quantity of data and the quantity of information differ, a certain proportion of data does not convey the meaning. Therefore, it is not transformed into information.

Second, the fraction of information is converted into knowledge, the smallest, entity by continuous drawing on it and practical implications of it. Again, only part of the entire information pool is converted into knowledge. Moreover, while data is rather a property of things, knowledge is already the property of human agents (Boissot, 1998, p.12). Information, the middle layer of the pyramid, has characteristics of both data and knowledge, being a subset of data.

Evidently, information layer requires the data layer as a foundation, and the knowledge level rests on the information layer. Moreover, the transformation is gradual in nature since the jump from data directly to knowledge layer is not possible. The consensus on which layer should be considered as a starting point has again not been found. In some studies, it is assumed that the data layer is a starting place and information and knowledge layer are the offspring of data. Others define knowledge as primary and information and data as secondary.

Within this research, the distinction between data and information is made as follows. From one perspective, if information is the processed data with an assigned meaning and relevance, then the information overload is a tautology.

Form the other perspective, constrained by a limited processing capacity and empowered by means of selective perception, individuals tend to make decisions on how much information they want to get. While some individuals will stop far before the overload threshold, many will accept the costs of being overloaded, anticipating the benefits of obtaining potentially crucial information.

3.2.2 Information overload: structure and components

The conceptual framework is defined within the context of themes that emerged in the literature review. Figure 8 provides an overview of the assumed relations between information overload and the range of factors that appear to influence its degree and scope. The factors outlined in the diagram are a distillation of the findings and the themes from the literature review. Following the logic advocated in Chapter 2, three generic groups of factors that contribute to the emergence and proliferation of information overload are specified: personal factors, situational factors, and contextual factors. Correspondingly, the following perspectives of the information overload study, such as human–related, task-related, context –related, can be identified. Moreover, we believe that there is an interactionist perspective that attempts to reveal the combined effect of all three groups of factors.

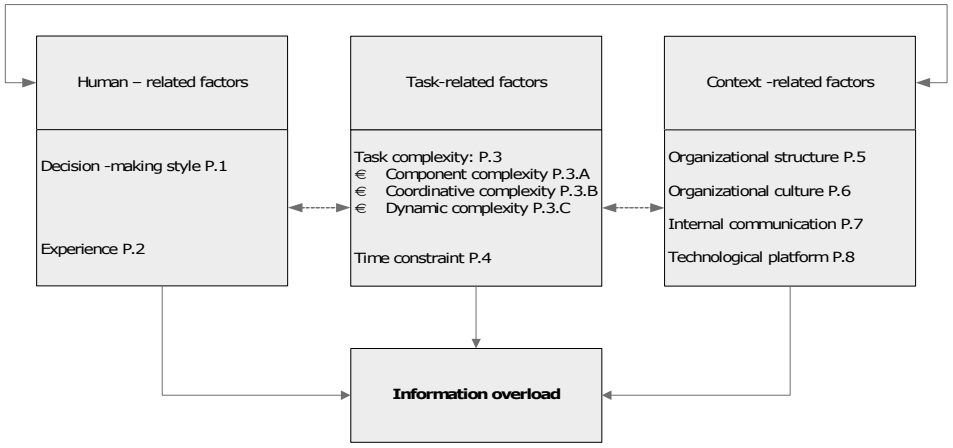


Figure 11. Conceptual diagram of factors influencing information overload

Within each perspective, a number of expected relations are specified. In the section below, we present and discuss the propositions.

Human – related perspective on information overload: personality factors

Within the human-related perspective on information overload, the effect of personality factors, factors that are internal to the person, is studied. It can be argued that in a situation when personality characteristics are incompatible with or insufficient for information processing and do not coincide with the communication requirements, the information overload takes place. The following propositions are specified:

Proposition 1: Decision-making style determines the individual's vulnerability to information overload. Information-intensive decision-makers are less vulnerable to information overload;

Proposition 2: Experience increases significantly the individual's ability to cope with increasing information growth. The greater is the experience, the less vulnerable is the decision-maker to information overload.

We will now discuss the propositions in further detail.

With respect to **Proposition 1**, decision styles refer to the behavior that an individual exhibits in the formulation, acquisition, analysis, and interpretation of information in the course of decision-making. Decision styles emphasize the structure and approach to problem solving rather than problem solving capacity. Correspondingly, the individual's decision-making style affects the way he or she collects and processes information. It provides a metric or set of rules for the way the person accumulates information from the outside world.

A number of classifications to differentiate decision-making style have been proposed in the literature and discussed in Chapter 2. Each classification emphasizes the effect of certain personality parameters and assumes the rest constant. As a result, decision-makers are placed in a small number of groups in accordance with their decision-making style. The diversity and apparent inconsistency of basic constructs as well as the multitude of measuring instruments make the literature on decision-making styles generally inconclusive and provide an inadequate basis for further research (see e.g. the critical review of existing research by Huber, 1983).

To define decision-making styles, we adapt a simplistic approach. Taking into the consideration the stated research objectives, we define the decision-making style as a function of the amount of information collected and processed and the number of alternatives considered. We assume that each decision-maker possesses a singular, dominant decision-making style, to which he is naturally predisposed. We place all decision-makers on a continuum, with *information-intensive* and *information non-intensive* decisions-styles being boundary types.

Correspondingly, we define the information–intensive decision style as keeping the options open by expanding the decision time and gathering sufficient information with no regard to search costs. Likewise, an information-non-intensive style is defined as moving quickly to

closure by making use of easily available information, prior knowledge and experience and spending minimum time on information acquisition.

Individuals with information -intensive decision styles are expected to have developed skills in absorbing and processing larger amounts of information. These skills deprive them from becoming overloaded, given information load increases. The opposite holds true for the information non -intensive decision styles. The lack of experience with absorbing large information sets and preference towards minimum information increase the risk of becoming overloaded. Hence, when the information load becomes extremely high decision makers who rely on smaller amounts of information are expected to perform better and be less vulnerable to the consequences of information overload.

With regard to **Proposition 2**, experience, the totality of events participated in or lived through as well as knowledge accumulated via this participation, has an effect on person's information processing and decision-making. Experience not only empowers decision-makers with "ready-to use" decision frames but also facilitates task learning. Learning is defined as a process or act of gaining knowledge or skill through the self-discovery or extracting from the others (Concise Oxford Dictionary).

The common idea is that experience underlies all cognitive processes and causes behavioral variations. In particular, experts tend to behave differently as compared to novices in terms of problem diagnoses, information search and acquisition, and information processing and formulating of decisions. The behavioral differences become viable when information load increases. As Snowball (1980, p. 326) puts it:

> *Under conditions of substantial information load, experience should (1) facilitate the selection of the strategy by which he is to arrive at the prediction, and [2] assist him in carrying out the processing procedures called for by that strategy. By the contrast, the novice is likely to encounter difficulties in processing the relatively unfamiliar data, particularly in identifying potentially useful stimuli, selecting working dimensions, and locating selected stimuli along those dimensions.*

Within the information overload studies, experience and task-learning are often defined as the counter-factors that can mitigate the negative effect of increasing information load. Iselin (1988), for instance, distinguishes between two effects, the one of experience and the other of task learning, and predicts that both will increase decision accuracy and shorten decision time. The ultimate decision-making performance depends on which effect is stronger. Often, as information load increases the positive effects of experience and task learning are eliminated by the negative impact of increasing load.

Since general experience mainly relates to know-how or procedural knowledge, the experience of the use of information communication technologies is of specific interest for information overload studies. Hiltz and Turoff (1985) and later Schultze and Vandenbosch (1998) traced the effect of experience with the use of groupware on degree of information overload. They observed that information overload picks up at certain stage of system use and then gradually goes down. Naturally, in the introductory phases the user lacks system-related knowledge and does not have sufficient experience of its use. As a result, the information load increases, but the processing capacities remain the same. As a result, information overload goes up. At later stages, when the technology-related experience is accumulated, the user develops coping mechanisms, applying the inbuilt functionalities. Information overload, subsequently, goes down.

Therefore, several types of experience such as overall work experience, decision-making experience, experience of information-intensive types of tasks, and IT-related experience can be outlined. While the first three define the decision-makers' proficiency in accomplishing decisions in general, the latter refers to the expertise with regard to the system use.

Task- related perspective on information overload: task-specific characteristics

The task-related perspective describes the effect of task-related factors on information overload. In particular, the impact of task specification, task mode, and the quantity and quality of task-related information available for the decision–maker will be investigated. The centrality of the task for the defining information overload is emphasized here. The following propositions are specified.

> **Proposition 3:** The risk of information overload goes up as task complexity increases.
>
> **Proposition 4:** The risk of information overload goes up as time constraint becomes binding.

Both propositions are now discussed in detail.

With regard to **Proposition 3,** the definition of task complexity was adapted from Wood (1986). He states that all tasks consist of three components: products, required acts, and information cues. Products are the observable, independent, and measurable results of acts. Acts are the required behaviors that result in the creation of a defined product. Information cues are the pieces of information upon which the decision-maker can base judgments in the course of decision-making. Wood further identifies three types of task complexity:

component, coordinative, and dynamic complexity. Propositions 3.A. 3.B, 3.C are specified accordingly (see Table 8).

> **Proposition 3.A:** The risk of information overload goes up as the component complexity of the task increases.

Wood defines **component complexity** as follows:

> *Component complexity of a task is a direct function of the number of distinct acts that need to be executed in the performance of the task and the number of distinct information cues that must be processed in the performance of those acts (Wood, 1986, p.66).*

As the number of non–repeated (non-redundant, in the terminology of Wood) acts increases the task complexity goes up, since acts are the knowledgeable behaviors of an individual that require not only prior knowledge and skills but also place demands on cognitive resources. The same logic applies to the number of information cues. The complex tasks imply the utilization of multiple, non-repeated information cues. By contrast, the simple tasks entail processing of few cues or even a single cue.

In Chapter 2 we have already discussed the fact that information overload is often considered as a positive function of the number of information cues. Combining this logic with the one of component complexity, we suggest that as the number of information cues increases the component complexity of the task goes up and so does the degree of information overload. Similar changes are observed when the number of independent acts increases.

Task complexity	*Components of task complexity*	*Propositions*
Component complexity	Number of information cues; Number of independent behavioral acts;	The risk of information overload goes up as the number of information cues increases. The risk of information overload goes up as the number of independent behavioral acts increases.
Coordinative complexity	*Timing* of independent behavioral acts; *Frequency* of independent behavioral acts; *Intensity* of behavioral act; *Location* requirements of independent behavioral acts;	The risk of information overload goes up as timing becomes binding, frequency and intensity of behavioral acts increases, and multiple locations for the behavioral acts are introduced.
Dynamic complexity	Novel information cues Novel behavioral acts	The risk of information overload goes up, as utilization of novel information cues and behavioral acts is required.

Table 8. *Task complexity: component, coordinative, and dynamic complexity and its effect on information overload*

Proposition 3.B: The risk of information overload goes up as the coordinative complexity of the task increases.

The definition of **coordinative complexity** suggested by Wood states that:

> *Coordinative complexity refers to the nature of relationship between task inputs and task products.[…] At a more specific level this will include timing, frequency, intensity and location requirements for performance of required acts. (Wood, 1986, p.68)*

The complexity of the task increases as complex timing, sequencing, frequency, intensity and locational requirements apply. At a high level of generalization, all four components of coordinative complexity increase information overload (Figure 12).

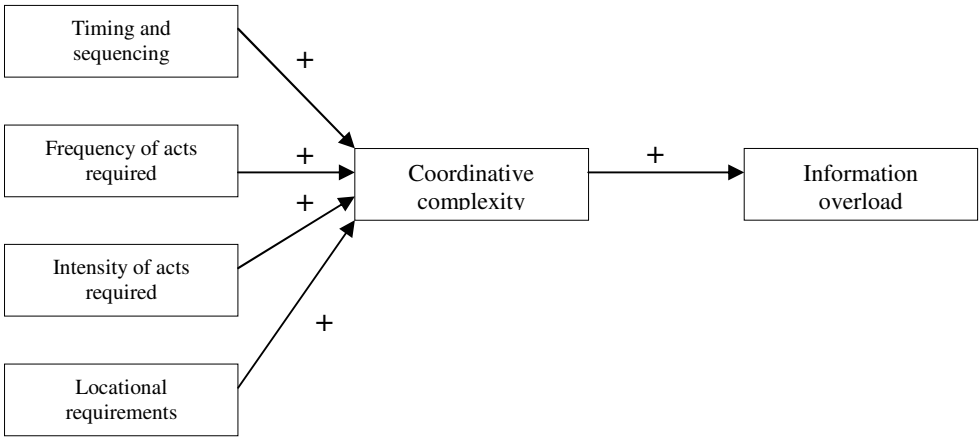


Figure 12. Coordinative complexity and its effect on information overload

While the nature of work changes constantly, the nature of organizations has been altered noticeably. In particular, the blurring of inter– and intra-organizational borders, applying flexible and mobile information – communication platforms, the absence of fixed working space, globally distributed team-working etc. have been observed. The conventional vision of the organization as a formally structured entity is more and more substituted by the concepts of team-working and virtual organizations (e.g., Lyytinen and Yoo, 2002). While acknowledging the value of formal structure, the latter changes introduce various forms of boundary crossing and boundary blurring. Naturally, the problem of coordination has shifted from the inter- and intra-organizational coordination to the individual level. The success of the individual depends largely on his ability to coordinate movements, interactions, information and communication flows. In that sense, the coordinative complexity of each task goes up.

Indeed, moving and working across extensive geographical areas and dispersed work locations require precise coordination, sequencing, and timing. Analogously, working independently and thus performing activities from different expertise areas imposes not only an extra strain in terms of required knowledge but also in terms of additional coordination efforts. Finally, intensive interactions with others both inside and outside organization can only be efficient when perfectly coordinated and synchronized.

> **Proposition 3.C:** The risk of information overload goes up as the dynamic complexity increases.

The **dynamic complexity** of the task is defined as the complexity that originates from changes in the external environment that alter existing relationships between task inputs and outputs. These changes transform task requirements in terms of acts and information necessary. To change the acts and to be able to process new information, novel skills and methods are required.

The modern business environment is characterized as turbulent, unstable, and largely unpredictable (e.g. Castells, 2001). Not only globalization and rapid expansion of business activities but also the constantly changing demand of consumers define the external environment of the company and urge firms to create novel products and services. As a result, the nature of contemporary work has been constantly changing during the last decade. Since the business environment is chaotic and random, such characteristics of personnel as flexibility, tolerance to uncertainty, and ability to learn fast and accommodate new knowledge become central. As a result, the breadth and depth of knowledge that is required to simply fulfill the daily responsibilities has expanded. Therefore, the risk of information overload goes up as the dynamic complexity increases.

With regard to **Proposition 4**, it is broadly recognized that the problem of information overload arises only when the time constraints are binding. The time constraint of a certain task is a composite function of many factors, such as the time requirements of the current task, the number of tasks needed to be fulfilled within some fixed time frame, the frequency of new tasks incoming, the hostility of working environment, and task priority. The success of a manager depends on his ability to allocate limited time resources in the most efficient way. Moreover, time pressure forms the individual perception of task difficulty, the evaluation of intensity of information input, and affects the psychological state of the decision-maker.

As mentioned in Chapter 2, Schick et al. (1990) developed an elaborate conceptual model of information overload within the time-constrained setting. They describe information overload as an interplay of information load and information processing capacity. The broad definition of information load as the "information processing demands on individual's actual time to interact with others and perform internal calculations" (Schick, et al., 1990, p.204) allows the inclusions of a wide range of variables that have a potential effect on individual perception of information overload. The information processing capacity, also defined in terms of time available to process a certain pool of information, is determined by the composition of personal cognitive characteristics and organizational factors.

Correspondingly, the information overload occurs when demands on time exceed the time available.

Quite a number of experiments have been conducted to justify the relationship between time constraint and information overload (e.g. Hahn et al., 1992). Besides simple validation of the negative effect of time constraint on decision-making performance due to increasing information overload, it is widely noted that reduced levels of motivation can be expected from a person who has a long history of working in a severely constraining work setting (e.g. Peters et al., 1984). In all, the risk of information overload goes up as time constraint becomes binding.

Context-related perspective on information overload: organizational, internal communication, and technology factors

Finally, information overload can be defined as a context-contingent phenomenon. In this case, information overload at the individual level results from higher– rank (in other words, organizational) inefficiencies. It is assumed that all individual actions are embedded in the organizational context. Through its institutions and coordination and control mechanisms, organizations enable, constrain, and define the possibilities for individual actions. Information processing, the dominant activity of individuals in contemporary organizations, is also subject to organizational regulation. Therefore, the central problem of organizations is one of determining how to organize the process of information processing. As a result, individual information processing rules and schemata are established, promoted, or even prohibited by organizational policies, norms, and resources.

Within the context-related perspective, information overload is defined as a function of various organizational variables, such as organizational structure, organizational culture, internal communication, and technology. Here, organizations are approached as information processing systems of a certain processing capacity, structure, and institutionalized behavioral norms. Information is created, transmitted, and shared across communication networks by the means of technology. Several propositions are specified accordingly.

> **Proposition 5:** The structure of an organization determines its organizational vulnerability to information overload. Mechanistic types of structures increase the risk of information overload.

The existence of a link between organizational structures and organizational information processing is largely accepted in management science. Summarizing what has been inferred

in Chapter 2 and keeping in mind the merits of this research, we suggest viewing organizations through the prism of information processing. Therefore, organizations should be approached as complex information processing systems that collect, process, use, and utilize information to reduce internal and external uncertainty and equivocality. Organizational information processing is defined in terms of processing capacity and information load. Correspondingly, the *organizational information processing capacity* is the ability to perform information-processing activities such as collection, processing, and use of information (Schick et al., 1990). Similarly to individual processing capacity, organizational information processing capacity is restricted. The organization structure is the central factor that determines the maximum of information processing capacity. Indeed, some organizations are more efficient in terms of information management than others. To explain the difference in information processing efficiency, we draw on the definition of organizational structure suggested by Mackenzie (1976) and apply the categorization of Tushman and Nadler (1978).

In brief, Mackenzie (1976) defines the organizational structure as a network of relationships or pattern of interactions that occur between organizational members. Based on the aforementioned definition, Tushman and Nadler (1978) suggest a classification of organizational structures. They claim that there are two types of organizational structures. The first one, organismic structure, the structure with tightly connected units, performs better in dealing with uncertainty since more information can be accommodated. This claim was reproved later by the social network theory. Highly connected networks, indeed, eliminate the single breakdown points and thus reduce the risk of information transmission failure.

In the second type of organizational structure, the mechanistic, the units possess higher independence. Correspondingly, the links are loose and sometimes do not exist at all. As a result, the information-transmitting path is often longer, meaning that the risk of information losses is higher.

Linking the structure and information overload, we suggest that organismic structures, more efficient in terms of information processing, are expected to perform better under the conditions of constantly increasing information supply, and reduce the risk of information overload. At the same time, mechanistic structures, where the structural units are dispersed and independent, do not have capacities for the accommodation and dissemination of large amounts of information. These structures increase the risk of information overload and are not preferable for information intensive types of companies that operate in highly volatile and uncertain environments.

However, this approach to defining organizational structure seems incomplete and over-simplistic. Thus, we suggest revisiting the definition of structure and delineating it in both vertical and horizontal dimensions. Vertically, the structure is associated with the formal hierarchy, and, thus, defines the reporting chains and the structure of management.

Horizontally, the organizational structure is more chaotic. To define it we apply the topology of interdependencies suggested by Thomson (1978). Pooled interdependency implies that each party has a discrete contribution to the whole. The contribution of one party is independent of the contribution of all the rest. In sequential (or series), interdependency the output of one party becomes the input of another party. Therefore, one party is directly dependent on another party. Finally, in reciprocal interdependency the input-output relations among units should be considered in terms of the ongoing interaction when the output of one party becomes the input of another and, at the later stages, returns as an input. Interestingly, each type of interdependency, relies on different mechanisms of coordination. Thus, in the case of pooled interdependency standardization and planning satisfy the coordination requirements. Sequential interdependency implies the active utilization of both plans and standards. In the case of reciprocal interdependency, the importance of mutual adjustment and rich communication is emphasized.

Organization information load, as mentioned earlier, is defined by uncertainty and equivocality. Both originate either from external or internal sources. External uncertainty and equivocality are created by the environment. Both the place of the organization within the external business environment and the intrinsic characteristics of this environment are important. To access the first we can use parameters, such as market share, financial results, and the effectiveness of relationships with customers. The latter is characterized by such factors, as market competitiveness, market tendencies and dynamics, market innovativeness. Correspondingly, the internal uncertainty and equivocality are the results of the inefficiency of inter-organizational mechanisms of regulation and control and should be considered in the empirical study.

> **Proposition 6:** Organizational culture affects the individual's vulnerability to information overload. Information overload is a voluntary state that indicates the individual compliance with organizational culture.

Revising the possible conceptualizations of organizational culture, Walsham (2002) suggests that culture is a collective construct that is defined through shared symbols, norms, and

values. These symbols, norms, and values can be codified. More often, however, they exist only in the minds of people and are revealed in behavioral acts. Information processing, one of the central organizational processes, is enabled, constrained, and shaped by the internal culture.

Contrary to the formal theories of organizational information processing that assume certain degrees of rationality in information acquisition, accumulating, and processing, the organizations systematically perform in a sub-optimal manner and tend to collect more information than they use.

Existing research results indicate that no matter how much information people receive they will still report that they need more (e.g., Zimmerman, Sypher, and Haas, 1996). Moreover, the empirical evidence suggests that there is "a general desire for more communication, particularly in face-to-face interaction and from sources such as "top management" and immediate supervisors" (Zimmerman et al., 1996, p.189).This desire for more information originates from the belief that more information will help to resolve problems regardless of type of problem and its current status. Zimmerman et al., introduced the concept of "organizational metamyth", stating that the desire for more information prevails and is shared across organizations. Moreover, in the work of Feldman and March (1981), organizational information processing is defined as a highly symbolic and political concept that reflects a variety of social processes taking place in the organizations (see Chapter 2 for further details).

In this thesis, we use the notion of culture in a collective sense, and apply it particularly to organizational information processing. We demonstrate how information overload becomes a part of organizational culture and how organizational culture stimulates information overload and places the state of overload into the category of "natural" states. To some extent, information overload is no longer a problem to address but the indicator of individual involvement in the daily processes and of commitment to organizational values. Furthermore, we stick to the belief that differences between organizations have a significant effect on individual information processing. In particular, the organizational information-processing climate shapes the individual's understanding of organizational values, communication habits, and competences.

> **Proposition 7:** As the amount of internal communication goes up, the risk of individual information overload increases.

Organizational information load, the amount of information generated and transmitted, is the most evident and straightforward determinant of information overload. The notion of organizational load comes from organizational communication research, in which the quantity of information transmitted is assessed.

For the purpose of the current research, we adopted the classical model of organizational information processing, which defines internal communication through its content, directions of communication flows, channels of communication utilized, and style of communication (e.g. Miller, 1995; see Figure 13).

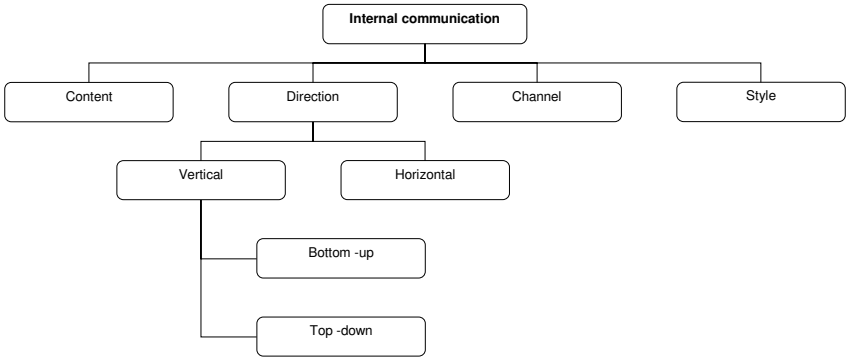


Figure 13. The structure of internal corporate communication

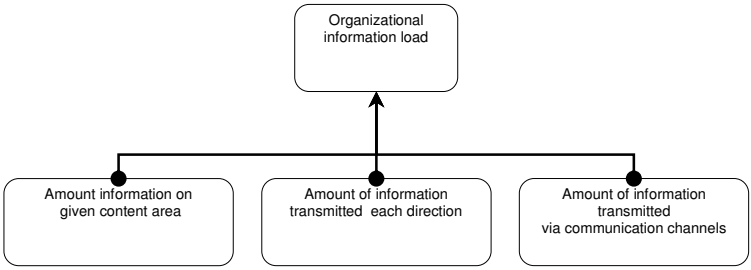


Figure 14. Organizational information load

Most generally, as organizational information load goes up the risk of individual information overload increases. To grasp the dynamics of organizational information load one can look at the characteristics of internal communication. In particular, one can evaluate the amount of information transmitted on a particular topic area (communication content), access the

quantity of information moving vertically, to subordinates and from subordinates, and horizontally, and consider the amount of information transmitted through each communication channel (see Figure 14). This notion is incorporated in Proposition 7. The mechanism of transmission of organizational information overload into individual information overload was discussed earlier in this chapter.

> **Proposition 8:** Introduction of advanced information communication technologies can cause information overload.

Besides supporting major business areas, advanced technologies provide a wide range of information processing functionalities that allow access to more information and facilitate information production and distribution.

As discussed in Chapter 2, Sorensen and Kakihara (2002), taking the position of the technology-in-use theoretical view, distinguish between four types of software, i.e. transacting, interpreting, connecting, and collaborating. Moreover, Sorensen and Kakikhara (2002) and Mathiassen and Sorensen (2002) outline four types of overload, i.e. information, structure, interaction, and transaction overloads. The link between the type of software and the type of overload is further established. By linking type of software with the type of overload, the role of technology in causing information overload is explicated.

While acknowledging the existence and significance of the relationship between the type of technology and the type of overload, we intend to use the concept of information overload as a broad notion that comprises all four types of overload mentioned above, with one or several dominating. Following Schick et al. (1990), we consider information as all inputs that people process to gain understanding (p. 207). Similarly to Schick et al., we expand the traditional notion of information overload to include that of interactions and transactions. Going further, the organizational IT platforms become more complex in terms of structure and offer the converged functionality of previously disintegrated application. Thus, ERP applications can be characterized as both transacting and interpreting; electronic mail application can certainly qualify as transacting, connecting, and collaborative. Therefore, we stick to the term of information overload, as the composite term for all four types of overloads, each having different weight within the particular context.

Human-related, task-related and organization-related perspectives on information overload: patterns of interaction

We argue that human-related, task-related, and organization-related factors, while often having an independent effect, produce certain interactions reinforcing or eliminating each other. In this case information overload is neither human–determined nor situation or context-determined but rather a consequence of their interaction.

As we can see, all three approaches define information overload differently. At the same time, all three refer to the existence of a phenomenon that is neither directly observable nor easily discernible, but which is truly perceived and subjectively determined (all attempts to measure information overload lead to the adoption of measurement surrogates and indirect measures). Thus, none of the three theoretical frameworks is directly verifiable as true. Nonetheless, employing the proposed framework to study information overload allows us to derive certain predictions, suggesting that the initial theoretical discourse is valid.

The people–determined approach allows the prediction that replacing of adjusting individual information processing and communication inefficiencies via personal training, stress coping etc., might reduce or eliminate the negative consequences of information overload. In a similar fashion, the task-determined approach suggests that using task management techniques, improving quality of task specifications, effective deadlines monitoring etc. affects the degree of information overload. Finally, the contextual approach, following a belief that the core of the information overload problem lies in organization inefficiencies, provides the basis to state that changes in organizational polices (structural changes, information systems redesign etc) will eliminate or reduce information overload.

Existing research, despite being highly fragmented and insufficient, has already indicated the need for the interactionist perspective, which claims that none of the approaches alone is sufficient for explaining information overload. Information overload consists of several facets with one dominating. In other words, sometimes a large proportion of overload is explained by the personal factors, while in other circumstances task-related or organizational factors prevail.

3.2.3 Summary

In the section above, we discussed a conceptual model of information overload. We started with a description of the theoretical lens, appointing the contextualist lens as the most appealing. We demonstrated that research on information overload and related issues implies

contextuality. Information overload can only be defined within a certain context and through this context. We have depicted the ongoing migration form one level to another and back.

We further proposed a process definition, arguing that information overload occurs in a process of transformation of information input into decision output, where information is treated as an extremely broad concept comprising all types of cues that must be processed. We accept the idea that moderate rather than excessively high or low levels of information load leads to the optimal task performance, meaning that both information underload / overload are not favorable for decision making. We further acknowledge that information overload is dynamic and evolving: the states of overload are followed by states of underload, and so on.

Next, a model of structure of information overload has been introduced. We believe that there are three groups of factors that cause information overload, i.e. human –related, task-related, and context –related factors. While all three define it differently and advocate a diverse mechanism that causes information overload, none of them seem to cover the entire complexity of the phenomenon. As a result, the need for the interactionist perspective is advocated. Within the latter perspective, information overload is treated as a product of human-related, task-related, and context-related factors in interaction.

To proceed further, after establishing the idea of what information overload is and how it is formed, we introduce the concept of coping as a response to the state of information overload. It is discussed in the section below.

3.3 Conceptual framing of coping

> *Organisms are active; they do some things and leave others undone. To pick one apple from a tree you need not filter out all others; you just do not pick them. A theory of apple picking would have much to explain (How do you decide which one you want? Guide your hand to do it? Grasp it?) but it would not have to specify a mechanism to keep unwanted apples out of your hand' (Giddens, The constitution of society, p.48; originally from Neisser, Cognition and Reality).*

The apple–picking metaphor expresses the essence of decision-making when a decision-maker is constantly confronted with the choice dilemmas of accepting one and rejecting the other. Thus he decides which information sources to use when information need is articulated, what information to consider relevant when information is collected, which alternative to support to finalize the decision, and so on. Consequently answering the questions of how and why the choice is made provides valuable insights into decision-making.

Contrary to the apple picking, however, the individual often needs to decide on how "to keep unwanted apples out of the hand". Due to the contemporary advances in information communication technologies information production, sharing, and transmission have become trivial and almost cost-free. As a result, when individuals need to accommodate the ever-increasing amounts of information and resolve unstructured, poorly defined problems it became much easier to determine the "unwanted" rather than "wanted" information. In other words, often "wanted" information is defined through its opposite, "unwanted" information. In this sense, the "filtering" mechanism is essential.

Jacoby (1984) outlined two crucial issues for information overload and human coping studies:

- Not the amount of information per se is important but the ***selection or filtering techniques*** an individual uses to make sense out of it.

- As individual processing capacity is limited and decision-makers are extremely selective, the probability that critical information will not be addressed increases significantly. This introduces the concept of ***dysfunctional information***, information that is not used in a satisfactory or intended way, often missed by the traditional, simplistic information overload theoretical paradigm.

The place of technology in the information filtering discourse cannot be underestimated. As Schultze and Vandenbosch put it, "[the] growth of computers and communications during the last several decades has caused great concern about information overload […]. Paradoxically, technology has also been called upon to provide mechanisms that enable us to cope with the information glut it has helped to generate." (p.127). Apparently, technology not only enables individual decision making by providing greater amounts of information but it also constraints one's abilities by causing information overload. Even more, technology enables individual decision making by providing the in-built functionalities that help to cope with the information overload but, at the same time, constraints it since the functionalities are predefined and often inflexible when applied.

So, to conclude that technology can resolve the problem of excessive information load would be an oversimplification. Other mechanisms of coping seem to be equally important.

In this section, we will look at various coping mechanisms that people adopt to handle the ever-increasing information load. We present first the theoretical lens of this part of the study. We start with a brief discussion of relevant concepts from the structuration (ST) and adaptive structuration (AST) theories and discuss why these theories are applicable to the study of the coping mechanisms that people utilize. Next, we speculate on the definition of coping mechanism and its components. Finally, we develop the theoretical guidelines for the information filtering study applying the structuration and AST frameworks. The analysis is undertaken in explorative, "ground touching" manner.

Structuration theory (ST): relevant concepts

Structuration theory conceptualizes the ongoing interaction between individuals and institutions that involves the production, reproduction, and transformation of social institutions (Giddens, 1984). Therefore, structuration theory is generally classified as a meta-theory that aims to provide an abstract way to understand the social aspect of organizations rather than the field-specific conceptualizations of social phenomena. Giddens acknowledged that the structuration theory, being rather general in essence, must be applied critically when adapted to a particular research field.

According to Walsham, the proponent of structuration theory in IS field, the major advantage of it is that "by introducing the duality of structure structuration theory resolves the debate between two main streams of social sciences: the ones that emphasize the process and the

ones that emphasize the context, making the context – process analysis possible" (Walsham, 1993, p. 60).

Giddens defines **structure** as rules and resources, or sets of transformation relations, organized as properties of social systems. Structures delineate through their structural properties and exist only as knowledge entities or "memory traces" (Giddens, 1990, p.17). In other words, structures are essentially non material and reveal themselves only through the human actions that produce, reproduce and thus reinforce these structures. In this way, the continuous reproduction of social order is achieved. The **duality of structure**, its enabling and constraining nature, is repeatedly emphasized. Therefore, as Giddens puts it, "the structural properties of social systems are both medium and outcome of the practices they recursively organize" (Gddens, 1984, p.374).

The knowledgeability of human actors is presumed. Giddens distinguishes between two types of consciousness, i.e. **practical consciousness**, the ability to act in a knowledgeable way, and **discursive consciousness**, the ability to explicitly describe the actions and motivations. This means that human actors are generally more knowledgeable than they can articulate verbally. While performing an action individuals always reflect on what they are doing and why they are doing it by scanning their own action, the actions of others, and the broad social and physical context. Giddens describes the **process of reflection** in the following way: "The reflexivity of modern social life consists in the fact that social practices are constantly examined and reformed in the light of incoming information about these very practices, thus constitutively altering their character" (Giddens, 1990, p. 38).

Giddens further speculates on **intention,** defining it as "[act] which its perpetrator knows, or believes, will have a particular outcome and where such knowledge is utilized by the author of the act to achieve this quality as outcome" (Giddens, 1990, p.104). Despite the knowlegeability of human actors and the intentionality of acts there is still some room for the **unacknowledged conditions** and **unintended consequences** of an action when "the production or constitution of society is a skilled accomplishment of its members, but one that does not take place under conditions that are either wholly intended or wholly comprehended by them" (Giddens, 1976, p.108).

3.3.2 Adaptive structuration theory (AST): relevant concepts

The adaptive structuration theory was elaborated in the work of DeSanctis and Poole (1994) and applied to the study of the use of groupware. It inherits the definition of structure and its

facets, the duality of structure and its continuous reaffirmation in the human act and focuses on how the structures are actually utilized.

In AST, technology is defined through its **structural features** (rules, resources, and capabilities) and **spirit**, general intent on values and goals (DeSanctis and Poole, p.126). By drawing on the structural features of technology, the social structures of signification and domination are reinforced. By drawing on the values and goals codified in the spirit of technology, both the structures of signification and legitimation are reinforced.

One of the basic concepts of AST is that of **appropriation**, the deliberate act of utilization. As such, "appropriations are not automatically determined by technology designs. Rather people actively select how technology features are used and adoption practices vary" (DeSanctis and Poole, 1994, p.129).

In the table below (see Table 9), we summarize the defining characteristics of appropriation, drawing extensively on the work of DeSanctis and Poole (1994).

Dimension of appropriation	*Description*
Appropriation move	Direct use of the structure; Relate the structure to some other structure; Constrain or interpret the structure; Make judgments about the structure;
Type of appropriation	Faithful appropriation: the appropriation consistent with the spirit and structural features design; Unfaithful appropriation: the appropriation inconsistent with spirit and structural features;
Instrumental use	Appropriation of structures for different purposes such as for accomplishing task activities, managing communication, exercising power and influence;
Attitude towards technology features	Confidence in technology use; Perceived value of technology; The willingness to use a system;

Table 9. *Dimensions of appropriation: summary (based on DeSanctis and Pool, 1994)*

3.3.3 The applicability of structuration theory and adaptive structuration theory frameworks for the current research

In commenting on the applicability of structuration theory to empirical research, Giddens claims that in accordance with specific empirical research needs, structuration theory can be summarized in ten principles (Giddens, 1984, pp. 281 – 284). In 0, we analyze how the key features of Giddens structuration theory are incorporated into the current research framework.

Key issues of ST	*ST applied to the current research*
1. All human beings are knowledgeable agents. They are aware of the conditions and consequences of what they do. They are able to describe what they do and why they do it.	1. We assume that the decision to utilize coping strategy is the deliberate choice of the human actor, in which he understands both positive and negative consequences of it and willingly accepts the risk of missing critical information or falling into the trap of over simplification.
2. The knowledgeability of factors is always bounded by unconscious and unacknowledged conditions and unintended consequences.	2. The unintended consequences of technology use are central here. Thus, in using the automatic filtering or clustering options the filtering of highly relevant information is certainly unintended.
3. The study of day-to-day life is integral to analysis of the reproduction of institutionalized practices.	3. To gain insights into human coping we look at information processing micro-procedures that individuals perform on a day-to-day basis. Understanding micro procedures sharpens our vision and interpretation of organizational-level phenomena, such as organizational information management and organization communication.
4. Routine is the predominant form of day-to-day social activities. Most daily practices are not directly motivated.	4. Most coping practices are routinized and allow for maintaining the same procedures on a day-to-day basis. The human actor maintains these routines by continuously drawing on them. To reconsider the efficiency of routines the disruptive event is necessary.
5. The study of context is crucial.	5. We acknowledge the embedded nature of human action and include the contextual factors into analysis.
6. Social identities, or roles, are “markers” in the virtual time-space structures.	6. Not implemented directly within the current study. At the same time, we acknowledge that position of the individual in the social hierarchy can be used as the information selection criterion and can also facilitate the assignment of priorities. For instance, when filtering incoming mail individuals tend to direct attention to the messages coming from superiors first, and only after to all the rest of the messages.
7. No single meaning for constraint exists.	7. The constraints were considered as both constraining and enabling, with no single interpretation possible.
8. The importance of structural principles since they specify overall type of societies	8. Not defined since it does not comply with the research scope.

Key issues of ST	*ST applied to the current research*
9. Power as the first-order consideration in the social science research.	9. We define organizational information processing as a symbolic, often irrational process that replicates the power relationships. We assume that the power relationship not only defines the directions of information and communication flows, but also their content, frequency, and intensity. We also demonstrate that power is often a central factor in human coping analysis, since it provides the explanations of why certain structures are used and others are rejected and how the structures are institutionalized.
10. Absence of the mechanisms of social organization or social reproduction identified by social analysis, which lay actors cannot also get to know about and actively incorporate in what they do.	10. This general attitude to research findings and their perceived value for human actors under the study is adapted straightforwardly.

Table 10. *The use of ST: applicability of ST framework for the study of human coping*

To summarize, in line with the suggestions made by Giddens, the ST framework was not used as the concrete research program but rather as a way of thinking about the subject matter. By drawing on the duality of structure and the ongoing interaction between human agency and social structures, we attempted to define and relate three generic types of coping and identify the role of technology. To do this, we assumed that individuals are knowledgeable agents that possess a certain degree of freedom in choosing the actual behavioral path. They act on the basis of personal routines that are the form of habitual, mechanic behavior that is deeply embedded and shaped by the individual's prior knowledge and experience. Organization, the abstract social system, is revealed and described through its structural properties. Thus, the structures of signification define directions for organizational sense-making. The structures of domination determine the asymmetry of power and allocation of resources. Finally, the structures of legitimation define the set of legitimate behaviors and norms. Technology represents the characteristics of modality, as Walsham puts it, "by embodying interpretive schemes, providing coordination and control facilities, and encapsulating norms" (Walsham, 1993, p.64). The individual, confronted with the structures, has a freedom to decide on how to use the structure. Assuming that structures are revealed only through human actions, we suggest that coping strategies are important only if continuously applied. The nature of appropriation of the structure is crucial. Here, the adaptive structuration theory is used mostly.

We further exploit the dual nature of structure, both enabling and constraining, to demonstrate that all coping strategies, from one perspective, enable the human actor to

survive an immense information load, from another, though, they constrain him by making him dependent. We demonstrate that besides being knowledgeable, human actors regularly overlook certain conditions and are unaware of some consequences, which cause them to miss of critical information.

3.3.4 Human coping with information overload: central definitions

Structuration theory resolves the debate between the social structure and the agency and defines them via ongoing interaction. Thus, the human agent draws on the social structures and by that reinforces or alters these structures. This solution to the debate makes the theory unique, and favored by the social scientists, in general, and the researchers from the Management Information System field in particular (Walsham, 1993, 2002; Orlikowski, 1992, 2000; Orlikowski and Barley, 2001). The use of structuration theory enabled us to focus on individual decision-making but at the same time to be able to construct the contextualist approach and depict the recursive human-context interactions. In the section below, we elaborate on basic definitions, drawing extensively on the structuration theory framework.

Based on the context of the themes, which emerged in the literature survey we make a distinction between three types of coping, i.e. human –enabled, technology-enabled, and organization –enabled. The enabling entity, in particular the entity performing the filtering, selection or clustering functions, such as the individual, technology or organization correspondingly, is the criterion for the classification.

Human –enabled coping is defined as removing the unwanted pieces of incoming information by means of knowledgeable reasoning, selection and organization, and enhancing the human information processing capacity by using limited cognitive resources more efficiently. Individuals employ a number of routines to cope with the information overload. Each routine is a form of habitual, and, in a way, mechanical behavior that is deeply embedded in and shaped by the individual's knowledge and prior experience. These routines are often performed automatically with individuals not immediately aware of why certain actions are executed. In addition, the routines are stable and repeated. In terms of structuration theory, human-enabled coping can be associated with the agency. It is broken into three components, i.e. communication, power, and sanction that, according to the ST, are intrinsic parts of the human action. Thus, the individual action includes the elements of assigning meaning and interpreting where personal routines are demanded mostly. Moreover, the process of sense-making is supported by the notion of power, norm, and legitimate

behavior. Thus, for instance, in selecting which electronic mails to read and which to leave unattended the individual applies certain interpretive schemes that help to formulate the expectations about the content and to assign meaning and relevance. Often individuals make this decision based on the date, sender, the indication of subject and other "signs". The previous experience of handling emails guides the process of selection. At the same time, the individual draws on the concept of power, under which the information requests and the information reports from superiors often have the highest priority and are credited with the highest value and relevance. Next, in choosing a certain mode of behavior, an individual complies or disobeys the social norms, thus defining his position with regard to the broad social context.

Technology-enabled coping implies the use of inbuilt technological features and functionalities aimed at filtering out the unwanted information. According to AST, technology is defined through its structural features and spirit that, if combined, form its structural potential. Technology inherits all the characteristics of modality since it embodies the interpretive schemes, enables and facilitates coordination and control, and contains the rules and legitimate behaviors (e.g. Walsham, 1993, 2002).

The ***organization-enabled coping*** embraces the filtering of information streams by means of organizational restructuring, calibrating of organizational information management activities, and imposing certain cultural and behavioral norms. Applying the ST, we approach the organization–enabled coping through the prism of social structures, and introduce the concept of coping structure.

Organizational coping structures are the ***rules*** and ***resources*** employed to deal with the information overload. It is not a random deviation path or an error but a patterned, adaptive response to a problematic situation. It permits an individual to adapt and survive. The explicit reference to rules and resources is crucial. Resources here include the entire set of possibilities that organizations provide (e.g., information banks and data bases, communicational resources); the rules comprise all norms and regulations, both formal and informal, that define the actual use of resources.

The organization-enabled coping structure is represented in terms of three interconnected dimensions, i.e. dimensions of signification, domination, and legitimation. Thus, for instance, management by exception, the organization initiative that promotes the idea that only "exceptions" must be communicated upward, is defined as follows. First, it has the dimension of signification, since it suggests the exact template for the information processing. Second, it has the dimension of domination, referring extensively to the concept

of superior–subordinate and defining the patterns for the upward communication accordingly. Finally, it has the dimension of legitimation, since it introduces the norm for the internal communication and defines the legitimate behaviors.

These structures both enable and constrain sense-making. By providing a certain scenario, the structure empowers the individual actors with the set of selection criteria that simplify the process of assigning value and defining the relevance of the piece of information. At the same time, the structure restricts the actor to a certain options and prohibits the rest.

For the examples of each type of coping, see Table 11. These examples were extracted in the course of the literature review and empirical data analysis.

Human –enabled coping	*Technology-enabled coping*	*Organization-enabled coping*
The use of prioritization schemes; Individual time and task management; Reducing the amounts of incoming information through deleting and diverting the information source;	In-built filtering rules; Classification, rearrangement and visualization of data resources; Clustering; Content management; Decision aid; Advanced search tools; Organization of work processes; Awareness software;	Structuring of organizations and defining boundaries; Information management initiatives; Standard operating procedures; Task and time management; Corporate culture;

Table 11. *Human coping with information overload: examples*

Facing the dilemma of either accepting the intense and burgeoning information-communication strain, or possibly threatening the performance via filtering out the relevant information or rejecting the important communication acts, an individual utilizes the composite coping strategy.

3.3.5 Human –enabled, technology-enabled and organization–enabled coping: the model of structuration

In this section, we develop the analytical model of human coping by linking three types of coping and revealing the analytical framework behind it. The definition of all three types of coping was presented in the section above. Applying the terminology of ST and AST, human–enabled coping routines are the structures in action, while organization-enabled structures belong to the group of social structures that ultimately define the social system. Technology–enabled structures comprise both human mental schemes and organization-enabled coping structures that are either mimicked, and thus produce the exact copy, or changed, and thus produce a new, purely technology feature. To make it more concise, when defining coping (see the previous section for the details), we deliberately emphasized the

enabling entity, resources involved, and rules applied. Naturally, neither human-enabled, nor technology-enabled nor organization-enabled coping alone seem to be sufficient in dealing with information overload. The individual applies a mix of all three. The graphic representation of projected interaction patterns is presented below (Figure 15). All three types of coping structures are constantly intertwined, which results in production, reproduction, and change of social structures. Below we describe the nature of the observed relationships in detail.

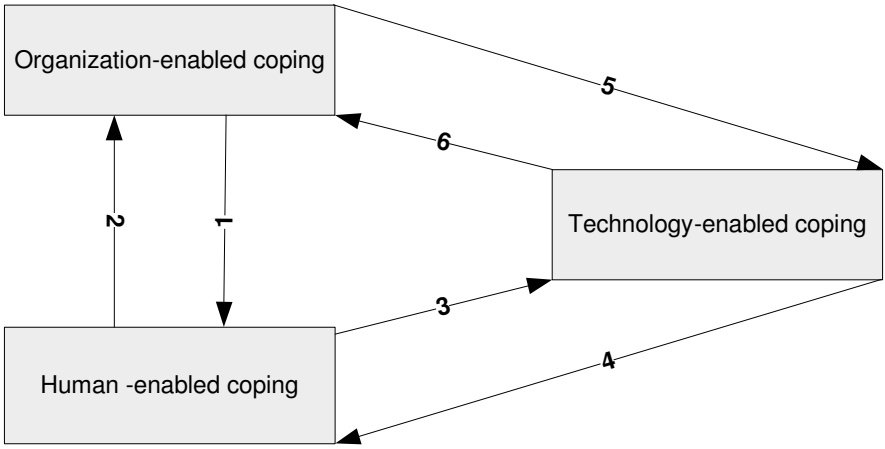


Figure 15. Human coping: the structuration model

(1) + (2) All human actions are situated and thus are enabled, restricted, and shaped by the organization. Organization assigns legal power and capacity to human coping, and restricts and shapes it (arrow 1). The social structures are reinforced or altered by humans drawing on them. In this way, the existing social order is supported or change (arrow 2).

As we have suggested earlier all actions are embedded deeply in the broad organizational context. Organizations enable certain human actions and prohibit other, they shape human actions by ascribing the structure and sequence of independent acts, and they define the formal and informal rules and procedures. Individual information processing, being an important subset of human actions, is defined by the organization. Where the information should come from (structures of domination), how the value of information should be determined and how it should be processed (structures of signification and structures of legitimation) and where to transmit it further (structures of domination): all these are legalized and standardized by the organization. In other words, organizations develop a wide range of structures that directly or indirectly address the need of reducing information load.

The actual process of legalization and standardization differs significantly. Thus, the sense making can be defined in terms of standard operation procedures, job descriptions and methodologies, where each step of information acquisition and information processing is defined, the approach to information analysis is prescribed, and the expected result explicitly stated. At the same time, it can be accomplished in a rather informal fashion, when the informal, although largely accepted, traditions of organizational information processing become central.

Human actors always have a freedom to act otherwise. In faithfully appropriating the structure, they reconfirm the existing social order. In rejecting the structure or emphasizing its impaired nature, they initiate the process of change that results in transformation of structures of signification domination, or legitimation. For instance, being acquainted with the standard operating procedures the individual may choose to act differently, thus introducing novel interpretive structures, drawing on novel resources, and advocating alternative norms. By rejecting the existing structures, the individual alters the social order. As soon as the alternative behavior is routinized and accepted by other human actors as valid and legitimate, it is said to acquire the properties of the structure. Therefore, the process of appropriation of the organization – enabled structures by human actors is important since it determines the ultimate outcome and effectiveness of organization-enabled coping. The active rejection of the structure by human actors or its unfaithful appropriation undermine the effect of organization-enabled coping and make the effort to address the issue of information overload from the organizational standpoint largely unsuccessful.

> *(3) + (4) Human mental coping schemes are implanted into technology (arrow 3). Technology enables and constraints human coping behavior by providing a certain pool of technical capabilities and features. The human actor appropriates technological structures in one way or another. (arrow 4).*

When collecting and processing information, human agents employ interpretive schemes. These schemes are systematic, patterned templates for action. They are essentially non-material, exist in the human brain, and are enacted by human drawing on them. The schemes represent the form of accumulated knowledge or experience situated in the broad context. For instance, when an individual assigns certain relevance to pieces of information and makes the decision on what to process further and what to leave aside he draws routinely on the interpretive schemes from his mind. Thus, he may look at the content, and based on prior experience evaluate its relevance for the current decision-making process. Alternatively, he

may look at who is the originator of the information and predict the relevance accordingly. Or he can pay attention to the various symbolic characteristics and guess the relevance.

Prior to the invention of information communication technologies, the individual was the only one responsible for information collection and processing. All filtering, systematization and categorization was accomplished in the human mind by means of logical reasoning and reflection. Most procedures involved in this filtering, through being continuously repeated, became routinized. As a result, the individual was able to act knowledgably without even knowing it, and when asked was not really capable of explaining why the certain action was performed.

At the later stages, these schemes were incorporated in technologies intended to improve the overall information processing efficiency and overcome the human cognitive limitations (see Figure 15, arrow 3). The resulting technology schemes can be a straightforward replication of the existing interpretive schemes, or novel schemes obtained through augmenting, changing, or combining of existing ones. For instance, putting all the papers into the garbage can is a sense-making scheme used when information overload is high and no further processing is desired. This scheme is mimicked, for instance, in electronic mail software allowing for cleaning up the entire mailbox. Similarly, structuring, sorting, and organizing the incoming mail is based on the combination of different interpretive human schemes and thus, in the end, produces a novel, technological structure with augmented functionality and restrictiveness. Since being incorporated in technology, these schemes have acquired the property of stability, leaving limited or no space for change and forming the structural features of the technology.

Technology facilitates the human performance in certain tasks by providing inbuilt functionalities and resources and sustaining certain norms and standards (see Figure 15, arrow 4). However, technology not only enables actions but also restricts them. By providing a pre-defined range of functionalities, pooling certain resources and facilities, propagating preset norms and standards, the use of technology feature prohibits alternative ways of acting. Regarding this, the following example can be representative. Deciding to use the automatic filter of incoming mail, a human actor runs the risk of missing potentially important information that has not complied with the specified selection criteria. At the same time, the use of a filter enables the actor to process information efficiently. To summarize, on one hand technology features secure higher information processing efficiency by collecting, filtering, and organizing information. On the other hand, they impose limitations on how

information is collected, organized, and formatted, and thus constrain the decision-making process.

Technology –enabled coping structures are brought into action by humans actively drawing on them. This is why the process of appropriation as defined by AST is important. The previous example on inbuilt information filters can be extended to clarify the matter. Thus, the existence of filtering functionalities per se does not have any meaning, or in a way, significance either for the human actor or for the organization unless applied. At the same time, as instantiated by the human in one way or another, it has an impact on human actor by first enabling and constraining his information processing, and second by reaffirming or changing the information processing practices utilized within the organization. In the latter case, when used repeatedly, the utilization of inbuilt filters becomes institutionalized and defined as the accepted information processing compliant with the organizational culture. The same logic applies when the structure is not instantiated in human actions or is instantiated in a specific way that conflicts with the initial motivation behind this structure. Continuously rejecting the structure, such as by refusing to use the in-built filters, the human actor initiates the change process that leads to the substitution of the existing structure by a novel one.

> *(3)+ (4)+ (5) + (6) The organizational structures are implanted into technology (arrow 5). Technology becomes a repository of replications of human-enabled and organization-enabled coping structures. Human action is enabled and restricted by the technology features, their availability, flexibility, and adaptability. By appropriating the structures implanted into technology, human actors reaffirm or change the existing social order.*

In this scenario, all the three types of coping come together. They are organized under the integrate framework, the model of structuration. Interestingly, technology mediates the human – organization relationship in the way discussed below. Organization, as a social system, is determined in terms of its structural properties. Technology replicates the organizational structures, either by producing the "copy" or the novel structure. For instance, in decision support systems the social structures of signification and domination are implanted into technology. This legitimizes the particular way of sense-making and results-reporting and discourages others. Via the system design, the organizational hierarchy is implanted into it, and a certain allocation of coordination and control powers is maintained. Thus, the structures of dominations are realized. Finally, by the implementation of data codification, the standardization and the unification of information formats, the structures of

legitimation are translated into technology. Technology mediates the organization–human relationship, and is referred to as a certain meeting-point, where the individual is confronted with the existing social order. By using technology in a certain mode, the human actor either reinforces or changes the former organizational structures. In that way, certain information management initiatives are supported or rejected. Similarly, the organization of internal work processes is accepted or altered, and the elements of internal corporate culture reaffirmed or denied. Importantly, the individual has a relative freedom to choose which structures to use and how to use them. Which structures are used and how they are used determine the ultimate outcome. Therefore, again, the appropriation process is crucial.

We further augment the model of structuration by suggesting the "cost-benefit" analysis framework. In particular, we imply that information selection is a twofold process of accepting relevant information while rejecting the irrelevant information. We specify four possible outcomes of selection and three related types of selection errors:

- Filtering out of irrelevant information while accepting the relevant information;
- Filtering out some irrelevant information, accepting the relevant information plus a fraction of irrelevant information;
- Filtering out the irrelevant information plus a fraction of relevant information, accepting the remaining relevant information;
- Filtering our relevant information and accepting irrelevant information.

Obviously, there is only one desired state (State 1). The probability of occurrence of the three remaining states differs significantly and depends on a large range of factors such human qualities and experience, the quality of incoming information load, and the characteristics of tasks. State 4 is the least desired, since the consequences are the most observable and the most threatening ones.

Each filtering mechanism can be analytically evaluated in terms of its potential to produce one of the three errors mentioned above. For instance, utilization of the inbuilt filters increases the risk of filtering out some potentially relevant information that does not satisfy the filtering rule. At the same time, when filtering logic is loosely specified, it increases the risk of accepting large amounts of irrelevant information. Obviously, the "delete everything rule" often applied in the case of extreme information overload equalizes the risk of rejecting the relevant information to one.

Besides considering the potential risk of missing critical information, the individual evaluates the efforts of utilizing the particular coping mechanisms as compared to the expected benefits of its use. Thus, the risk and efforts of use constitute the costs side of mechanism utilization, while more efficient information processing and improved decision-making performance are the benefits.

In other words, the individuals actively select how to use the existing coping mechanisms, in which combination, and to what extent. Thus, coping practices vary significantly not only across the organizations but also among the individuals. The nature of the coping practices applied determines the ultimate decision-making outcome.

3.3.6 Summary

In this section, we have looked at various coping mechanisms that people adopt to handle the ever-increasing information load. We deliberately applied an explorative stance, relying on both existing research endeavors and our own understanding of the theme of the research. We defined coping ***rules*** and ***resources*** that an individual employs to deal with information overload, claiming that it is not a random deviation path or an error but a patterned, adaptive response of human being to a problematic situation.

We have outlined three types of coping using the enabling entity as the classification criterion, i.e. human-enabled, technology–enabled, and organization-enabled coping, and provided the practical examples of each. We suggested further that instead of sticking to one type of coping, the individual applies a mix depending on the actual structure of information overload and expected costs - benefits of utilization.

At the end, we focused on the ongoing interaction among the structures, paying specific attention to the role of technology. The structuration model of interaction was proposed, explaining the rationale behind the interaction and visualizing the existing links between the three types of coping mentioned above.

Chapter 4 Research Methodology

In this chapter, the methodology and general approach to the empirical inquiry are discussed. The choice of methods indirectly determines the ultimate results of the research. Therefore making this explicit is crucial. The explorative character of the research implies the accomplishment of various research objectives and includes the elements of description and explanation.

The chapter is organized as follows (Figure 16). First, we define the research perspective and research scope, and suggest that the current study inherits elements from multiple disciplines. We proceed with the discussion of the case study research methodology and explain why it has been chosen. The next section uncovers the process of case sites selection. Afterwards, we introduce two parallel methodological approaches and explain the rationale behind this methodological duality. First, we discuss the method and research design of the information overload study. Second, we discuss the study of human coping. We suggest that, although both belong to the case study research, the study of information overload has been accomplished in the positivist manner (Yin, 2003), while in the study of human coping we have utilized the interpretive approach (Walsham, 1995 Klein and Myers, 1999). Finally, we integrate the two studies, outline their potential limitations, and make some concluding remarks on the quality of the research.

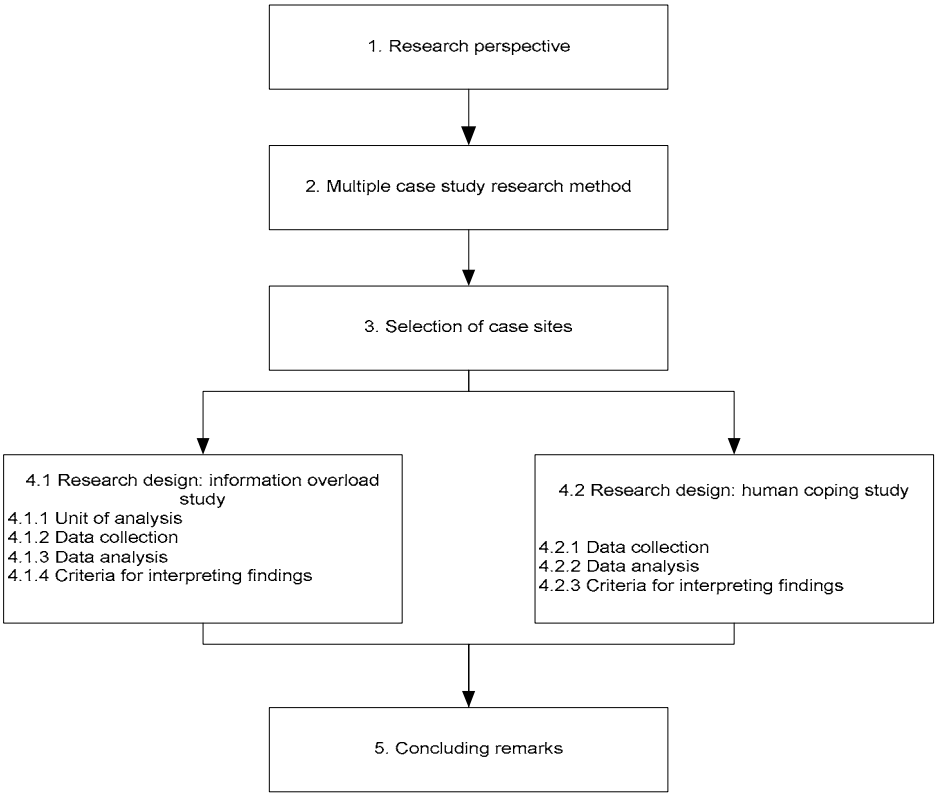


Figure 16. Research Methodology: structure of chapter

4.1 Research perspective

In Chapter 2, we have argued that the concept of information overload is too complex and multifaceted to be considered from a single perspective or theoretical standpoint. For instance, information overload can be discussed from a purely technical perspective. In this case, automatic information filtering, artificial intelligence, automated decision aids, and system architecture and design are central. Correspondingly, computer science and engineering disciplines will most probably guide the inquiry. Similarly, one can discuss a variety of individual or organizational aspects and focus on the social facets of information overload. At this point, selected concepts from sociology, psychology, philosophy, management etc. will be considered.

In this thesis, we apply a contextualist research perspective that assumes the situated nature of human actions. We first study individual decision-making using a behavioral decision-making approach. Next, we place the individual decision-making within the broad

organizational context. In so doing, we rely on information processing theories of organizations. We emphasize the role of technology as both the cause of information overload and the potential source of coping structures. In addressing the technology, we consider the technical and social aspects of it and the interplay between two. Such a synthesis is particularly beneficial for this information overload study.

A similar multidisciplinary approach is applied in the human coping study, where we use concepts from behavioral decision-making, information management, information technologies, and organizational studies. The structuration theory is used as a meta-theory that helps to bridge the concepts from the different fields and develop a coherent theoretical framework.

4.2 Multiple Case Study Research Methodology

In the design of this thesis, the general recommendations of Yin (2003) on the case study research design were closely followed. The MIS-field specific advices of Lee (1989, 2003) were applied as well. In the process empirical data analysis the instruments suggested by Miles and Huberman (1994) were used.

The conceptual model of information overload includes a large number of variables and relationships. Moreover, most of the relationships are time-dependent and should be considered in a dynamics rather than in a stable setting. Therefore, we believe that the case study provides a number of indisputable advantages for the current study.

Yin (2003) suggests three criteria for choosing the **research strategy,** i.e. type of research question, control over behavioral events, and focus on contemporary versus historical events. Each of the three is discussed in detail below.

Text Box 5. Research Questions

(1) What is information overload? What are its structure, major components, and determinants?

(2) How do individuals relate their own micro-procedures and daily practices to broad organizational and technological measures to be able to adapt to the situation of information overload?

1. The type of research question

We make a distinction between two focus areas within the research and thus formulate two research questions (see Text Box 5). First, we aim to understand **what** information overload is and **what** are the major components and determinants of overload. These questions are exploratory in nature and are posted in order to gain better understanding of the phenomenon of information overload.

Second, in the course of the study we continuously look at **how** people adapt and gain advantage from the ever-increasing information load. We address a number of sub-questions here:

- What are the micro-procedures that people adapt in responding to the increasing information load?
- How do these micro-procedures evolve?
- How are the individual micro-procedures linked to the organizational and technological adaptive measures?

These questions contain elements of exploration and explanation, with an emphasis on exploration.

2. Control over behavioral events

The problem of information overload was traditionally studied in an experimental setting (see Chapter 2 for further details). However, it has evolved significantly during the past decade, shifting the focus from the individual to the entire organization. Due to this, information overload inherits elements of the context that cannot be easily replicated in an experiment. Moreover, we believe that the imposition of any control upon the decision-maker will inevitably lead to behavioral biases and distort the actual behavioral patterns.

Given the lack of control over behavioral events, the use of the case study research strategy is preferred.

3. **Focus on contemporary versus historical events**

According to Yin, case studies are recommended for examining contemporary events. As such, information overload is a contemporary phenomenon that has progressed and proliferated deeply in the business environment during the last decades.

The **multiple case-study research** was conducted to increase the external validity of the research. According to Yin, multiple case studies allow for replication. In particular, he distinguishes between two types of replication. First, literal replication implies obtaining the same results in a series of cases. Second, theoretical replication implies obtaining different results but for predictable reasons. The issue of replication will be addressed in more detail later in the chapter.

4.3 Selection of case sites

A number of criteria governed the process of case sites selection:

1. **Feasibility of research project**

The research project must be feasible, meaning that the size and profile of the sites should fit all feasibility constraints such as, for example, time, budget, and accessibility constraints. For this reason we targeted medium–sized companies (such as REKLAME in Case II) or functionally–independent divisions of larger companies (such as the Intermediary Division of ING Bank in Case I, SoftCOM, IDT Division in Case III).

2. **The principle of theoretical sampling**

The selection of the site must comply with the principles of theoretical sampling summarized in the work of Eisenhardt (1989) and Strauss and Corbin (1998). Theoretical sampling, as defined by Eisenhardt (1989), is sampling that is based on non-statistical reasons. The intentions to understand, explain, and describe, rather than test, motivated the selection of sites. In particular, in selecting the sites the prevalence of information overload was not defined as the central criterion but rather its components and structural properties.

3. **The process of interest should be transparently observable or has the greatest chance to be observable**

The company should acknowledge the existence of the problem of information overload at both the individual level and the company level, and place increasing value on information management initiatives

4. **The guaranteed access to multiple hierarchy levels and various functional areas within the organization**

The study is accomplished under the contextualist research framework, in which individual actions are deeply embedded in the context. For the purpose of the study, the context is delineated across the vertical and horizontal dimensions. To do this, we should be able to have access to both different levels in the hierarchy and various functional areas.

5. **The information-intensive type of work**

Individual participants must be qualified as professionals and perform non-trivial information processing acts in the course of daily work. Moreover, we shall specifically look for individuals who actively utilize various ICTs and acknowledge explicitly the significant role of ICTs in daily work.

4.4 Research design: methodological duality

The actual research design consists of two interlinked parts: the study of information overload and the study of human coping. As mentioned earlier, two central research questions were formulated. At first, we focus our attention on information overload, its structural components, and the interaction among them. We proceed with the study of coping structures in an attempt to understand how human actors react to constantly increasing information load. Although both questions are explorative in essence, we have used different approaches for data collection and analysis. This methodological choice, in particular the methodological duality, was dictated by the current state of research in the associated areas. In particular, there is the number of studies of information overload that can be used as a theoretical foundation for the research design. In the literature review the relevant constructs were identified, the central causal relations were suggested, and certain interaction patterns were observed. In this way, the results of the extensive literature review were organized into the conceptual model and the list of analytical positions was specified.

By contrast, the research on human coping is rather immature. Both the theoretical foundation and empirical evidence are relatively lacking. The need for data-driven theory-building is therefore articulated. Although the range of potentially relevant constructs was specified in the course of the literature review, none of them was guaranteed a place in the

resultant theory (Eisenhardt, 1989). In designing this part of the research, we applied the guidelines of Eisenhardt (1989), Strauss and Corbin (1998), and Klein and Myers (1999).

4.4.1 Research design: information overload study

Yin defines research design as consisting of five components that must be explicitly specified by the researcher (Yin, 2003, p.21). These components are the study question, the propositions, the unit of analysis, the logic of linking data to propositions, and the criteria for interpreting findings. In Table 12, we summarize the research design components as applied within this study.

Components of research design	Specification
Study question	Exploratory "what?" question: What is information overload and what are the major components and determinants of overload?
Propositions	Prior to the field research we formulated the conceptual model with a set of propositions that connect the conceptual variables and explain the nature of the relationship.
Unit of analysis	Individual situated in the context. Context acts not as passive background but as enabling and restricting entity.
Logic linking data to propositions	Addressing rival explanations, pattern matching, logic modeling
Criteria for interpreting findings	Construct validity, internal validity, external validity, reliability

Table 12. *Research design (adapted from Yin, 2003 and extended)*

The nature of the research question has been already discussed in the section above. The process of formulating propositions, defining and measuring the central constructs, as well as the logic linking data to propositions, will be addressed in more detail in the section on data collection and analysis. We will resume the section on research design by discussing the criteria applied to assess the quality of the research.

Unit of analysis

We defined an individual decision-maker as the focal unit of analysis. However, we claim that all individual actions are embedded in the context. Therefore, context, instead of being a stage for the individual actions, in our interpretation plays an active role by both constraining and enabling human actions. The context has been divided into several vertical levels: group,

organization, and industry context. Moreover, historical perspective was considered when necessary. The contextualist research framework, proposed in the series of works of Pettigrew and selected pieces from structuration theory, determines the logic that we use to treat the context and define the interactions between context and action. For detailed explanations, please refer to Chapter 3.

Data collection

The empirical data was collected in the period from October 2003 to September 2005. Semi-structured, in-depth interviews were the primary means of data collection. At each site, interviews were held during a period of several months. The author carried out all the interviews. All interviews were held in person. Several follow-up telephone or email interviews were scheduled. The follow-up interviews aimed to verify the researcher's interpretation of the information obtained. The interviews followed closely the interview protocol, the formal document that includes the procedural remarks and the list of possible questions.

In total thirty eight people were interviewed in the course of data collection. Most of them held managerial positions and were engaged in one or several projects. All interviews were recorded and transcribed later.

The researcher took detailed notes during each interview. Eisenhardt (1989, p. 538) defines field notes as "a running commentary to oneself and /or research team". Notes comprise the researcher's ideas and reflections on what is happening in the course of the interview and include the elements of both raw data and initial sense-making. The notes were taken during the interview sessions and in the course of observing the participants and field setting. The notes were converted into digital format (typed) immediately after the interview.

The second method of data collection was observations. The methodology literature distinguishes between two types of observation, ad-hoc and participant observations (e.g. Barley and Kunda, 2001). Only the ad-hoc observations were feasible. The researcher observed the field and the participant during and straight after the interview session. In addition, in REKLAME the researcher was allowed to attend the monthly corporate meeting.

Multiple secondary sources of data were used, such as information from the corporate web-site and internal information systems, financial statements and reports in the mass media. Data from these sources was essential for improving our understanding of the organization as the context.

Data analysis

In this section, we describe explicitly how we formulated propositions, defined the central constructs and translated them into the interview instruments, how the patterns of relationships were captured, and how the data from interviews were connected with the propositions. In agreement with the case study approach of Yin, we believe that the way of which data will be analyzed must be determined, to some extent, at the early stages of research when the propositions are formulated. In this way we ground current research into the existing theoretical endeavors, outline explicitly the theoretical framing, and formalize the link between theory and empirical data.

Step 1: Formulating propositions

The logic that guided the process of formulating propositions is as follows. To a large extent it was inspired by the work of Markus (1994) and the related work of Lee (1989) and the extensive literature review.

In studying information overload we present four alternative approaches. All four aim to explain what information overload is. All four theories refer extensively to the existence of phenomena that are neither directly observable nor easily discernible: cognitive styles, decision-making styles, task complexity, organizational culture, organizational information processing, efficiency and effectiveness of technology, and social interactions. None of the four approaches is therefore directly verifiable. However, all produce predictions of events that would be observable. As a result, we expect to be able to make inferences whether the theory is valid or not.

The first approach involves factors that are internal to the person. Thus, the problem of information overload is rooted in personal inefficiencies. The individual information processing capacity is a function of various personal characteristics. When it is incompatible with the information processing requirements the situation of information overload occurs. The problem of information overload can only be treated by augmenting the individual information processing capacity.

The second approach involves factors that are task-specific and characterize the requirements posted and resources available for the current task. Accordingly, information overload must be considered only in the light of a particular task. And the imbalance between capacities and requirements results in the situation of overload. By altering the task characteristics, one abolishes the problem of information overload.

The third approach includes contextual factors. Information overload is defined as a by-product of various organizational inefficiencies. Not only the structure of the organization and its nature but also the characteristics of the technological platform are the determinants of information overload. Changing these context–related conditions will eliminate information overload.

Within the fourth approach, interaction is emphasized. It involves all three groups of factors discussed earlier. Accordingly, information overload can be defined only through the interaction of personal, task-specific, and contextual factors. Information overload conditions are generated by the mismatch between the requirements of the actual task and individual information processing and the coordinative capacities within a given organizational setting. As a result, the interaction approach predicts that neither changing people's intrinsic capacities and capabilities, nor altering task specifications, nor changing broad organizational and technical features will resolve the problem of information overload. Rather, a complex measure would be beneficial.

As four major facets of information overload research are defined, the related propositions are outlined. According to Yin (2003, p.22) "each proposition directs attention to something that should be examined within the scope of study.[…] Only if you are forced to state some propositions will you move in the right direction". The formulation of propositions helped us to clarify the understanding of major constructs and relationships. Moreover, it helped us to develop the data collection tools, build up valid operational measures, and gain control over the complex process of data collection and data analysis.

Step 2: Linking data to propositions

The validity of suggested links between data and propositions to a large extent determines the quality of empirical research and the degree of its compliance with the stated research objectives. That is why we will devote specific attention to and explicate our approach to connecting data to propositions. Here we discuss how we "operationalized" conceptual variables and defined the instruments for assessing and evaluating the major concepts. We show why certain factors were selected while others were left aside, and how the ones selected were operationalized and related to the propositions.

- **Analyzing the role of personal factors as a determinant of information overload**

To asses whether information overload is a function of personal inefficiencies and limited capacities, a set of questions in a questionnaire was developed. The questions were formulated in accordance with the relevant prior findings and included concepts that proved to be important in the course of previous research. In particular, we decided to focus on two concepts, decision-making style and experience (see Table 13). We selected these factors for a number of reasons.

First, they are the most often cited in information overload and related studies. From one perspective, this prevents the selection of the non-relevant variables. From another, it grounds the research in the existing theoretical framework and makes the comparison and the alignment of research results possible.

Second, we aim to understand how people actually process information and in which way information processing impacts decision-making and, from this, reflect on the role of information overload. Information processing is determined by the amount of cognitive resources (such as attention and memory) the human actor possesses and the efficiency of their use. While the amount of resources is given, and to large extent is inflexible, the efficiency of its use can change over time. Decision-making style and experience affect the efficiency of cognitive resources utilization. The definitions of both decision-making style and experience are presented in Table 13.

Concept	*Operational definition*
Decision-making style	Decision styles refer to the behavior that an individual exhibits in the formulation, acquisition, analysis and interpretation of information in the course of decision-making. Decision styles emphasize the structure and approach to problem solving rather than problem solving capacity.
Experience	Totality of knowledge or skills gained from observing or doing by means of participating or living through. There are different types of experience, such as task-related, technology-related, field-related.

Table 13. *Personal factors defined*

All participants were interviewed in an attempt to assess their personal characteristics as defined above. Since the concepts of decision-making style and experience are quite multifaceted, controversial, and vaguely defined the literature review was undertaken. This helped to sharpen the definition of the concepts, to outline the structure, and to split the complex concept into the simpler ones that can be operationalized and related to the interview questions.

The operationalization of decision-making style is discussed in detail to give illustration of the method of operationalization (Figure 17). All the other concepts have been operationalized in the same fashion.

Decision-making style is one of the most often used but still one of the most unclearly articulated concepts in general management and decision–making literature (see, for example, the critical review by Huber, 1983). To capture the essence of the complex concept of decision-making style we followed a two-step approach during the interviews. Firstly, we asked individuals to comment on their decision-making style without providing any prior definition.

Second, we asked the research participants to respond to a number of semi-structured questions that captured the essence of decision-making style as addressed in existing theoretical discourses. To accomplish this, we decided to split this concept into the sub-constructs first, and then into the categories and, in that way, derive a number of operationalizable approximates (see Figure 17). Two levels of disaggregating were applied to the concept of decision-making style. Following Driver & Mock (1975), we first divided it into two categories:

- *Degree of focus in data use*: the number of alternatives that the decision-maker derives from the available data pool and considers further in the course of decision-making.
- *Amount of information used*: amount of information necessary to take a certain decision.

Degree of focus in data use can be operationalized straightforwardly by formulating the binary–type interview question. Amount of information is, however, still hard to define. Despite the fact that amount of information can be placed somewhere in a continuum between minimal and maximal, most individuals who participated in the questionnaire pretest experienced difficulties with placing themselves in such a continuum. Therefore, second-level disaggregating has been applied.

In the literature review, we outlined the factors that indirectly define the amount of information an individual prefers to collect prior to a decision. These factors are attitude to uncertainty and rationality (for further details refer to Chapter 2). In short, risk aversion requires more information to be collected and processed. Following the existing research

traditions, we asked the individuals to define themselves as being risk-seeking or risk-aversive. Similarly, we required them to speculate on rationality. Two-point scales were used: from risk attraction to risk aversion and from fully informed decision-making to decision-making with incomplete information. In that way, we obtained an idea of how much information the individual prefers to collect.

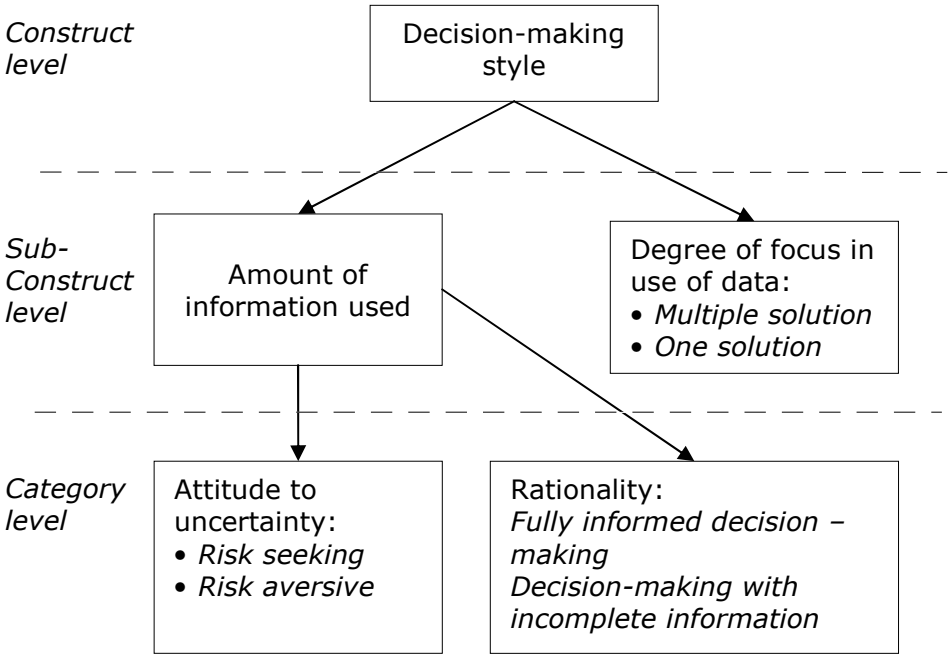


Figure 17. Operationalization of decision-making style concept

After the decision-making style was defined, the effect of decision-making style on information overload was assessed. Drawing on existing research endeavors, we suggested that there is a relation between decision –making style and information overload (see Chapter 2 for the detailed explanation). To assess whether this effect reveals itself in a way proposed in the conceptual model, a set of questions was included in the interview questionnaire. Again, we mostly relied on subjective, reported perceptions of managers. Although it is generally acknowledged that objective measures, the measures uninfluenced by emotions or personal prejudices, are preferred, research must consider subjective measures, the measures proceeding from a person's mind rather than the external world, under two conditions (Hoogeveen, 1997):

- Accurate objective measures are unavailable;

- The alternative is to remove the variable from the research design.

Since a high degree of agreement was found among the research participants with regard to the effect of decision-making style on information overload, we qualified the applied research method as valid and proceeded in the same way.

Although experience, at first glance, seems to be a straightforward construct, we assumed that there were a great number of experience dimensions that can be influential. In addressing this, we utilized principally the same logic as with decision-making style. First, we determined the central types of experience. For instance, total work experience, decision-making experience, experience over a number of years, the proficiency of technology use, particular task experience were considered. Next, we asked individuals to speculate on whether they saw any possible relation between the level of experience and degree of information overload without defining what exactly was meant by experience. Finally, we verified the existence and direction of the relationship as stated in the related proposition.

- **Analyzing the role of task-specific factors as determinant of information overload**

To understand the role of task-specific factors as determinants of information overload we have focused on two constructs: task complexity and time constraint. In this section, we consider the example of task complexity to demonstrate how we delineated the complex construct and incorporated it into the questionnaire instrument.

The conceptual definition of task complexity was adapted from Wood (1986). Multi-level delineation was applied as follows (Figure 18).

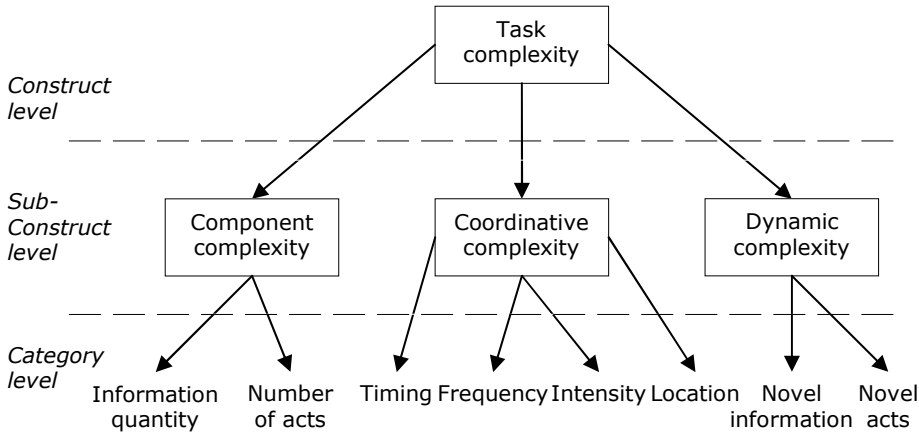


Figure 18. Task complexity

The construct was divided into three sub-constructs. The sub-constructs were further split up into categories. While some of the categories still require explanation, most of them can be directly incorporated into the interview question or evaluated by obtaining data from the different data sources. For instance, in addition to asking the interviewee to rank various tasks with respect to the amount of information they use, we collected the data from corporate standard operating procedures and internal information systems. Similarly, the dynamic complexity was evaluated based on both individuals' perception (subjective data) and data obtained through the study of industry reports (objective data).

As task-specific issues were of a particular interest for us and most of the interviewers were from different functional areas we needed to reconsider the task-specific block of questions before each interview. To reformulate the questions we collected secondary data, such as information from the Internet, the corporate website, and internal documentation. Some questions were similar for all respondents involved.

- **Analyzing the role of contextual factors as determinant of information overload**

Due to the complex nature of most organizational constructs and the large number of factors that are hard to operationalize but, at the same time, are crucial for the information overload study, the logic of data analysis was different from the previous sections. A stronger emphasis was put on alternative sources of data such as internal documentation, information from web-sources, press releases and reports. Although assessing the meaning and defining

the impact of the given factor on information overload required a somewhat more interpretive approach in some particular instances, such as capturing the relation between the amount of internal communication and information overload, we felt that a different approach to data collection and analysis would be beneficial.

To assess whether the internal culture in the organization can cause information overload we included a number of general questions where the interviewees were asked to elaborate on different information processing practices and traditions of the organization. In addition to the individual perceptions, we collected insights from the internal corporate rules and regulations that specify the general terms of information production, transmission, and sharing. Finally, we asked the individuals to comment on explicit statements, such as claiming that information overload is an element of internal culture.

The vertical structure of the organizations was derived from the organizational charts and other internal documentation. Moreover, the key informants were asked to depict the structure and the links between the structural entities. For the purpose of the current research, we distinguish between two types of organizational structures, such as organismic and mechanistic structures. This classification, initially introduced by Tushman and Nadler (1978), complies with the information processing view of the organization, putting clear emphasis on organizational information processing capacity. In this respect, it satisfies the requirements of this research.

The effect of technology on information overload was assessed as follows. First, we were particularly interested in how certain applications were used. Second, due to the fact that the technological platforms in the companies are highly standardized, we were searching for a classification that possessed the required degree of generality. Based on the literature review we accepted the four–type classification of information communication applications suggested by Cronford and Sorensen (2002). By analyzing the internal corporate documentation and asking the interviewees to describe which applications they use and how, we were able to qualify the applications as being of a certain type and to investigate the link between IT and information overload.

Moreover, we evaluated the effect of quality of IT output on information overload. To do this, we first evaluated the quality of the IT platform by drawing on the subjective appraisals of its technical and functional quality. The functional quality of a system was defined as the user's satisfaction with the information output in terms of its content, timeliness, and quantity. The technical quality of the system included such characteristics as system reliability, the frequency, and the lead-time of system breakdowns. The instrument was

adapted from Hoogeveen (1997). Second, we assessed the relation between quality of IT output and information overload by combining the instrument of Hoogeveen (1997) with one of Schultze and Vandenbosch (1998).

Criteria for interpreting the findings

We assessed the quality of research design by looking at construct validity, internal validity, external validity, and reliability (Yin, 2003). The summary of this analysis is presented in Table 14. Some issues were already discussed in the previous section, in which the process of data collection, analysis, and the logic linking data to propositions were described.

Tests	Definition	Approach applied
Construct validity	Establishing correct operational measures for the concepts	1. Multiple sources of evidence as a means to encourage different lines of inquiry: interviews, direct observations, company's documentation, artifacts, intranet, and internet documentation. 2. Review of drafts of study reports by key informants: REKLAMER case: draft of case report was submitted to a company and reviewed by General Manager ING case: draft of case report was submitted to and reviewed by consultant LL.
Internal validity	Establishing casual relationships, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships	Relying on theoretical propositions: both during data collection and data analysis stages we were guided by theoretical propositions. Addressing rival explanations: as four competing theories of information overload are used in the conceptual model, theoretical propositions include rival explanations. Pattern matching: we have used rival explanations as patterns. The actual patterns formulated in the course of empirical data analysis were compared with the predicted ones Using logic models to facilitate matching empirically observed events to theoretically predicted events: the individual profiles of information overload were developed using individual level logic modeling.
External validity	Establishing the domain to which a study's findings can be generalized	Analytical generalization via applying replication logic to multiple cases
Reliability	Demonstration that the operations of a study – such as the data collection procedures – can be repeated, with the same results	The use of case protocols when working at case sites. Case databases with all raw data available

Table 14. *Assessing the quality of research (after Yin, 2003)*

Construct validity implies establishing correct measures for the concepts being studiesd (Yin, 1994). Yin suggests several methods of how to increase the internal validity of research. We addressed the issue of construct validity as follows.

First, we used multiple sources for data collection. In collecting data from different sources, we primarily aimed to comply with the principle of converging evidence when the facts from the different sources reinforce one and the same conclusion.

Second, we asked the participants to review the draft. Key informants, the most knowledgeable and the most committed participants, were selected at each site. The draft of the case report was submitted for review and the comments were incorporated into the final version of reports. This, in a way, secured the validity of inferences drawn from the data.

Internal validity deals with the establishing of casual relationships, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships. As summarized in Table 14., we used several techniques to improve the internal validity of the study. First, we formulated theoretical propositions about the structure of information overload and its antecedents prior to entering the field. This helped to focus the attention of the researcher and to guide the data collection and the data analysis. Naturally, the validity of formulated propositions becomes crucial. In agreement with the suggestions of Lee, in formulating the propositions we drew on the rules of formal logic (Lee, 1989, p.40), which if applied correctly, secure the controlled deductions. We phrased the propositions in a clear and falsifiable way.

Second, we utilized the strategy of **rival explanation**. Thus, we suggested that information overload can be caused by human-related, task-related, and context-related factors in isolation but, more often, it is attributable to the interaction among three. Similarly, coping is also defined from different angles, and three types of coping, i.e. human-enabled, technology-enabled, and organization-enabled, are specified. Moreover, the mix of all three seems to provide the best outcome.

Third, **pattern matching**, a technique to increase the internal validity by comparing the empirically derived patterns with the predicted one, is widely advocated by the methodological literature (Miles and Huberman, 1994; Yin, 2003). Since the overall logic of the conceptual model is built upon rival explanations, **pattern matching** was accomplished in that way also. In our case, the empirically observed pattern was matched within one of the rival explanations.

Fourth, we used **logic models** to increase the internal validity of the research. Logic models essentially help to connect data to propositions in a rigorous and consistent way. To make the

analysis more explicit we designed the individual profile models in which the dynamics of overload is visualized. Correspondingly, we were able to explicitly demonstrate how the codes are transformed into categories and concepts and how the data is connected to propositions.

External validity addresses the issues of generalization of findings and establishing the domain to which the results of study can be generalized. One of the most often cited critiques of case study research methodology claims that the research results cannot be generalized. In a number of MIS studies, the problem of generalization of case study results has been addressed explicitly (Lee, 1989, Lee & Baskerville, 2003, Walsham, 1995, Yin, 2003). Consequently, it is claimed that case results are subject to analytical rather than statistical generalization.

Analytical generalization rests on the notion of replication logic and results in the development of a theoretical framework. As such, the evidence from multiple case studies is considered more reliable, since the results from one case have been replicated and reaffirmed or confronted (Yin, 2003). When the cases produce diverging results and this difference cannot be explained the initial theoretical framework must be reconsidered.

Since we aim to construct some theoretical foundation for further investigations in the area of information overload through the introduction of novel concepts and verification of existing ones, we claim that the results of our research can be and should be generalized to theory. By utilizing a multiple case study research design, we intend to benefit from replication the research results from one case to other cases.

There are several common limitations of the multiple case study research design. For instance, one can question whether the number of cases and the number of interviews within each case are sufficient to make valid theoretical inferences. To address such objections, we developed a transparent strategy for cross-case analysis and described the replication logic. Case study is a specific research methodology that captures the phenomenon in a natural, real-world setting. We have selected the individual as a principle unit of analysis, meaning that each individual is a case. Since all the individuals are different and operate in different organizational, technological, and task environments, the straightforward comparison of case narratives is not intended. However, already at the stage of data collection and later in the course of data analysis we found that a number of concepts as well as relationships were similar for each case. This finding predetermined our approach to cross-case analysis in the following ways:

- We structured the analysis of cases in the same way, applying the same analytical techniques and using converging terminology;
- We structured the case narrative in the same way so the findings could be matched: the stories were written in one style, the same data displays were utilized, and the structure of narrative was the same.
- We included an integrative chapter after both the separate cases and the cross-case analysis were finished. This helped us to systemize and summarize the research results and to integrate the findings from both cases.

Reliability implies that the processes of the study can be repeated, and, if repeated, will produce the same results. To control for the reliability of research results we established both a case database, a repository of raw data, and a database with all the preparatory and procedural protocols. The preparatory filed study materials include the interview protocols that formalize the exact procedure of interviewing, the exemplar questionnaires, and the forms for taking field notes. In this way, we attempted to make the research procedures more transparent. All documents are available for external analysis.

4.4.2 Data collection and analysis: the study of human coping

The major challenge for the interpretive researcher is to find an optimal balance between interpretive flexibility and control over the research procedures and operations. To control the quality of research we outline explicitly the research method, data collection, and data analysis procedures. We evaluate the research using seven criteria for conducting and evaluating the quality of interpretive research suggested by Klein and Myers (1999).

To answer the question: "How individuals adapt and develop the coping practices in respond to ever–increasing information load?" it is helpful to adapt the interpretive research tradition in which the knowledge is socially constructed and is extracted from language, consciousness, shared meanings, documents, tools and other artifacts (Klein and Myers, 1999, p.69). As Eisenhardt (1989) suggests, the prior formulating of the research question and central constructs makes data collection and data analysis more focused, although the clear understating that "no construct is guaranteed a place in resultant theory" (p.536) is essential. Therefore, based on the existing literature we have formulated the research question, defined the major areas, and outlined the potentially relevant constructs and

concepts. At the same time, we stayed open to new ideas and the alternative interpretations that could emerge from the data.

Data collection: the study of human coping

Although the data collection methods were essentially the same as in the information overload study, the emphasis was different. Since the study consisted of two interconnected parts, the study of information overload and the study of human coping, the interview protocol was divided into two parts. The part on coping implied somewhat greater flexibility and allowed the on-going re-structuring and altering of the interviewing process. It included both the theoretical questions that aimed at obtaining the participant's interpretation of the concept, and practical or procedural questions that were related to actual working practices.

A greater emphasis was placed on observations as the means of data collection. Observations are particularly valuable for practice-based studies such as the study of human coping since they provide information on "what people actually do or how they do it" (Barley and Kunda, 2001, p.84). The observations were documented in the field notes and comprised the description of acts and happenings, as well as the impressions and ideas of the researchers.

The secondary data, such as internal documentation, standard operating procedures, information from the web-sources etc., were particularly valuable in constructing the forms of organization – and technology –enabled coping.

Data analysis: the study of human coping

In this section, we aim to illustrate the interpretive approach to data analysis only. Throughout the data analysis, we used the open-coding technique, "the analytic process through which concepts are identified and their properties and dimensions are discovered in data" (Strauss and Corbin, 1998, p.101). Although the process of coding is highly dynamic and sometimes opportunistic and improvised, we made an attempt to structure it and define the major steps and phases.

We start the analysis of each interview transcript by dividing it into several focus areas. The division is accomplished in accordance with our prior assumptions and pre-conceptions. Further, we first address the large textual pieces as a whole (Phase 1). Second, we move to the analysis of the sentences as separate repositories of meaning (Phase 2). Naturally, these steps are not independent and imply constant re-iteration and re-interpretation. The section below illustrates the method we use to deal with the text fragments.

Phase 1: Analysis of the text fragment as a whole

First, we looked at the paragraph as a whole and tried to outline the topics that emerge there. For example, the respondent describes several **strategies** that he might use to process the incoming mail accumulated during the holiday time. In particular, he identified the following "strategies" (see the color selections in the Text Box 6). The use of the term "strategy" is conditional and facilitates the initial stages of data analysis:

1. The use of an "auto-reply function" in-built in email applications and later addressing all incoming mails in a mail-by-mail manner;
2. The delegation of initial email processing responsibilities to the secretary;
3. Deleting the entire mailbox, sending the email that reports system fallacy, and suggesting an alternative way of communicating.

Importantly, at this stage we have deliberately not applied any classification to the extracted filtering strategies; rather we attempted to collect maximum insights from each text fragment. In particular, the attitude of the respondent and his evaluation of each strategy were of a particular interest.

Text Box 6.

[Respondent] : I was on holidays for three weeks. I came to an agreement with my secretary. Initially they [IT and Operations Department] wanted to implement a rule on my computer. Under this rule when email is coming in you get an automatic response: "I am on holiday. I am not answering the email now; maybe I will do it in three weeks. If it is very urgent please, call 911 or 112, whatever". I didn't want that one. Instead I agreed with my secretary that she reads all the emails. If it the one we normally skip – skip it; if it is something that easily can be reallocated – she answers the originator that from this point one of the managers is taking the issue over and then she instantly deletes the message.

[Interviewer]: So, you did not see this message when you were back?

[Respondent]: NO [emphasized by the interviewee]. It was the first time I've done it, Otherwise I get 400 –500 of unread messages. You cannot decide where to start. I am 3 weeks on holidays; afterward I can go for one and a half weeks behind my computer only answering all these emails. What I do once in a while, I just throw them all away. Then I email to some friends something like: "My email has crashed, I do not know if there was something important you needed from me; if it was – call me". Sometimes you get 4-5 messages back saying that they were expecting an answer – quite an easy way of getting rid of all emails.

Text Box 7.

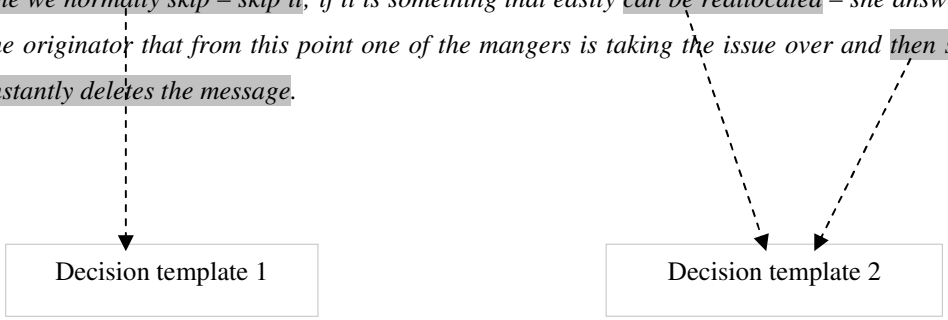
[Respondent]: I was on holidays for three weeks. I came to an agreement with my secretary. Initially they [IT and Operations Department] wanted to implement a rule on my computer. Under this rule when email is coming in you get an automatic response: "I am on holiday. I am not answering the email now; maybe I will do it in three weeks. If it is very urgent please, call 911 or 112, whatever". I didn't want that one. Instead I agreed with my secretary that she reads all the emails. If it the one we normally skip – skip it; if it is something that easily can be reallocated – she answers the originator that from this point one of the managers is taking the issue over and then she instantly deletes the message.

[Interviewer]: So, you did not see this message when you were back?

[Respondent]: NO [emphasized by the interviewee]. It was the first time I've done it, otherwise I get 400 –500 of unread messages! You cannot decide where to start. I am 3 weeks on holidays; afterward I can go for one and a half weeks behind my computer only answering all these emails. What I do once in a while, I just throw them all away. Then I email to some friends something like: "My email has crashed, I do not know if there was something important you needed from me; if it was – call me". Sometimes you get 4-5 messages back saying that they were expecting an answer – quite an easy way of getting rid of all emails.

Text Box 8.

[Respondent]: Instead I agreed with my secretary that she reads all the emails. If it is the one we normally skip – skip it; if it is something that easily can be reallocated – she answers the originator that from this point one of the mangers is taking the issue over and then she instantly deletes the message.



Clearly, the paragraph contains several straightforward appraisal statements that express the attitude of the respondent towards the Strategies (see Text Box 7). While extracting explicit comments on Strategy 1 and Strategy 3, we derived the attitude of respondent to Strategy 2 by interpreting his intonation and emphases made. The consequent analysis suggests that the respondent ranked Strategy 2 highest prior its actual execution but also was satisfied with the results of this execution. The attitude to the strategy seems to be paramount in understanding why one strategy has been used while other strategies have been rejected. Even this basic analysis prompts the idea that the positive attitude leads to the strategy utilization.

Phase 2: Analysis of separate text segments

After we were able to outline a number of possible strategies to process incoming mail accumulated, we proceeded with the analysis of text segments that refer to each strategy named. At th*e* end, we expected to improve our understanding of the structure of this strategy both in terms of resources involved and actions applied, and how this structure was used. To make our logic explicit, let us consider the example of Strategy 2, the actually executed strategy (Text Box 8).

In describing the Strategy, the respondent draws on certain templates that he believes his secretary should utilize for managing email. For the purpose of this chapter, we will refer to them as "decision templates". The first template implies filtering out irrelevant messages, where irrelevance is assigned on the basis of prior experience of the similar messages. The second template implies re-direction and further filtering. As we can see from the passage, both decision templates are a mimicking of the respondent's routine actions and are strongly guided by the related experience (the use of phrase "we normally do" is highly indicative). Moreover, the respondent expects the secretary to be in the possession of work-process knowledge and the knowledge of the corporate hierarchy, which enables the re-direction of email. That is why, although Strategy 1 seems easy and straightforward at first, even the prior analysis of the data suggests that its actual execution involves drawing on rules and attracting resources that can neither be easily obtained nor developed.

To summarize, from the text fragment we were able to extract a number of distinctive strategies that the respondent relies on in dealing with incoming mail. Moreover, the attitudes towards the strategies seem to be antecedent to their actual use. The structure of each strategy in terms of resources required for its execution and rules drawn on is defined.

A similar analysis was conducted for each respondent. Naturally, the range of topics that emerged in the process was much wider that what we have obtained and demonstrated in the examples above. Thus, different facets of coping were targeted, the variety of coping strategies expanded significantly, the structural properties of each was clarified, and the patterns of use revealed. In the course of analysis the codes were aggregated into categories and categories related to certain constructs and concepts. Contrary to the information overload study where the "top-down" approach to data analysis was applied, within the study of human coping we moved from data in the form of particular codes to the categories, concepts, and constructs with higher levels of generalization. To do this, we organized codes into groups that are related to certain categories and we relate these categories further to the high-level abstract constructs. Thus, we organized all the strategies into several groups; we outlined the commonly shared characteristics of strategies within each group; we specified the patterns of use; and defined the interaction patterns, if any, among groups.

Criteria for interpreting findings: the study of human coping

The interpretive case study research is criticized severely on the basis of insufficiently articulated theoretical framing, the absence of formal approach to data collection and data analysis, and the lack of criteria for assessing the research quality. To address the possible criticism we tried to be explicit in defining the research method and the underlying reasoning. In this section, we apply the set of principles for evaluating the credibility of interpretive research proposed by Klein and Myers (1999).

1. The fundamental principle of the hermeneutic circle

The principle claims that understanding is achieved only through constant reiteration between the part and the whole. We have applied this principle at two levels of abstraction: first, for interpreting context – action recursive interactions, and second, for assigning the meaning to particular textual data.

Accordingly, in the thesis the process of interpretation moves from the understanding of individual action to the understanding of organizational context. Placing the independent, dispersed in time and space actions into the context contributes to our understanding of these actions. Thus, the knowledge of broad organizational context influences our understanding of human actions. At the same time, the individual actions augment and shape the broad organizational context.

Moreover, we apply the logic of the hermeneutic circle when analyzing the interview transcripts. First, we try to grasp the meaning of the larger text piece and to outline the central ideas based on it. Second, we go down to the analysis and interpretation of each sentence. The interpretation of the sentence is guided by the ideas we have obtained from the larger pieces of text and, at the same time, shapes and sharpens the interpretation of this piece as a whole. The use of the principle is illustrated in the exemplar data analysis section.

2. The principle of contextualization

The principle of contextualization requires reflection on the constant changing of the broad historical and social context. According to this principle, the explicit delineation of how the situation under the study emerged and what are the building forces must be provided.

To delineate the context we reflect on industry background first, and outline major trends, changes, and developments. This helps us to improve the understanding of corporate strategic moves. We build up the profile of the company focusing on the organizational

changes and its responsiveness to external demands. We then go down to the level of the particular individual and demonstrate how current behavioral patterns emerge and proliferate and how they are shaped by the broad organizational context.

3. The principle of interaction between the researcher and the subject

The principle suggests that facts are the product of social interaction between the researcher and the humans under investigation. As Klein and Myers suggest, the research is qualified as interpretive "if it assumed that our knowledge of reality is gained only through social constructions such as language, consciousness, shared meanings, documents, tools, and other artifacts." (Klein and Myers, 1999, p.69).

Accordingly, we acknowledge that we inevitably have certain assumption about the subject. Second, these assumptions can be somewhat biased and incorrect. Third, these assumptions are interpreted by the research participants and their interpretations can differ from ours. In interviewing the participants, we deliberately avoided the use of fixed concepts and were always keen on extracting the participant's understanding, in the first place, and than matching it with our own understanding of the subject matters.

4. The principle of abstraction and generalization

As Walsham (1995) claims, generalization from the interpretive case studies cannot be accomplished in the statistical sense; rather, it is rooted in the consistency and plausibility of logical reasoning. He outlines four types of generalizability applicable for interpretive case study research: (1) the development of concepts; (2) the generation of theory; (3) the drawing of specific implications; and (4) the contribution of rich insights. In the thesis, we made an attempt to relate the empirical findings to the theoretical concepts of high levels of abstraction from structuration and adaptive structuration theory. In doing so we aim to show how coping practices emerge and evolve, and how they are appropriated by human actors.

5. The principle of dialogical reasoning

This principle requires the explicit explanation of how the original research frame evolved when confronted with the data.

We have addressed the issue partially by revising the role of the researcher (see Principle 3). In addition, in the body of the thesis we explicitly identified the intellectual roots of the research and outlined the beliefs and central assumptions with which we would enter the field. We also reflected openly on how some of our assumptions have been changed or

revised significantly in the course of the study. In particular, we significantly reconsidered the role of technology in facilitating information filtering.

6. The principle of multiple interpretation

This principle proclaims the need for sensitivity to possible differences in interpretations. With regard to this principle, we acknowledge that the concept of coping in itself can produce multiple interpretations. For instance, one can define coping as deleting unwanted information. At the same time, coping can be defined as a combination of strategies, such as deleting, restructuring, organizing, and re-directing the incoming information flows. These interpretations are of a complimentary rather than of a conflicting nature.

7. The principle of suspicion

According to the principle of suspicion, the researcher must be able to rule out the obviously false, biased, or distorted interpretations. In the course of data collection and data analysis, we recognized the influence of existing power structures and the symbolic nature of many corporate activities so as to be aware of possible distortions in participants' accounts.

4.5 Conclusions

In this chapter, we have outlined the research method applied. We explained why multiple case study strategy was chosen; we advocated the particular research design as consisting of two interrelated parts. We argued that, while the study of information overload can be performed in a positivistic way, the study of human coping requires somewhat greater flexibility in terms of both prior conceptual framing, data processing, and data analysis, and thus will benefit from the interpretive approach. We provided an illustration of data collection and data analysis. In addition, we outlined the common methodological problems of case study research and demonstrated how we had addressed them in the thesis. The method for the study of information overload was designed in accordance with the recommendations of Yin (2003), where a great emphasis is put on the field study preparation: designing the theoretical framework, formulating the analytical propositions, and developing reliable and valid measurement procedures. We have explained the rationale behind the propositions, and the logic used to select the concepts for the study, and utilized the "top-down" approach to operationalize the major constructs. Several examples have been presented to illustrate the operationalization logic. In all of them, we have applied from two to three levels of disaggregation. In doing so, we have drawn extensively on existing research endeavors. We have further elaborated on data collection procedures and explained why semi-structured, in-depth interviews were used as a primary tool of data collection. Further, we described how the empirical data is linked to the propositions. We elaborated on the actual application of pattern matching technique, the rival explanations, and logic modeling as the well-established instruments for conducting case study research. The interpretive field study was designed to obtain the insights into human coping. Although the prior theoretical framing was developed, no constructs or relationships were guaranteed a place in the final conceptual model. We have focused on how data were collected and interpreted, and how the quality of interpretive reasoning has been assessed. To illustrate the approach to data analysis, we have included some example fragments, which aimed to demonstrate how we have balanced the free-flowing, often improvised interpretation, and a need for the research structure and discipline in drawing inferences.

Chapter 5 Case Study I

In this section, we present the case of BANK, the large Dutch financial institution. We first examine the problem of information overload from the contextual perspective. We provide an overview of the organizational structure, the nature of organizational information processing, internal communication, and the existing technological platform and subsequently link this to information overload.

We then move from the level of the organization to the level of particular individuals and present two focus profiles in parallel. One captures the task-contingent and human-contingent perspectives on information overload for the case of HL, the managing director of the Department. The second provides a similar analysis for the case of LL, a senior consultant of the Demand business unit. The analysis is structured in accordance with the logic advocated in the conceptual part of the thesis.

Afterwards, we present the findings on human coping. We start this section with the background information on all three types of coping. Afterwards, we analyze the patterns of interaction.

In the concluding section, we merge the discussions on information overload and coping. To do this we integrate the findings and build up two complex individual profiles.

5.1 Contextual perspective on information overload: Department of Demand & Change, Division Intermediary, BANK

5.1.1 Background information: Department Demand & Change, Division Intermediary, BANK

BANK is the largest financial service provider in the Netherlands, ranked among the biggest financial companies in Europe in terms of market capitalization. It was established in 1991 as a result of a merger between an insurance company, ***NN***, and a bank, ***NMB***. Currently it serves more then 60 million private, corporate, and institutional clients in 60 countries. It provides a wide range of financial services such as insurance products for individuals, companies, institutions, and governments, retail banking operations, and asset management. The multi-product / multi-channel approach is central.

A number of acquisitions that BANK has undergone since the establishment has resulted in several large-scale changes in the organizational structure[7]. Eventually, under pressure from the external business environment, BANK announced a strategic move towards an organizational re-design and wide-scale integration of geographically and functionally dispersed business units. These reforms aimed at increasing the corporate flexibility and adaptability through the optimization of the existing business portfolio. Clear emphasis was put on the efficiency of the organizational structure. It has been summarized in the strategy and mission statement in the following way[8]:

> *Focus and execution are the key words to respond to the new economic environment. BANK will focus more in terms of activities it wishes to expand or scale down and in terms of markets it wants to be in or withdraw from. No large acquisitions will be made in the near future.*

Several recent financial crises have undermined the exceptional prosperity of ING and indicated the need for cost-cutting initiatives that included the aforementioned organizational re-design, restructuring, and optimization of the IT portfolio.

The ***Commercial Division*** of BANK consists of three sub-divisions, Banking and Insurance Wholesale, Banking and Insurance Retail, and Intermediary. This Division is involved in sales of banking and insurance products via the multiple channels.

The ***Department Demand and Change,*** part of ***Division Intermediary***, hosted the empirical study**.** Division Intermediary sells insurance and banking products through independent brokers to both business and consumer markets. Department Demand and Change is responsible for the specification and management of the business requirements of the Division Intermediary to the internal and the external providers as well as for planning and actual executing the various "change initiatives". At the time of the study, Department Demand and Change was just being established and employed around 130 people.

[7] The Belgian bank BBL, the German BHF-Bank, a number of US insurance companies etc.
[8] Corporate website

5.1.2 Organizational structure and management: Department Demand and Change

The organizational structure of BANK is highly formalized, both vertically, as a hierarchy of authority, and horizontally, as a functional chain. In the following section, we discuss briefly the vertical and horizontal structure of Demand & Change.

Vertically, Demand & Change can be represented as a three –level hierarchy, with the managing director being at the top, the business unit managers one step down, and the project managers at the bottom (see Figure 19). It consists of six rather independent business units that operate relatively autonomously from the other business units, but closely with the clients they serve. Each business unit belongs to either the "Demand," or the "Change" stream. "Demand" units are responsible for the specification of internal demand for change initiatives and services. The "Change" units are engaged in management and execution of specified change initiatives. The business unit managers head the business units and report directly to the managing director of the department.

Quite straightforwardly, the ***Project Management*** business unit is involved in the actual project execution and management. At the moment of study, it employed 35 program and project managers. It hires highly trained professionals in the area of project management, with distinctive, highly specific backgrounds such as information technology, human resources, or finance. As a result, the program / project managers are fairly independent of each other.

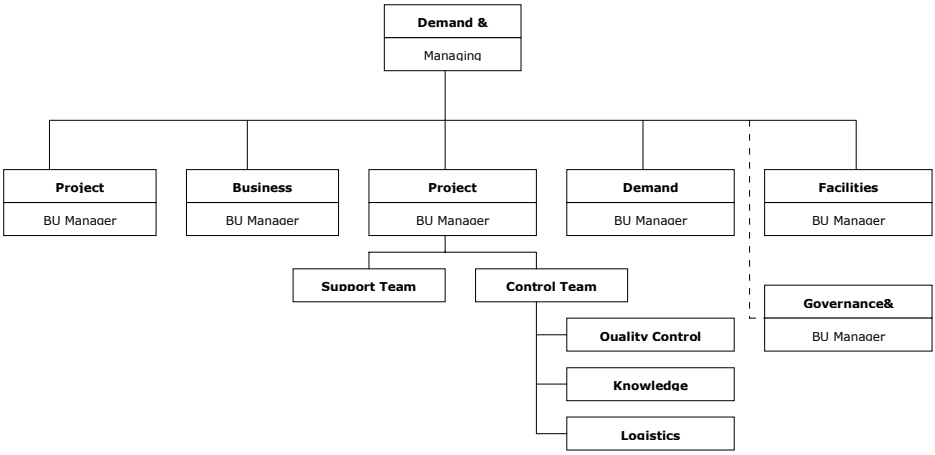


Figure 19. The Organizational chart of Department Demand & Change

The typical projects involve different divisions and entities of BANK. They are classified as follows:

- Projects that aim to increase the efficiency of the process;
- Projects that aim to increase earnings;
- Projects that are initiated due to the government legal changes.

While program and project managers are in charge of "Change" programs and projects respectively, other team members are coming from all over BANK. The Business Unit Manager fulfills the coordination and control functions, focusing on the individual performances of the employees and stimulating their professional excellence.

The ***Business Consulting*** unit is engaged in consultancy types of projects. Its mission is to support the decision-making process within the Division Intermediary by providing sufficient analytical evidence and knowledgeable judgments. Currently it employs 10 consultants with both insurance and banking expertise.

The ***Project Control and Support*** business unit controls and maintains all the projects and programs initiated by Demand & Change. The unit is subdivided into two separate teams, *Support* and *Control*, in accordance with the functional area of involvement. The *Support* team works closely with the program and project managers on an actual demand basis. The *Control* team monitors the overall quality of the programs/ projects, tracks the potentially problematic areas, and makes sure that all the operational processes related to the particular project are executed. The Control team is subdivided into the Quality Control, Knowledge Management, and Logistics groups.

The ***Demand Management*** business unit is responsible for specifying business requirements to the internal (e.g., IT and Operations Division) and external suppliers (e.g. energy companies). It helps internal clients to develop the strategic vision and indicate potential improvements. Furthermore, it creates the Business Change Plan, the planned and specified path between the current state and the desired state. The work of the Demand Management unit is team-based, with all employees grouped into function-specific clusters such as Insurance, Banking, General, and Business Process Management.

The ***Facilities*** business unit stipulates the requirements of the particular type of facility services that constitute the work environment. There are two groups within the structure of the unit, Operational Facility Services and Strategic Facility Services.

Although in theory the structure of the Department is extremely straightforward and clear, it is unstable and confusing in real life. In the course of the study, the instability of the formal hierarchy and its actual ambiguity were continuously cited as the major reason for constant reinvention and repetition of activities and the resultant redundancy of initiatives, and the mismatch between workflow and information flow and resultant information overload. The collection of citations below illustrates the argument (Table 15).

Scale of organization	*[…] It's the scale of organization that makes it all worse. We make it more and more complicated because the scale is getting bigger and bigger and bigger. Before we used to work in the small worlds, we looked in our small organizations; we talked to people in the same building. So we knew what was going on, whom you need to talk to, who is going to make a decision. I think nobody knows it any more.{HF}*
Redundancy of initiatives as a result of organizational scale and its instability	*I am allergic to things that have happened already twice – three times. For instance, if there is a project that has been done in Division Intermediary and the same project with the same purposes is been launched somewhere else or vice versa. And it is happening often because there is no formal, efficient structure.{JP}*
Information overload as a result of organizational scale and its instability	*In my opinion, information overload is very simple, just too much information […]. One reason for it is the unclearness of organizational structure. Demand & Change is a new organization, new function, new environment, new colleagues, and new boss. You get all kinds of issues that will never occur in the established working environment. No one knows who should get which piece of information. And certainly if you are not sure it is better to have several people informed {LL}*

Table 15. *Vertical structure of organization and information overload: summary of critical issues*

Horizontally, the Department is structured in accordance with the process–based approach. Under the process–based approach the end-result rather, than the results of particular activities or tasks, is emphasized. Therefore, the whole organization is considered as a collection of processes each aiming to achieve the certain goal. Internally, a project is defined as the central process within the Department. The projects, in turn, are role-based. Role is a formal description of a participant's functions and responsibilities. In that way, it outlines the actual activities and tasks, formalizes the communication and interaction

patterns, and determines the reporting hierarchy. The following quotation from the interview is illustrative:

> *We are making so-called Blueprint. In this Blueprint the types of responsibilities are clearly defined, within each type of responsibilities we define the tasks that one should perform, and within each task we specify which parties should be involved and etc. It is a formal instruction every one is supposed to follow. {LL}*

To expand our understanding of the horizontal structure of Demand & Change, we attempted to depict the typical project flow and plot the links that occur between the business units (see Figure 20).

The Demand Business Unit, the unit that has direct contacts with the internal clients, initiates the Project. The *Change Plan*, a formal document that specifies the required changes and sets up the schedule of proposed change activities, is a "final product" delivered by the unit. Having the Change Plan, the Facilities Business Unit supplies the facility services and takes care that the business environment will guarantee the project related work–processes. At the next stage, the Project is taken over by the Project Management Unit, which is responsible for its actual execution and implementing required changes. At the same time, the Project Control & Support Unit steps in, monitoring and evaluating the quality of project related activities and supporting it at the on-demand basis. The Business Consulting Unit backs up the whole process, providing decision support in terms of recommendations and business advice.

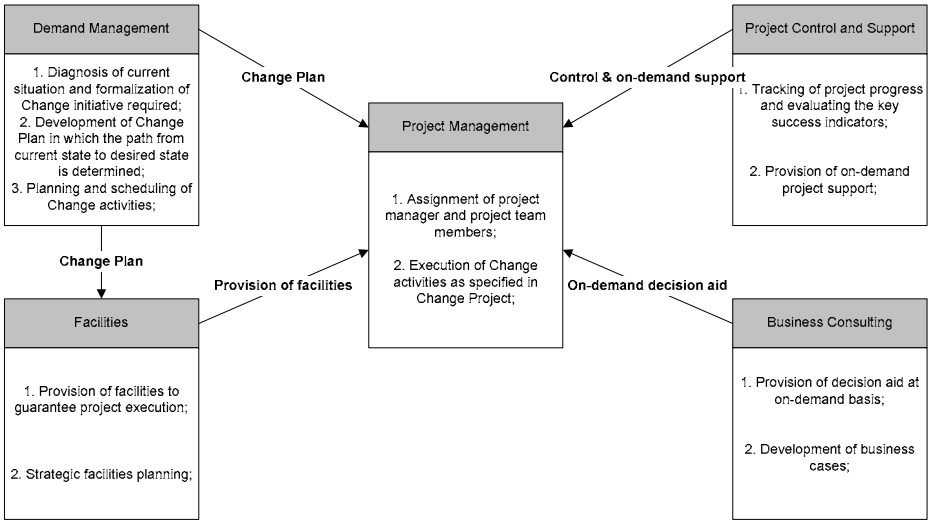


Figure 20. Project flow

Already at this stage, we see that the units possess a high degree of independence: all of them are linked to the Project Management unit but almost none of them have any direct connection with one another. Project Management business unit holds the central position and has the largest number of connections. The remaining units are connected only to Project Management, having no other links. One of the consultants suggested the following explanation for this:

> *The regular contacts with the Department [Demand & Change] and other business units are not really necessary because everyone concentrates on the specific field. If you need due to some reason to contact some of your colleagues, you do it in person, informally, or on the smaller group basis... If you need the project specific information you go to the internal sub-directory, each project has it. Everything about this particular project is there. {LL}*

To delineate the nature of horizontal structures further we have analyzed the nature of interdependencies among the units and the type of coordination implied (see Table 16). We base our analysis on the ideas on organizational design summarized in Chapter 3. The type of interdependence predetermines the choice of coordination mechanisms, as discussed below, and has significant implications for the information overload study.

The interdependence between Demand Management (DM) and Project Management (PM) is sequential when the product of DM, the Change Plan, is the input for PM. DM initiates the change projects and PM sets off actions only at the time the Change Plan is received. Standardization is used as a primary coordination mechanism. The employees of PM draw actively on the rules, role descriptions, and standard operation procedures.

The link between Demand Management (DM) and Facilities (F) is also sequential, with standardized mechanisms for the coordination involved. Only when it has the Change Plan, can F specify the requirements and provide the requested supply. Existing rules, standards, and regulations are used as guidelines for specifying the project requirements.

The link between units	*The description of link*	*Type of interdependence*	*Coordination mechanisms*
Demand Management – Project Management	Change Plan is submitted to the Project management unit for further execution	Sequential	Standardized
Demand Management – Facilities	Change Plan is submitted to the Facilities so to guarantee further project execution	Sequential	Standardized
Facilities – Project Management	Facilities provide a wide range services to make the project fulfillment possible.	Reciprocal	Planning Mutual Adjustment
Project Management – Project Control and Support	Project Control and Support imposes control over key project areas and provides the on-demand support.	Reciprocal	Standardized Mutual Adjustment
Project Management – Business Consulting	Business Consulting provides the on-demand decision aid to project management team	Reciprocal	Planning Mutual Adjustment

Table 16. *Organizing model: the horizontal interdependencies within the Department*

The interdependence between Facilities (F) and Project Management (PM) is reciprocal and implies different coordination mechanisms, i.e. planning and mutual adjustment. In this relation PM represents the demand side and F the supply side, and both try to negotiate a better arrangement at lower costs. Although planning and scheduling of supply is important, the mutual adjustment plays a significant role. Mutual adjustment implies the use of rich communication media, such as face-to-face and telephone, that support the ongoing process of altering of project requirements and compromising:

> *Facility services include everything that people need to do their work. That is why it is very emotional subject. And, of course, the emotional stuff is better handled when involved parties are physically present. So, every time you need to sit around the table and discuss the issue together {LM}*

The link between PM and Project Control and Support (PCS) is reciprocal when the actions of PM are contingent on and driven by the actions of PCS, and vice versa. PM expresses the need for certain resources, PCS finds a way to accommodate the request and provide the requested services. At the same time, PCS tracks the progress of the project and suggests improvements to PM. The latter link rests on standardization as a primary coordination mechanism. So, the projects are evaluated in accordance with the key success and critical indicators, and the standard evaluating procedures are applied:

> *We aim to control the quality of the projects, whether it has been accomplished as intended. There are the guidelines and standards collected in "Project*

Management Method" [the internal collection of project management guidelines], so we check if everybody uses them. {AL}

The former link implies the personal involvement of the parties due to the high dynamism and evolving nature of on-demand requirements.

The last link is between PM and Business Consulting (BC). This interdependence is reciprocal and is based on the planning and mutual adjustment coordination mechanisms. BC both provides the pre-requisite decision support to project managers and the on-demand decision aid that cannot be scheduled at the stage of project planning but rather emerges as the project evolves.

Summarizing, in this section we have examined both the vertical and horizontal facets of organizational structure. Clearly, the structure of the Department has all the elements of traditional mechanistic structures, such as a well-defined hierarchy, a formal chain of command and control, top-down supervision and a strong emphasis on formalization, high degree of independence between structural components, and an active reliance on job descriptions and standard operating procedures. However, due to the frequent organizational restructuring, despite being defined in clear and unambiguous terms in the formal documentation, the actual organizational hierarchy is rather unstable and unclear. This results in redundancy in terms of work processes and information flows and establishes the basis for information overload.

The analysis of the structural properties of the Department in the horizontal dimension revealed that one business unit has a central location with a maximum number of connections. The units are assembled in a "star-like" network, all being connected to one, and structurally isolated otherwise. The further analysis and the classification of links among business units in accordance with the type of interdependency and coordination mechanism applied, indicates that standardization and planning are favored coordination mechanisms. However, the actual absence of ready-to-use standard operating procedures, guidelines, and standards shifts the emphasis towards the mutual adjustment coordination mechanism. As a result, the processes are coordinated in the course of intensive face-to-face and telephone engagements, increasing communication strain significantly.

5.1.3 Organizational culture

In this section, we augment the contextual frame by providing some insights into the symbolic nature of organizational information processing. In particular, we look at

information processing through the prism of practices that people continuously utilize for information production and transmission. We believe that these practices are crafted from corporate knowledge and personal experience. In this respect, they represent a legitimate, organizationally accepted way of behavior. We expect to get the additional ideas on how the internal corporate culture leads to the establishment and, in a way, institutionalization of information overload. In this discussion, we assume that information processing in organizations is highly symbolic and does not comply necessarily with the principle of rationality.

Two information processing practices potentially relevant for the information overload discussion were extracted in the course of data collection and data analysis. In the exhibit below we present the interview quotes describing these practices (see Table 17)

Copy terror	*No one knows who should get which piece of information. And certainly if you are not sure it is better to have several people informed {LL}* *I call it "copy terror" – everybody is getting copies and is copied in – and after 20 copies you have to fight through the email {HL}.*
Dysfunctional upward communication	*In my working situation, almost everybody thinks that they need to let me know everything. If you look at all these 300 projects that are running into my office all these projects deliver 10 pages of output a day (project plans, business cases, blueprints whatsoever). Everybody thinks that I have to read all these stuff. There are 600 people who are running projects who think that I am the one who needs to know everything about what they are doing, everybody likes to report to the highest person in a hierarchy {HL}.* *There are a lot of mails that come to me from the unit members. Basically, it's communication between two members and they copy all these to me. I open it, I see it, and I delete it instantly. I do not think that they have to mail me about a lot of things {AL}*

Table 17. *Informing practices*

The first practice is related to the previous discussion and explains how the instability of formal organizational structure leads to the institutionalization of sub-optimal informing practices. As indicated in the previous section, the vagueness of structural properties and procedures generally contributes to the individual feelings of uncertainty and makes the individuals use various self-protective practices. The "copy terror", or sending copies in just-in-case mode, is one example of self-protection. Given that production and re-production of an additional piece of information is almost costless and effortless, the practice spreads extremely fast and becomes dominating. Although many respondents pointed out the practice and evaluated it as negative, most of them also acknowledged that it is extremely hard to change it or to get rid of it.

We have named the second practices as dysfunctional upward communication. It certainly inherits the specific characteristics of bottom –up communication in general, under which the greater amount of information is communicated upward unconditionally. Reporting to a high –status superior rather then to one's immediate manger has the elements of self-protection and reflects the desire to move up the status ladder. While initially the status approximation and the instrumental theories (see e.g. Lloyd, Viadya, Ford, 1975) were used to explain why more information is directed towards the top, with the proliferation of advanced information communication technologies the alternative explanation can be suggested. In particular, the use of email as the major communication channel has resulted in a flattening of the formal hierarchy and has eroded many social and status barriers. One of the respondents illustrated the idea as follows:

> *Email is now common for everybody. The Internet is common for everybody. People are staring into their computer screens, and they do not communicate any more. In the email they can tell such things about each other that they would never dare to tell in face-to-face conversation. If they do it at the face-to-face meetings they get a punch in their head…What they allow themselves to say about each other in the email is just incredible! {HL}*

Combined with the ease of producing the additional copy the practice proliferates and becomes dominant, despite its dysfunctional nature. The motivation behind including the senior managers in the list of recipients can vary, ranging from self-protection to attracting the attention of the manager to the particular matters.

However, the response of managers is always dysfunctional and essentially negative. The quotes above suggest that most managers have developed a strongly negative attitude to such kind of informing and tend to ignore the incoming mails instantly.

In all, we found that people indeed develop and utilize a sub-optimal informing practices that are deeply rooted in the symbolic nature of organizational information processing. Both practices are strongly linked to information overload and are institutionalized by humans repeatedly drawing on them.

5.1.4 Internal communication

In the previous sections, we have already discussed the internal organizational structure and some aspects of organizational culture particularly relevant to information overload research. Now we aim to expand the contextual perspective by including internal communication into the range of factors that have a potential effect on information overload.

As mentioned earlier, the work is organized in terms of processes. Each process is defined through the project, or a series of projects. Therefore, the work of the Department is project-centered. Communication flows, replicating the workflows, are also project-contingent. In this section, we describe the dominating communication patterns revealed and pay specific attention to external and internal communication drivers. To do this we discus communication style, directions and channels, and provide an evaluation of communication load.

Background information: typical project

On average, a project lasts from one to two years and involves about twenty people participating in it actively. Moreover, many participate in the projects on an on-demand basis. That is why the number of actual participants can be large. Within the project, people are organized into several groups, each focusing on different functional areas. The project is supervised by the project board and governed by the project manager. The project team has regular formal meetings when all participants are present. These formal meetings are held once in three to five weeks.

The daily work-related communication inside the project team is extremely intensive. The citations below illustrate the respondents' evaluation of the importance of daily communication and its high intensity:

> *For my work it's important to be here [in the office]. I do not really feel that I could or I need to work more at home, for example. Communication is the only thing I do especially during the setup of the department.{JP}*

> *This time, I think for 2-3 weeks already, I only have the appointments all day round. I am always at the meetings. In between, I can do some very little things. I do not think it's a good way to work. You need some time just to work actions over, talk to people… Now it's coming out of order {AL}*

The summary of the analysis of internal communication is presented in Table 18.

Dimension	*Components*	*Practices observed*
Communication style	Informal	Employees rely heavily on the personal, informal networks since the formal communication structures are instable and often vaguely defined.
Communication content	Project –related content Corporate newsletters	Newsletters are defined as spam; High relevance of project related information;
Directions of communication	Project–centered horizontal Upward	The prevalence of two counter practices: dysfunctional upward communication and communication of exceptions
Channels of communication	Face-to-face Telephone Email	Mangers attempt to combine different communication channels to expand own accessibility and achieve maximal control over events. The actual patterns of communication channels use differ significantly among participants.

Table 18. *Internal communication: summary of analysis*

Communication style

As mentioned above, for almost a decade BANK was particularly active in terms of market acquisitions and mergers. As a result, re-organizations and re-structuring were often inevitable. Recently, however, in attempt to increase corporate flexibility and responsiveness to external market demands, the corporate management announced a shift in strategic orientation towards the optimization of internal structure and existing business portfolio. As a result, a wide-scale reorganization was initiated. In response to the instability of corporate structures, employees rely heavily on their own, informal communication networks that often do not coincide with formal communication structures:

> *Inside the BANK if I know someone who knows a lot about it I will connect to him. So, if I want to know how the project is really going, what are the problems, I contact somebody who is working on that. I am working for ING for 13 years, so I know some people around. I see names, "Oh, I know him!" The network is really important.{HF}*

As a result, the style of communication is rather informal.

Communication content

Although a wide range of content is communicated, the individuals indicated that project-related content is of particular importance. At the same time, employees expressed strongly negative attitude towards copy terror, as defined earlier in the chapter. Most of them claimed that they delete this type of incoming information instantly. At the same time, many

acknowledged that they do the same and often send messages that have multiple recipients in the "CC" field, in a just–in-case mode.

When asked to define spam, the vast majority of employees classified the internal information about general issues, such as various corporate newsletters, as essentially spam–like, since in most of the cases it is irrelevant in terms of the current time and task frame, and thus is unwanted.

Directions of communication

Vertical: Upward communication

Upward communication, communication along the hierarchical scale, was particularly interesting since managerial information overload was selected as the focal unit of analysis. In the course of the study, we were looking at managerial information overload assuming that managers are exposed to greater information and communication load, and thus are the most immediate "victims" of information overload.

Two interesting, though counter, trends were observed in the Department regarding upward communication:

1) Dysfunctional upward communication;
2) Management by exception;

The description of dysfunctional upward communication has been presented earlier in this chapter. In response to ever-increasing amounts of upward communication it was decided to adapt the "management by exception approach". Essentially, this means that only "exceptions" must be communicated upward. The citation below provides some further details:

> *For project managers there is always a very strict base line: they have a plan, they have products they are going to deliver, they have certain time frame and budget. If there is anything that will disrupt one of these issues – it's an exception. It's like building a house: you agreed with someone who is going to build a house, you've given the requirements, you agreed the price etc, and this person tells you that there is some problem and something cannot be delivered on time – it's an exception. {JP}*

Although management by exception is a company-wide communication standard that is included in all internal project management documentation, the managerial perception of "exception" often differs from the subordinate's perception. As a result, the first practice (dysfunctional upward communication) dominates, meaning that much information is still communicated upward.

Horizontal: project-centered communication

Horizontal communication, the communication within the same hierarchy level, is essentially project-centered and can be characterized as rather free-flowing and seemingly unstructured. The following characteristics of horizontal communication have been revealed:

- Communication network consists of project team members and expands beyond this scope only on an on-demand basis;
- The entire work process is project-centered. To address the project requirements and actually execute the projects the professionals from different functional areas and structural entities are organized into teams. This allows for combining the distinct skills of each and serving the client's needs best.
- The amount of communication and its intensity and frequency depend on the status of the project and number of projects the person is involved in.

Communication flows are essentially project- dependent in terms of intensity, direction, and content. In the course of interviews, the participants repeatedly emphasized the fact that the amount of communication depends on the status of the project. For instance, one employee pointed out the fact that the amount of incoming emails is dependant on the stage of the project:

> *I get about 20 emails per day, on average. However, it depends entirely on stage of the project, and how many projects I have. {HF}*

Moreover, each employee of Demand & Change is involved in several projects at the same time. Apparently, the membership in one group neither excludes the membership in the other nor makes the manager belong to one group in a formal employment sense.

Channels of communication

Face-to-face, telephone, and electronic mail are the primary communication channels. We observed that managers were constantly engaged in heterogeneous interactions in terms of modes and content. The challenge of allocating time and attention, coping with the high interaction strain, balancing the own accessibility with the interaction requirements, became a primary task. Each manager seemed to develop their own mechanisms of coping with the conflicting demands. Correspondingly, the use of communication channels differed

significantly among managers. However, the attempt to combine different communication channels, such as fixed phone, mobile phone, email, and face-to-face, intending first to increase one's own accessibility, and second to execute maximum of control over events, is what made it similar. The quotation below is illustrative:

> *I have the mobile phone. I use it when I am in the car…. In the office I try to use the fixed lines as much as possible, however I keep mobile on and normally check the messages to keep a track if whether there was something urgent. If people really need me they can also find me via the secretary, she leaves the "yellow paper" that I need to call back someone. Now I am always at the meetings, so it can be difficult to find me… But I have the email as well which I do normally at home {AL}*

The quotation illustrates an attempt at the combination of mobile phone, fixed phone, and face-to-face interactions in a simultaneous manner "to keep track if there is something urgent".

In brief, personal networks, which often differ from formal communication structures, are crucial in understanding the internal communication. The communication is essentially project-centered, when project-related content is valued most. The general organization content is often qualified as spam, being irrelevant and unwanted. Managers are exposed to a soaring communication load since many employees have adapted the practice of dysfunctional upward information, which dominates the practice of management by exceptions, the internal communication standard that has been introduced recently as the counter measure. The within-project communication is extremely intensive and managers are engaged in heterogeneous interaction in terms of both mode and content: face-to-face, telephone, and email are the communication channels that are used most. In an attempt to stay in control over the situation, managers combine various communication media.

5.1.5 Technological platform

In this section, we talk about the properties of the company IT platform and discuss the issues potentially relevant for information overload and coping discourse. For the purpose of the current case study we make a distinction between company-specific applications, the applications developed either in-house or customized in accordance with the company requirements (e.g., internal information systems), and standard office applications, the applications that support information production and transmission on a daily basis (e.g. MS Office applications).

Company specific applications: background information and strategic IT impact

Generally, the strategic IT role within the financial services industry is a subject of particular interest within the IT field. It is widely accepted that IT has a somewhat larger impact on financial firms than non-financial firms, due to the higher information intensity of the former (Dos Santos et al., 1993; Dehning et al., 2003). The most recent studies have revealed the fact that IT not only automates the business processes employed in the financial companies through the advanced back office systems, but also fundamentally alters traditional ways of doing business, introducing web-enabled financial products (Dehning et al., 2003).

The BANK has been exceptionally profitable during the last ten years. As a result, the IT investments of that period can be characterized as abundant, with poor control over the actual return rate and the overall consistency of IT strategy. However, the situation changed dramatically after the financial difficulties and the increasing competitiveness of the financial services market that together eroded the profit. To improve the profitability the management decided to impose a tight control over the efficiency of the internal operations. Naturally, it required a comprehensive re-consideration of IT strategic role in a way that would allow for cutting the IT costs but at the same time, for responding to rapid business and technology changes. Since then, the following IT guidelines have been accepted:

- The IT solutions must be cost effective in terms of time, money, operation, and maintenance;
- The preference is given to standard, off-shelf products that can be customized and thus re-used rather than to internally developed solutions;
- A shared fully-compatible IT platform for all the member organizations must be developed. Thus, all the existing systems must undergo a wide-range conversion.

In the Mission and Strategy Statement for the years 2003-2005, the IT strategic approach was summarized as follows:

> *In the field of operations / information technology, ING will complete many integration and restructuring projects as well as the shared service center{corporate website}.*

The role of Department Demand & Change in executing the strategic IT guidelines

The **Demand & Change** Department plays an active role in the initiating and execution of the IT-related initiatives within the Division Intermediary, BANK. Most of the projects that are run by the department have either a significant IT component or directly deal with the IT development and implementation, aiming to bring new or improve existing functionality. In

Table 19, the key challenges of IT re-organization initiatives are summarized. While the strategic guidelines formulated by the corporate management are straightforward, there are a number of critical factors that complicate the wide-scale IT re-design. The table presents a distillation of facts obtained in the course of empirical enquiry.

Strategic Guidelines	*Critical factors*
A. Integration and restructuring of all existing systems	Large number of existing systems Impaired quality of existing systems Design complexity that arises from the attempt to connect "everything-to -everything" Functional incompatibility of systems Incompatibility of databases Need for alignment of various strategic initiatives
B. Preference for the standard, off-the-shelf, solutions, rather than in-house development.	Lack of in-house skills and knowledge for implementation and customization of the standard solutions Complex and delayed decision-making

Table 19. *Summary of critical areas with respect to the formulated strategic IT guidelines*

Integration and restructuring of all existing systems

From its foundation till the early 1990s all members of BANK, in particular Banking and Insurance branches, were considered as independent entities. Therefore, all operations were backed with specific, often unique technological platforms that had been designed in accordance with the entity-specific set of requirements. Not surprisingly, the number of such independent systems grew exponentially. At the time of the study, the struggle to decrease the number of systems had just begun. As one of the business unit managers puts it:

> *One example is a big IT program that aims to change our 230 systems that exist into 8 new systems, let's say. So they need to convert all data etc. Sounds very simple, but it is a huge operation. {JP}*

The next serious complication originates from the quality of core back office systems that are often subject to moral depreciation in terms of underlying business and data models and technical characteristics. One of the IT project leaders stresses the point, saying that:

> *In my opinion, our back office is not the state of the art. Some systems are 25-30 years old. Almost all have the different programming language and environment. After so many years the original design of the system is not known any longer. Sometimes we just have systems with tricks, undocumented features. … These systems were designed for the situation we were in 25-30 years ago. Now the processes are completely different but we still use these old systems with their old data models. We cannot just transmit the knowledge from one legacy system to another. It takes a lot of time, the systems are not*

flexible, and almost all interfaces are point-to-point. If we want to introduce a new product, for example, the situation is more or less the same. It takes a lot of time. Our competitors always introduce new products before we do. Our marketing is good, but our back office… {MD}

Further, in theory, the IT integration rests on the principle of synchronization of dispersed IT functionalities, which allows for the coordination activities, decisions, and knowledge across many different functions, levels, and structural entities. At the time of the study, ING Netherlands alone consisted of more than 20 independent companies, each having a broad network of local and foreign agencies. Mapping the connections among the operating systems of these companies is an extremely complex task. One of the project managers of the Demand & Change who is engaged in a number of integration projects summarizes the major difficulty as follows:

…In our organization, people think that thanks to technology you can put everything together… Let's take an example of commercial loans. The situation now is like we have a system, somebody else has a system, in Belgium they have a system, but people in this organization think that it is possible to make one big system, perhaps the unified system for the whole Europe (at least for Holland), one big process… And that makes it extremely complicated. They are connecting everything to everything… Sometimes it's better to get started all over again because the way to get there out of existing systems is very complicated. Until one year ago we had everything for our own, to make it available for every one is not really possible {HF}

The lack of overlap between the underlying business processes demands a full-scale re-establishment meaning, that the business logic of one system cannot be transferred or adapted to the business logic of another system. To illustrate the problem one of the interviewees used the example of the system development initiative undertaken by the Wholesale Department of the Commercial Division of BANK he is engaged in:

We have a department, a kind of Wholesale Department. It sells commercial loans to all kinds of customers. We have a computer system, called Profile System, that is more or less outdated. What we are doing now we are trying to get all the processes of the Wholesale Department that are coded in the Profile System into the system of the Operations and IT Division, Service Center Commercial Loans and Guarantees. So we have to transform all the processes and all the data…Even more, their system is not suitable right now for our processes, so we have to do a lot of research to find out the differences, we have to do a lot of discussions about the investments, what is necessary to change the system etc. {HF}

The client databases are undoubtedly part of the most valued corporate information resources. The efficiency of use of client data determines the corporate competitive position

and the responsiveness to the emerging market demands. With respect to this, the desire to have a unified client information system that could be available in any geographical location is understandable. The typical problem that arises during the merger of data sets from the different information systems is addressed in the quotation below:

> *For instance, if you decide to have one system for Commercial Loans you have to make the decision about what you are going to do with the client's data. Right now the entire commercial loans departments of BANK have their own client databases, which are not connected to the "big" Commercial Loans System. So, the idea of having one Commercial Loan System is attractive but you have at least one problem: "How do you connect this new system with the old consumer / client databases?". Thus, another project is starting to make one client database for BANK. {HF}*

The assumption that overall IT initiative is composed of interdependent IT projects, and thus the ultimate success of strategic IT approach is an additive function of the success of each project, is not valid. Projects may not necessarily depend on or support one another in any direct way. The project team members may not interact with each other. Yet the projects are interdependent in the sense that unless each performs adequately, the total result is jeopardized; failure of one can threaten the whole; the success of one does not mean anything unless it is backed up with the success of all the rest:

> *The major problem is to plan the IT changes and to align them. Last year we had 1-2 implementations each week. With such an intensity of system development projects can get into a conflict with each other. This conflict is very hard to anticipate in advance. It's also hard to explain people that the ultimate success depends on how well the projects, systems, are working together. The success of a single project doesn't mean anything until it integrates in a broad framework. It should be fine all together. {MD}*

Preferences for the standard, of-shelf solutions that can be re-used

The BANK had a strong tradition of building all the necessary solution in-house, solely relying on the proficiency of their internal labor force. However, constant changes in the IT sector resulting in regular advances, establishment of a market for the corporate IT solutions, and proliferation of IT outsourcing practices have shaken the long-standing belief in "in-house efficiency". Naturally, there are certain advantages and disadvantages to both outsourcing and in-house development. While outsourcing may indeed prove to be cost-saving, certain "hidden costs", not always detectable at the stage of early planning and decision-making, can outweigh the potential benefits.

In the case of BANK, the lack of internal knowledge of and skills in system implementation and customization can be qualified as the hidden cost of outsourcing. The organization that used to develop everything in-house, such as BANK, inevitably faces significant implementation risks and must rely on subcontractors to do the customization when the off-shelf product is implemented. Thus, for example, the implementation and customization of SAP products are provided by Ernst & Young, since the internal IT and Operations Division does not possess the right knowledge –skills mix.

Even more, the functional diversity and the lack of overlap among business processes make the customization and re-use of the software solutions not easily possible. The absence of straightforward solutions places an increasing burden on decision-making and expands its time-frame significantly. The quotation bellow illustrates the aforementioned difficulties:

> *In this project for Commercial Loans, for example, [one of the projects the interviewee is engaged in] there is a smaller part of it in which we are working with the intermediary. This intermediary gets the commission. We have to do something about commission; we need to incorporate the process of paying and receiving of commission into the system. We talked to people and we've heard about the project in Rotterdam [One of the BANK Insurance Divisions is located in Rotterdam]. They work with SAP, we went there, we studied what they have – basically it's exactly what we need but the problem is that they are working only for the insurance, so at the end, there is nothing for us (commercial loans). Another person said that he's heard about another BANK department in Belgium, so go there – some people from here went to Belgium. Right now they are doing a study, perhaps, we can use that. I am sure that in Italy they also have something. But in the meantime we are not making any progress in our project, and we are spending a lot of money and time to save money – that's the idea if we can use something that someone else is using already it's less expensive, maintenance and all these things are easier". {HF}*

Standard office application: background information and major components

The distinguishing characteristic of the office platform at the site of the study is its high degree of standardization: standard applications, standard functionalities within applications, standard input and output formats.

Put simply, technology supports various daily activities by enabling information production and distribution, facilitating the sense-making and decision-making processes, connecting remote work sites and information repositories, and sustaining cooperative and collaborative work processes. In fact, the respondents generally acknowledged the role of technology in fulfilling their daily responsibilities as follows:

- *"Technology is part of my work. You cannot do work without it." {LL}*
- *"If we wouldn't have these utilities [standard applications] it would make our work a lot more difficult" {HF}.*
- *"It makes my work efficient and allows to do it faster" {LM}.*

However, many insist on the secondary role of technology, referring to it as a "utility" that has no value in itself. The citations below further explain the argument:

> *"No – no, in our work we depend on technology only to some extent. We are working on changing the technology but we are not dependent on it. All projects and programs we do in general have the technology component but they are not dependent on IT entirely" {JP}*

> *"[Technology] is not really a big issue here. Incidentally we have the problem with the network or internal system failures. In that case 100 people, at most, are not working. On the other hand, last year there was a fire in one of our main towers in Rotterdam; thousands of people were not working. That's much more of trouble. Or that we have got another building, which is 38 floors high, and then the elevators do not work. It is really a problem" {LL}*

Linking technology and information overload

To find out if there is a link between technology and information overload, in line with the logic presented in the Conceptual chapter earlier, we classified all the applications from the site into four general categories: transacting, interpreting, connecting, and collaborating software. The analysis is summarized in Table 20.

We have placed several applications into more then one group since they possess a wide range of functionalities. For instance, Outlook, which serves as major connecting application, also provides the interpretive functionalities that allow for the classification, retrieval, and filtering of incoming mail in accordance with a pre-defined logic. In that way, it supports the individual information processing and sense making.

Type of application	*Type of overload*	*Example of applications form the site*	*Empirical*
Transacting software: basic information production and distribution of information	Data overload	Standard MS Office applications Intranet	No link with overload observed
Interpreting software: supports individual information processing	Structure overload	Internal information systems MS Outlook	Insufficiency of interpreting functionalities and as a result strong link with overload observed
Connecting: communication platforms that support all types of social relations	Interaction overload	MS Outlook	Strong link between email and overload
Collaborating software: support distributed working and collaboration	Transaction overload	Commonly shared project directories	Limited functionalities for the collaborative processes supported and as a result strong link with overload.

Table 20. *Technological platform: summary of analysis*

Transacting software is used for basic information management purposes such as information production and distribution. The standard MS Office applications are examples. All of them are designed for the production of quantitative (e.g. MS Excel) or qualitative (e.g. MS Word) information. The produced information is further collected in the internal corporate network, such as Intranet that is accessible to internal users only. Although the use of these applications acquires for somewhat significant portion of working time, no connection between the use of these software and overload was found.

Interpretive software supports the individual information processing and sense making by providing the categorization, filtering, clustering, and the initial analysis functionalities. Despite the fact that interpretive software is built to overcome the human inefficiencies and assist human decision-making and possesses the capacities for information filtering, structuring, categorization, and analysis, these functionalities are still unsatisfactory. In the course of the filed study, the interviewees continuously emphasized the paucity of automatic filtering techniques and poor fit between information requirements and system output. The clear indication of that can be found in the citation below [the fragments of texts were underlined by the author for the aim of further analysis]:

…. When I look at how I read the newspaper, for example – it's difficult to reveal the pattern. For example, there are things in which I am always interested in but I do not read it all the time because I do not have time for that. There are other things I am reading because the header attracts me or because I am sitting on the terrace in the sun and read the stuff that doesn't really interest me. I am always wondering how do these things work out with software. The same holds true with the software checking my email. From one point, you feel you would like to have it. From another, I feel like I need to check what it has done. It is the same with searching the internal system: when I really need to find something the search does not help me a lot. {HF}

Here the respondent refers to the automatic filtering capacities of MS Outlook at most. From the passage above and a detailed analysis of other interview transcripts, we have extracted the following critical factors that determine the poor use of interpreting software:

- Lack of stable, repeated patterns behind formulating information requirements and fulfilling information search;
- Unstructured information requests dominate;
- Lack of trust that the mental processes underlying human decision-making can be replicated by the inbuilt technology functionalities;
- Absence of positive experience when the use of interpreting software was strictly beneficial;

Connecting software establishes the communication platform and supports all types of social relationships. MS Outlook is the main connecting application within BANK. All respondents acknowledged the existence of a link between the number of incoming messages and the degree of information overload. Although the actual number of emails received daily differed significantly and ranged from 30 to 100, all respondents evaluated it as being too much.

Collaborating software provides the shared workspace and supports the distributed working and collaboration. It mediates the process of organizational communication in a fascinating way connecting professionals and giving them maximum mobility and independence. Likewise, it establishes a platform for the coordination of team-based work in a geographically dispersed and structurally flexible work environment. Apparently, the efficiency and fit between the collaboration requirements and the existing collaboration platform is a "key success factor" both for the organization and for the individuals.

From one perspective, as discussed earlier, each project team includes members from various functional areas and structural entities (see Figure 20). At the same time, although working

on the project implies intensive daily collaboration among the project team members, often, participants work at geographically distributed locations. In this sense, the collaborating technology becomes important. Due to the fact that workflow is essentially project-centered, the information and communication flows are project-centered as well. To facilitate the within-team collaboration the system of project directories was designed and implemented within BANK. There is a separate directory assigned to each project. The collection of project-related documents is placed there, from working files to the final versions of project assignments. The project team members have an unlimited access to the directory, so the available information pool is shared. Even though the idea behind this application is simple, one of the respondents has illustrated the difficulties that project members face when using the shared catalogues, as follows:

> *We put all the working documents, both finished and finished, into the unit directory. The purpose of this is to make files accessible for everyone to avoid the workflow breakdowns as like you are seek and no one can finish it because no one has an access to it. Somebody else can always take it over and finish it. It [directory] is HUGE. From one side it's good, from another side it's difficult to find what you need. Everybody has the right to change directory, you can make a new directory, you can clean it up, you can move someone's directory to another location etc. To keep it updated and clear costs a lot of time. Before you arrived I was busy with trying to find the piece of information, which I need to carry out my work, but I couldn't find it. I need to make a decision today; today is Friday. This afternoon I would probably need to stay longer, will try to work it out. I have to go through all the files one-by-one. You can easily get lost there. I do not want to go there, it's too much... All I need is a small piece…. {LL}*

From another perspective, under the general regulations all Information Communication Applications within BANK must be standard and uniform for all structural entities. As a result, the number and diversity of communication devices and collaboration applications is under strict regulation. Moreover, in line with the cost-cutting initiatives the number of communication channels available for the employees is also limited.

As a result, we have defined the organizational collaboration in terms of four interlinked entities (see Figure 21):

- Driving forces that determine the nature of organizational collaboration, such as: team-centered organization of work, geographically dispersed and flexible working environment;

- Organizational regulations, such as: unification and standardization of information-communication platforms, inflexibility in terms of applications available and functionalities supported, orientations towards cost-cutting;
- Existing collaboration platform that consists of all internal collaboration applications;
- The required collaboration platform, the platform that satisfies the demands for collaboration at maximum;

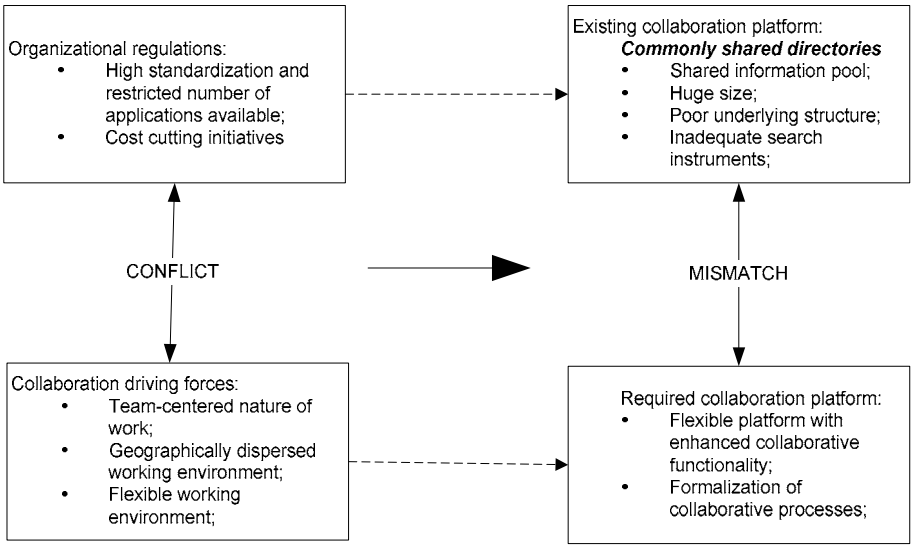


Figure 21. Project flow

Based on the analysis of the empirical evidence we have concluded that the existing collaboration platform, developed under the organizational regulations and standards, supports collaboration only to a limited extent and neither enhances the efficiency of project-based work nor resolves the problem of overload. Correspondingly, we have observed the conflict between the essentially collaborative nature of work and the organizational regulations that impose inflexible standards and restrict the use of collaborative application (see Figure 21).

5.1.6 Contextual perspective on information overload summarized: linking data to theoretical propositions

Proposition	Empirical evidence
The structure of organization determines the organizational vulnerability to information overload. A mechanistic type of structure increases the risk of information overload.	Due to the instability of organizational structure, the proposition was not tested directly. However, a strong link between the features of organizational structure and degree of overload was found.
Organizational culture affects the individuals' vulnerability to information overload. Information overload is a voluntary state that indicates individual compliance with the organizational culture.	Partially supported. It was found that individuals indeed develop and deliberately utilize the sub-optimal information processing structures that are deeply rooted in the symbolic nature of information processing and, in so doing, institutionalize the state of information overload.
As the amount of internal communication goes up, the risk of information overload increases.	Supported: amount of communication is positively related to degree of information overload.
Introduction of advanced information technologies causes information overload: A. The use of transacting technologies increases the risk of data overload. B. The use of interpreting technologies increases the risk of structure overload. C. The use of connecting software increases the risk of interaction overload. D. The use of collaborating software increases the risk of transaction overload.	 Not supported Supported: Strong link observed Supported: Strong link observed Supported: Strong link observed

Table 21. *Contextual perspective on information overload: linking data to theoretical propositions*

In the previous section we have discussed the characteristics of the organizational context, including organizational structure, the particular elements of organizational culture that emphasize the symbolic, not always rational nature of organizational information processing, the internal communication, and the characteristics of the technological platform. In the subsequent sections, we are going to address the issue of information overload from the task-contingent and personality-contingent perspectives. To do this, we move from the level of organization to the level of particular individuals. Although the detailed analysis was conducted for each participant of the study, in the final version of the dissertation we present the examination of two profiles referred to as focus profiles. The first profile illustrates the nature of information overload for HL, managing director of the Department, and second profile does the same for LL, the senior consultant of Demand business unit. These profiles were selected due to their particularly exemplary content and highly representative underlying patterns.

We start the discussion with the profile of HL and describe first the task-related and than the personality factors of information overload. We than continue the discussion with a detailed explanation of LL's profile.

5.2 Focus profile I: HL

5.2.1 Information overload: task-contingent perspective, HL

Task complexity

In the conceptual model, we made a distinction between three components of task complexity: component, coordinative, and dynamic complexity. We assume that for each individual there is a high degree of homogeneity in terms of daily tasks performed. Therefore, rather than treating each task separately and discussing its particular structural properties, we study the characteristics and structural properties of the task environment. To do this, we define the accumulated component, coordinative, and dynamic complexity of task environment and describe each of them in detail below.

Component complexity is a direct function of the number of distinct acts and the number of distinct information cues. The number of distinct information cues that HL needs to process is high. The quotation below is illustrative (the emphases are made by the author for the purpose of further analysis):

> *If you look at all these 300 projects that are running into my office, each delivers 10 pages of output a day (project plans, business cases, blueprints whatsoever). Everybody thinks that I have to read all these stuff. There are 600 people running projects who think that I am the one who needs to know everything about what they are doing. And then they do not put it on paper in half-A4 format, but they like to express their knowledge and put it in print in 40 pages. And the real issue is on page 32 or 38.*
> *In real life you can see 50-60-70 emails a day, such a pile of written documentations per day, and also all your interviews for which you need to be prepared. And then it is this official data that you have to process, and something else you would like to know…I get too much, more than I can process within a day of work {HL}*

Printed information comes from distinct functional areas, as each project addresses functionally specific issues, requires different prior knowledge to be processed and understood, and is presented in a different format, such as project plan, case, blueprint, or an official report.

A wide range of issues is covered in the emails. Above all, email messages convey procedural remarks, status reports, and on-going discussions. The majority of them are related directly to the current business processes and require a reaction in a short-term time frame.

The face-to -face and telephone conversations require a significant portion of the daytime and are qualified by the interviewee as one of the most reliable sources of information. HL has from four to six business meetings per day. Each implies prior preparation and "thinking over" (in the terminology of HL) and ex post reaction and actions.

All fixed line telephone calls are received by the secretary. She makes the decision about the redirection, connection, or diverting of the call. From this perspective, she is credited with unlimited power in screening the incoming calls and ascribing both the urgency and importance characteristics to them. Moreover, the mobile telephone is exploited heavily, ringing almost in a non-stop mode.

In the citation above, HL defines information overload straightforwardly as getting too much. The consequent analysis of the empirical data supports the proposition that there is a strong positive relation between component complexity and degree of information overload.

Interaction, mutual or reciprocal action or influence, which implies active information exchange and cooperative information production, is the predominant form of action in the contemporary business environment. HL is constantly engaged in interactions: the participating parties, the modes of interaction, its content, and the communication channels utilized, all vary.

Coordinative complexity consists of the characteristics of timing and sequencing of acts, the frequency of acts, their intensity, and locational requirements. In the course of the study, we made a distinction between two interlinked levels of coordination, i.e. interpersonal and personal level coordination. Correspondingly, two types of complexity arise:

1) *Interpersonal coordinative complexity*: HL's central responsibility is interpersonal coordination and control. Due to his superior position in the formal hierarchy, his large span of control, and the large number of employees under his supervision, the coordination task becomes non-trivial and complex. The newness of the department, the instability of its structure and procedures increase the coordinative complexity significantly. The quotation below gives an idea of how complexity that arises from interpersonal coordination is linked to information overload:

> *I am accepting too much of the load. In most of the cases I am getting into trouble or my department is getting into trouble because I am trying to accommodate the responsibilities which are actually not my or our job. It does not mean that you do not need to know what's going on in the other departments, but you always must keep in mind that there are people hired to look after these departments. {HL}*

2) *Personal coordinative complexity*: On a daily basis, HL has to interact with a wide range of people, from superiors and peers to clients and external parties. The ongoing multi-channel interactions place conflicting demands on the individual's cognitive abilities and time. As a result, HL faces a dilemma of either restricting his own accessibility and missing potentially relevant information, or being exposed to an ever-increasing communication flow and accepting the risk of overload and potentially damaging his own performance. During the interview, HL has received several phone calls on his mobile and was notified by his secretary about an important fixed-line call: thus, he is engaged in non-stop multiple interactions.

Together, interpersonal and personal drivers reinforce each other and increase the complexity of coordination significantly. Below, we evaluate the effect of each component of coordinative complexity (timing and sequencing, frequency, intensity, and locational requirements) and trace the link of each with the information overload (see Table 22)

Timing and sequencing of acts	Constant overlap of interactions
Frequency of acts	High frequency of interactions
Intensity of acts	Intensive multi -channel interactions
Locational requirements	Absent, work at one location

Table 22. *Coordinative complexity: major components*

Out of the four factors that affect the degree of component complexity, only one was not present (see Table 22). In particular, since HL works at one location and does not need to travel across multiple locations, the locational complexity had no effect on the overall coordinative complexity. A sequencing of acts, their frequency, and intensity all are evaluated as high and produce a composite effect that increases the overall coordinative complexity.

Although HL acknowledged explicitly that sequence and timing were complex, the frequency and intensity of acts were high, he did not link it to information overload, as we would expect. For him the highly intense interactions are the essential characteristic of the job, perceived as something natural and part of daily responsibilities. For instance, for HL having six business meetings a day is natural and has no negative meaning in itself. Similarly, balancing his own availability and orchestrating daily interactions is recognized as part of a daily job. That is why, although the respondent explicitly built a link between coordinative complexity and information overload, coordinative complexity is believed to have a somewhat marginal effect on the overall degree of information overload.

Dynamic complexity is imposed by the turbulent and unstable nature of the contemporary business environment. To evaluate the dynamic complexity we have traced the pace of change of information and action requirements. The constantly changing market situation, the overall instability of the organizational structure, and the superior position of HL in the formal hierarchy are among the distinctive characteristics of the business environment in which HL is working. The position of Managing Director implies that, while staying at a reasonably general level, he is in possession of the knowledge from specific functional areas that is necessary and sufficient to execute project coordination and control. In addition, his own desire to be involved actively in the activities of the Department expands the required breadth of knowledge. In the text fragment below HL explains how he collects information and provides the rationale behind this:

> *Besides the official data you have to process, there are your own interests. Even TV and radio, for instance, are not the resting places for me. Half–consciously, I am searching for all these specific issues…Let's say there is*

> *some government change or initiative. We always need to know what's happening and what it is about because it is crucial for our products and processes. […] If someone wants to grow, he needs to know more, he always needs to learn how to do things differently, to be able to look over a fence. {HL}*

He emphasizes that information collection is an ongoing, endless process that continues even on a half-consciousness level. He claims further that information collection is guided by objective information needs, such as the information necessary to fulfill a task, and his own preferences and interests, which constitute the stock of general knowledge and contribute to personal business intelligence.

He accentuates the positive relation between dynamic complexity, in the way defined earlier, and degree of information overload. Importantly, he claims that although threatening, the willingness to accept and accommodate novel information and knowledge, and the ability to learn novel activities, are absolutely essential for his daily responsibilities and professional growth. In that way, he stresses the voluntary facet of information overload, claiming that it stops as soon as the person decides to stop.

Time constraint

Although not stressed explicitly, HL defines information overload as a state of having too much information given a certain time frame. He suggests several mechanisms for balancing the time constraint and degree of information overload. In particular, he advocates "stretching of working hours" by working during leisure time at home, and "shifting of time" by changing the type of activity and thus increasing overall productivity. Both will be discussed in detail later.

Task-contingent perspective on information overload summarized: linking data to theoretical propositions {HL}

Proposition	Empirical evidence
The risk of information overload goes up as time complexity increases:	
The risk of information overload goes up as the component complexity of the task increases;	Supported: the strong link between degree of information overload and component complexity is observed;
The risk of information overload goes up as coordinative complexity of the task increases;	Supported: although the effect of coordinative complexity on information overload is somewhat marginal and interpersonal coordination accounts for most of the effect;
The risk of information overload goes up as dynamic complexity of the task increases;	Supported: the link between degree of information overload and dynamic complexity is observed. The breadth of knowledge required to fulfill the general management functions mediates the link.
The risk of information overload increases, as time constraint becomes binding.	Supported

Table 23. *Task –contingent perspective on information overload: linking data to theoretical propositions {HL}*

5.2.2 Human-related perspective on information overload: HL

HL, 45, is the managing director of the department under study. While successful in his managerial career, he claims that he is not working for money. He ascertains that his guiding motive is that he likes the job. This, to his mind, makes it much easier, less stressful. HL believes that the problem of information overload is becoming one of the primary ones being still poorly addressed and dealt with. Interestingly, the importance of the problem of information overload to HL personally and to the Department Demand & Change in general secured the researcher access to the company site and allowed us to undertake the investigation.

Decision-making style

Decision-making style comprises the amount of information collected and the number of decision alternatives derived from it. HL repeatedly claims that patterns of information processing in terms of amount of information collected and number of alternatives considered differs significantly among individuals. In the text fragment below HL describes his information acquisition behavior:

> *If you look at 100 documents that are coming to you, there are probably 5-6% of it you need to fulfill your responsibilities and really work. The next step, correspondingly, is to decide what you need to know and what is nice to know. By that you expand 5-6% to somewhat 20%. When I am through this 20%, I am curious what is in the other 80%. And then I get all 100% and still think it would be nice to get something else. It is individual for a person, when he stops. At 4 o'clock in the afternoon some people say "Ok, I've finished, my day is over. Now, I am taking care about children or making dinner". I am jealous with people who know exactly what they need {HL}*

Drawing on the definition of decision-making style, we qualify the one of HL as information-intensive. The empirical evidence is strongly supportive of this. In fact, he states explicitly that his information search never stops and having more information is always better for him. He emphasizes that he collects a lot of information in surveillance mode, following the intuition that it might be relevant some day rather then satisfying his actual information need. Moreover, he admits that some people are less vulnerable to information overload than the others, because they utilize a minimalist approach to information processing that allows them to focus only on the necessary minimum. He continues this line of reasoning by suggesting that information overload has a significant voluntary component.

With regard to the number of alternatives, HL likes to consider the whole set of possibilities and to include in the decision model as many risks as possible so as to be able to produce the outcome with maximum accuracy. This preference is objectively –motivated, in a way. A high position in the formal organizational hierarchy reduces the margin for mistakes and imposes a high degree of decision responsibility. Eventually, extensive information collection and complex decision-making represent a form of self-protection.

Contrary to what was expected, HL indicated that his decision style (characterized by intensive, non-stop information search and consistent preferences for more information) was one of the central causes of information overload.

Experience

HL is 45. At the moment of the study he held the position of managing director of the Department. We made a distinction between five types of experience and evaluated all of them using a five points scale from high to low (see Table 24). We based our inference on the interview data and curriculum analysis.

Type of Experience	Evaluation
Experience of information–intensive types of task	High
Decision-making experience	High
IT knowledge and experience	Somewhat average
Work experience (total)	High
Experience in the current position	High

Table 24. *Experience: the empirical evaluation {HL}*

Contrary to our expectations, extensive experience of information intensive types of task had no mitigating effect on degree of information overload. Extensive work experience, experience in the current position, and overall decision making experience mediate the effect of coordinative complexity on information overload, and empower HL with a profound knowledge of the organization and all its internal processes. Somewhat average experience of information communication technologies accentuates his general scepticism of the technology and its potential to address and satisfy the information management needs.

5.3 Focus profile II: LL

5.3.1 Information overload: task-contingent perspective {LL}

In the same fashion, in which we have investigated the structure of information overload for the case of HL, we will depict the components and the links among them for the case of LL. LL is a senior consultant in the Demand Business Unit. Throughout the interview, she

continuously emphasized the actuality of the information overload problem, specifically in the information–intensive context of a consultancy job. In the following sections we discuss the task – contingent and personality factors.

Task complexity

In this section, we study the effect of task complexity on information overload. Similarly to the previous case, we distinguish between three types of complexity: component, coordinative, and dynamic complexity.

First, we define the **component complexity** of the task environment. Being a senior consultant, LL classifies her job as extremely information-intensive. Her typical daily activities include the preparation and finalizing of the Project Calendar, the formal document that defines the number of projects, their sequence, and budget; or working on the Business Change Plan, the official document in which the required change activities are specified. Fulfillment of these activities implies extensive information acquisition, processing, and finalizing of ideas in the form of business cases, plans, or schedules. LL specified three major sources of information:

- Email;
- Internal shared project directory;
- Face-to-face or telephone communication with parties involved.

Apparently, the number of distinct information cues LL needs to process on daily basis is extremely high. Moreover, she emphasizes that not only the number of information cues per se is important but also the size of each. She illustrates the issue using the example an email with large attachments:

> *… [Every day] I first check my email. Normally I have a lot of emails waiting, on average 30-50. There are **huge** attachments [emphasized by the respondent]. Here we come again to information overload. People do not know how to use simple way to avoid huge attachments sending around. {LL}*

Similar to the case of HL, LL receives much of her information via email. It is apparent that not only the large number of incoming mails leads to information overload but also the size of attachments that she needs to process. LL feels that sending attachments is often redundant since the same information is available through different information sources. To avoid redundancy she suggests using the link to the document. This, in her mind, will help to

decrease the redundancy of information and complexity of the task that arises from this redundancy.

Much of information she utilizes on a daily basis is deposited in the shared project directory. The shared project directory is a shared workspace, in which all project-related documents, both finished and in-progress, are stored. Due to the fact that a large number of documents is produced daily, the navigation through the directory is not an easy task. Moreover, the absence of a formal structure and the unconstrained rights to change the directory make it more difficult. For LL, getting the necessary piece of information when she needs it is the biggest challenge. With regard to this, she mentions the following example:

> *…Just before you arrived I was busy with trying to find a piece of information which I need to carry out my work, but I couldn't find it. My colleague worked on this piece but now he is on leave… I need to make a decision today; today is Friday. In other words, I cannot get the right information in the right time. This afternoon I would probably need to stay longer, will try to work it out. If I will not reach him, than I have to go through all the files one-by-one. You know, we have huge directory with all kinds of files. You can easily get lost there. I do not want to go there, it's too much information!!!. All I need is a small piece…{LL}*

Evidently, the use of email and the use of a shared project directory both result in information overload. In the former case, it happens because of the large number of incoming messages and the huge size of each message. In the latter, the large number of documents and poor structure are central.

The **coordinative complexity** arises mainly from the need to align the intensive interactions. Since the work is project-centered and the final product is the result of collaboration among professionals from distinct functional areas, the interaction strain is high. We define the effect of coordinative complexity on degree of information overload by looking at each component of coordinative complexity, such as timing and sequencing of acts, frequency of acts, intensity of acts, and locational requirements (see Table 25).

Coordinative complexity	Empirical evidence	Empirical evidence
Timing and sequencing of acts	Structured interactions with strict timing and sequencing	*I try to be in control of my agenda as much as possible. What I do is try to concentrate all meetings on certain days and book 1-2 days without meetings. {LL}*
Frequency of acts	High frequency of interactions.	*More than 50% of daily time I spent on meetings. When I am in the office I have something like 4 appointments a day. It's less than my boss has but it is pretty full. {LL}*
Intensity of acts	High intensity of interactions	*I: How do you plan your day? Your appointments?* *LL: Oh, it is a very difficult task. I have both paper agenda and agenda in Outlook. But every day I plan things and cannot finish them all.* *I: How do you divide the working time between activities?* *20-25% of time, at least, I spend on email; 50-60% on meetings; 15% - calling and receiving calls; 5% - real work.*
Locational requirements	Work at two locations	*I work in two locations: Den Haag and Rotterdam. In general, I work half of time in Rotterdam and half of time in Den Haag. I do not mind so much traveling. I am trying to solve as much problems as possible via the telephone, but it's ok.*

Table 25. *Coordinative complexity: major components*

In contrast to HL, LL spends much effort on organizing and formalizing her own agenda, so to reduce the overlap among interactions. The meticulous day planning and sequencing all daily activities, the utilization of time-reserving procedures - all are used to maintain the non-overlapping and non-interrupted workflow.

Like HL, LL is exposed to a large number of communication acts per day. Communication is held in a face-to-face manner both formally and informally and via the telephone. Although she classifies the number of interactions as high, she admits that it is still reasonable and that many colleagues are subject to more intense interactions. Despite this, she mentioned several times that such interaction flow leaves very little space for reflecting and actual working, including thinking, reading, processing information, and producing documents (5% of her daily time, in the quotation above).

She works at two locations and needs to share her working time between them. Traveling is essential for the work process since many work-related issues cannot be solved remotely and require physical presence. She tries to optimize traveling by solving as many problems as

possible via telephone, via concentrating her day at one location only and avoiding moving across locations during one day. In that way, she reduces the work disruptions and complexity resulting from locational requirements.

Contrary to HL, who linked dynamic complexity with the breadth of knowledge necessary to fulfill the general management functions and its evolving nature, LL sees the instability of organizational culture as the central source of **dynamic complexity**. The quotation below is indicative:

> *I have a difficult task, which is not out yet. It is evaluation of project or information system of business unit from Banking. It's not difficult to evaluate the system itself but it has also much to do with the reorganization – moving, changing environment. It's not very clear, things are changing every day. These things make the evaluation and you advice very difficult. We have not finished this task yet. {LL}*

Despite the fact that the assignment in itself (the evaluation of the information system) is rather standard and in that way is not difficult, the instability of organizational structure and constant changes in organizational hierarchy intensify its complexity significantly.

Time constraint

Although not addressed and emphasized explicitly, sufficient evidence was found to support the idea that information overload is essentially a time-contingent phenomenon.

Task-contingent perspective on information overload summarized: linking data to theoretical propositions {LL}

Proposition	Supported / Not supported
The risk of information overload goes up as time complexity increases:	
The risk of information overload goes up as the component complexity of the task increases;	Supported: the strong link between degree of information overload and component complexity is observed. Not only the number of independent cues but the size of each cue are linked to information overload;
The risk of information overload goes as coordinative complexity of the task increases;	Supported: the link between degree of information overload and coordinative complexity is observed;
The risk of information overload goes up as dynamic complexity of the task increases;	Supported: the link between degree of information overload and dynamic complexity is observed. The link is mediated by the general instability of organizational structure;
The risk of information overload increases, as time constraint becomes binding.	Indirectly supported, not addressed explicitly by the respondent.

Table 26. *Task –contingent perspective on information overload: linking data to theoretical propositions {LL}*

5.3.2 Human –related perspective on information overload: {LL}

Decision-making style

Similar to HL, LL always prefers to have more information, not being willing to accept the risk of missing something potentially important. Having an extensive academic training, she has developed the habit of thoroughly informed and perfectly grounded decision making.

A habit of processing large quantities of information helped her to develop highly efficient search techniques and enhanced her information processing skills. The observed tendency to structure and formalize most work-related activities spreads into information search and processing. Contrary to the case of HL, the observed relation between decision-making style and information overload was in line with the expected.

Experience

Type of Experience	Evaluation
Experience of information –intensive types of task	High
Decision-making experience	High
IT knowledge and experience	High
Work experience (total)	High
Experience in t the current position	Somewhat average

Table 27. *Experience: the empirical evaluation {LL}*

LL has an extensive academic training. Her academic credentials include an MBA degree and the PhD in Information Systems Management. After accomplishing her PhD, she had worked in academia. That made her thoroughly familiar with various research techniques and enhanced her information acquisition and information processing skills. Moreover, high technical skills and a familiarity with systems design allowed her to become an advanced user of corporate applications and use the inbuilt search and interpreting functionalities to a high degree.

She has moved into business and has at least eight years of consultancy experience. She has been working in the company for four years. As a result, at the moment of the study she was in the possession of knowledge about the internal procedures and specific work-related issues, but expressed some difficulties with grasping the internal hierarchy and formal structure.

5.4 Human coping with information overload

5.4.1 Human-enabled coping: background

Human–enabled coping is defined as removing the unwanted pieces of incoming information by means of knowledgeable reasoning, selection, and organization; and enhancing the human information processing capacity by using limited cognitive resources more efficiently. In the section below, we describe the persistent forms of human coping as they emerged in the course of data analysis. In Table 28, we summarize the empirical evidence on human coping and define accordingly a number of dominant routines. The quotes from the interviews are used to explain the essence of each practice.

Human –enabled coping	*Empirical evidence*
Selectivity: applying interpretive schemes, particular selection procedures;	*(1) If I want to do my job right, from all the stream of information that comes to my office I need to select somewhat 20% because that's what I can process. {HL}* *(2) I am very selective at what I read. I do not want end up reading reports day and night. All papers, emails that come to me I give quick look and decide whether I should read it. {JP}* *(3) It's difficult to understand how I actually select. When I look at how I read the newspaper – it's difficult. There are thing in which I am always interested in but I do not read them all the time because I do not have time for that. There are some things because the header attracts me or because I am sitting at the terrace in the sun and I am reading the stuff that doesn't really interests me. The same holds true for checking email. {HF}*
Structuring of agenda: organizing and structuring the agenda in accordance with particular criteria;	*(4) I have to have all my appointments organized per subject in accordance with what types of action I'll need to do afterwards. {AL}*

Blocking of time: reserving time for specific activities unconditionally on all the rest of the daily activities;	*(5) Every week I block some time in my agenda since I need time for reflection, cleaning up. During it I do lots of email work, I process the materials and sum up the results of appointments of the week, I organize documentation, and I decide what I need to do. {LM}*
Stretching of working hours: relaxing the time constraint by expanding working hours	*(6) I work every weekend. So, on Sunday I work for 4-5 hours. {AL}* *(7) I am working during the weekends to prevent myself from the overload during the working time, to be somewhat ahead at the beginning of week. {HL}*
Shifting of time: changing the type of activities in order to increase overall productivity	*(8) I need to do sports in the evening; I go on tennis, out on mountain bike, on my horse. After I can resume working and I'll be much productive in that way. {HL}*
Regulating own accessibility: changing the accessibility mode to regulate the intensity of information and communication flows	*(9) I use my mobile during working hours only. At 7. 00 p.m. I turn it off. The calls can wait. If not, they can always track me down. It's not like in medicine that life depends on my decision. {JP}*
Face-to-face contacts: filtering the incoming information by verifying, clarifying and assigning relevance to it in the course of face-to-face contacts.	*(10) I want to look in person's eyes. It is very important to me. {JP}* *(11) Sometimes, you get an email and you think that this is the answer. But than, later, it turns out to be different form what was in email. During face-to-face communication you can find out what is exactly the problem and make further decisions.{AL}*

Table 28. *Human –enabled coping*

Individual routines are the form of stable, patterned behavior that an individual exhibits under the condition of information overload. In drawing on certain routines, the individual enacts the mental scheme which condenses his or her prior knowledge and experience

In utilizing these routines, individuals act either in a truly conscious or subconscious, automotive manner. For instance, when applying time blocking, individuals were thoroughly knowledgeable about what they were doing, why they were doing this, and what they

expected to achieve at the end. In many cases, however, the individuals could not immediately relate their behavior to the particular knowledge frame. The citation about reading newspaper from the table above is illustrative (quote three, Table 28).

Apparently, the routines aimed either at reducing information load or, alternatively, at increasing human information processing capacity. The former include, for instance, stretching of working hours, applying selection and filtering; the latter, blocking of time, shifting of time, pursuing face-to-face contacts, and meticulously organizing interactions. Naturally, individuals employed combinations of structures that consisted of structures increasing processing capacity and structures reducing information load.

Selectivity, applying certain interpretive schemes that facilitate information selection and further information processing, is one of the central human-enabled coping structures. The need for selectivity is objectively motivated by the presence of information overload (quote one, Table 28). At the same time, information selection is often habitual and routine since it is repeatedly performed and no second thought is given to it until a disruptive event happens (quote three, Table 28). Human selectivity is defined through a set of rules that describe particular selection procedures and mechanisms. These rules evolve on the basis of prior knowledge and experience. In the course of data analysis, we have been able to extract the following selection criteria or combination of them that individuals draw on when selecting one piece of information and rejecting another (the sequence is not important):

- Prior experience of information of similar type;
- Prior experience of information source;
- Prior knowledge of problem domain;
- Information format;
- Up-to- datedness of information;
- Originator;
- Individual preferences and desires.

Since interactions tend to play an increasingly important role and require a significant portion of daily time, the individuals develop routines that allow them to stay in control of intense, multi-channel interactions. Accordingly, the results of this research indicate that managers indeed utilize structured, systemized approaches to keeping an agenda. A quotation from an interview (quote 4, Table 28) illustrates one of the possible approaches used for systemizing and organizing an agenda.

Blocking of time and **shifting of time** are used to increase human information processing capacity by targeting the efficiency of information processing (quotes 5, 8, Table 28). While the former routine implies a restitution of the non-interrupted work environment and is used particularly for tasks that require concentration and intense mental processes, the latter is based on the idea that changes in the type of mental activities increase overall productivity.

Stretching of working hours, as one respondent has explained it, is used not only to cope with current information load, increasing the time available for fulfilling the task, but also to prevent excessive load in the future (quotes 6, 7, Table 28).

As was mentioned before, the degree of information overload is often a voluntary state, when the individual accepts information overload in an act of compliance with internal corporate culture or in an attempt to satisfy their own information requirements. At the same time, the individuals can limit their own information load either by utilizing a certain selection rule or by **restricting their own accessibility** (quote 9, Table 28).

The use of **face-to-face communication acts** to verify, clarify, and define the relevance of certain information pieces and, to assist further information processing, is also considered as way of selecting certain pieces of information while dismissing others (quotes 10, 11, Table 28).

5.4.2 Technology-enabled coping: background

In the section devoted to information overload, we have demonstrated that information overload is primarily related to the use of electronic mail applications. Accordingly, in the following section we will focus on this application and demonstrate what technical functionalities are available and how the actual use of them shapes the effect of these functionalities on the overall information processing efficiency.

Technology-enabled coping implies the use of inbuilt technological features and functionalities in order to filter out the unwanted information. We consider technological structures in terms of rules and resources involved. We claim that, while the availability and the technical features of these structures are certainly important, they are signified by their actual use only. In other words, the existence of the technical function in itself does not have meaning until applied by the human agent. In this sense, the characteristics of the actual use of technology become crucial.

During the field study, we have extracted five dominant technology- enabled coping structures:

1. Application of inbuilt filtering tools (MS Outlook) to reduce the number of incoming mails by performing automatic, patterned selection;
2. Use of "clean up" function to reduce the amount of admitted content and facilitate information processing (MS Outlook);
3. Application of awareness and accessibility tools (MS Outlook Calendar, mobile devices) to restrict and control one's own accessibility;
4. The use of classification, rearrangement, and visualization options to increase the efficiency of one's own information processing (Intranet, Internal systems, MS Outlook);
5. Utilization of advanced search tools in an attempt to reduce the quantity of incoming information and improve the fit between information request and system output (Intranet, Internet, MS Outlook);

Technology not only facilitates human information processing by enabling more efficient information processing but also restricts performance by supporting one particular way of acting and by providing a limited number of functionalities. So, for instance, the inbuilt filters allow an individual to establish a certain filtering logic and reduce the level of incoming mail. However, at the same time, the filtering rules are rather restrictive, they do not adjust proactively, and the use of them boosts the risk of missing potentially crucial information. The same holds true for all functionalities. The empirical analysis of the data suggests that currently the constraining nature of technology-enabled coping dominate over its enabling nature.

Due to the fact that all participants of the study link information overload with the electronic mail application (MS Outlook), in this chapter we will focus on electronic mail and discuss how the inbuilt functionalities enable people to cope with ever-increasing amounts of incoming mail.

5.4.3 Organization-enabled coping: background

In structuration theory, organizations, being a form of social institution, produce a wide range of social structures. Organization-enabled coping structures, a part of organizational structures, embrace all structures that restrict the information streams by means of organizational redesign, information management, and imposing certain cultural and behavioral norms. These structures are signified, reinforced, or altered by humans drawing on them. At the same time, these structures both enable and constrain human action. Table 29 provides a summary of the structures that have been extracted from the empirical data.

From the structuration theory perspective, human action is situated in and is shaped by the organizational context. Organizations produce and accumulate knowledge and define the resources and norms on which individuals draw when performing actions.

For instance, **management by exception** is the coping structure that aims to reduce the amount of information transmitted upward. According to management by exception, only exceptions must be communicated to superiors. The exceptions are defined as the deviations from the pre-defined path. In terms of structuration theory, any structure can be described as a combination of interpretive schemes, facilities, and norms. Indeed, management by exception introduces the concept of exception, and defines information and communication flows as dependent on exception. Moreover, by implanting the elements of formal hierarchy it legitimizes the asymmetry of authoritative resources and defines the patterns of domination. Finally, it identifies the organizationally prescribed and organizationally accepted norms of information transmission and upward communication. And it is certainly both enabling and constraining, since it provides the means to cope with information overload and, at the same time, restricts the variety of legitimate coping behaviors.

Formal structuring of organization and **formalization of all processes** and information–communication flows together make one of the most dominant structures within ING. Again, it can be described in terms of signification, domination, and legitimation. In a way, it defines the legitimate coping procedures by suggesting a set of interpretive schemes, settling the power hierarchy and reporting chain, and institutionalizing certain behavioral norms.

Finally, the introduction of information **gate-keeping roles** also aims to reduce the managerial information load. Some of the information processing tasks are transferred from managers to their assistants. Often, these tasks imply extensive information search, initial information processing, pre-selection, preparation of reports and other forms of information support.

Organization-enabled coping structures	Descriptive empirical evidence
Formal structuring of organization and formalization of information flows accordingly	*We have a got a role-based process. Each process is defined in terms of roles, so each employee has a certain role. Each employee knows what kind of responsibilities all the rest have in the process. If you have the small fraction of organization under your responsibility than you do not need to read or to do everything that comes from or happens in the whole organization. Everyone who is sending a proposal to managing director should know what are his/her responsibilities and what are the responsibilities of managing directory and, accordingly, understand to whom this proposal must be sent. {HL}*
Standardization of workflow, processes and roles at the level of each business unit	*We are making so-called Blueprint. In this Blueprint, the types of responsibilities are clearly defined within each responsibility we define the tasks, within each task we specify the parties that should be involved. There are similar efforts in other business units of the Department.{LL}*
Design and implementation of gate-keeping roles	*I do not do some work myself, I simply do not have time for that. I ask my assistant and other people from the unit to prepare all the documentations and do all the preparations for the meetings. I will call my assistant, talk to her for one hour and she will prepare me during this hour. And I know I can rely on her as far as she knows my point of view, collects all materials and spends significant time on preparation. {LM}*
Regulating the frequency and intensity of internal communication	*What we are trying to do, we are trying to reduce the number of formal meetings Especially project managers have problems with overload, so it is particularly hard for them to get there.{HF}*
Management by exceptions	*The recent development is that we have implemented the management by exception approach. Before starting the process, we make an agreement how process will work, and only exceptions are communicated. {HL}*

Table 29. *Organization – enabled coping structures*

5.4.4 Structuration theory perspective: an integrated view of human coping

The empirical evidence is strongly supportive of the fact that, instead of using one particular type of coping each individual tends to apply a combination of all three. In the following section, we attempt to construct the links among these three types of coping. We believe that coping structures are used in a complementary and mutually corrective manner, when the inefficiencies of one type of coping are neutralized and overcome by the utilization of another type of coping. To do this, we revisit the structuration model of human coping advocated in the conceptual chapter and link it to the empirical evidence.

Electronic mail is the standard office application with the unvarying functionalities. The difference between the email applications across organizations is negligible. Neither can it be customized and, thus, reflect the specific features of a particular organization, nor can it be used in a significantly different way. Therefore, two separate pairs of relationships would be considered in the section below such as follows:

(1) Human –enabled coping *versus* technology-enabled coping;

(2) Organization-enabled coping *versus* human-enabled coping;

Human-enabled coping and technology-enabled coping: the model of structuration

We consider human–enabled and technology–enabled structures as being in constant interplay (see Figure 22). Not only are technology-enabled structures the product of human actions but also human actions are shaped and changed by the availability of technology features.

Technology coping features are the product of human actions because of several reasons:

- Human mental schemes served as the prototype for the inbuilt technology functionalities;
- Technology is a subject for human appropriation and only through human use are technologies ascribed their meaning;

At the same time, in applying technology features human actors are both enabled and constrained. Naturally, there is time - space discontinuity between (A) and (B) interaction patterns.

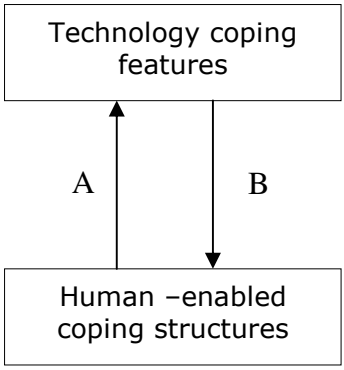


Figure 22. Technology –enabled and human –enabled structures: the model of structuration

A) Human mental schemes are replicated in terms of technology functionalities and appropriated by human actors

In collecting and processing information, human agents utilize interpretive schemes that exist in their minds and represent their prior knowledge and experience in condensed form. These schemes are further implanted and replicated in technology by either mimicking or changing the original human structure. Some examples of replication are presented in Table 30. As a result, the new, technology features emerge.

Examples of human-enabled coping structures	*Examples of related technology feature*
Selectivity	Assigning relevance to the incoming mail; Ordering and displaying messages by category (date, sender, subject etc.); Automatic email filtering in accordance with a filtering logic; Utilization of tree of sub-folders;
Repeated use of the same information source	Bookmarks; Search history;
Structuring of agenda	Organizing agenda in MS Outlook;
Blocking of time	Reserving of time in the electronic agenda and limiting accessibility during reserved time;
Group / team working	Shared work space; Electronic documents interchange; Instant messaging; Forums and discussion boards;

Table 30. *Human –enabled versus technology coping features*

Within the current study framework, the following issues with regard to technology use are important:

- The technological platform is highly standardized with only a limited number of applications qualified as standard. These applications are basic office applications (e.g., MS Office) with a pre-defined set of functionalities and a low level of technical sophistication. The internal corporate applications are heterogeneous and hardly compatible but again do not require any particular IT-related knowledge or prior experience for successful utilization.
- All individuals demonstrate significant reliance on electronic mail application in fulfilling daily responsibilities and maintaining formal and informal communication. At the same time, all participants reveal a strong belief that electronic mail is the major cause of information overload. Due to this reason, we have based our further analysis on the email applications. The use of other applications goes beyond the scope of this case.

The empirical data suggested that individuals tend to employ a vide variety of mental structures and that the exact combination of these structures differs among individuals. This variety in terms of mental structures can be explained by individual preferences, decision-making styles, objective characteristics of information load such as information quantity and the type of information, and the level of technical proficiency. From another perspective, there is only a small number of interpreting features such as categorization, organization, storage, and filtering of incoming information available. Moreover, these features are rather inflexible and rigid when applied. To find out how human mental structures relate to the technology features, we have undertaken a one-to-one mapping for each respondent and than compared the observed patterns. As a result, we have found that technology features that resemble the human mental schemes most closely are used more intensively.

B) The technology –enabled coping structures are appropriated by humans

Since we focus on the electronic mail applications only, to be able to proceed with the analysis of human appropriation, we define its structural features and its spirit. Electronic mail, the application that uses text processing and communication tools to enable high-speed information exchange, is by far the most adopted information-communication application, as well as the most often-cited cause of information overload. While the structural features often mediate the relations of signification and domination, the spirit of the technology mostly provides the basis for legitimation and occasionally for signification and domination.

In Table 31, we suggest a list of structural properties, and characterize the spirit of email. The structural properties of email were extracted from the documentation; the description of spirit is largely based on interview transcripts analysis and systemized in line with the classification proposed by Sproull & Kiesler (1991).

Technology	*Description*	*Examples*
Structural properties of email	The rules of information accumulation, manipulation and management	Ordering and displaying messages by category (date, sender, subject) Utilization of a tree of sub-folders Searching a mailbox Assigning a priority to the message Maintaining a group list Message storage and retrieval functionalities
"Spirit" of email	The essence or set of general principles associated with the email use and interpretation of embedded functionalities	Collaborative decision process Efficient information sharing Informal structure of pursued interactions

Table 31. *Structural features of electronic mail and its spirit*

The structural properties of email include all rules that determine information accumulation, manipulation, and management. In the table above, we list examples of structural features. The spirit of technology is comprised of its social features. Sproull & Kiesler (1991) specify six social features of email that make it distinct from all the other communication technologies. Firstly, email supports an asynchronous communication, which allows for sending and receiving messages at the convenience of both recipient and sender. Secondly, email is fast. It is text-based, and in that sense it has restricted potential in conveying social and status cues, making interaction between sender and recipient rather informal with lack of subordination. Next, email sustains multiple addressability, making "one-to-many" communication not only possible but also effortless. Together with the previous feature, it loosens the structure of communication. Moreover, having an inbuilt external memory that is computer processable, it has the potential to enhance the overall efficiency of the communication process. The proposed characteristics are in line with the dimensions that DeSanctis & Poole used to define the spirit of technology. Electronic systems applications are designed to promote collaborative decision-making, often connecting individuals from the remote sites. They facilitate communication across hierarchical levels, making the high-status employees easily accessible. Moreover, they encourage an informal style of communication. Finally, electronic mail applications signify communication efficiency in terms of speed of communication and manipulation and retrieval of communication content.

The availability of the structural features of electronic mail in itself does not have any meaning until these structures are enacted by human actually drawing on them. Thus, an individual has the freedom to decide whether to use the structure or reject it, and how to use it; the actual appropriation of the structure becomes central.

In the subsequent section, we consider the process of appropriation of electronic mail structures. We define how the nature of appropriation affects the ultimate efficiency of technology–enabled coping. The analysis is undertaken in accordance with the adaptive structuration theory guidelines. The summary of the analysis is presented in Table 32.

To obtain the inferences on appropriation, we have analyzed the interview transcripts for all participants. Using the definitions of appropriation moves from DeSanctis and Poole (1994) we have identified a list of the most persistent ones for the given study. We have further identified the nature of appropriation in terms of its faithfulness and described its instrumental use. Finally, we analyzed the attitude of individuals towards the technology functionality. As a result, we came up with a descriptive analysis of the appropriation of technology-enabled coping features.

The structure	Appropriation move	Definition of appropriation move	Type of appropriation	Instrumental use	Attitude towards structure	Empirical evidence
Inbuilt filtering functionalities	Constraining the structure: Diagnosing	Structure is interpreted; Comments on how structure is working, either positive or negative, are provided;	Faithful appropriation	The structure is implemented for the intended use	Neutral, also the limited functionality is emphasized	*Sometimes I use the filters but only to deal with the external SPAM, all internal mail comes into my mailbox. It is not working that well since every day they invent the new ways to rich your mailbox. {LL}*
Deleting all "CC" messages	Consistent combination	Combining two structures: such as selecting certain messages and further deleting them, in a way consistent with the structure	Faithful appropriation	The structure is implemented for the intended use	Positive	*When I open the mailbox, I have a quick view of what it is. About messages, in which I am the second person addressed or I am in CC line, I do not care. I just select them and delete.*

Clean up functionality	Direct use of the structure and explicitly referring to this structure	Openly use and refer to the structure	Unfaithful appropriation since the appropriation is not consistent with the spiritual features of electronic mail software.	The structure is implemented for the intended activities	Positive	*What I do once in a while, I just through all my emails[…]. {HL}*
Clean up and selective reacting	Relating one structure to another structures: Corrective combination	One structure is used as the correction for another	Unfaithful appropriation since the appropriation is not consistent with the spiritual features of electronic mail software	The combination of structures is implemented for the fulfillment of intended objectives	Positive	*What I do once in a while, I just through all my emails away – email to some friends saying that my email has crashed and I do not know if there was something important they needed from me– just call me. And sometimes I get 4-5 messages back saying that they were expecting an answer – quite an easy way of getting rid of all emails. {HL}*

Selective deleting	Relating one structure to another: Combining structures	One structure is combined with another in a way consistent with the spirit of both	Faithful appropriation	The combination of structures is implemented for the fulfillment of intended objectives	Positive	*The simple selection method is that everything after three weeks not looked in to and nobody cried for help is something that you just push to the basket. {HL}*
Sorting the messages and storing them in the tree of folders	Direct use of the structure Expressed judgment about the structure	The structure is used straightforwardly. In addition, the attitude towards structure is expressed	Faithful appropriation	The structure is implemented for the intended activities	Neutral	*I know some people set up the function that automatically directs the mail to the certain folder. So the mail from the client always goes to the client's folder. The mails you normally do not read go to another folder, so at the end you can instantly delete them all, I also use it sometimes. {HL}*

Rejecting electronic mail	Express judgments about structure: directly rejecting the appropriation of structure	The structure is rejected directly or actively ignored	Unfaithful appropriation, which is in conflict with spirit of electronic mail.	Unintended instrumental use	Positive	*I am often thinking of shutting the whole email system down, so everybody chatting via the telephone or walking into each other's rooms. If you want to write something - in pen and paper; and you are allowed to fax it – but only one fax at a time; and if you want to copy it – only two copies at a time. Then you have to decide who needs, really needs, this information. You decide who will keep the copies. {HL}*

Table 32. *Appropriation of technology –enabled structures*

First, we have observed that all respondents either do not use the inbuilt filters or use them for strictly limited purposes (Table 32). In the quotation from the LL interview, the narrow functionality of the structure is indicated and, as a result, the limited value of this structure is suggested. Although in the fragment the negative attitude towards the structure is not expressed explicitly, a neutral attitude can be a significant obstacle to structure utilization. The empirical evidence further reveals that decision makers avoid the direct appropriation of email filtering structures, trying to substitute it with the combination of alternative, often non-technology features. They also attempt to invent novel, subjectively more efficient structures through the combination of the existing technology–structures. Intuitively, in filtering, the irreversible act of removal imposes the risk of missing important information or communication opportunities. Apparently, this risk is prohibitively high for contemporary managers, who are in constant search of novel business prospects and opportunities. Thus, facing the dilemma of either accepting the excessive information-communication strain or rejecting the potentially important pieces, managers tend to favor the first one, inventing the filtering "walk around".

Second, most of the structures are applied on an ad hoc basis and imply the use of "clean up" (Table 32). By ad hoc we mean that instead of accomplishing the pre–selection, all mails are admitted into the mailbox and only after that are acted upon. Thus, we have identified four structures: clean up, selective clean up, clean up of all CC messages, and clean up with selective follow-up actions (Table 32). All structures have similar characteristics, such as:

- "Clean up" functionality is central;
- Desired result is a radical decrease in the number of incoming messages;
- The "clean up" function is often used unfaithfully;
- The attitude of actors to the technology features is strictly positive due to the "effectiveness" and ease of its utilization;

The unfaithful nature of appropriation, the appropriation conflicting with the spirit of the technology, attracted our attention since it provides valuable insights into why the technology feature does not always bring the outcome that its designers intended (DeSanctis and Poole, 1994). Although "clean up" seems to be an easy, effortless and prompt way of getting rid of the entire mailbox content, in our mind it does not coincide with the initial intention. Electronic mail, in theory, is the application that enables fast and efficient communication and information transmission. It is assumed that the receiver addresses and processes the incoming mail and takes action accordingly. In this way, the "delete" operation

follows the "process" operation, with the "process" operation being primary. However, we have observed that individuals delete content without addressing it, making no use of the information received**.** The positive attitude of users towards this structure indicates that it is not only an important practice of email handling at the current moment but it will most probably persist in the future.

The most extreme technology coping feature observed is the complete rejecting of the email applications (Table 32). The structure is based on active rejection and avoidance of email as a communication and transmitting medium. Instead, the alternative, non-technological structure is proposed. The unfaithful nature of appropriation is reinforced by opportunistic instrumental use when electronic mail is credited with no value in terms of task performance assistance and facilitating work-related communication.

Human actions are shaped by the organizational context. The organizational structures are appropriated by the humans.

We also observed that there is a constant interplay between organization-enabled and human-enabled coping when all individual actions are shaped by the organizational context (Figure 23). At the same time, the organizational structures are subject to human appropriation when humans can always choose to act differently and thus alter the existing structure and initiate the change process. In the section below, we describe the mode of interaction between human–enabled and organization-enabled coping and depict how they emerge, evolve, and change in the course of interaction.

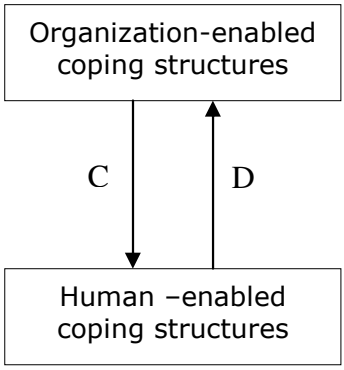


Figure 23. Organization-enabled versus human-enabled coping structures: the model of structuration

C) Organizational institutional properties shape human actions

Depicting the organizational context of BANK, we continuously emphasized its orientation towards strict regulation, standardization, and unification of all work processes. In particular, we described how the work process is organized in terms of sub-processes, projects, and roles, where each individual knows their own responsibilities and chain of reporting. Blueprints with role descriptions within each business unit, BANK Project Management Methodology, the collection of project management roles descriptions, ISO standards etc. are among the standard documents that we have come across during the field study. Therefore, in fulfilling daily activities employees of BANK are influenced significantly by the organizational prescriptions, rules, and norms. All define the guidelines for organizational sense-making, determine the formal hierarchy, envision the division of power, and define the resource allocation. All are distinct forms of the accumulated knowledge of BANK that realize structures of signification and domination, and define the structures of legitimation.

For instance, the Project Management Methodology is a comprehensive collection of prescriptions about how the project should be managed. The project participants are defined, the division of responsibilities among them is specified, the reporting chain is established, and the key indicators for the project's progress are discussed. Moreover, the general approach to sense-making in terms of data requirements, data analysis, and tools applied is prescribed.

Although the organization-enabled structures are prescriptive in nature, they are subject to appropriation by individuals. The empirical evidence collected and summarized below indicates that individuals still possess significant freedom in deciding whether to appropriate the structure or not, and if yes, then to what extent.

D) Human actors reaffirm, alter, and reject organizational structures through their appropriation

Similar to the way we have analyzed the appropriation of technology features by human actors we have investigated how the organizational structures are appropriated and how the type of appropriation affect the ultimate effectiveness of coping. Table 33 represents a summary of the analysis.

The nature of appropriation of organization-enabled structures differs significantly if compared to the appropriation of technology-enabled structures (Table 33). Most of appropriation moves refer to the structure explicitly, explain the structure, and depict how it

was actually appropriated. Moreover, faithful appropriation dominates, indicating the absence of misuse of structure.

There is one structure the appropriation of which deserves specific attention since conflicting attitudes towards the structure among the participants were found (Table 33). The idea behind the management by exception approach has been discussed earlier. Although the structure is highly praised among managers and the use of the structure is supported and promoted by the management, employees at the lower level of the hierarchy ignore the structure and refuse to appropriate it. As a result, although the structure is formally in place, it is not brought into use by human actors and thus has only limited value.

Structure	Appropriation move	Type of appropriation	Instrumental use	Attitude towards structure	Empirical evidence: exemplar interview Fragments
1. Formal structure and hierarchy as a way to reduce information load	Structure is interpreted. The meaning of the structured is explained explicitly and how it should be used.	Faithful appropriation	This structure is used to manage task flows, information and communication flows vertically, and preserved the corporate integrity and achievement of the common goal.	Positive since the high expected efficiency is assigned to the structure.	*We have a got a role-based process. Each process is defined in terms of roles, so each employee has a certain role. Each employee knows what kind of responsibilities all the rest have in the process. If you have the small fraction of organization under your responsibility than you do not need to read or to do everything that comes from or happens in the whole organization. Everyone who is sending a proposal to managing directory should know what are his/her responsibilities and what are the responsibilities of managing directory and, accordingly, understand to whom this proposal must be sent. {HL}*

2. Standardization of work flows, process and roles at the level of business unit	Defining the structure explicitly and explaining the status of the structure and what has been done in terms of structure	Faithful appropriation	This structure is utilized to manage the workflow, information and communication flows horizontally, at the level of each particular business unit.	Positive	*We are making so-called Blueprint. In this Blueprint the types of responsibilities are clearly defined: within each responsibility we define the tasks, within each task we specify the parties that should be involved. There are similar efforts in other business units of Department.{LL}*
3.Management by exception	Defining the structure explicitly and explaining how others reject the appropriation of the structure.	Faithful appropriation	The intention behind the structure to restrict the upward information and communication flows, although the intended use and actual use do not coincide.	Positive to intended structure; Strictly negative to emerged structure;	*The recent development is that we have implemented the management by exception approach. Before starting the process, we make an agreement how process will work, and only exceptions are communicated. Just to have an idea about how well we are doing. It's better to have it [..] In my working situation, almost everyone thinks that they need to let me know everything. In most of the cases it's not me who should know it. But they still send it to me. {HL}*

4. Gate – keeping roles	Direct appropriation of the structure: the definition of the structure and explicit reference to it	Faithful appropriation	The structure is utilized to reduce the information load of managerial workers via the outsourcing of some responsibilities	Positive	*I do not do some work myself, I simply do not have time for that. I ask my assistant and other people from the unit to prepare all the documentations and do all the preparations for the meetings. I will call my assistant, talk to her for one hour and she will prepare me during this hour. And I know I can rely on her as far as she knows my point of view, collects all materials and spends significant time on preparation. {LM}*

Table 33. *Appropriation of organization-enabled structures*

5.4.5 Human coping: concluding remarks

Earlier in the thesis, in conceptualizing human coping behavior we suggested three pairs of relationships (for further details refer to Chapter 3):

1. Human-enabled coping structures *versus* technology coping features;
2. Human –enabled coping structures *versus* organization-enabled coping structures;
3. Technology – enabled coping structures *versus* organization-enabled coping structures;

In this case study, only two pairs were observed: (1) and (2). No indication of the last one (3) was found. The following arguments are important with regard to this finding. At the moment of the study, no system development was taking place. Moreover, a significant shift towards standardization, simplification, and unification of the technological platform had been accomplished. Employees increasingly relied on standard office applications and low-degree sophistication internal information systems. As a result, the link between organization and technology was not observed.

In the course of the study, we detected a large number of diverse human-enabled coping routines. Most of them are instantiated in unconscious, automotive behaviors and deeply rooted in human knowledge and prior experience. Each participant employed a combination of structures that consisted of structures increasing processing capacity and structures reducing information load.

With regard to technology coping features, we focused on one available within the electronic mail applications. The number of structures available is comparatively small indeed. The empirical analysis of the data also suggests that at the moment of the study the constraining nature of the technology features dominated over their enabling nature**,** which, to some extent, explains the poor rate of their use.

Although several organization-enabled coping structures were listed in the course of the study, many of them existed only in theory and were subject to constant change. At the same time, there was a clear need for having these structures in place.

We considered the interplay between human–enabled and technology–enabled structures. As a result, we have found that the technology features that resemble the human structures most closely are used more intensively. The specific process of human appropriation of technology features was central. We found also that majority of respondents refrained from the use of automatic filters or used them for strictly limited purposes. In avoiding the use of

inbuilt filtering structures, decision-makers try to prevent missing potentially important information. Thus, they substitute automatic filtering with a combination of alternative, often non-technology features. Most of the technology features appropriated by humans are applied on an ad hoc basis and imply the use of "clean up". Frequently individuals delete content without addressing it, making no use of information received. In so doing, they place the information sent and received via email into the category of dysfunctional information and credit no value to electronic mail in terms of task performance assistance and facilitating work-related communication.

Depicting the organizational context of BANK above, we continuously emphasized its orientation towards strict regulation, standardization, and unification of all work processes. The empirical evidence collected indicated that individuals still possess significant freedom in deciding whether to appropriate the structure or not, and if yes, then to what extent. The nature of appropriation of organization-enabled structures differed significantly if compared to the appropriation of technology-enabled structures, and prompted somewhat higher expectations about the potential efficiency of the organization-enabled coping. Most of appropriation moves refer to the structure explicitly, explain the structure, and depict how it was actually appropriated. At the same time, two critical issues were detected that undermine its overall efficiency. First, although structures were clearly defined and described in theory, many of them were not implemented in practice Second, the individuals, by rejecting and ignoring the organizational structure, actually affected the existing social order and undermined the success of organization-enabled coping initiatives.

5.5 Information overload and coping strategies applied: an integrated perspective {HL}

In the following section, we summarize the analysis of information overload and human coping and try to merge them into a single framework. To do this, we build up the individual profiles that explain the structure of information overload. Moreover, the profile integrates all the ideas expressed in the previous sections and provides an overview of the information overload and coping discourses. We illustrate the findings with a flow chart that not only depicts the relevant concepts but also the relevant connections among concepts. The further discussion is structured in terms of sequences, the organized logical sequences (Figure 24). The sequences are placed in accordance with the explanatory power, the highest one (Sequence I) accounting for most of the explanation.

Sequence I depicts how instability and the unsettled nature of the organizational structure triggers information overload. The instability of organizational structures discloses itself in the absence of well-defined roles and processes despite the fact that ING generally is oriented towards formalization, standardization, and unification of all work activities. As a result, suboptimal informing practices are utilized, such as dysfunctional upward communication and copy terror, thoroughly discussed in the previous sections. The utilization of both practices is enabled and facilitated by the electronic mail application, which allows fast and effortless transmission of data and communication content. At the same time, the limited number of filtering structures of email software, accompanied by poor, unfaithful appropriation and general scepticism towards technology, reduce the efficiency of technology-enabled coping dramatically and undermine its future potential for being used as a mean of coping with information overload. The vast majority of technology-enabled strategies used by HL are rather extreme and exploit the "clean up" function extensively. These change the nature and the spirit of electronic mail application significantly, transforming it into an inferior communication media, with essentially dysfunctional information transmitted. The resulting email flood leads to information overload. Remarkably, the failure of both technology-enabled coping and organization-enabled coping is marginal, putting an additional strain on human-enabled coping.

In **Sequence II,** we build up the link between advances in Information Communication Technologies and information load. Although using ICT in daily activities rather passively and often avoiding interaction with technology, HL believes that the introduction of novel ICTs made the information overload more severe. Not only did it increase the availability of

information but, also did not empower users with sufficient functionality for coping with ever-increasing information load. All this eroded personal control over information and exposed the humans to a much larger information load. As a result, both component and dynamic complexity increased, causing information overload. The disproportion between the increase in information load and efficiency of available interpretive tools towards the first is characteristic. It signifies the need for organization-enabled coping and thus shifts the problem of information load from the level of each particular individual to the level of the entire organization.

Sequence III illustrates how the superior position of HL in the formal hierarchy makes the information overload inevitable. The breadth of knowledge necessary and sufficient to perform the general management functions is constantly increasing. The constant search for new information becomes the predominant daily activity. At the same time, information acquisition is guided and shaped by decision style. Selection, accepting the relevant information and dismissing irrelevant, becomes essential. To do this, HL mainly uses human routines, the mental frames that are formed on the basis of previous experience, prior knowledge, and various heuristics. Although HL is in a possession of extensive experience and has significant prior domain knowledge, the amount of information still cannot be accommodated efficiently, leading to information overload.

Sequence IV explains how complex coordination is transformed into information overload. As discussed earlier HL is responsible for performing coordination at personal and interpersonal levels. Although there are some technology-enabled tools that can assist the fulfillment of coordination tasks, most of them are rather basic and do not satisfy the requirements imposed by the multifaceted, multilevel coordination. In accomplishing this coordination, HL mostly relies on himself and uses the organization-enabled triggers that are still insufficient. As a result, the coordinative complexity increases sharply, leading to information overload.

5.6 Information overload and coping strategies applied: an integrated perspective {LL}

We develop a similar individual profile for LL (see Figure 25). We summarize the findings on information overload and coping and present them in terms of sequences of concepts and relationships. Profiles are compared to each other and similarities and differences are explained. On the basis of comparison, we reach some preliminary conclusions on the

validity of the conceptual model of information overload and extend our understanding of coping and the appropriation of coping structures.

Sequence I is almost similar to the first sequence in the profile of HL. However, LL, holding a lower position in the managerial hierarchy, cited different information practices that prevail in the organization and increase information overload. Besides copy terror, she suggested that unnecessary large attachments are not only needless, since the same information is available in the shared corporate resources, but they also undercut the functionality of electronic mail application, requiring larger storage space. Moreover, she emphasized the insufficiency of in-built technology–enabled functionalities.

Sequence II again starts from the instability of organizational structure, suggesting that not only the dysfunctional communication but also the need to search for new information constantly result from the structural instability. Together with the high dynamic complexity, which is the product of continuous organizational redesign and the high pace of environmental changes, this leads to the increase in information load. Although the presence of organization-enabled coping structures could be beneficial, the empirical data suggests that none were observed. Moreover, the instability of organizational structure in itself dents the effectiveness of the organization-enabled coping that is largely based on formalization and standardization of work flow and internal information and communication flows.

Sequence III is what makes the profile of LL distinctive and highly relevant for the information overload and coping discourse. LL, a senior consultant of Demand business unit, performs diverse information–intensive activities on a daily basis. Information production, acquisition, and processing become primary responsibilities. Naturally, information production and processing are initiated, guided, and enabled by humans. At the same time, the role of technology in mediating the process of information production and information processing cannot be underestimated. In theory, technology is designed to support and facilitate both processes and overcome various human inefficiencies. In real life, as LL stressed, both the insufficiency of searching and interpreting functionalities and the inadequacy of the collaboration platform burden the imbalance between processing requirements and capacities, increasing the component complexity. Similar to the case of HL, while the technology functionalities and organization-enabled coping structures are insufficient or not present, the human -enable structures are utilized most intensively.

Sequence IV depicts how high communication load leads to information overload. The project-based organization of work implies a high frequency, intensity and complex sequencing of acts of interaction. The increased coordinative complexity leads eventually to

information overload. And again, despite the fact that the organization-enabled structures that will regulate, support, and facilitate the interpersonal interactions are of a high potential value and can be expected to be rather efficient, none of them were observed at the moment of the study.

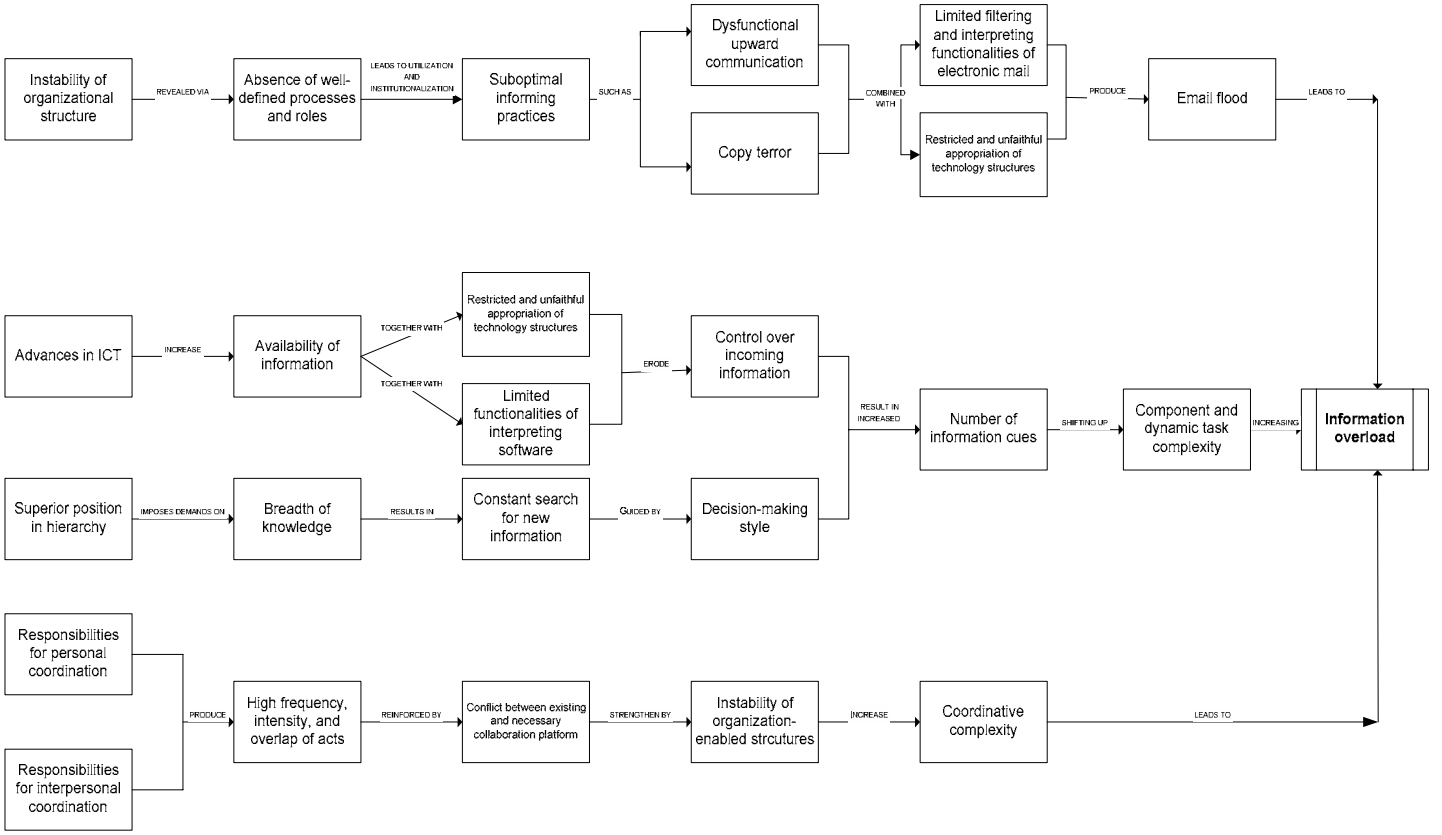


Figure 24. Individual profile: HL

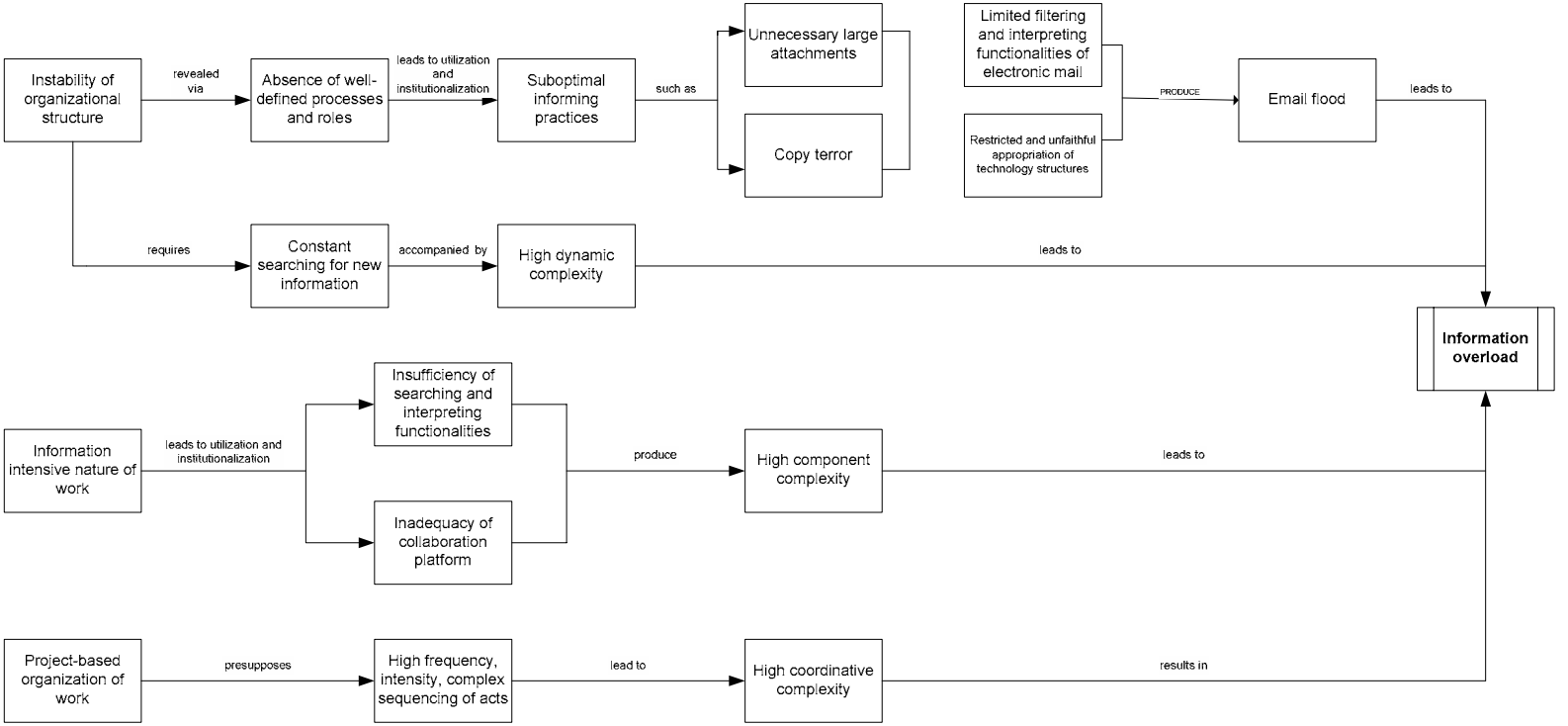


Figure 25. Individual profile: LL

Chapter 6 Case Study II

In this section, we present the study of REKLAME Holding, a medium sized communication agency. In presenting the case, we adapt a structure similar to the case of BANK. We start the discussion with the contextual perspective on information overload, examining the organizational structure, specific features of organizational information processing, the intensity and efficiency of internal communication, and the technological platform available. Afterwards, we present two focus profiles and discuss the task-related and human-related facets of information overload. The structure of analysis is formed according to the ideas presented in the conceptual model, and replicates the sequence of sections from Chapter 5. After presenting the findings on human coping, we merge the two lines of analysis, the analysis of information overload and of human coping, into a single framework by building up two profiles where all the concepts and relationships observed are presented in an interlinked manner.

6.1 Contextual perspective on information overload: REKLAME Holding

6.1.1 Background information: REKLAME Holding

REKLAME Holding is a middle sized, full-service advertising agency. It focuses on advertising and market research and consulting. The major business functions are:

- Market advice and market research;
- Evaluation of product portfolios, target audience, market requirements, and advertising efficiency;
- Design and production of advertising materials such as newspapers ads, mailings, brochures, leaflets;
- Development of media strategies, negotiation of media placements and buying costs, and media plans and schedules.

At the moment of the study, the agency had been operating successfully for 19 years and employed around eighty people.

6.1.2 Organizational structure and management: Reklame and Data

Vertically, the agency consists of three rather independent departments: Data, the market

research department, Reklame, the advertising department, and the Administration, the general administration department (Figure 26). It can be represented as a two-level hierarchy and described as reasonably straightforward and flat.

Three partners own the agency, each having certain decision power. Strategic decisions are presumably based on the mutual agreement of all three partners, though the procedure is not formalized. Informally, the spheres of influence are divided into three areas: general management, creative output of the agency, and long-term strategy of the agency; and are assigned, correspondingly, to one of the three partners. A business unit manager, who reports to the managing director, heads each business unit. The general manager performs the daily management functions.

Reklame is a standard-profile advertising agency that consists of three business units. The *Retail Media Unit* is mainly involved in media buying and media planning activities, where media buying implies purchasing advertising time and space from media outlets and reselling it to the client-companies. The *Graphics Production Unit* writes, designs, and produces all printed advertising materials. The *Creation Unit* is a creative engine of Reklame. At the time of the study, Reklame was listed among the "top 25" advertising agencies in the Netherlands, and as one of the "top 3" in Rotterdam. Its stable position in the market and its sustainable growth are ascribed to the diversity of the services provided and, thus, to the ability to refocus fast in response to environmental changes.

Data is the marketing research agency. Among Data's know-how are firstly consumer loyalty research, that aims at monitoring the customers' attitudes and behavior [*Research and Consultancy Unit*] and, secondly, the standard performance scan that evaluates the corporate commercial performance [*SPS Research Unit*].

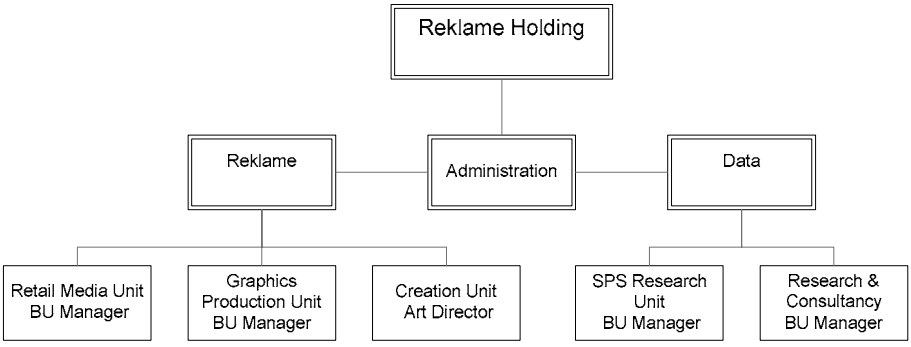


Figure 26. Organizational structure: vertical hierarchy

The **Administration Department** monitors all financial and general issues and holds the central position at the crossroad of the two operational departments.

Horizontally, all business units are independent, having literally no links among each other and possessing high operational sovereignty. To discover the specific characteristics of the horizontal structure, we have looked at the nature of the interdependencies between the business units (see Figure 27**,** Table 34)

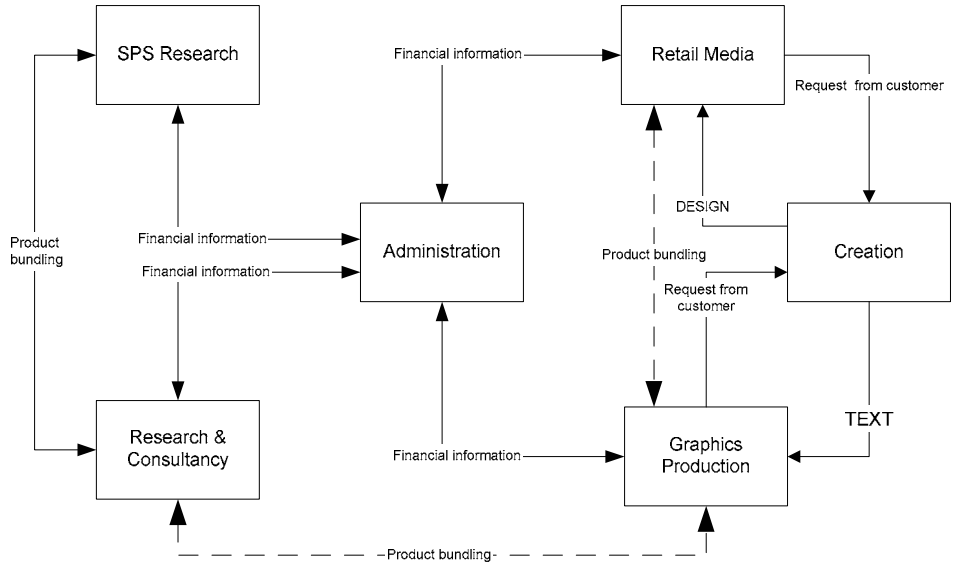


Figure 27. Organizational structure: horizontal dimension

We have outlined two distinguishing features of the horizontal structure of REKLAME. First, the independence of the two departments, Reklame and Data, has been outlined above. The advertising agency, Reklame, and Marketing and Communication Research Group, Data, are working as independent organizations. They have not only different names and logos, but are located on different floors of the office building, which reinforces the separation. Although the general and strategic management are centralized, the departments are independent and to some extent even competing.

Second, a high independence of the business units has been observed. Only the links implied by the functional division of responsibilities are present, such as ties between Retail Management and Creation, and Graphics Production and Creation, when the Creation Unit is responsible for the design part and the Retail Management and Graphics Production for the final product and relations with the customer. Therefore, each unit is an organizational entity

that has its own targets, resources and capacities. Two quotes from the interviews illustrate the issue:

> *With the other agencies you often see that they have a production unit, they have the account mangers, and they have the graphic managers. Everybody does the particular thing for the project. We do it all in one unit {LS}.*

> ***I:** Do you communicate with the Graphics Unit? For me it would be logical and reasonable. I can expect that if the client places an ad in the newspaper he might have some need in printed materials as well.*
> ***RL [working in Retail Media]:** We do it ourselves most of the time. Let's say a customer places some ads in the papers and he wants a billboard. Mostly we do it ourselves.*
> ***I: Why?***
> ***R**: I do not really know. It's supposed to go to the Graphics business unit. Sometimes you have the different business units and they are really different, they are not seen as a whole.*

The subsequent analysis of the nature of the interdependencies and coordination mechanisms applied below contributes to our understanding of the horizontal structure of REKLAME, and suggests the basis for the following discourse on internal communication and its effect on information overload. The summary of the analysis is presented in Table 34.

With respect to type of interdependencies, only two links (RM – C; GP –C) were classified as sequential, when the output of one unit depends on the final product of another unit. Although some coordination is accomplished via the standardization, most of it is fulfilled in the manner of mutual adjustment and implies frequent and intensive face-to -face communication. At the same time, most of the interdependencies belong to the pooled category, with standardization as the key mechanism of coordination. Thus, for instance, all operational units (GP, RM, SPSR, and RC) are expected to send the financial reports in accordance with the reporting schedule. The reports should have the standard, uniform layout, so to be compatible with each other and comply with the requirements of the Administration Unit. Despite the fact that the operation of sending the financial report is trivial, the following complications have been detected in the course of the study. Due to the high independency of the units, each has a unique collection of operating practices, forms and reports that are not always compatible. In particular, the financial reports of the Graphics Production are different from the ones of the Retail Media in terms of layout and key indicators. This requires additional efforts to converge them to a uniform standard and results in significant information redundancy. The Administration unit has the central location,

being the only unit that is connected to all the rest units. It also buffers the upward information flows, accumulating information from all operational units, and processing and transforming it into management reports.

The link between units	Description of links	Type of interdependence	Coordination mechanisms
Retail Media - Creation	RM formalizes the request from the customer, C sends back the ad design	Sequential, based on division of responsibilities	Standardized Mutual Adjustment
Graphics Production – Creation	GP formalizes the request form the customer, C sends back the ad text	Sequential, based on division of responsibilities	Standardized Mutual Adjustment
Retail Media – Administration	RM sends to A the financial reports on a regular, pre-defined basis.	Pooled, based on provision of standard information	Standardized Mutual Adjustment as a result of lack of standards
Graphics Production (GP) – Administration (A)	GP sends to A the financial reports on a regular, pre-defined basis.	Pooled, based on provision of standard information	Standardized, Mutual Adjustment as a result of lack of standards
SPS Research (SPSR) – Research & Consultancy (RC)	SPSR investigates the commercial performance of the client, while RC does the research into consumer behavior and satisfaction	Pooled, based on provision of standard information	Standardized Mutual Adjustment as a result of lack of standards
SPS Research (SPSR) _ Administration (A)	SPSR sends to A the financial reports on a regular, pre-defined basis.	Pooled, based on provision of standard information	Standardized Mutual Adjustment as a result of lack of standards
Research & Consultancy (RC) – Administration (A)	RC sends to A the financial reports on regular, pre-defined basis.	Pooled, based on provision of standard information	Standardized Mutual Adjustment as a result of lack of standards

Table 34. *Organizing model: the horizontal interdependencies within REKLAME*

Summarizing, the structure of REKLAME inherits all the characteristics of a mechanistic structure such as a straightforward vertical hierarchy, high independence of organizational entities horizontally, and absence of direct links and, as a result, direct information flows between the business units. The Administration Unit has a position of information gatekeeper since it collects information from all operational units, processes it, transforms into reports and shifts to the Management. Naturally, information management inefficiencies occur mostly within the Administration Unit, with the information overload being central.

Although the nature of pooled interdependencies implies the active drawing on the standardized mechanisms of regulation, the lack and insufficiency of company-wide standards and regulations, reinforced by the high operational independency of all business units, was observed. This facilitates overload and makes the position of the Administration Unit and the General Management particularly vulnerable.

6.1.3 Organizational culture

In an attempt to enrich our insights into organizational information processing, we have listed several specific characteristic of the corporate culture that define and shape the internal information processing and communication. Although the link between the practice and information overload is not always immediate, each possesses certain relevance for the information overload discourse and is used in the further analysis.

First**, vaguely defined top -management roles** produce conflicting responses, behaviors, and guidelines. As mentioned in the previous section, the company is owned by three partners, each having the same stake and being in possession of equal decision-making power. The formal distinctions of responsibilities as well as the formal procedures for strategic decision-making are not defined. This situation results in internal ambiguity and causes redundancy in terms of managerial guidelines due to their conflicting content. The following citation is illustrative:

> *We have lots of memos where Person A says one thing, person B says something completely opposite. You often find this with several board members… The most reliable source of information for me is the paper, which I have in my hands with the signature on it! {LS}*

Second**, a spirit of competition** among units rather than the spirit of cooperation and knowledge-sharing prevails. The empirical evidence suggests that knowledge, competences, and resources are not shared willingly. Business units behave more like rivals than like partners, when accomplishing a task or moving towards the same objectives:

> *We have different business units and they are really different, they are not seen as a whole. Because you have your own budget as a business unit you have to get the target of course. You do things yourself because it brings money to your unit and you need to get your target. At the end of the year the results go to the general management:" Well you missed your target by 50000 euro, what are you going to do about it?". Nobody wants that of course… {RR}*

Third, in constantly **balancing being creative against being disciplined** the weight is often shifted towards being creative with little or no concern about being disciplined. REKLAME Groep provides a wide range of creative services to the customers, though it constantly needs to diversify the product offer and to challenge the own creative output by developing and introducing new ideas. This results in loose discipline, which spreads over information sharing, information reporting, and corporate system use. Moreover, it makes the internal change initiatives largely inefficient since, despite being necessary, they are not supported by the company "creative ideology". The General Manger illustrates the issue as follows:

> *In our business you always need to inspire, you always need to do something extra and you cannot keep producing much of the same. But at the same time we must be disciplined… and I think we have a very poor discipline. Certainly, I do not want us to be a "stalinistic" type of organization. But in the current information fuzz I am not really able to track, on the real time basis, how are we doing. {KR}*

Therefore, to retain customers REKLAME certainly needs to be at the edge of creativity. At the same time, to make the organization controllable and predictable and to guarantee an economically viable performance, precise organization and discipline are required. Shifting the emphasis towards creativity increases the risk of poor discipline. Similarly, imposing strict behavioral rules and reinforcing controllability have an adverse effect on the creative output of the agency and results in the clients' dissatisfaction.

Fourth, **"stretching people**" or, in other words, getting the maximum from the available human capital, is the prevailing approach to defining the workload. The relatively small size of the company and lack of extra financial resources both form a rather conservative attitude to hiring new people. The decision to hire a new employee or, otherwise, to put the additional workload on someone else is often resolved in favor of the latter. As a result, the average workload of the staff is high with almost no re-direction possible. The fragment from the interview with the General Manager illustrates the idea:

> *In each business unit we ask a lot from people, we are stretching ourselves very much. We really have people start screaming: "Now I need additional data analyst or I need the project leader because the volume of the work or the intensity of the work is such that I cannot do it myself anymore". Then we hire more people. Adding a new person must be really a corporate driven need. {KR}*

Therefore, the high workload and, as a result, the high intensity of information-communication flows is a "given condition" of working in REKLAME. This condition can neither be rejected nor easily altered. And in this way, information overload is an routinized

and institutionalized and considered as indispensable part of the organizational culture and an element of daily life.

All four practices have a significant effect on the amount of information transmitted, its content and quality. The number of negative consequences, such as information redundancy, information delays, and the ambiguous structure of information flows, are associated with the named practices.

6.1.4 Internal communication

In the previous sections we have examined the structure of REKLAME and the specific characteristic of information processing that are potentially relevant in the light of information overload study. In the following section, we delineate the composition of the internal communication.

Directions of communications

The most intense information and communication flows are horizontal and unit-centered. The communication within the unit is characterized as intensive and frequent. Moreover, the information and communication streams are structured differently in each unit. That is why information coming from one unit cannot always be accommodated within another unit.

At the moment of the study, there was an initiative to formalize and centralize information and communication flows. The initiative was suggested and promoted by the General Manager. He claimed that information often disseminated at the level of the business units is not transmitted upward. Therefore, to improve the strategic decision-making and day-to-day governance, it is necessary to address the issue of quality of information first. He indicated that information could be characterized as incomplete, but at the same time redundant and delayed. The Financial Manager describes the situation as follows, confirming the ideas of General Manager:

> *We are reporting too late to the general management because we do not have information in time. Business unit managers always have their own figures and we get a lot of confusion between their figures and our figures. In 90 % of cases our figures differ significantly from what they have. {HG}*

Style of communication

Due to the relatively small size of the organization and the strong emphasis on creativity, the style of communication is informal. Besides having a number of indisputable advantages

such as lack of social barriers and communication openness, the following drawbacks to it were indicated:

1) **Lack of structured internal communication** that would establish a solid basis for effective information sharing. In particular, we found that no regular meetings were held. Most of the organizational issues were discussed on an irregular basis in the course of one-to-one conversations. Similarly, the communication of strategic vision from the level of management down to level of employees can be characterized as irregular and fragmented.

2) **Absence of incentives and traditions for knowledge sharing**. Despite the fact that management acknowledged explicitly the need for sharing knowledge and expertise in a more regular, structured way no steps had been taken in that direction.

Communication channels

Physical proximity and the small size of the organization made face-to–face the primary channel of communication and information acquisition internally. Telephone and email are used for the external communication.

The summary of analysis of the internal communication is presented in Table 35. In brief, communication and information flows are business–unit centered, with face-to-face conversations being the dominant communication channel. The communication is essentially informal, lacking structure, but at the same time limited to the scope of the business unit. Two features particularly hampering the efficiency of internal communication are lack of structured intra -unit communication and lack of incentives to share information.

Dimensions	*Components*	*Practices observed*
Directions of communication	Horizontal, unit-centered communication	The most intensive communication occurs among the members of the same unit. The information communicated upward is incomplete and fragmented.
Communication style	Informal	The physical proximity and lack of hierarchy or social barriers makes informal, face-to-face communication extremely easy. At the same time the absence of structured, formalized communications and traditions for constructive information and knowledge exchange have strong negative effects.
Communication channels	Face-to-face	Face-to-face dominates internal communication.

Table 35. *Organizing model: the horizontal interdependencies within the REKLAME*

6.1.5 Technological platform

Company-specific applications: background information and strategic IT impact

Since the middle 1990s advertising has become an extremely technology–driven business (Dehning et al., 2003). The technological advances have changed the way the advertising agencies were working. The overall growth of media spending at that time had a positive influence on the sector turnover, and transformed a previously small advertising agency [REKLAME Holding] into a middle-sized full service bureau with the number of national contracts constantly increasing. Besides soaring revenues, it also meant an urgent need to change the general management practices from the simple ones that worked well for the small advertising agency to more sophisticated ones. Responding to this trend, REKLAME Holding led an initiative to change the way of working and to improve internal efficiency as well as to increase the quality of services provided to clients. The decision was made to purchase a standard system, SymSys, which has been actively used in the media sector in the Netherlands. At the moment of the study, more than 200 advertising agencies with a media buying profile have been using the system (www.symsys.nl). The General Manager illustrated the rationale behind this decision as follows:

> ***I.*** *Why do you want to have this system?*
> ***KR****: Because we have this media-buying function in the organization and this is the only system that really allows combining the ordering and your media buying processes. It is the standard in the business. You cannot work without it more or less.*

The system contains several functional modules, such as financial administration and analysis, project management, media order and purchasing, cost accounting, and media databank (www.symsys.nl). It aims to coordinate the activities of the company and track and support the decision-making process across the different functions, levels, and business units. Although information systems in general create a number of opportunities, the first attempt to implement Symsys raised new problems and issues for the management of the company, and it underwent the textbook "implementation fiasco" scenario. As one of the business unit manager puts it:

> *I think that there were many problems from the beginning. They [the company] are working for more than 3 years already [with Symsys] and they tried to set*

it up normally 3 times but because of time pressure and all those kinds of things each time stopped. Finally they started to work with it [Symsys] but it is not used. I think now we use 10-20% of the total system... If we want to see if the project is doing well, we need to have all the data in SS… Now we cannot see anything because the business units do not use SS. {HG}

Despite the fact that Symsys was designed for and customized in accordance with the media-buying profile of advertising agencies and demonstrated a good fit between the organizational information architecture and system infrastructure in most of the cases, the broad social context of system implementation appeared to be significant in the case of REKLAME. Such factors as organizational culture, lack of standardization in terms of internal processes, and insufficient IT-related knowledge of personnel are among the social factors that triggered the implementation failure.

In Table 36, we present a summary of the analysis of the factors that resulted in the "implementation fiasco". All factors taken into consideration have an independent negative effect on the process of implementation but also reinforce one another and burden the existing challenges.

The reason for the "implementation fiasco"	*Empirical evidence*
Poor IT use discipline	*I think we have poor discipline. We easily cut it out and do things faster, but afterwards we find out that we spent twice the time. Because that is the sort of re-entering data and you find out that the system is not producing information because there is no actual data in the system. {KR}*
"Top-down", prescriptive nature of IT implementation initiative	*We are now investing in the re-operating of our computer system, which is the system that is used predominantly in the media area. People each have their own Excel files; they maintain lots of information in Excel sheets etc. I do not want that. It is very hard for me to rule out this kind of procedures…. Actually I am right now in the process of changing that. And it's a challenge…{KR}*
Low IT-related knowledge and insufficient technical skills of personnel	*It's a difficult program, once you understand it – you can do everything with SS. But it's not very easy. {LS}* *In general, some people have better computer skills than the others. With people from Reklame it can be difficult…{EK}*

Absence of formal training and as a result poor system-related knowledge	*When I came here [REKLAME Holding] Symsys was installed already they were working with it but only for half a year. It was like somebody knew this and somebody knew that. I just learned from these people and the rest you hopefully learn by working with it. {R}* *I think we use 10-20% of the whole program. People just do not know how to work with it. {HG}*
Incompatibility of existing work practices and functionality provided by Symsys	*Now we make all the budgets, which go to the client in Excel. Then all the same information is placed in SS. It happens because in SS we are using now it is not possible to get a nice layout. It's not logical – it's not logical to make budget first in Excel, then you think that if you open SS it would be possible to import this budget from Excel. This is not possible! You have to make it again. The one you made in Excel, you must do exactly the same once again in SS. When you fill in all the information to make a project number: you've said 6 hours for this, 6 hours for that – you put it in one screen, than you go to another screen where you put in the budget again and you need to repeat the whole thing again. Again you are saying: "6 hours for this, 8 hours for that". And you think why am I doing this three times. If you mention SS people always say "pfffff"…. {LS}*
Nature of IT investment decisions, lack of the complex approach	*It's like a burglary system- people do not install burglary system after the burglary, because it's too late. We bought a new server because the other one crashed month ago and we had some problems: we lost two days of productive time, we had to reset some data… And now we bought a new server, probably we should have done some preventive stuff. Hence preventive actions [in the sphere of IT investments] are not really part of our business. In our business there is no great drive for being in forefront. {K}*
Instability of corporate IT infrastructure and network environment	*I do not see any IT management in this organization so far. They don't even have the position of system administrator. For instance, now we are replacing the old server. Hopefully the old one will work until the new one will be installed. There are security problems as well. It is very-very busy. I hope I'll get an assistant. {EK}* *I think technology is a big problem in this company. I am really happy with the new person who is doing IT stuff now. He knows really a lot but he is too kind to everybody…So at the end he gets too much {DJ}*

Table 36. *Overview of the factors that resulted in the "system implementation fiasco"*

First, the poor discipline was cited as the most obvious cause of the implementation failure. Although all respondents characterized the discipline as poor and insufficient to secure a successful system implementation, there was a clear lack of motivation or intention to pursue any changes. Second, the top-down, prescriptive nature of the implementation initiative

produces a conflict between the managerial intentions and the way of working of employees, and reinforces the end-user's resistance towards the system implementation. Next, both the unsatisfactory technical skills of personnel together with the inadequate and insufficient training are also considered the triggers of the implementation failure. The emphasis on creative rather than technical skills has resulted in low average technical capabilities of personnel, which has had a strong negative effect on the implementation process, on the end-user's attitude towards the system, and on user's desire and eagerness to learn and upgrade system-related knowledge. Further, all users indicated that there was a misfit between the working practices prevailed prior to the system implementation and the practices, which imposed by the system implementation. Moreover, the majority of users considered the latter less efficient. They emphasized that system output is often hard to understand as compared to a conventional spreadsheets, and it demands much more time and effort to produce it since a lot of data must be converted from the Excel format into the Symsys format, entered into the system, and often re-entered. Finally, the last two factors, the nature of IT strategic decision-making and the overall quality of the IT environment, are related to the broad organizational context of System implementation. Thus, the reactive strategic IT decision-making implies that the company does not have a tradition of investing in IT and its maintenance, the decisions are delayed and postponed and made in a "crisis management style" when the time frame and the speed of implementation rather then the implementation quality become of a paramount importance. At the same time, IT is always an area for cost savings and cost cutting, meaning that the financial resources are scarce and insufficient. As a result, the instability of the IT environment is a "normal", taken for granted, state.

The second initiative to improve the performance of Symsys by installing the latest version with the extended functionality and to start using it as an enterprise level application, was launched at the moment of study. We have outlined the following distinct characteristics of the process:

- The sufficiency of skills and knowledge as the basis for efficient system use has been emphasized. A freelance system consultant was hired to introduce the system functionality, illustrate the novel possibilities of the system, customize the system in accordance with the specific requirements of end-users, assist the end-users in obtaining the necessary knowledge, and prepare the blueprints and instructions that are easy to read and to learn. In addition to a series of formal training sessions that

were held for all system users there were also special sessions for the business unit managers and the employees who use the system most extensively.

- The management stressed the importance of a single, company-wide system, so attempts to change the attitudes towards the system were undertaken.
- The full-time IT specialist was hired to maintain the corporate network and stabilize the IT environment. Although the existing corporate network was basic, the instability of the network environment and the frequent technical failures (network disruption, loss of essential data, and security problems) demonstrated the need for a more careful, systematic approach to the technical administration and monitoring.

Linking technology and information overload

As in the previous case, to find out whether there is a link between the particular types of technology and information overload, we classify all applications into four types: transacting, interpreting, connecting, and collaborating software. The summary of the analysis is presented in Table 37.

Type of applications	*Type of overload*	*Examples of application*	*Empirical evidence*
Transacting software: basic information production and distribution of information	Data overload	Standard MS Office applications, Symsys	Strong link with overload observed
Interpreting software: supports individual information processing	Structure overload	Symsys, MS Outlook	Strong link with overload observed
Connecting software: supports all types of social relations	Interaction overload	MS Outlook	The insufficiency of the connecting platform results in communication inefficiencies that if accumulated cause overload.
Collaborating software: supports distributed working and collaboration	Transaction overload	None	The absence of the communication platform results in communication inefficiencies that if accumulated cause overload.

Table 37. *Technological platform: the summary of the analysis*

Contrary to the case of ING, a strong link between the transacting technology and overload has been observed. **Transacting applications** are the basic office information management applications that support information production and distribution. Besides MS Office applications, we have placed Symsys in this category since it supports standard information

management procedures within advertising. All respondents indicated that they use Excel most intensively and keep all information in Excel sheets. Therefore, when Symsys was introduced they needed to translate all information from Excel. The process of transmitting demanded significant effort and time. Due to lack of motivation, and the belief that Symsys will contribute to a more efficient way of working, the information either has not been transmitted or has only been partially transmitted. As a result, at the moment of the study the information in Sysmys was characterized as incomplete and fragmentary and, at the same time, redundant. This produced significant ambiguity and resulted in information overload.

In general, poor adoption rate of the corporate information system led to the significant distortions in information flows and inefficient dissemination of internal information across business units and departments. Correspondingly, the task of project management became extremely complex, as the Finance Manager described it:

> *I: Can you describe step-by-step how do you do project administration now and what do you get at the end?*
> ***H**: The business unit manager has to put in [into Symsys] the entire project budget: the expected income, the expected costs, everything... But now, they [business unit managers] fill it all in at much later stage. During the project we can never see if we are going to earn any money. It becomes possible only when the project is finished. Often we see only the expenditure that comes from the invoices and it becomes very difficult to relate / transfer it to our clients We get the financial results for the project 2-3 months later, and it's too late. {HG}*

Interpreting software, the applications that facilitate the individual decision-making by expanding the range of available interpretive functionalities, is represented by MS Outlook and Symsys. Compared to the case of ING, in REKLAME email was less important. It was used only for the external communication with clients and suppliers, while face-to-face communication dominated internally. Therefore, though the link between email and overload has still been observed, the number of emails that users received on average was smaller (average: 15 emails a day; maximum: 35 emails per day). At the same time, all respondents emphasized the role of Symsys in escalating the information overload. Sysmys is designed not only to support information production and transmission within the advertising agencies but also to provide assistance in retrieving and analyzing information and presenting it in a condensed and clear format so as to facilitate individual decision-making.

Connecting software, designed to support all kinds of social interactions, is represented only by MS Outlook. In REKLAMER most of the work is done at the base-office, meaning

that the majority of employees are located in the same physical space. However, for SPS Research, the unit that provides research and consultancy services on commercial performance, distributed working is the dominant working practice. Doing commercial performance research implies working at the client's sites and reporting the results to the base-office on a daily basis. Since the "know how" of the SPS Research business unit is providing high quality research within a short time frame, getting all information in time becomes central for success. At the same time, besides supplying the field researchers with laptops, no other connecting and collaborating facilities were made available. Often, the reports that must be sent to the central office come with a delay, which places at risk the project deadlines and increases the workload of all parties involved.

Collaboration software, the applications that support distributed working and collaboration, was not present in REKLAME. The absence of an Intranet–like application that would support knowledge accumulation, transfer, and sharing between the business units and the departments impeded the collaborative working and led to constant reinvention of the procedures and processes.

6.1.6 Contextual perspective of information overload summarized: linking data to theoretical propositions

Proposition	Evidence observed
The structure of organization determines the organizational vulnerability to information overload. A mechanistic type of structure increases the risk of information overload.	The structure of REKLAME has all the elements of mechanistic types of structures. It is flat vertically and consists of independent units at the horizontal level. Empirical data indeed indicated that information overload could be partially ascribed to the mechanistic nature of organizational structure. The proposition is supported.
Organizational culture affects the individual's vulnerability to information overload. Information overload is a voluntary state that indicates the individual compliance with organizational culture.	Four dominating characteristics of the organizational environment were extracted in the course of data analysis , i.e. conflict in defining managerial responsibilities and roles, prevalence of spirit of competition rather than spirit of collaboration, constant balancing between being creative and being disciplined, and "stretching people". All four had a significant effect on information processing and facilitated proliferation of information overload in a direct or indirect way.
As the amount of internal communication goes up, the risk of information overload increases.	Most of the internal communication is unit-centered and rarely goes beyond the unit. The absence of incentives for structured communication and knowledge sharing impedes efficient information exchange. Therefore, information that is transmitted to the general manager is often fragmented, delayed, and often redundant. Therefore, not the abundance of information but lack of structured, high-quality information is central.
Introduction of advanced information technologies causes information overload: A. The use of transacting technologies increases the risk of data overload.	The introduction of Symsys is associated with the overload.

B. The use of interpreting technologies increases the risk of structure overload. C. The use of connecting software increases the risk of interaction overload. D. The risk of collaborating software increases the risk of transaction overload.	The introduction of Symsys is associated with the overload The absence of connecting and collaborating applications causes various inefficiencies in terms of information processing and communication and causes information overload.

Table 38. *Contextual perspective of information overload summarized: linking data to theoretical propositions*

6.2 Focus profile I: KR

In the previous section, we have discussed the contextual perspective on information overload and described the effect of the organizational structure, the specific characteristics of organizational information processing, the internal communication, and the technological platform on information overload. In the consequent section, we present two individual profiles that illustrate the task–related and human–related perspectives on information overload. Again, the detailed analysis was conducted for all participants of the study, but only two profiles are presented in the final version of the thesis. The first profile describes the composition of information overload for KR, the managing director of REKLAME. In the second profile, we carry out a similar analysis to that of LS, the Graphics Production business unit manager. In general, the discussion is guided by the logic advocated in the conceptual model.

6.2.1 Information overload: task -contingent perspective, KR

In the conceptual model, we suggested that the effect of two factors such as the task complexity and time constraint should be investigated within the task–contingent perspective on information overload. We start the discussion with the task complexity, making a distinction between the three types of this. We further proceed with the discussion of time constraint.

Task complexity

In accordance with the distinction we have made in the conceptual model, we define task complexity as a combination of component, coordinative and dynamic complexity. We analyze the empirical data and track the effect of each type of complexity on information overload.

Component complexity is a function of the number of distinct information cues the person needs to process and the number of distinct acts that the person needs to perform. In the citation below, KR compares his everyday decision-making process with performing surgery. In the same way as the success of an operation depends on the accuracy and immediacy of information about the current state of a patient, the success of day-to-day decision-making is determined by the availability of necessary information and its quality:

> *I often see it as an operating a patient. While operating, you get a lot of information that you use to make decisions. We are operating on a patient without reading his heart tone etc. too often. I feel I have too little information, too little structured information. {KR}*

Therefore, information overload for KR is an imbalance between the amount of structured information and all the remaining information that is of a limited interest. Therefore, not only the quantity of information but rather its quality is important.

Like HL, KR also performs the functions of general management, which include strategic decision-making, planning and budgeting, maintaining operational continuity, retaining and gaining new customer, and recruitment. To be able to fulfill these responsibilities, he collects diverse information from different sources. KR describes his typical day as follows:

> *Normally I start at 8.00 and try to leave at 18.00. Within these hours I try to manage all stuff I have to manage. Normally I do not have two external meetings a day, I always attempt to do maximum one because there is so much to be done in-house. My office is just "next door" to every one. As a General Manager I always get a lot of problems at my desk, people walk in a lot. I wish I do not mind it all, but obviously the agenda is very tough…In my agenda I have appointments pretty tightly scheduled: there are so many people you want to see or so many people who want to join. And there is obviously lots of reading, lots of information. Even more, there is writing, and there are lots of phone calls of course. I am addicted to mobile phone. [KR]*

The day at work comprises various activities such as scheduled and non-scheduled appointments with external parties and personnel, reading and writing, calling people and receiving telephone calls. Communication, as the specific act of transmitting information between individuals, takes up most of the day. Similarly to KR, he believes that the most reliable information is obtained in the course of face-to-face and telephone conversations. Face-to-face informal conversations, scheduled appointments, telephone calls, emails, all flow interchangeably, leaving no space for reflection. KR admits that the communication strain goes up constantly, eroding the feeling of personal control over incoming information and increases the overall information overload.

Coordinative complexity originates from the complex timing, sequencing, and frequency of acts, their intensity and locational requirements. The position of KR and his responsibility for the company's general management explain his involvement in active interactions not only with the personnel of the company but also with the clients, suppliers, and various external parties. He has up to two external appointments each day, not taking into consideration numerous meetings with the internal staff. He is always either at a meeting, on his way to a

meeting, or preparing for a meeting. He receives on average 30 work-related emails per day, having the strict personal rule to open, read, and possibly react to all of them. All telephone calls come directly to him with no secretary available to put the call on hold. Naturally, this extreme openness to communication is his choice. However, KR, being one of the three stakeholders of the company and having a strong personal interest in the company's wellbeing, feels that he is obliged to be accessible for communication since each rejected communication act might mean a missed business opportunity. Similarly to the Managing Director of ING, he is facing the dilemma of either coping with extremely high communication load or protecting himself from the communication flood but potentially damaging his own and the company's performance. The increasing information overload is the price he prefers to pay in order to be in control of the company and its external environment.

Moreover, the relatively small size of REKLAME does not require a complex organizational structure and management hierarchy. The organizational structure is flat and significant decision-making power and responsibility is disseminated at the low levels. Indeed, there is no need to explain to the designer what must be done with respect to a certain request from the client. Direct supervision is resisted and considered as an infringement on professional autonomy. Nonetheless, no matter how knowledgeable and skilful the employees are, the problem of overall coordination and control remains. For instance, there is always a need for control and the interference when a non-standard situation, a situation falling at the margin of individual experience, emerges. Moreover, in practice, the informality of the organizational culture allows the employees simply to stop by and have a chat with the General Manager. Due to the physical proximity and the absence of social barriers, the upward delegation of responsibilities becomes effortless. KR comments on the issue as follows:

> *We are relatively flat organization and lots of functions and responsibilities obviously come to me rather than being solved at the level, they should be solved. I love thinking with people; I like helping them… But they are often distracting from what you really want to work at. Often, I feel I do not want to solve the issues for my employees but they look at you as at big father who is going to help them. From one hand, it's not difficult to delegate, it's difficult to say, "that is your responsibility, and you must do it yourself. {KR}*

No two problems require the same knowledge and expertise; no two problems are equally difficult or easy. Yet each imposes demands on managerial attention and time; each adds to the diversity and variety of tasks performed by the manager on a daily basis. In Table 39 we

summarize the discussion on coordinative complexity by evaluating each component of it and building up the link with the information overload.

Timing and sequencing of acts	Constant overlap of interactions
Frequency of acts	High frequency of interactions
Intensity of acts	Intensive multi-channel interactions
Locational requirements	Visiting clients at various locations

Table 39. *Coordinative complexity: major components*

All four components of coordinative complexity have been observed. KR acknowledged explicitly that the interactions overlap constantly, imposing conflicting demands on his time and attention. In general, KR admits that although he still manages to be in control of complex, on-going interactions, he has already been "stretching himself" and that the amount, intensity and frequency of interactions are approaching the upper bound.

By **dynamic complexity** we mean the complexity that comes from the external environment in terms of its ambiguity and instability. As KR mentioned several times during the interviews, advertising is an extremely competitive market. The low entrance barriers permit start-ups to emerge constantly and challenge the market position of existing firms. At the same time the growing demand for "high efficiency but low budget" advertising campaigns changes the rules and conditions of the competition. It is crucial for the company to be flexible and responsive to the market demands. To achieve this non-trivial goal REKLAME is constantly striving to diversify its market offer through introducing novel products and entering new markets. For instance, under pressure from the market the company shifted from pure advertising (Reklame) to advertising consulting and research (Data). KR emphasized that the major challenge for the General Manger is to be equally knowledgeable in many diverse areas of the business: advertising, research, consultancy, and administration:

> *I feel that I always have to be informed about what's happening in the world and I make it a religion to read a newspaper for 50 minutes in the morning. There is so much information in there, which I can use for my work, on which I can refer; I need this information as content when I talk to customers. But I do too little in my opinion; I do not know how to find time to do more.*
> *My work is extremely information-intensive. I always have to dig pretty deep. When I need to talk to, for example, the SPS Research unit manager, in order to really help her I need to go deep and understand what is the problem. It is hard to help people when you are only at the superficial level.*
> *I have to be part of everything and because this "everything" is so diverse. The diversity of the projects makes it necessary to know a lot about different areas. Clearly, I am not able to be involved in each project. Already now we are stretching ourselves very much.*

KR stresses that for him it is extremely unpleasant to feel the lack of one's own knowledge. To prevent incompetence he constantly trains and educates himself, struggling through the one-hour obligatory morning reading of business newspapers, attending business-specific exhibitions and events, subscribing to specialized magazines, and searching the Internet. Interestingly while he admits that nowadays people can get vast amounts of information without leaving the office, he still thinks of the immediate information that he gets through the traditional information transmitting channels as the most important. As an example, KR describes the way he searches the information about a potential client. He says that he can certainly search the Internet: the corporate web site, the market-specific portal, and the government sites, though the best way would be just to visit the client, to observe, to walk around, to talk to people. But that is rather an ideal situation. In practice, he is often forced to utilize a suboptimal information gathering and processing strategy because of the lack of time and all the other things he needs to squeeze into 8 –10 hours of the working day. As a result, he characterizes his work as extremely information-intensive, with information overload being at the top of the list of the most alarming problems.

Time constraint

Although KR continuously emphasized that the complexity of daily responsibilities is transparent only in the time constrained setting, such as working hours, no specific evidence that illustrates the link between the time constraint and information overload has been found.

Task-contingent perspective of information overload summarized: linking data to theoretical propositions

Proposition	Illustrative evidence
The risk of information overload goes up as task complexity increases:	
The risk of information overload goes up as the component complexity of task increases;	A strong link between the degree of information overload and component complexity is observed;
The risk of information overload goes as coordinative complexity of task increases;	A strong link between the degree of information overload and coordinative complexity has been observed. Coordinative complexity originated from two sources: the interpersonal coordination and the coordination of personal activities.
The risk of information overload goes up as dynamic complexity of task increases;	The link between degree of information overload and dynamic complexity is observed. The breadth of knowledge required to fulfill the general management functions mediates the link.
The risk of information overload increases, as time constraint becomes binding.	No specific evidence has been found

Table 40. *Task-contingent perspective on information overload summarized: linking data to theoretical propositions*

6.2.2 Hunan –related perspective on information overload: KR

KR is in his early forties. His main business is general management, i.e. management on a daily basis. Taking advantage of work experience at a world leading company (GE), of the social networks he built through the years, and of invaluable commercial knowledge, he performs a wide range of functions such as strategic corporate planning, work with the clients, expanding the clients and project base, recruitment etc. He is thrilled by the diversity and heterogeneity of his everyday responsibilities, admitting the fact that now and then it becomes difficult.

Decision-making style

In Chapter 3 of the thesis, we have defined decision-making style as the amount of information collected and number of decision alternatives derived. To access the decision–making style we also suggested looking at the individual's attitude to uncertainty. Drawing on this definition, we qualified KR as an information non-intensive decision-maker who collects the minimum of information, reduces it to a single alternative and relies mostly on his own experience and accumulated knowledge. In the interview fragment below the central characteristics of KR's decision–making style are present:

> *I am a kind of creative commercial person, I mean, I am not an administrative type. I do like to be informed in the precise manner. But I also know that it's better sometimes to decide even when you do not have all information. Things need to move on, it is very easy to hold on, to delay, but you need to make decisions. Actually, I like taking decisions; that is part of my job. I have no fear of making decisions, so if I do not have information I just decide. I am definitely not a risk aversive person.*

Experience

KR, 40, started working for Reklame Holding three years ago. He first worked at a big multinational company engaged in a wide range of activities from manufacturing to financial services. He worked there for 14 years in 10 different positions at diverse locations, constantly flying from the Netherlands to Hong Kong, from England to Germany and Belgium. After so many years working for one of the world's giants, he decided to move to a medium–sized, privately-owned advertising agency, to the position of Managing Director.

Type of Experience	Evaluation
Experience of information intensive types of tasks	High
Decision-making experience	High
IT knowledge and experience	Somewhat average
Work experience	High
Experience in the current position	Moderate

Table 41. *Experience: the empirical evaluation*

Experience of information-intensive types of tasks, decision-making experience, and overall work experience was evaluated as high. The average IT knowledge and experience formed the specific attitude of KR to technology. The citation below is illustrative:

> *Technology is a bit complex now. It's like a car: you do not know how the engine runs, you hardly know how to change the oil, it's just the functionality that satisfies you. I think that's the problem with technology, it's growing more and more complex, advanced. I just want to turn the system on, do my work and that would make me happy {KR}.*

His moderate experience in the current position as well lack of overall experience and prior knowledge in advertising stimulate a constant information search and recursive attempts to expand his knowledge base and increase his proficiency. Thus, to compensate for this lack of experience, KR reads the newspapers and specific magazines, attends the industry events, and goes on education trips. Consequently, while extensive decision-making and work experience help KR to deal with information and communication load and empower him with ready–to-use schemes and decision templates, his insufficiency of industry-specific and company experience, on the contrary, places additional pressure and causes information overload.

6.3 Focus profile II: LS

In the second profile, we demonstrate how information overload evolves using the example of LS, the business unit manager of Graphics Production. Again, we first discuss the task-contingent perspective on information overload and trace the effect of task complexity and time constraint. Next, we present our findings related to a human-related perspective on information overload.

6.3.1 Information overload: task-contingent perspective, LS

Task complexity

Working on an advertising project requires constant interaction between the project group of the advertising agency and the client. The great number of interactions per day contributes to **component complexity**. LS uses electronic mail extensively for communicating with clients. She suggests that most of the routine communication is done through electronic mail. Moreover, often the client is the one who imposes the use of email as the primary communication media. From one perspective, email is the easiest way to get in touch and that is why it has outperformed all traditional communication media. From another perspective, the use of electronic mail has a number of drawbacks that can destroy the benefits from its use. For example, when asked which information–communication application she associates with information overload most, LS immediately mentions email:

> *Information overload is caused by email and then printing the messages. First of all, I think a day I receive 30-35 emails. It is a lot since I read them all. I have to read them all because all my clients are corresponding by mail. I left my place now [for the interview], when I will come back and open my email – "Vjittt" [tries to demonstrate that she will get some great number of new emails]. They all have different information inside or questions that can be really important. If I do not read them all I can make enormous mistakes. Then it's really strange that I often feel I need to print it since it is so much information in it. Actually, by printing the message the amount of information is doubled. That produces a lot of information that is not necessary. {LS}*

Obviously, not the electronic mail per se but rather the emerged patterns of its use cause information overload. While email certainly ensures the convenience of communication, it fails to be equally efficient for all types of communication. In particular, there is a certain conflict between the characteristics of electronic mail and its transmitting capacity and the demands imposed by the communication act. LS illustrates the issue in the following way:

I think email is annoying when people use it to make long stories. I do not think email is meant for more than 20 sentences or something. Because otherwise you need to print it to really read it. Then you see if you mail to your client asking 5 questions he will only respond to 1-2 questions. And he will never come back to the remaining three, having the feeling "I've done it!". Email is very fast. You have to open it, to see it, ok, I understand, and close then. It's not for really long stories, or questions, I think.{LS}

In the fragment above LS cautions that email, the central merit of which is the speed of information transmitting, is not appropriate for lengthy communication and on-going discussion among several parties. She states that not only the number of emails but also the length of an email and the size of an attachment are important. Long emails are hard to process. Moreover, the efficiency of information processing decreases as the number of independent issues included in it goes up. As a result, LS prints the incoming mail, admitting that this is, however, counter to the nature of digitalized communication.

Defying conventional understanding, the empirical data demonstrates that an email flood cannot be considered from the purely quantitative standpoint. The large number of emails is not the only factor that leads to email flood. In particular, in the case under consideration LS receives 30-35 emails per day, which is not a lot if considered on its face value. Indeed, it is not indicative unless we get some additional characteristics with regard to the informative composition and the length of each message.

Coordinative complexity arises from the complex sequencing, frequency, intensity, and locational requirements of acts. Excessive coordination strain is determined as one of the central causes of information overload for LS. She claims that operational independence of the business units places the responsibility for the coordination and alignment of all activities on the unit manager. Therefore, among her daily responsibilities, she names maintaining relationships with the clients, contacts with the suppliers and parties involved in the production, and the coordination of all work processes internally:

We have about 30 projects running at one time. With the other agencies, you often see that they have a production unit, you have the account mangers and you have graphic managers. Everybody does the particular thing for the project. We do it all. From one side, it's very nice because you always know what is going on, how it's going, whether everything goes ok, if the client is calling you can always tell him what is the status of the project. On the other hand, if you want to give a lot of attention for your client it's not always possible because I also have to call suppliers and also have to sit here and check if everything is done in the right way. It's very difficult to separate time your time in the right proportion. Sometimes you work really late, you work hard and if something is going wrong you are really upset, it's not necessary because it's work and something can go wrong. You are so in the project, so

you are going-going-going, you are too involved. That's hard. And we all have it. I see it with the other people. {LS}

Large numbers of projects running simultaneously and the operational independence of the units complicate significantly the sequencing, frequency, and intensity requirements. As a result when asked about the typical working day LS says that she does not have a clear distinction between working and non-working time since she starts to work as soon as she is awake and never finishes it at the official end-time. From one perspective, the high involvement and challenging workload make the work exciting, never bringing the same day. At the same time, constantly balancing on the edge between "too much" and "just a lot" is stressful.

Besides being responsible for the overall coordination of the work processes, LS has a very special, gate-keeping position within Reklame. At the moment of the study, she is the most experienced business unit manager, having knowledge not only in the area of graphics production but also in terms of organizational processes: how the workflow is organized, where certain information could be found, whom to consult on the issue. Employees are constantly looking for her advice, which she never refuses to provide. The following citation is illustrative:

I: What takes most of your working time?
LL: I get a lot of questions during the whole day: "How can I do this? How can I do that?" "Can you help me?" That's from my unit but also from the other units. We are a kind of the units that if you do not know how to do it you go to us. And it's our fault. We are a kind of cross road for several units where many information flows come together. People in my unit are not working very long for the company. I have one colleague who works for an year, another colleague – 3 months, another – 2 months. We are growing a lot in a short period. A lot of things are really new to everybody; they do not know how to do it, that's why I have a lot of questions. I've been working here already for 3,5 years. Almost every day there is a moment when I feel like saying "Please, hold on your questions, I need 2 hours to have work done".

Although building up the reputation of extremely valuable and irreplaceable employee, this left her little to no time for the execution of her direct responsibilities.

Dynamic complexity is the complexity that originates from the turbulent, unstable nature of the external environment. Compared to the other focus profiles, the dynamic complexity in the case of LS was characterized as moderate. Although she states that the day at work is never the same and the solutions are always creative, in general, the work processes are rather stable.

Time constraint

For LS, the time constraint is the function of project deadlines. In the quotation below, she indicates that the deadlines not only establish the time frame but also define it strictly, with no delays possible:

> *We are really busy unit. We have a lot of projects, a lot of clients. It is always a kind of stress to make the deadlines. In the relation with the client if you promise something, you have to do it. And if you see that it doesn't work you have to call the client early, not at the last minute. Because it's really bad for the relationship, if you do ten things right and one thing too late, they always remember the one that was not on time. We always know for ourselves that we want to do it right and in time, so we work really late sometimes, just to make sure that we are making the deadline.{LS}*

Therefore, the workload varies in time, increasing dramatically as the deadline is approaching. This is particularly interesting, since for the first time the composition of time constraint and its perceived nature has been disclosed explicitly by a research participant.

Task-contingent perspective on information overload summarized: linking data to theoretical propositions

Proposition	Illustrative evidence
The risk of information overload goes up as time complexity increases.	
The risk of information overload goes up as the component complexity of task increases;	Supported, with the number of emails and the amount of information within each being the major determinant of this. The strong link between degree of information overload and the component complexity is observed;
The risk of information overload goes as coordinative complexity of task increases;	Supported, with coordinative complexity coming from the internal coordination of work processes and external coordination of information flows.
The risk of information overload goes up as dynamic complexity of task increases;	The dynamic complexity is characterized as moderate. No link with information overload has been observed.
The risk of information overload increases as time constraint becomes binding.	Time constraint is defined as a function of multiple deadlines. A strong link with overload has been observed.

Table 42. *Task-contingent perspective on information overload summarized: linking data to theoretical propositions*

6.3.2 Human –related perspective on information overload: LS

LS is the youngest, at the same time one of the most experienced, business unit managers in REKLAME Holding. In an attempt to compensate for the lack of confidence arising from age, she collects a lot of information in surveillance mode.

Decision-making style

Throughout the interviews LS stressed continuously that her work is information-communication intensive, with these two aspects constantly intertwined. Not only does she need to collect and process a lot of information, but also to communicate it to subordinates, clients, and suppliers in a clear and efficient manner.

To fulfill her daily responsibilities LS collects and processes a lot of information: information she receives at work that is directly related to her responsibilities, and general information from the wide range of sources that increases her overall business intelligence and industry-related knowledge. She reads lot of marketing and advertising magazines during her free time and thinks that it is necessary to constantly update "the feeling of the field".

According to the classification we have suggested in Chapter 3, LS is a decision-maker who always like to collect maximum information and consider all possible alternatives. Contrary to our expectations, the habit of processing great amounts of information does not preclude her from being overloaded. Even more, her preference towards additional information increases information load and causes overload.

Experience

The work experience of LS is evaluated as moderate since she has entered the job market only recently (Table 43). Correspondingly, both her decision-making experience and her experience of information-intensive tasks are average as well. At the same time, she has been working at the current position for almost four years, which made her one of the most experienced employees at the firm. As suggested earlier in the chapter, though it helps her in terms of working with the clients, managing the projects, and maintaining contacts with the suppliers, it also places the additional communication strain on her. Rather low knowledge and experience of IT results in difficulties with adopting new applications.

Type of Experience	Evaluation
Experience of information intensive types of tasks	Average
Decision-making experience	Average
IT knowledge and experience	Low
Work experience	Average
Experience in the current position	High

Table 43. *Experience: an empirical evaluation*

In general, no evidence was found to suggest that the counter effect of experience on the degree of information overload exists. At the same time, the lack of experience could explain the severity of information overload:

> *I have a lot of responsibilities. I think I am a little too young to have so much responsibilities…And I am learning every day. I have to do it {LS}.*

6.4 Human coping with information overload

In the subsequent section, we present the findings on human coping. We first consider human-enabled, technology–enabled, and organization– enabled coping separately. Than we present the integrated model of structuration, where all three categories of coping are considered in ongoing interplay.

6.4.1 Human-enabled coping: the background

In this section, we analyze the set of personal routines that human actors utilize in an attempt to adapt to constantly increasing information load. In Table 44, we summarize the findings and provide illustrative fragments from the interviews.

An individual action includes elements of assigning meaning and interpreting. To do this, the individual draws on the concepts of power, norm, and legitimate behavior. Thus, for instance, in selecting how to divide scarce attention and time, individuals apply certain interpretive schemes, the mental frames that accumulate the prior knowledge and experience, to assign relevance and formulate anticipations about the quality of information. At the same time, the individual draws on the concept of power, under which the information requests and the information reports from superiors often have the highest priority and are credited with higher value and relevance. Moreover, in choosing a certain mode of behavior individuals expresses compliance with the organizational norms, implicit and explicit rules. For example, neglecting the incoming mail and not responding to it, is considered as legitimate, widely-accepted behavior in some organizations, while unacceptable in others.

Human-enabled coping	*Descriptive empirical evidence*
Summarizing / Reporting back: condensing information into short reports, and reporting back to the parties involved.	*(1) Most of the time I try to make summary of what someone has told me because when you talk to a client you always gets tremendous amounts of information. I am afraid I miss something. In most of the cases after the meetings I send the email back with something like: "This and that I am going to do, did I understand it correctly?". I think it is very useful because I can always go back and check what we said, what did we agree upon. Recorder would be nice. {LS}*
Selectivity: applying interpretive schemes, particular selection procedures	*(2) If I go to the client and I have to make the research plan they provide a whole pile of reports. If I read all these I'll become totally crazy. I do not do that. I know what my goal is. I scan the titles quickly. As a result I get "must read" reports and reports that might be interesting to look at. And then "must read" – you read, and only if you have time you read "maybes" .If you have a clear idea of what you want to accomplish, it's easier to do the selection. The difficult projects are the projects in which you do not have a clear idea at the beginning. Than you need to recognize the point in the project when things go out of hands and decide what you really need to do. Just try to be selective. it's easier said than done {JS}.*
Structuring of agenda: organizing and structuring of agenda in accordance with particular criteria	*(3) Every day in the morning I decide on what do I need to do. But it changes even during the day.{RR}* *(4) I do not believe in 24 hours working day, that's why I plan my activities in between eight and five, six. To me it is "work hard and play hard" {KR}* *(5) You always need to think ahead and reserve the couple of hours for something you know and for something you do not know and try to be flexible in that {JS}*

Stretching working hours: increasing the information processing capacity by expanding working hours	*(6) I work at home during the weekends. Then starting on Monday morning I think that I am somehow ahead.*
Regulating own accessibility: changing the accessibility mode to regulate the intensity of information and communication exchange	*(7) Sometimes I stay at home for 3-4 hours in the morning. I work at home 10 times faster than in the office because no one is sitting next to me, the telephone is not ringing, no one is coming in.{LS}*
Working ahead: executing some actions / performing the functions in a proactive mode	*(9) If you have some room left you just work ahead, you start working at things that do not have to be done today. {RR}*

Table 44. *Human-enabled coping*

Individuals employ a number of routines to cope with information overload. Each routine is a form of habitual and, in a way, mechanical behavior that is deeply embedded in and shaped by the individual's knowledge and prior experience. As in the previous case, the personal routines observed were often performed automatically with individuals not immediately aware of why certain actions are executed. At the same time, most interviewees suggested that they perform particular actions because they have always been doing them and "it is just the way it is". For instance, when asked about how they structure the agenda and if there are any "rules" involved, the individuals at first tend to claim that it is absolutely spontaneous and chaotic. Later, however, they all formulate the "standard procedures" they apply in planning daily activities and scheduling appointments.

Most of the personal routines extracted from the empirical data are similar to the ones discussed in the case of ING. In addition, we have observed two novel practices, (1) "summarizing and reporting back" and (2) "working ahead".

"Summarizing and reporting back" implies the reducing of information load by converting all verbal information created and transmitted via the face-to-face communication channel into a digital format. Moreover, the content is reduced to the crucial, the most critical, points. The document is sent back to all the parties that were involved in the communication for verification and approval.

"Working ahead" is a strategy under which the individuals act proactively and shift some future workload to the present. In doing so, they draw extensively on their previous experience and knowledge of business processes, which allows making predictions on how the workload will evolve. In that way, the individuals attempt to equalize the "present" and the "future" workload and avoid dramatic fluctuations in it.

6.4.2 Technology–enabled coping: background

In the preceding section on information overload, we have investigated the link between particular applications and information overload. We suggested that in the case of REKLAME the information overload is associated with the use of Symsys, the enterprise resource planning application, particularly designed for advertising agencies. Therefore, we focus on this application and investigate what are the coping functionalities and how individuals appropriate these functionalities to reduce the information load.

Technology–enabled coping functionalities imply the use of technological features to filter out the unwanted information and reduce the overall information load by improved information representation, information structure, and reduced redundancy.

We have already indicated that a low level of IT-related knowledge and skills encumbered the process of Symsys implementation, and explained its poor use. Although the system provides a large number of functionalities for information processing, organization, retrieval, and filtering, only very few were used. Even more, the insufficiency of system-related knowledge and, as a result, various inefficiencies in terms of system utilization, reinforced the individual's information overload.

6.4.3 Organization-enabled coping structures: background

We define organization-enabled coping as restricting the information streams, involving organizational triggers such as organizational redesign, information and knowledge management, and promoting certain cultural and behavioral norms. In Table 45, we list the coping strategies that have been observed within REKLAME.

Organization-enabled coping	*Descriptive empirical evidence*
System related training	*(1) We have a person from Symsys who is training us how to use the application. He has prepared the instructions about SS: how to make an order number, how to make an invoice, so you can look it up and it's quite easy. Once you know it it's not difficult. {LS}*

Design and implementation of gate-keeping roles	*(2) Since a couple of month we have arranged it in the unit so that we have a colleague who is doing various internal things. If you are on the road, for example, you can always ask her to do something.{LS}*
Regulating the efficiency of internal communication by introducing structural meetings	*(3) It is really effective and clear when the company has structured meetings at the regular basis. I think it's really very good when one person says: "We are going to do it like this", everybody agrees, and it's done. No uncertainty, clearly defined responsibilities, everything is defined. {LS}*
Utilization of formal planning procedures	*(4) We do planning mostly every day. Every morning we go through everything that needs to be done. We move the stuff around in that way that everything that must be done today is done today. And it is every morning like that. {RR}* *We have the separate planning for each week and we have the planning form where each manager fills in what is he going to do for the project during the week.*
Werkdag	*(5) We have a system here, every third Monday or Thursday of the month we take a "day off". We call it "werkdag" and we work, but we only work for ourselves: we participate in training, clean up the place, we do all kinds of things that make our work better. We study, we visit other companies where we can learn the techniques and tools and see if we can implement better ways of working. {KR}*

Standardization of work flow, processes, and roles	*(6) For Data we have job descriptions. For all different functions we have different protocols: this is how we work, this is how we do the field research, etc. They are really going from step 1 to step 10. Step 1 is really when the person comes to the customer for the first time and step 10is when the person delivers the final result. {KR}*

Table 45. *Technology-enabled coping*

While the personal routines were quite similar both in BANK and REKLAME cases, the organization-enabled coping structures differed significantly. First, since the large proportion of information overload in REKLAME could be explained by the poor use of the internal system (Symsys), the management decided to launch an initiative to improve the system-related knowledge, to enhance the technical skills of personnel, and to change the attitudes towards the system. Emphasizing the importance of the proper use of the system, the management promoted a uniform, system-based way of sense–making while discouraging alternatives, and explicitly defined the organizationally accepted norms and legitimized behaviors. Thus, the use of Symsys rather than a number of dispersed and non-compatible information production, processing, and transmitting practices should enable efficient and effective information processing and exchange. In motivating and even prescribing the employees to use Symsys for all internal processes the general management drew on the concepts of effectiveness and efficiency, and this involved mechanisms of reinforcement, such as rewarding and punishing, for instance, which are intrinsic to the managerial role. In this example, the concepts of effectiveness and efficiency, as well as the structure of the formal hierarchy and power exist primarily in the minds of the human actors involved. Moreover, by promoting the "Symsys" way of working, managers both enabled the employees to work more efficiently but also restricted and prohibited acting them otherwise.

A similar way of reasoning can be applied to the standardization of internal communication and the implementation of standard operating procedures. Though both are general and rather abstract labels for organizational initiatives, both restrict and direct organizational information flow and define the rules of information production and transmitting. In the case of REKLAME, where an informal, "creative" style of working dominated for decades, the introduction of standard operating and communication procedures and, thus, the shift towards formalization and centralization, was a forced response to the increasing pressure from the external environment.

Werkdag ("working day") is the day reserved for internal matters that cannot be addressed during the working hours. Due to the excessive workload, many issues that do not have a high degree of urgency are held back and, when accumulated, produce an additional strain. During the werkdag employees are advised to pay attention to such "secondary" matters to reduce the overall workload. Again, the werkdag is defined in terms of concepts such as efficiency and effectiveness, team working, and urgency. In imposing the werkdag as a repeated and "obligatory" event, the management of the company draws on their managerial prerogatives and utilizes the power ascribed to the managerial position. Moreover, by prescribing explicitly what should be and what should not be done during the werkdag certain norms and behaviors are legitimized while others are discouraged.

6.4.4 Structuration theory perspective: integrated view on human coping

In this section, we consider the interplay between human-enabled, technology-enabled, and organization-enabled types of coping. We suggest that information overload is addressed at the level of the each particular individual and the level of entire organization. Moreover, neither human-enabled nor organization-enabled coping in isolation seems to be insufficient. Therefore, the model of structuration considers the human action and social structure as being in constant interplay, and traces how social structures define and shape human action but at the same time are reinforced or altered by this action. Technology mediates the relationship between organization and individual, since it encapsulates the interpretive schemes, accommodates the resources and envisions their allocation, and mirrors the legitimate behaviors and organizational norms.

Earlier in this chapter, we have demonstrated that most interviewees link information overload with the use of Symsys, the corporate ERP application. Sysmys was particularly designed for advertising agencies, to support all operational processes, provide information exchange and information management facilities, facilitate collaboration with clients and customers, and improve the efficiency of internal communication.

Figure 28 depicts the model of structuration and links individual actions to the social structures that constitute the structure of the organization. In the course of the study, we have indicated a number of distinct strategic guidelines of REKLAME such as close relationships with customers, close relationships with suppliers, efficiency of the internal information exchange, efficiency of the internal operations (see Figure 28). Close relationships with suppliers and the ability of the company to react to the changes in demand and to satisfy the client's needs help to retain the customers and secure the production of high-quality services.

Close relationships with suppliers such as newspapers and publishers not only allows the company to be thoroughly informed about recent changes in the area but also determines its potential to negotiate a price for media placements and publishing. The efficiency of internal information exchange can be divided into two components: efficiency of internal information flows and efficiency of internal communication. Regarding the former, a certain centralization of information flows and the accumulation of all information into the single information depository, such as Symsys, were regarded as central. To increase the efficiency of internal communication the shift towards structured, formalized communication was undertaken. Finally, to guarantee that all internal business processes indeed complied with the principles of effectiveness and efficiency, a wide-scale certification was undertaken. The business processes were split into standard operating procedures, each meticulously formalized and described.

Symsys, the enterprise system, is designed to support all major processes and flows. The intimate relationship with the customer is supported by the enhanced collaborative platform that makes the real-time communication, information production and transmitting easy and inexpensive. The close relationship with the suppliers is facilitated by the Media Bank operational module of Symsys. Media Bank allows users to get actual information about the current market, track the market changes, and adjust their pricing policy consequently. The standard information management functions of Symsys, in particular information storage and retrieval, centralize all information flows and make information accessible and readily available to everyone. In this way, the information from the business unit is collected and stored within Symsys. The functional modules' organization of Symsys, in which all central business processes are replicated and translated into the system architecture, supports the struggle for the efficiency of internal processes. The resulting processes are highly standardized and imply the execution of standard, logically linked steps. Finally the strategic direction towards the increasing efficiency of internal communication is supported again by the extensive collaborative functionalities of Symsys, which includes shared workspaces and discussion groups.

In terms of the model of structuration, Symsys embodies interpretive schemes, provides coordination and control facilities, and encapsulates norms and, thus it supports the structures of signification, domination, and legitimation (Walsham, 1993). Therefore, in theory, Symsys supports the structure of signification since it provides project flow templates, delivers information in a certain format, and suggests possible interpretations of the information.

Symsys supports the structures of domination since it is built on the assumption of the centralized control and coordination of projects. Thus, the system design is project-centered, where all processes and flows are related to the project number. While Symsys has an inbuilt quality control option under which the key indicators are tracked, it certainly facilitates centralized control by the general management, when filling in one request allows the manager to get the entire information about project status, progress, and finance.

Finally, Symsys supports the structure of legitimation since it defines standards, norms, and legitimate behaviors. In the quotation below, the company's general manager suggests that one of the reasons for Symsys's implementation was that it is standard for the field and these standards cannot be bypassed or overruled:

> *Symsys is the only system that allows for combining the media buying function with the ordering. It is a system that is used in the media area. The newspapers say that you can only send us your ads in the "Symsys" format that means we have to follow.{KR}*

Internally, Symsys defines how the project must be executed, explicitly identifying legitimate acts and behaviors. By providing the quality check criteria, Symsys incorporates the company's sets of norms and concepts of success, effectiveness, and efficiency.

The previous discussion demonstrates how the institutional structure of REKLAME is translated into the functionalities of Symsys. Although the replication and the fit between the structural properties of the organization and the structural properties of technology are important, the actual appropriation of the technology features by the human agents becomes of primary concern.

The backward loop in Figure 28 illustrates the idea of appropriation. The human agents, confronted with the set of structural features of the technology, have a freedom in choosing the exact appropriation mode and can always act otherwise and thus reject the technology-structure actively or ignore it. The process of appropriation either reaffirms the underlying social structures or alters them. In the subsequent section, we examine the process of appropriation using the framework of AST. The summary of the appropriation analysis is presented in Table 46.

Symsys, being an enterprise resource planning system particularly designed for the media and advertising agencies, can be described as relatively restrictive in terms of possible behaviors. The work is defined in terms of projects and processes, where the sequence of steps, the actual acts within each step, the parties involved, and the actual information and

communication flows are strictly defined. Moreover, it is certainly a system with a high degree of comprehensiveness, since it provides a large number of complimentary features.

Among the reasons for the system implementation, increasing the efficiency of the internal processes and improving the relationships with the suppliers and clients were crucial. Although REKLAME is an advertising agency, implying that the ultimate success depends on creativity, a certain formality is desirable. The implementation of Symsys aimed to change the atmosphere of anarchy and impose the elements of formal organization, structure, and regularity. The use of Symsys implies that all operations are predefined and well communicated. Moreover, the idea of efficiency became central. Efficiency was expressed in terms of time-savings, the increased transparency of the work processes, and the increased reusability of information and solutions. Together, the structural features and the spirit of Symsys, suggest that it promotes structured, formalized work processes. Correspondingly, the users are expected to follow the predefined paths and express compliance with the ideas and processes underlying the system design. Moreover, the prescriptive nature of Symsys leaves very limited space for deviations and choosing alternative work processes. The choice of the end user is limited to two extreme options, to use it as prescribed or not to use it at all, since a low level of interpretive flexibility characterizes the system.

As a result, the dominant strategy of appropriation was an explicit or implicit rejection of the inbuilt structures (see Table 46). Rejection, an explicit refusal to use the structure, combination; the grouping of the Symsys-based structure with another structure in a way contradicting the spirit of the technology and its intended instrumental use, and negation, the active rejection of the structure; all these represent the forms of explicit rejection of appropriating the structure. Contrasting, in other words, explaining the difference between the structure within Symsys and the structures utilized prior to the system utilization is a form of implicit rejection also. Second, we qualified the appropriation as unfaithful since it contradicted the spirit of a technology that was defined earlier as oriented towards formalism and centralization. The latent conflict between the spirit of Symsys and the atmosphere within REKLAME, where informality, lack of standards and internal regulations, and orientation towards creativity has been emphasized, leads to unfaithful appropriation and active resistance of end-users towards system-imposed and system-dictated changes.

Third, most of the structures have been used in a way differently from how they were intended. For instance, storing all project-related information in the Excel shits and than putting the same information into Symsys is inconsistent with the spirit of the technology and, at the same time, does not coincide with its preset instrumental use.

Fourth, the negative attitude towards the system in general and, as a result, the active resistance of end users, has been already listed among the significant obstacles to the successful system implementation. Two drivers of the negative attitude towards Symsys, i.e. insufficient system-related knowledge and overall lack of technology-related skills and the user's attitude towards the value of the technology and the significance of any expected benefits as compared to the expected costs, have been listed earlier.

Finally, evidence of the direct appropriation of the technology feature was observed only within the Retail Media business unit (Table 46). The employees explicitly referred to the system functionalities. At the same time, they emphasized that they used only a small fraction of the existing functionalities. The direct appropriation that complies with the spirit of technology and is in line with its intended instrumental use was observed only within the Retail Media because of the strong external drivers and prescriptive standards for the processes, information, and communication flows.

Actively rejecting the technology features, the end-users alter the underlying social structures (Figure 28). Thus, the attempts of the general management of REKLAMER to structure the internal interactions by organizing and centralizing information flows, implementing the system of standard operating procedures, and shifting towards structured, formal communication were strongly challenged. The lack of consensus and often conflicting ideas about internal issues such as the effectiveness of information and communication were observed. In particular, while the general management assigned a high importance to internal matters and expected significant savings and increases in effectiveness, the majority of employees did not share this belief. Therefore, in rejecting the technology features the employees altered the underlying social structures of signification, domination, and legitimation. At the moment of the study, facing the strongly negative attitude of employees towards the system and a dramatic lack of faithful appropriation of its inbuilt functionalities, the management was forced to hire an external consultant to customize the system and reduce the gap between the existing and the system-based business processes. In this way, under the pressure of the end-users' resistance, the structures of signification and legitimation were altered.

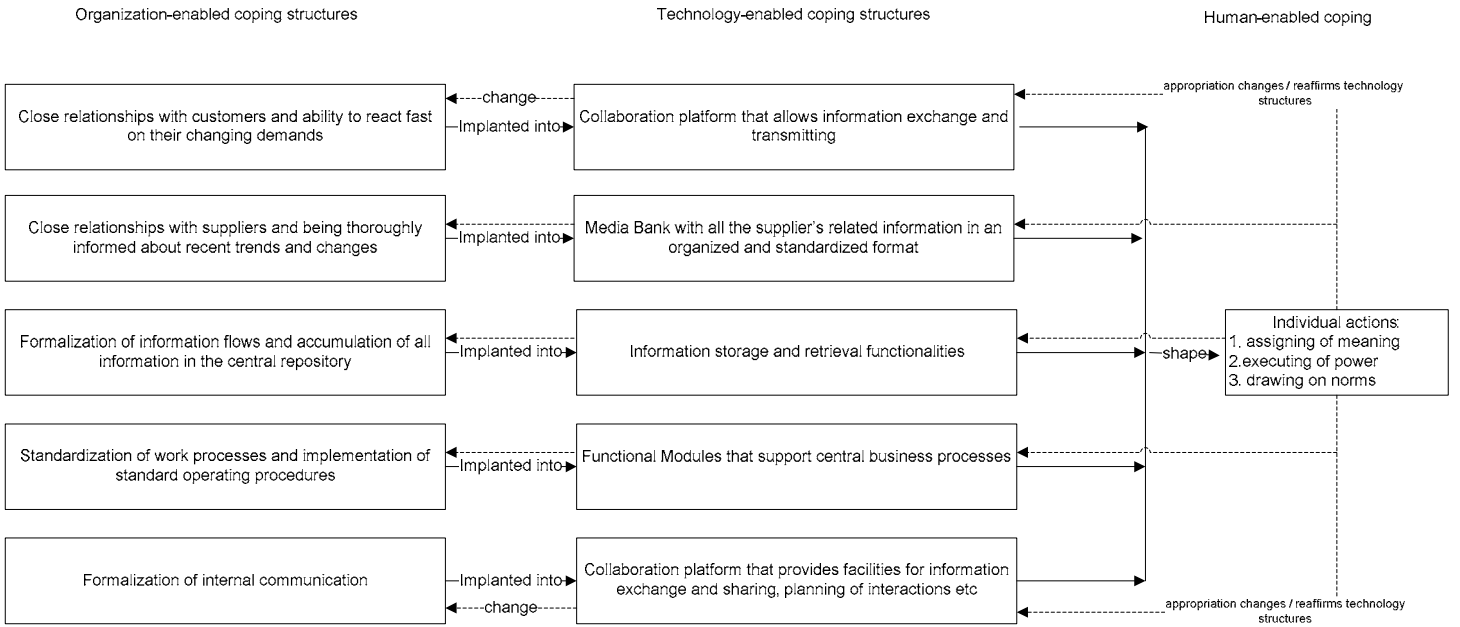


Figure 28. Human coping with information overload: the model of structuration, REKLAME

Description of structure	*Appropriation move*	*Type of appropriation*	*Instrumental use*	*Attitude towards structure*	*Empirical evidence*
Use of Excel for financial reports instead of using similar features of Symsys; Use of Outlook to maintain correspondence with clients and suppliers instead of using the collaborative platform within SS.	**Rejecting** and **substitution:** active rejection of the structures inbuilt in Symsys and use of alternative structures instead	Unfaithful appropriation since the spirit of the technology is violated	Unintended instrumental use	Negative, since the end-users are both not confident with the system use and they do not acknowledge the value of technology	*The structure of Symsys is not very good so we have to make much of reports in Excel. {HG}*
Doing budgeting first in Excel and than putting the same budget into Symsys to make it accessible for the Administration and General Management Units.	**Combination:** use of structures in Symsys in combination with the other structures	Unfaithful appropriation since the structures are redundant	Unintended instrumental use	Negative attitude resulted from lack of skills and system-related knowledge and is reinforced by the duplication of efforts	*We use Excel to make the nice sheets and customer's reports. We of course can print the report from SS but it is hard to understand it. It looks just like a block of letters and numbers. {RL}* *All people work with Excel now. So first they put everything in Excel and than translate it all into Symsys. Most of the work is done two times{HG}*

Comparison of the Symsys – based way of working with the previous working procedures to demonstrate the discrepancy between two.	**Contrasting** – expressing the structure in terms of "what it is not or what it cannot do" and illustrating it with the contrasting structure	Unfaithful appropriation	Intended instrumental use	Negative attitude since difference between structures in Symsys and previously existing structures is significant	*You have to work with Symsys to really get used to it because it is so different from what we are used to. It needs to integrate in the way you work. {RR}* *All people have their own files, directories; they maintain lots of information in their own way. You spend so much time gathering information at you PC. And it's hard to change because people claim that the system is not user-friendly.*
Using of 10-20% of all functionalities available, claiming that the application is difficult, has poor interface and certain flaws in logic	**Negation**: explicit and implicit rejection of appropriation	Unfaithful appropriation	Unintended instrumental use	Negative	*The structure of Symsys is not very good: that is why it is not used properly. {HG}* *It's a difficult program. It's not logical either. When you fill in the information for a project number you've said "6 hours for this", "6 hours for that" – and you put it in one screen; than you go to another screen and repeat all the same thing again. And you think "why am I doing all this twice?"*

Description of how the structure is used to process the customer's orders	**Direct appropriation:** explicit use and reference to the structure	Faithful appropriation	Intended instrumental use	Positive attitude towards the structure	*In Sysmys there is a module which is called Media Execution. There you can fill in the order; you get the prices of the newspapers. So everything you might need to make an order is there. Also there is a Media Bank, a different module of Symsys, where you can do the media planning for the customer. To make the reports we use the Excel.*

Table 46. *Appropriation of technology-enabled coping functionalities*

6.4.5 Human coping: concluding remarks

At the beginning of the section, we identified human-enabled, technology-enabled, and organization-enabled coping. We have suggested that each individual uses a combination of personal routines to reduce the information–communication strain, either by reducing the load or increasing the processing capacity. In line with the structuration theory, we have suggested that all routines in one way or another support the social structures of signification, legitimation, and domination. We used the example of a selective approach to the incoming information and demonstrated how the individuals decide which information pieces to process and which to neglect, drawing on structures of signification, domination, and legitimation. Next, to define the technology-enabled coping we have listed several technology features. Here we have focused on Symsys, the enterprise application, since it was mostly associated with information overload. Similarly, the organization-enabled coping was defined through the particular structures.

As was expected, to cope with information overload a individual utilizes the complex combination of human-enabled, technology-enabled, and organization-enabled coping. To explain how the three types of coping are linked the model of structuration has been proposed. We have demonstrated how the organizational structures are related to the technology features. In particular, we suggested, for instance, that the close relationship with the client is supported by the Symsys collaboration platform, where the parties involved can produce, exchange, store, and retrieve the transaction information. The organizational initiative to formalize the internal information exchange is related to the Symsys general information management capacities, which allow for accumulating all information in the central depository in a standardized format, making it easily accessible to everyone. Under such a perspective, technology is considered as a collection of interpretive schemes, of coordination and control facilities, and as the depository of norm and legitimate behaviors. The individual is confronted with a set of structures that are embodied in the technology. By appropriating these structures, the individual either reaffirms the existing social order or alters and initiates the change process. We have analyzed the process of appropriation and demonstrated that most appropriation moves reject the underlying structures, either directly or indirectly. Moreover, the appropriation is unfaithful, in other words conflicting with the spirit of the technology, and contradictory to its intended instrumental use. The overall negative attitude towards system frames the process of appropriation. For instance, we have demonstrated that individuals actively reject the project management strategy prescribed by

Symsys and, in so doing, challenge the initiative of the general management to implement standard operating procedures and uniform, structured information exchange among the parties involved in the project.

Based on the results of our data analysis we have concluded that information overload is primarily addressed at the level of the individual. The technology-enabled and organization-enabled coping structures are neglected and actively rejected by the individuals.

6.5 Information overload and human coping: an integrated perspective {KR}

In the same way in which we have put two perspectives together in the case of ING, we develop an integrated approach to information overload and human coping here. Again, we present two individual profiles, KR and LS's profiles, that delineate the structure of information overload and link it to the discourse and findings on human coping. The discussion is structured in terms of sequences represented graphically (Figure 29 and Figure 30).

Sequence I depicts how the characteristics of the broad organizational context establish the information overload at the individual level. Thus, in balancing between the creativity and discipline, the creativity is often favored at the cost of discipline. Moreover, the historically informal nature of the organizational culture rests on the principles of loose formalism. Taken together, the creativity and informal nature of all organizational processes produce a lack of discipline, which is particularly transparent in the area of information management. Naturally, the integration of Symsys into daily practices causes additional costs, such as time and effort necessary to gain the proficiency in system use, time and effort necessary to convert all information into the Sysmsys format and to fill in the system, and the discipline to deposit the information in Symsys regularly so as to guarantee its continuity and high quality of output. Although the use of the system is desirable and is promoted by the general management of REKLAME, it is not a "must", with no mechanisms available to enforce its utilization. The analysis of appropriation has demonstrated that it can be characterized as unfaithful, conflicting with its intended instrumental use. Instead of being treated as a productivity tool Sysmys was perceived as the additional responsibility. Therefore, the implementation of Sysmys not only has not resolved the information management challenges, but also deepened the existing burdens. In particular, the information fuzz, the term suggested by KR to describe the current state of information management, was only escalated after the system implementation. By actively rejecting the system, the employees indicated their attitude to the broad organizational information management initiatives promoted by the general management at the moment of the study. Unsurprisingly, the failure of both organization-enabled coping and associated technology-enabled coping placed additional strains on the individual. KR explicitly indicated that the information within Symsys is fragmented, delayed, and non-structured.

Sequence II demonstrates how the type of organizational structures can be linked to information overload at the individual level. The organizational structure of REKLAME is rather flat. There is always a need for control and interference when a non-standard situation, a situation falling at the margin of individual experience, emerges. At the same time, the flat organizational structure with no social or hierarchy barriers and no formal description of the responsibilities makes the upward delegation of responsibilities effortless. As a result, many trivial issues that could be solved at the lower level end up on the desk of General Manager. From one perspective, this leads to the increased amount of information that KR has to process and the increased number of follow-up acts that must be executed to resolve the issue. In this way, the component complexity is shifted up. From another perspective, by imposing additional demands on KR's time, it raises the complexity of the timing and sequencing of acts and thus affects the coordinative complexity. Given that the management initiatives to formalize the work processes and information-communication flows failed to a large extent, human-enabled coping remains primary in addressing information overload. As a result, the information overload goes up.

Sequence III

Similar to the case of HL, the ING managing director, the superior position of KR in the formal hierarchy imposes certain demands on the breadth of knowledge. As discussed earlier in the section, the critical issues from all business units accumulate on his desk. To provide assistance, a significant breadth and depth of knowledge is required in the areas of advertising, marketing, and commercial performance. To achieve this non-trivial goal KR is constantly searching for new information, reading professional newspapers and magazines, visiting web-sources, attending specific events, collecting printed reports and White Papers. As a result, the quantity of information he needs to process is constantly increasing, shifting up the component and dynamic complexity. His decision-making style based on the principles of selectiveness and the orientation towards action mitigates some of the negative consequences of ever-increasing information overload.

Within **Sequence IV,** we outline the drivers of coordinative complexity and demonstrate that as coordinative complexity goes up information overload also increases. Again, strong similarities are observed with the case of HL, the managing director of ING. In particular, the coordinative complexity originates from two major sources. First, KR needs to coordinate his own interactions, which imposes conflicting demands on his time and attention. Second, being a general manager, he is responsible for orchestrating all internal business processes and ongoing interactions. Regarding the latter, the employees themselves

handle most of the decision-making responsibilities and, indeed, there is no need to explain to the designer what must be done in terms of the ad design, so a considerable control over the work resides at the lower levels of hierarchy. Direct supervision is resisted as infringements on professional autonomy. Nonetheless, no matter how knowledgeable and skilful the employees are, the problem of overall coordination and control still remains.

6.6 Information overload and human coping: an integrated perspective {LS}

Sequence I depicts how high external and internal communication requirements are eventually translated into information overload. LS uses email extensively for communicating with clients. She claims that most of the routine work with the client is done through email. The accomplishment of project goals implies constant interactions between the project group of the advertising agency and the client. The number of interactions per day is not restricted, making the communication strain for both parties extremely high. Obviously, email itself is not the core of the problem of information overload, but rather the emerging patterns of its use. Thus, the large number of emails and length of each email together produce an email flood. No evidence of use of technology filtering structures has been found. To be able to process all emails she prints them all, explicitly acknowledging that by doing so she literally doubles the amount of information. As a result, the component complexity increases, causing a rise in information overload.

Sequence II is the same as in the profile of KR, revealing how the creativity–discipline tradeoff leads to information overload.

Finally, in **Sequence III** we describe what the factors that contribute to the coordinative complexity are. LS has continuously emphasized that much of her workload and information-communication load comes from the large number of projects running simultaneously. Importantly, LS clearly indicated that the project deadlines establish complex time constraints that cannot be shifted or neglected. Being a business unit manager implies that she holds the ultimate responsibility for coordinating the activities of personnel. For her personally it produces a high frequency, intensity, and overlap of activities. Moreover, LS, being one of the most experienced employees within REKLAME, holds the gate-keeping position under which she is engaged in non–stop interactions. All these factors have a cumulative effect on the coordinative complexity and contribute to information overload.

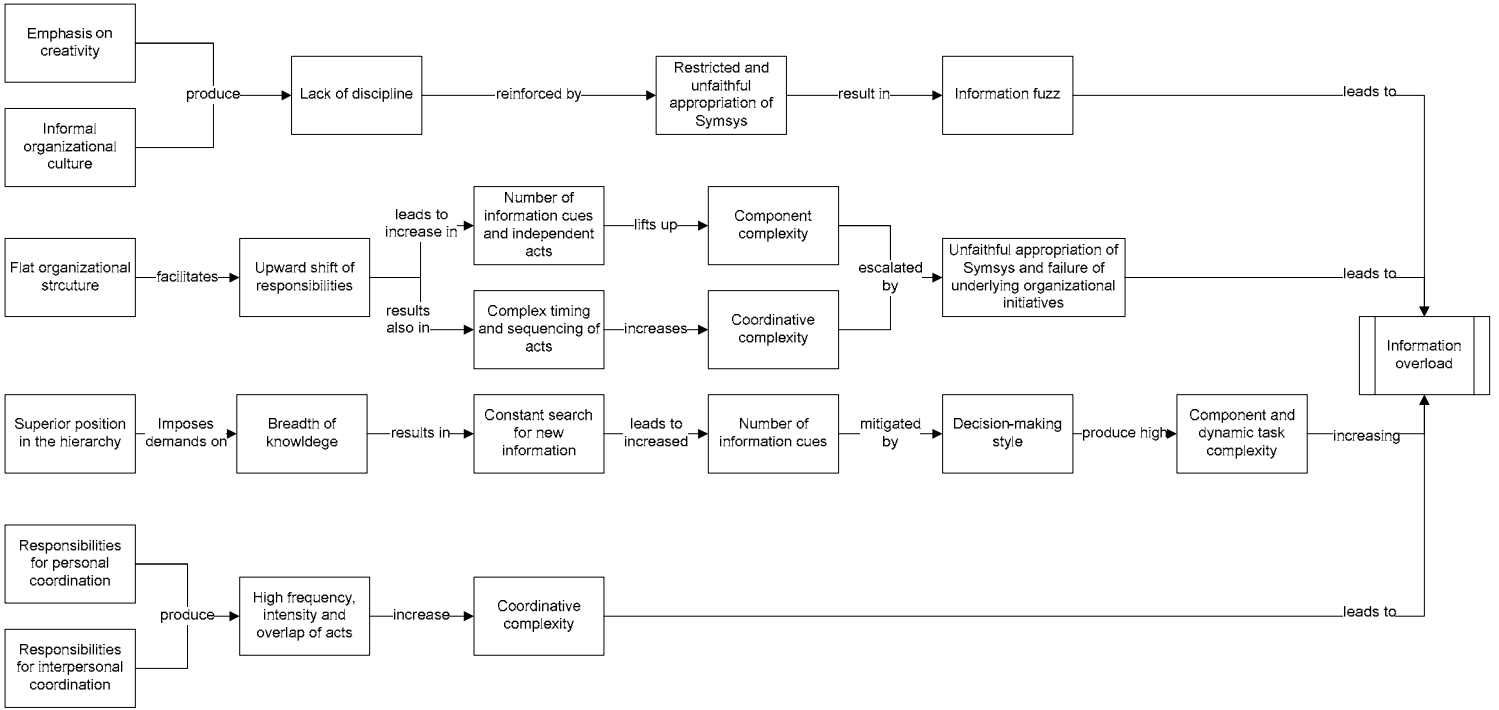


Figure 29. Individual profile: KR

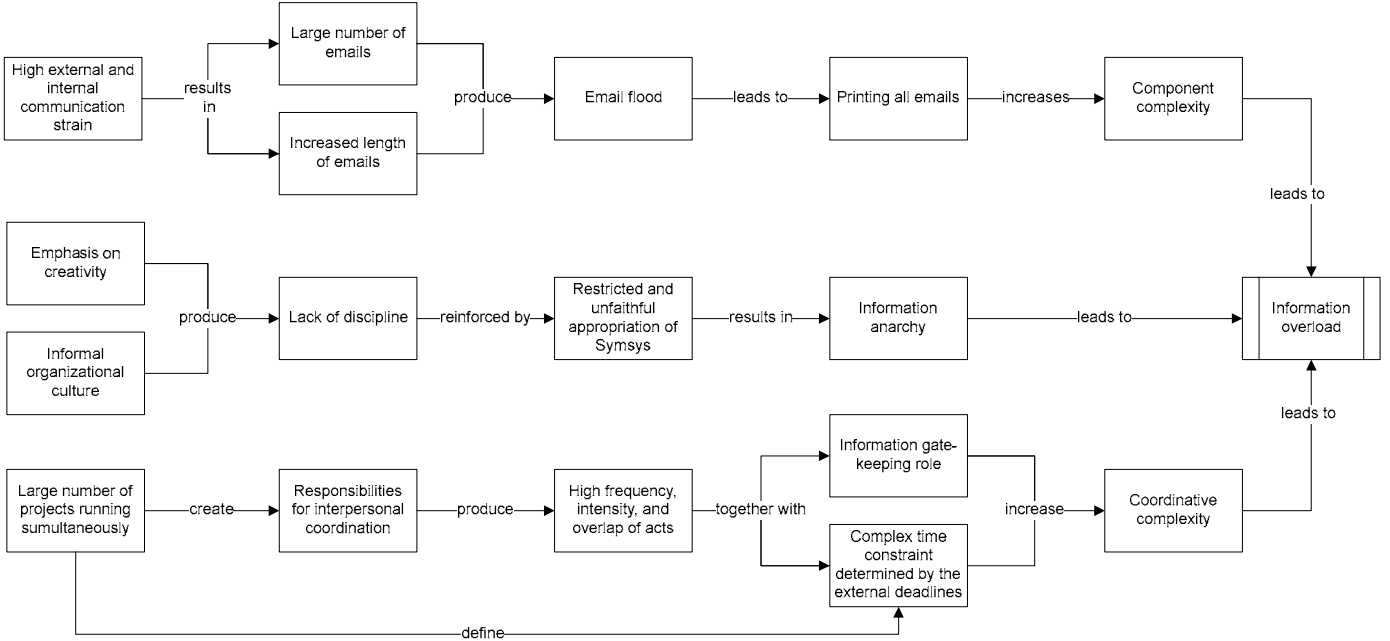


Figure 30. Individual profile: LS

Chapter 7 Case Study III

In this chapter, we present the case of SoftCom, a global IT solutions company. We first discuss information overload as a context-contingent phenomenon and trace the effect of organizational structure, culture, the effectiveness of internal communication, and the technological platform on information overload. Next, we describe information overload as an individual level –contingency. In so doing, we present an individual profile that captures the task-related and human-related perspectives on information overload.

After this, we elaborate on human coping with the information overload. We use the structuration theory as an analytical devise that allows for the modeling of interactions. We suggest that the human-enabled, technology-enabled, and organization-enabled coping should be considered in constant interplay. In the concluding section, we suggest a synthesis of information overload and coping studies and present the case-specific findings.

7.1 Contextual perspective on information overload: SoftCom

7.1.1 Background information: SoftCom, NL, Industry, Distribution and Transport Division

SoftCom was established in 2002 as a result of a merger between the UK company Soft and the Dutch-UK company COM[9]. The merger was market and customer driven, and aimed at two major goals. First, significant cost cuttings and economies of scale were expected. In the market of wireless products, the consolidation of equally-sized players, Soft and COM, allowed them to increase market share and compete with leaders such as Nokia and Ericsson. Second, customers persistently indicated a preference towards collaborating with a few business partners who can provide full-scale IT support. After the merger, the competencies of the two companies were combined and the product offer was diversified, so the opportunities for cross-selling emerged.

At the moment of the study, SoftCom was positioned as a global IT solutions company with a UK-based headquarters. The company provides a wide range of information technology and business process solutions across various markets, such as energy and utilities, financial services, the public sector, telecommunications, and industry, distribution, and transport. The company has operations in 34 countries with the focus on the European market. It employs

[9] corporate website

around 20,000 people. Being listed among the top IT firms in Europe, SoftCom aims to enter the top group in the world by expanding its US market and operations. At the same time, the further integration and alignment of the cultural and operational differences is defined as a major internal challenge.

SoftCom, NL, the Industry, Distribution, and Transport Division (IDT) hosted this study. The Division provides a wide range of IT services and solutions for industrial clients such as, for instance, Dutch Railways (NS), Postal Service (TPG Post), Philips, Unilever, DHL, and Heineken.

7.1.2 Organizational structure and management: Industry, Distribution, and Transport Division

At the moment of the study, the organizational structure was undergoing various changes, driven by both the merger and the market. In general, it inherited elements of the structures of Soft and COM, though with a greater emphasis on the centralization of power and knowledge and the unification of all internal processes and flows.

As such, the **vertical structure** of the division is rather formal and is represented by a four-level hierarchy (see Figure 31). At the highest level, SoftCom NL has five divisions, i.e. Energy & Utilities, Financial Services, Industry, Distribution & Transport, Public Sector, and Telecommunications. All operate in different markets and address the needs of different customers.

Interestingly, the organizational structure of the divisions differs significantly, partly due to the differences in the underlying business processes but, more importantly, because the reorganization initiative has not been finalized yet. Although the unification and standardization of structures, roles, and processes across markets and product lines has been promoted by the company's management, a mismatch in the organizational structure and managerial roles has produced uncertainties in communication and information and knowledge sharing. The quotation below is illustrative:

> *Divisions have different organizational structures. I find it hard to believe that it is of any good to have such freedom. When you are talking to the managers from the Utility Division, they have different roles. For instance, they have field managers; in our division, we do not have them. It produces numerous uncertainties in setting up the function house. {RR}*

The IDT Division is organized as an assembly of functional areas such as sales, project delivery, and competences. The sales process is either project-based, when a solution

portfolio is offered to a client, or solution-based, when a particular solution is sold. Within the delivery and the competence area, the man-hours business model prevails.

The competence function is the largest within the division and is represented by a number of business units (see Figure 31). The units on average are equal in size, employing around 100-150 technical specialists and consultants, and are headed by the director. A number of associate directors (on average three) perform daily operational and human management functions and report to the director. Together with the director, they form the management team. At the lower level, the team managers, whose managerial responsibilities overlap with the responsibilities of the associate directors to a certain extent, supervise consultants and technical personnel. The team managers report either to the associate directors or to the director.

Before the merger, all business units held significant decision-making power and were treated as separate, "small companies" that had profits and losses and were reasonably free in terms of operational moves. After the merger, significant power was shifted upward and the results of the Division (IDT) rather than the results of each unit separately have now become central. Both financial and administration functions have been centralized at the divisional level. Besides cost cutting, the increased efficiency of internal operation was aimed at. This argument is illustrated in the interview fragment below:

> *For instance, if there is a new technology we want to make sure that there is one business unit which is responsible for making it successful. In the old days [before the merger], you could be sure that there were 6 companies busy with the same technology. It's about wasting resources. If you see a lot of people busy with the same work, it is not effective. {RC}*

The reorganization and centralization also implied the redirection of information flows. A greater emphasis was placed on the efficiency of top-down information transmission and communication. At the same time, the changes in the organizational structure were not always accompanied by changes in the structure of information flows. As a result, an ambiguity of information flows and also information and knowledge losses happened often. One of the interviewees described the situation in the following way:

> *Before we used to have all information within the smaller companies, and there was always someone who knew how to handle it. Now you see that a lot of information and knowledge had moved and it is not clear where all these information went. {RC}*

Previously, the decisions about the organizational structure and the internal process were also accomplished at the level of the business units. As a result, the units were often using

different operation procedures and management structures. The merger intended to change this also. The quotation below illustrates the idea as follows:

> *[…] we had a lot of local rules, totally different from unit to unit. All these rules aimed to do the same, but in the special way. During the last two years [after the merger], more and more authority goes up, more and more decisions about marketing, customers are shifted to the higher level. Companies at the lower level are working as a part of the bigger organization {RC}*

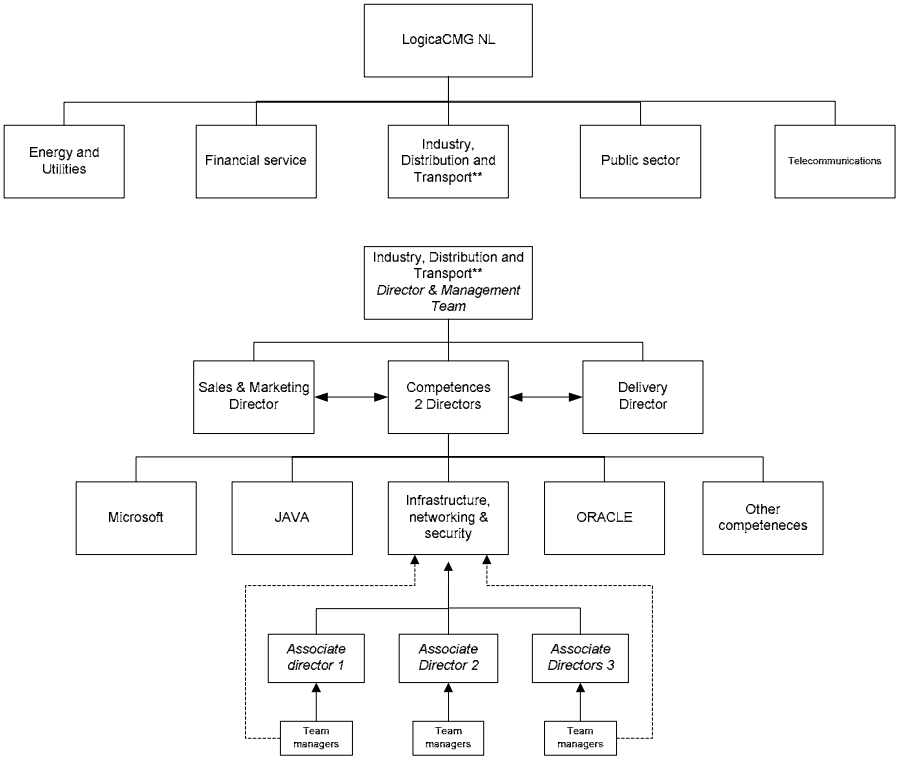


Figure 31. Organizational structure: vertical hierarchy, SoftCom, IDT Division

Despite the fact that Soft and COM were equal–sized companies, operating in similar markets, and providing similar types of services, the merger-driven changes in the organizational structure, business processes, and management are defined as significant. In the quotation below one of the competence directors suggests that besides the changes in the organizational structure a wide-scale reconsideration of the structure of information flows is necessary. He illustrates the current challenges with respect to these matters as follows:

> *The merger has changed our behavior. We are changing our way of working, we are changing our structure, we are changing the responsibilities – we need information to support these changes. We used to have business units who were responsible for everything. Now the business units need different and*

more information because profit and losses are at the Divisional level. The idea of a merger was to move more towards the specialized departments, which are not fulfilling every task. So we are not profit / loss units any more, rather we are units with specialized tasks. Therefore, we need new information systems. For us it is struggle to determine what kind of information needs we have, for the financial department is very hard to provide us with this information. {DS}

The **horizontal structure** is not defined formally but rather is grounded and driven by personal networks. From one perspective, the diversity of competences does not imply intensive cooperation among the business units within the Division. The cooperation between similar competence units across the divisions, when the solutions, knowledge, and experience are shared and reused, is also rare.

From another perspective, consultants often combine their competence roles with account management, sales, and delivery roles. All these roles entail working with clients and, as a result, intensive cross-unit cooperation at the interpersonal level aimed at the increased satisfaction of the customer. The basic principle of working with clients states that the account team should be stable. Therefore, consultants perform the roles that go beyond the competence, delivery, or sales only. For instance, one of the interviewees, RS, besides being the JAVA business unit director, is involved in the Heineken account management team. While within the former role he performs general management functions, under the latter role he is actively engaged in the sales and delivery of a wide range of SoftCom solutions. Therefore, he is involved in intensive interactions with his colleagues, who are the part of the account team and come from different business units. These interactions are essentially non-formal and are organized and coordinated on an on-demand, real time basis. The interviewees continuously emphasized that the extended social network is necessary for fulfilling daily responsibilities.

Besides providing undisputable advantages, combining of roles often leads to stretching managers in opposite directions, imposing conflicting demands on their time and attention. In the quotation below the interviewee compares having two responsibilities with having two heads, and depicts the downside of it:

Our organization model sometimes makes it quite difficult because my competence boss says that I should spend more time on competence and my account boss says that I should spend more time on Unilever. I am just stating at the beginning of the year that my intention is to spend 20% on Unilever and 80% on competence. Many people have two heads within this company.{RVR}

In all, the horizontal structure resembles a highly connected network. The number of connections, their direction, and strength vary. It is not codified or described in the organizational regulations or procedures.

Summarizing, the formal structure of IDT Division belongs to the mechanistic types of structures. The vertical structure is a four-level hierarchy with a strong emphasis on centralization of power, responsibility, and information flows. Initiatives to overcome the structural and management differences between the units have been undertaken. A uniform, standard structure within all organizational entities has been targeted at.

Since the objectives and major processes are different for the Sales & Marketing, Delivery or Competences units, formal links between business units are absent. At the same time, the informal interactions are frequent due to the fact that many managers have combined roles. Personal networks determine the actual patterns of interaction, such as their direction, frequency, and intensity.

7.1.3 Organizational information processing: the symbolic nature

Similar to all internal processes, the corporate culture has not stayed the same after the merger. Although both COM and Soft were IT services companies that operated in similar markets and provided similar services, there were major differences in terms of structure, the ways of working, and the internal culture. While the structural and process differences have been resolved to a large extent, the cultural differences between the former COM and former Soft are still significant. In Table 47, we have summarized the differences between the cultures within COM and SoftCom.

In general, the culture of SoftCom inherited the spirit of formalism from Soft. This formality revealed itself through the introduction of new hierarchy, built on the principles of layers and subordination, the shift from a human-centered to a result-centered approach, the centralization of power and responsibility, the imposition of a new, meticulous reporting structure, and the emphasis on compliance with standards and standard operating procedures.

COM Culture	*SoftCom Culture*
The main emphasis is on people	The main emphasis is on financial results Tough attitude to employees
Although formal, easy to communicate and "talk" to boss	Formal; the hierarchical barriers have been introduced
Open culture where all decisions can be discussed and negotiated	Closed culture where decisions are more prescriptive with no room for discussion
Reporting on "general" picture and leaving the control over details at the lower level	Detailed reporting, increased number of obligatory reports
Being aware of rules and standard operating procedures but at the same time being reasonably free to act otherwise if this complies with the company's objectives	More emphasis on standard operating procedures and promoting discipline in using them
Decision power is located at the low levels	Decision power is centralized and is UK-based
Dutch-dominated working environment	English and Dutch have equal stakes in the company in terms of number of people employed. The major decisions come from the UK, and are often perceived by the Dutch employees as enforcement.

Table 47. *Cultural differences: Soft versus COM*

As a result, as many respondent suggested, though the nature of the work has not changed, the way of working has been altered significantly. Moreover, since most initiatives come from the UK, the Dutch employees perceive this as a forceful imposition of new, "British" orders and neglecting the "Dutch" part of it. For instance, the increased number of reports is qualified as somewhat unnecessary by Dutch employees. Similarly, making the procedures obligatory and actively enforcing them contradicts the Dutch spirit of working. In the quotation below, DV explains the typical attitude to rules, and speculates on its Dutch nature:

> *I do not believe in rules, rules are broken; they are not followed in this company. We are just Dutch. We do not accept the rules, we do not accept the authority, and we think we are smart enough. We only accept the rules in the format of practical solutions that have direct benefits and demonstrate that things can be better. If you want to change something in this company, it needs to be practical. It won't work only because the boss says you have to do it like this. Everybody says yes, and no one is following it. We have a lot of rules and regulations and I think we are acting according to them but we are not following the rules. Lot of guidelines: we are trying to use the rules a bit more visibly. I think that 99. 9 % of the population will not know exactly the rules but will act 90% according the rules. It is a much higher score than if you make it obligatory. {DV}*

The attitude to information and knowledge sharing is particularly important for the information overload study. Although the ultimate success of the company depends on the

efficient re-use of existing knowledge and expertise, the tradition of knowledge and information sharing within SoftCom is underdeveloped.

The efficiency of knowledge sharing is defined by the quality of the enabling technological platform, the procedures and regulations that define the terms of exchange, and a wide range of social factors, such as corporate culture, attitude, and the presence of a stimulus to engage in knowledge sharing. SoftCom, being a leading IT solutions company, possesses an extensive expertise in the area of enterprise content management (ECM) and has an impressive history of successful ECM implementations. At the same time, within SoftCom the area of knowledge management is one of the most critical and underinvested in. The Director of the ECM competence suggests the following metaphor to describe "the state of the art":

> *As we say, the children of the shoe seller always have bad shoes, and the children of the doctor do not have the best treatment. We are IT people, we help our customers with IT, but our internal knowledge management is not very good. I can earn more money with my people helping customers than helping the internal organization. {AB}*

Regarding the quality of technology, as SoftCom becomes more and more international with affiliates in a large number of countries and supporting clients all over the globe, the need to shift from the local to global IT platforms becomes genuine. Storing knowledge and information in compatible standards promotes and stimulates the sharing of information. At the moment of the study, SoftCom was changing the enterprise content management platform. There were several pilot projects; however, the final decision towards a particular IT solution had not yet been accomplished. Again, the comments of AB, the ECM competence director, are helpful:

> *We, within COM, had a system for that [information sharing], in Soft, they had nothing. There is now a lot of discussion going on about what are we going to use. The old COM units still have their old Lifelink system, but the integrated divisions have virtually nothing. There are some pilot projects, there are some units who start to use something, but it is not a general chosen system at the moment. Some people are trying this and that. I think Sharepoint as it is, is not a good solution for SoftCom. It will not fulfill our demands. {AB}*

However, above all, not the technology but the lack of discipline or incentives to share information contribute to the loose culture of knowledge sharing within SoftCom. The Commercial Director, FK, who is responsible for an initiative which aims at increased quality system awareness and consists of measures that stimulate knowledge and information exchange comments on the current situation as follows:

> *The biggest challenge this company is facing is sharing information. I know that we have a lot of clever people at this company but there is no attitude to share information. It's only culture. Our business management system clearly defines project close, where in the project close all lessons learned have to be evaluated, written down uploaded. Standard templates are available etc. Somehow, it is not done, or if it is done, the information is not shared. This is not because people do not want to share this information but most of the time people think that their knowledge is not special enough to be shared. It is attitude. {FK}*

The loose attitude to knowledge sharing originates and is reinforced by the insufficient emphasis and lack of incentives to codify information and experience gained and to place it into the system. Since making information available to others neither affects a manager's performance indicators nor directly contributes to the project, the stimuli to do it are very low. Moreover, the high workload of managers, assigned to a new project two weeks before the previous project is closed, does not leave much space for the closure. In the quotation below, the interviewee describes the situations and reflects on the immediate outcomes:

> *We have the procedures, we have the tools, but we do not use them. Why we are not using then? I think the reason is that the guys who have done the project do not have incentives to write the information and store it so someone else can use it. They do not have the benefits of doing evaluation. They have knowledge, they have done the project, If they need to do it again, they know it. For them there is no incentive for storing it. Of course we have the procedures that say that when the project is finished it must be evaluated and stored. We have the tools. There is no one, REALLY no one, who stores information in the database when the project is finished. It is often that at the later stages we are looking for this information, and only because of your personal network you phone your friends, and following you own network you will, if you are lucky, find out, if you are not lucky you will need to reinvent the wheel. That happens quite often. If it is not in the tools, not in the procedures, that it must be culture.*

To summarize, all the research participants emphasized the urgent need for improvement in the area of enterprise knowledge management. Both the shortcomings in the existing technological platform and the attitude and lack of motivation were cited among the reasons. As a result, no, or very few, information and knowledge resources have been codified and stored for wide access. This inhibits the reuse of information and existing expertise and causes significant redundancies and "re-inventing the wheel". Naturally, solving the problem at the level of technology only could not change the situation. As FK suggests in the quotation below, changing the attitude of people and the culture of knowledge sharing must precede and dominate the process:

I was involved in a pilot project for a knowledge-based system that performed the matching of an engineer with a problem. The system was very rudimentary and was not performing well. However, when the information about the skills of engineers was in the system, the system could make a good decision. The problem being, get the right information into the system. It was the hell of a job to get the proper information into the system. So, the logic of the knowledge-based system was not a problem, getting the right information was an issue. As SoftCom is not that very good in putting information into a system, the implementation of KBS is beyond our interest. We are not there yet. Let's put the information into systems first, lets people start using this information, and only if you are there and people start trusting this information, you are ready to go the next step {FK}.

7.1.4 Internal communication

In the previous section, we have outlined the characteristics of the organizational structure and focused on a number of features of organizational culture particularly relevant for the information overload discourse. In the section below, we discuss the effect of internal communication on information overload.

Directions of communications

As mentioned briefly in the previous section the importance of the vertical communication, in particular bottom–up, has been emphasized as resulting from the merger. Besides the formal, structured communication procedures, most of communication between superiors and subordinates has been done informally.

Formal communication included the regular meeting of the management team members (once per week), the face-to-face meetings of the associate director and the consultants (once in six weeks), and the monthly meeting of the entire business unit (once per month). Above all, the purpose of these meetings is to ensure that sufficient and correct information is communicated upward. Information is comprised of commercial and competence–related issues, as well as personal and human management issue. The structure of formal communication is the same across business units.

Informal communication between managers and consultants, or in other words, communication in "walking in" mode, is credited with more value and often referred to as the most efficient. The critical, urgent daily issues are handled in the course of such communication. Importantly, this communication is bi-directional; both top-down, and bottom-up reflecting the recursive interplay between information demand and supply.

Style of communication

Communication style is characterized as informal. Most of the interviewees defined the company as people-networking, when informal, face-to-face conversations prevail. Although many indicated that communication is easy and no social or structural barriers are present, at the moment of the study, some changes in terms of communication style were observed. Resulting from the merger, the culture gained some elements of formality expressed in the increased number of reports to fill in and the formalization of the top-down communication. The communication with one's immediate superior was still perceived as easy. The associate directors and directors share the working space with their subordinates and are not "protected by the secretaries", as one manager puts it. At the same time, contacting the managers from the higher levels of the hierarchy became difficult and unwelcome. The quotation below are used to illustrate the changes:

> *We used to have very open, easy to communicate culture that is changing a little bit with the merger. But it is still quite open and informal. Open culture is better for our work. {DS}*

> *Things are changing. I have never spoken to Martin Read [SoftCom chief executive]. I am not sure I understand his directives, beliefs, or whatsoever. It is very normal for large companies, I am not complaining. There is a point of tension. Based on the size of the company and the layered management structure, you have the information flows from top to bottom and from bottom to top. Each layer introduces noise. It is a common problem and I do not know how to solve it. {FK}*

Communication channels

Face-to -face, telephone, and electronic mail are primary communication channels within SoftCom. Face-to-face and telephone are used most intensively. Utilizing rich media for communication with colleagues and clients is perceived as a part of corporate culture. Calling and talking is promoted by the management and is described as the dominant way of communication, information transmission, and acquisition.

The intensified use of the mobile phone has been associated with information overload. From one perspective, the mobile phone expands work-related opportunities greatly. It enables the "any time, anywhere communication", and, in so doing, secures the continuity of the work process. For instance, making telephone calls in the car on the way to the client site allows for a saving of the traveling hours, and thus provides tangible gains in effectiveness. Many

participants indicated that they do most of their telephone negotiations in the car. From another perspective, the use of the mobile phone blurs the border between work and leisure time and increases the interaction load significantly. In the fragment below the interviewee explains how the use of the mobile phone changes the way of working but, at the same time, affects other aspects of life and introduces new social constraints:

> *If I look at the channels there is of course the new channel, mobile phone, introduced in the last five years. Normally, you have the business time and private time, but I think the mobile phone has changed that. You can be reached anywhere and any time, so, actually, you are changing your business time and relaxation time. You are doing a lot more at home. However, at the same time, for example, on Saturday you can be reached by colleagues, and it is normal; also during holidays. Luckily, there is a button, which makes it quiet, so you can just decide to look at the telephone every hour and see how much voice mails do you have and who has been calling you. I think people use mobile phones because they can; it is not strictly necessary, I think. The emotional status of the person is that if you want to know something now and you do not have any means to do it, you train yourself to be patient and then you wait till the next day. If there is a means to do it, you use it. {FB}*

In the quotation, the use of the mobile phone is qualified as not always necessary but rather a matter of personal choice. The mobile phone, although an "aggressive" medium that increases the amount of personal interactions greatly, at the same time still provides facilities for imposing personal control and regulating one's own accessibility. By changing the mode of phone use, the person decides on how much information he wants to receive via this channel. While the choice to use the mobile and the way in which to use it is an individual choice, it is affected by the social and business context. The proliferation of the mobile phone makes it a communication standard that can neither be neglected nor changed. In the example above, FB explicitly indicates that although calling is not always exactly necessary, the fact that the majority of employees is doing so, makes it the normal, accepted communication practice. Interestingly, the ability to regulate one's own accessibility by changing the mode of mobile phone use is perceived as a way to cope with high interaction load. Electronic mail is used intensively both for internal and external communication. More than half of daily emails within SoftCom are sent internally. Besides providing significant benefits in terms of information transmission, in many cases electronic media are not the preferred communication channel. Therefore, the use of email for fulfilling daily responsibilities is controversial. The interviewees continuously emphasized the issue of inappropriate use of email. In Table 48 we present a summary of the analysis of electronic mail as the communication media, and outline the areas in which email is perceived as appropriate / not appropriate.

Electronic mail is appropriate for:	*Electronic mail is not appropriate for:*
Communicating the agreement achieved during the appointment, confirming the agreements Exchange of non-emotional, impersonal issues with no reaction required When the addressee is busy at the moment and cannot be reached otherwise Formal communication Sending attachments Answering brief, non-emotional questions	Sending email requests when action is required Handling the discussion among several parties Sending long letters / stories / long lists of questions Discussing urgent issues when the reaction time is critical

Table 48. *Electronic mail as the communication media: the analysis of its use*

In defining the appropriate way of using email, a high degree of agreement among interviewees has been observed. Most respondents agreed that email is appropriate when formal, non-emotional information that can be presented in a structured and brief way should be communicated. By contrast, personal issues that involve emotions and can be interpreted differently and even misinterpreted should be communicated through more rich media such as telephone or face-to-face. Moreover, email is good for distributing agreements or confirmations, while the process of negotiation should be handled otherwise. The fragment from the interview below illustrates this idea:

> *Email is not a medium for discussing things. I think email is a medium for exchanging non-emotional information and not for coming to an agreement with each other. So, if the email conversation goes on and on, why don't you call or why don't you meet because in one call you can finish it in 10 minutes but via the email you have a week of urgent emails. A lot of email discussions are going on with clients and I really experience it as a trap when you are becoming engaged in a very frequent email exchange with the client concerning some topic – you loose track of what you've said {DV}*

Next, electronic mail, an asynchronous communication medium, is not efficient for handling urgent issues. Even more, the excessive reliance on electronic mail can produce additional losses in efficiency. By sending the email, the person accomplishes certain goals and expects a reaction. At the same time, the person who receives this email is not aware of the content, the urgency, and the intention of the sender. He might decide to react later or not to read the incoming email at all. That is why a conflict between the expectations of the sender and the actual behavior of receiver happens often.

In all, similarly to the previous cases, the majority of research participants associate information overload with the use of electronic mail. Correspondingly, not only the number of incoming mails is treated as threatening but, more importantly, the inappropriate use of electronic mail as the communication media. Thus, for instance, using the email for handling

negotiations or reaching agreements not only shifts up the number of messages sent and received, but also leads to misunderstandings, corrective actions, and delayed decisions.

The multinational scope of SoftCOM implies that the development, delivery, and sales projects involve parties from different countries and regions where the traditional communication media prove to be insufficient. To overcome the traditional communication problems of global IT projects several competence units have started to use MSN as the central communication means. One of the competence business unit directors comments on the use of MSN as follows:

> *Email is a media when you do not need to react straight on. The phone is the same because you just let it ring, and MSN is like that you see if someone is available and at that moment you can skip the social nonsense part of the telephone. Everyone at MSN is quite used to get that part done, so you can go straight to the issue. Everyone within MS community is more or less in MSN. Some people are really used to it, and with those, you can communicate in a very quick manner and cheap manner. Also, it is quite quiet, because when everybody is talking on the phone it's becoming too noisy. It's a way to be quite productive. In another sense, when you do not want to talk about some subject on the open floor, you can communicate through MSN. We use it a lot to communicate with India. You can neglect email, by phone although we speak English, we can have communication problems because you do not see the expression. With MSN within the software environment, you can copy in all kinds of codes etc. We experience 15% more productive communication. {DVV}*

Besides being, cheap, fast, and straightforward, MSN presents plentiful opportunities, which are particularly valuable for the software development environment, such as copying and sending the fragments of code in a synchronous mode. Although providing significant cost savings and efficiency gains, MSN is still not treated as a company standard application. At the moment of the study, only one unit was using it as the main communication application and one more unit was in the process of launching.

Content of communication

As was suggested earlier (see Figure 31), the IDT division is sub-divided into three functional areas: sales, delivery, and competence. The communication flows replicate the formal structure of the division and the content of communication is either account, delivery project, or competence related. Since the same competences are present in all divisions, the competence–related communication is interdivisional.

For instance, around 800 consultants from different divisions within SoftCom NL deal with Microsoft products. To sustain the integrity and leverage the expertise, these consultants are

organized into a virtual community. Within this community all Microsoft–related information is disseminated, the relevant knowledge is stored, the news are posted. In so doing, the information is targeted towards the interested audience only and cross-divisional collaboration is facilitated.

An analogous initiative is present within the Java competence. In particular, the Java competence centre has been established. The relevant information is posted and accumulated for further use by the Java-consultants. Although exploited intensively within some competences, these initiatives are still rather local and non-structured. As a result, they are not supported at the level of the entire organization and, thus, still offer significant room for improvement:

> *The week after you sent something and ask did you read it, the answer most of the time is no. Therefore, you really want to create more or less a target group where you can be sure that they will read it and this information is interesting only for them, and at the same time you do not bother the other groups in the company which just see it as being spammed again. Currently it is not handled at all. That's the major problem I am facing from the MS alliance point of view. {DVV}*

The summary of the analysis of the internal communication is presented in Table 49. In all, the merger-driven changes in the internal communication resulted in increased formalism, particularly viable for the bottom-up communication. However, the rich communication media still dominate the process of communication. Interestingly, the research participants relate information load to the use of the mobile phone and email. The use of the mobile phone increases interaction load significantly and makes the boundary between working and non-working time negligible. The inappropriate use of email reinforces the email-enabled information overload.

Dimension of internal communication	*Components*	*Practices observed*
Directions of communication	Emphasis on the bottom–up communication	Intensive bottom-up communication, both formal and informal, has been observed. Various communication channels have been utilized accordingly.
Communication style	Informal	The informal style of the former COM acquired the elements of formalism after the merger. While communication with the immediate superior was still perceived as easy and unconstrained, the higher levels of the hierarchy became locked.
Communication channels	Face-to-face Telephone Email MSN	Rich media are preferred strictly for the internal communication. The use of mobile phone and email are strongly associated with information overload. The use of the mobile phone redefines the working and non-working time in favor of the former. Regarding the use of email, not only the number of emails is important but also the inappropriate use of email. MSN is used as a "corrective" communication media that allows for the increased efficiency of communications.
Content of communication	Account, delivery or competence - related	Local initiatives to build up practice communities have been observed. By targeting information, the efficiency of the communication is increased.

Table 49. *Internal communication: the summary of analysis*

7.1.5 Technological Platform

Technological platform: background information

Before proceeding with the discussion of the technological platform, two general remarks seem to be necessary. First, SoftCom is an IT solutions company. Most of the employees have qualifications in computer science or related fields. As a result, both the quality of the technological platform in general and the user's technical skills and proficiency are evaluated as high. Second, the IDT division is divided into three areas, Sales and Marketing, Delivery, and Competences. The business models differ across the areas. Thus, within Sales & Marketing the solution-based and project-based business models are utilized most, while within Competences the man-time-based modeling of processes prevails. As a result, the applications used differ also. Consequently, the technological platform consists of multiple applications with diverse or complimentary functionality.

First, **LARA**, the internal resourcing system, is the centralized database where all individual profiles are stored. The system allows for submitting a request where the requirements are specified and accomplishes matching between the requested and existing profiles. Although

the actual process of matching is done by humans, the functionality of LARA was evaluated as high.

Second, **Cortex**, the quality management system, is a collection of standard operating procedures that defines how the project should be run and what the reporting procedures are. It includes templates and standard documents and procedures. By making available all possible guidelines and templates the system is meant to assist the consultants in fulfilling the project-related responsibilities but, at the same, to facilitate the control over the project progress for the managers.

After the merger, the quality system has been changed several times. Finally, the decision to use Cortex as a standard company application was made. During the study, as mentioned earlier in the chapter, the Cortex awareness initiative was undertaken. Although Cortex was a quality management system of COM and thus its content, structure and processes were very familiar to the employees, the results of the merger had somewhat dreadful effects on the system use. The Commercial Director, responsible for the awareness project, describes the situation as follows:

> *Although the content of the quality management system is not that different people are more involved in understanding what was the impact of the merger on themselves, instead of concentrating on performing their work according to the quality system. So, the merger really had a negative impact on the quality awareness of our staff. Now people are more open to revival of the quality management. {FK}*

The quality awareness initiative was comprised of measures that aimed at changing the attitudes of users towards the system. Thus, all employees were divided into two target groups, such as managers and consultants. Changing the attitude of managers was considered central since they held the enforcement power and were responsible for the daily supervision and control over the work of consultants. To do this, business cases that demonstrated the benefits of the system use, such as reduced costs of the project, increased customer satisfaction, were developed and presented.

However, there has been observed a counterforce that undermined the success of the awareness program significantly. Among the other factors, the increased formalization of the company meant that additional control and formalization of reporting processes were imposed. Both the number of obligatory reports and the frequency of these reports went up. Thus, filling in the additional templates so as to put project closure into Cortex, not strictly necessary, has been often sacrificed. Moreover, the overemphasis on control rather than

information sharing contributed negatively to the users' attitudes towards system. One of the interviewees illustrated this as follows:

> *Now we have a lot of control reports. Of course, this information is also used for measuring how the project is doing and how we can use it in the next project so to improve it, but the main reason is not knowledge but control. {AB}*

As a result, Cortex has not been used. The quotes from the interviews are illustrative:

> *Of course we have the procedures that say that when the project is finished it must be evaluated and stored. We have a tool. There is no one, REALLY no one, who stores information in the database when the project is finished. {EM}*

> *No, I do not use Cortex, probably I should… But I do not use it. {BR}*

Third, the **Order Management Tool (OMT)** is an application that supports the sales process both along the product line and along accounts. It allows for tracking the existing sales projects, to see the dynamics of sales and the stage of the sales cycle at which the current project is. The application is used within the Sales & Marketing area.

Fourth, **MS Workspaces** is an application that is designed to enhance the collaboration and facilitate team working. In theory, it has the functionalities to connect people, information, and processes. It has been mentioned already earlier in the Chapter.

At the moment of the study, the company was in the process of transition from the LifeLink application towards the MS Workspaces. Although, the work is project-based and many projects imply interaction between the parties at various locations within the Netherlands and, more and more often, at distributed spots over the globe, the collaborative process is supported to a large extent by email only. Thus, the documents are shared in the asynchronous way and the collaboration process is discrete rather than continuous. In the quotation below the typical collaboration process is described as follows:

> *I think most collaboration is done by email and sending the documents to each other. Let's say, I do Chapter 1, you do Chapter 2, and tomorrow we are sending each other the chapters to make one document. The real collaboration, when you really have the team working together, is not here at the moment. {AB}*

Fourth, **Intranet**, the internal corporate network, is designed to integrate the dispersed processes, flows, and systems, and to constitute the generic information environment of the company. The basic idea of Intranet is to create on-line, easy to access, and easy to search repositories of information that can be used by employees in performing their daily activities.

Again, at the moment of the study, the transition from the “old” to the “new” Intranet was in process. The use of the Intranet and its’ quality was criticized heavily by the research participants. In Table 50, we evaluate the Intranet using four criteria, i.e. structure of information, search, quality of information, and the content update and maintenance.

Quantity of information	*There is very much information in it {RVR}.*
Structure of information	*It is not always possible to find information needed because the structure is not perfect, because the search engine does not cover the whole Intranet {DS}.* *Intranet is not so good, structure wise {DVV}.* *The structure of Intranet within SoftCom is awful; it is difficult to find information. If you know where to look then it's easy. Information is very valuable, but there is no clear structure. {FK}*
Search	*Most of the time the information is there, in the Intranet, but it is difficult to find it. For instance, I have a consultant in my team who has been transferred to my team some years ago, before he was working at some other jobs, nice guy, junior, starting as a professional. Some years ago he got a warning, written down as a letter, signed by the manager. This warning is still in his profile, I was trying to find what is our policy regarding this. I though that I should remove the warning from his file: then you are going to the Intranet to look at the policy. It's a simple question, you can spend more than 1 hour just looking for it. And I have more examples. {RC}* *I never use the Intranet. I just do not use it. I cannot find anything in it. For instance, I wanted the latest English version of the contracts for assigning people to the client's sites. So, getting it, if you do not know the exact location, by using the search engine, is very difficult. I know it should be there, because in one of the communication emails they told that it is there but… I am not going to use it. {DV}*
Quality of information	*We were asked [to put information into the Intranet] in a logical but not in the standardized way. We were just asked to put it in the way we think is logical. And in that way, it's difficult to find the things in the Intranet for other subjects, because everything is so different {DVV}* *I need to fill in the scorecard, I am busy two days just on getting this information in, but then it is still 90% accurate, instead of just pressing one button and an hour after getting an overview in 1 hour. {DV}*
Responsibility for uploading the content and update	*I am not sure who is doing the maintenance. People who have information are putting it on the Intranet, but they do not know who will be looking for it. So you have two parties, you have consumers and the producers. I am a consumer, and producer does not know who the consumer is. {RC}*

Table 50. *Intranet: the structure of information, search, quality of information and maintenance*

In all, the structure of information was generally evaluated as unclear and seemingly absent, the search engine as insufficient. Despite the fact that the information requests are often structured and individuals know exactly what they need, the search is still extremely time and effort consuming. To overcome the shortcomings of the search engine, the users exploit their own personal network and try to get the exact link, the exact location of information, instead of using the search functionalities.

Though many individuals admitted that, if found, the information is easy to use, the factors that affect the quality of information negatively are still present. First, the lack of standards makes the information pieces incompatible. Second, due to the fact that the changes in the structure and direction of information flows happen slower than changes in organizational structure, the actual structure of information flows does not always replicate the structure of organization. As a result, the quality of information, in particular financial information, is hampered. Although information in itself can be correct and accurate, it does not always satisfy the demand of users, which changes in line with the organizational structure. Thus, corrective actions require significant time and effort and make trivial procedures, such as filling in the regular reports, burdening. The example described by one of the interviewees illustrates the matter.

Finally, it was found out that the employees are not aware of who is responsible for the content maintenance of the Intranet. While the technical functionality and quality of all internal technology is very high, the content maintenance is not among the priorities within the company.

Linking technology and information overload

In the section below, we construct the link between the particular type of overload and the application. In so doing, we relate the inferences obtained from the empirical data to the theoretical propositions (see Table 51).

We have placed four applications into the category of transacting software: LARA, Cortex, OMT, and the Intranet. The use of LARA and OMT was evaluated positively by the majority of the research participants, as the sufficient fit between the supported processes and available functionalities exists. At the same time, the use of the Intranet, the internal network that establishes the overall information environment and connects the centralized depositories of data, was strongly associated with information overload. Besides the search difficulties, the structure of information has been evaluated as ambiguous, seemingly missing, and not compliant with the structures of internal processes.

Type of application	*Type of overload*	*Examples of applications*	*Empirical evidence*
Transacting software: basic information production and distribution of information	Data overload	LARA Cortex OMT Intranet	No link between LARA and OMT, and overload has been observed. Intranet, the internal network that constitutes the general information environment, was most associated with overload. Poor use of Cortex does not allow for making any further inferences.
Interpreting software: supports individual information processing	Structure overload	OMT Cortex Intranet	No link between OMT and overload has been observed. Strong link between Intranet and overload revealed. The impaired quality of information caused by the delay in changing the structure of information flows and its content, as compared to the speed of organizational changes, required the re-checking, reinterpretation and re-approval of information.
Connecting software: supports all types of social relations	Interaction overload	MS Outlook MSN	Strong link between Ms Outlook and overload has been found. Not only the quantity of email per se but also the inappropriate use of emails as communication media contributed to the overload. MSN has been utilized as a "countermeasure" against email overload.
Collaborating software: supports distributed working and collaboration	Transaction overload	MS Workspaces	The insufficient functionality and instability of MS Workspaces as the standard organizational application impeded efficient collaboration, and indirectly contributed to overload by increasing the number of face-to-face, telephone, and email interactions.

Table 51. *Technological platform: summary of analysis*

Among the interpreting applications, we have placed OMT, Cortex, and Intranet. Again, OMT was generally valued very highly. The poor use of Cortex, as a centralized information resource on projects, did not allow us to make any further inferences. The use of the Intranet again has been strongly associated with the overload. It did not facilitate the process of sense-making or improve the overall quality of decision-making: on the contrary, it inhibited and slowed done both. Frequent organizational restructuring resulted in delays in changes of the company's information structure and information content. Therefore, the misfit between

the current organizational processes and business models and the information architecture was a major challenge.

MS Outlook, the connecting application, is strongly allied with information overload. Interestingly, not only the quantity of information per se, such as the number of emails, was cited as the factor of overload, but also the inappropriate use of the medium. For instance, the use of email for handling discussions is considered as a trap that results in delayed decisions and, at the same time, an increased number of emails. MSN has been utilized as the countermeasure to this.

Finally, MS Workspaces was placed in the collaborating software category. Due to the fact that the application was still perceived by many as a pilot and was not regarded as a standard company application, the process of collaboration was still conducted in an "old-fashioned" way, using traditional communication media, such as face-to-face, telephone, and email. Consequently, the amount of interactions increased significantly, contributing to overload.

7.1.6 Contextual perspective on information overload summarized: linking data to theoretical propositions

Proposition	Empirical evidence
The structure of the organization determines the organizational vulnerability to information overload. A mechanistic type of structure increases the risk of information overload.	The increased formality implied that the decision-making power and information flows have been shifted upward. While the changes in the organizational structure have been accomplished, its alliance with information architecture has not been finalized yet. Therefore, the losses of knowledge and information have been significant. To find their way, individuals relied considerably on their personal networks. Also, the differences in terms of structures, procedures, and management impeded efficient information transmission and knowledge sharing across the organizational entities, such as units and divisions.
Organizational culture affects the individual's vulnerability to information overload. Information overload is a voluntary state that indicates individual compliance with information overload.	The cultural shift resulting from the merger towards increased formality, subordination, standardization and an emphasis on control had a negative effect on knowledge sharing and information transmission. The loose discipline in keeping the information resources combined with a lack of incentives impeded the knowledge and expertise reuse and caused redundancies and reinventing the wheel.

As the amount of internal communication goes up the risk of information overload increases.	SoftCom is a "people networking" company with rich communication media dominating. The use of the mobile phone is strongly associated with the interaction overload and changes the definition of working space and working hours. The inappropriate use of email contributes to overload. Interestingly, MSN is used as a corrective media.
Introduction of advanced information technologies causes information overload:	
A. The use of transacting technologies increases the risk of data overload.	Supported
B. The use of interpreting technologies increases the risk of structure overload.	Supported
C. The use of connecting software increases the risk of interaction overload.	Supported
D. The risk of collaborating software increases the risk of transaction overload.	Indirectly supported

Table 52. *Contextual perspective on information overload summarized: linking data to theoretical propositions*

7.2 Focus profile: DVV

In the previous section, we have presented the contextual perspective on information overload. In so doing, we described the effect of the organizational structure, the particular features of the organizational culture, the frequency and intensity of internal communication, and the technological platform, on the information overload. In this section, we step down from the level of the organization to the level of a particular individual and construct the task-contingent and human-contingent perspectives on information overload. Again, we conduct the analysis on the basis of the focus profile. We have included the profile of DVV, the MS Alliance Director, as the most representative.

7.2.1 Information overload: task contingent perspective, DVV

In the conceptual model, we have outlined two factors, which are particularly relevant within the task-contingent perspective on information overload. Thus, we suggested that task complexity and time constraint determine the degree of information overload. In the section below, we construct the task–contingent view on the information overload.

Task complexity

Task complexity is defined as a function of the component, coordinative, and dynamic complexities. As in the previous sections, rather than consider each task separately, we analyze the complexity of a representative task environment.

Component complexity is composed of the number of distinct acts that must be performed and distinct information cues that must be produced to fulfill the stated objectives. For DVV the component complexity is the cumulative effect of the number of emails needed to be addressed and reacted to, the amount of information in print that must be processed daily, the number of meetings to attend, and the number of non-stop telephone conversations.

DVV has two email accounts, using both on a daily basis. His position in between Microsoft and SoftCom implies that he receives a lot of information that must be evaluated, redirected and transmitted to the interested parties. He describes his role as follows:

> *Because of my role as MS Alliance manager, I am a window to the organization; a lot of information is coming to my inbox. I dispatch it further to the rest of organization. Naturally, all emails are accumulated in the inbox.{DVV}*

He receives about sixty emails per day at the SoftCom account, claiming that 99% of the emails are of his direct interest. Although all emails require attention, they have different degrees of urgency and call for different types of reaction. This is reflected in the structure of the mailbox. Thus, the emails that imply action are placed in one folder and have priority; all the remaining emails are forwarded to the "To read" folder, and can be processed later during the day. In all, DVV prefers to save all emails on his personal drive, having an extended email archive. In the quotation below, DVV describes his approach to email as follows:

> *I do it in a Dutch way; I keep them all [refers to the email]. I have the full history on most of the topics. I make an archive and put it on DVD. I am doing it because you never know; it's just an idea of having them. In couple of years you get rid of that. I keep the same structure when storing email on hard disk: MS-related, customers-related etc. I like to have some structure in there because then you really know where to look for information, I also keep sent items because sometimes someone asks I've deleted something unpurposely can you send it to me again. I am able to do that. {DVV}.*

Besides the amount of information received via the email, the large number of face-to-face interactions contributes to the component complexity. The number of formal appointments averages around four per day, increasing to six during the peak periods. Informal conversations with colleagues and subordinates consume the remaining time. Working on the open floor makes communication easy, demolishing all barriers. That is why, for DVV staying at the workplace means constant engagement in informal conversations and discussions.

Finally, the use of the telephone, constantly making and receiving calls, shifts up the component complexity. Besides providing tangible benefits, such as working on the road, the telephone blurs the border between the working and non-working hours. DVV illustrates the situation as follows:

> *I never switch it [mobile phone] off. Because of the fact that I have only one device and the device is a company device, when you want to use it in private you are more or less allowed but then you need to keep it on. I didn't make a decision to buy a private phone, because you then cannot really separate them. No one currently can see at the system that you have a day off, it will be a future functionality probably, but at the moment it's not possible. You can reject or change your welcome message saying that you have a day off. For one day, you normally do not change your welcome message. Therefore, your colleagues think that you are just working; they keep calling or ask you to call back. {DVV}*

In all, the component complexity is stable high. Being at the crossroads between two companies means that a lot of information must be received, processed, and communicated further. The process of information processing and transmission imposes significant demands on individual time and attention and, at the same time, increases the interaction load significantly.

Coordinative complexity is defined as a function of the timing and sequencing of acts, frequency of acts, their intensity, and locational requirements. DVV, being the MS Alliance Director, at the same time holds the sales role, being responsible for the sales of MS-based solutions to the large customers of SoftCom. Having two roles and two distinct streams of responsibilities imposes non-trivial demands on coordination (Table 53). DVV explains that formally there is a parity between the time devoted to each role:

> *I have a split role. For 50% of my time I am responsible for the alliance with MS, being a window between MS and our company. We have 800 MS consultants within our company, we make about 95 million in turnover, and we consider MS as a partner and with that respect, I am a partner-manager. For another 50% I am a sales manager responsible for selling the MS products.{DVV}*

In reality, the demands imposed by the roles often run into conflict. At the moment of the study, for instance, Microsoft had just opened the new financial year, meaning that a lot of planning and negotiations had to be done. Naturally, the alliance role gained the priority since a lot should be communicated in both directions, while the sales role had been pushed to the side. As a result, the timing and sequencing of acts, as well as their frequency, is determined externally by the stage of the sales project or the status of the partnership with MS.

Timing and sequencing of acts	Determined by the external deadlines and events, the focus is changed from one role to another.
Frequency of acts	Stable high
Intensity of acts	Determined externally, by the stage of projects
Locational requirements	Traveling on a daily basis

Table 53. *Coordinative complexity: major components*

Frequency of acts is evaluated as stable high, since the "peak" period within one role is followed by the "peak" period within another role.

Finally, both roles imply traveling. Two appointments out of four are held at a location different from base office. DVV thinks that traveling is the indispensable part of his job and explains the rationale behind this as follows:

> *On a daily basis, we have email contacts, MSN, or phone contacts with Microsoft. But sometimes we need to clean up the actions and discuss something on a longer term, so we do it bi-weekly. Doing sales within our bigger customers means traveling as well, because the customers are not coming to you. {DVV}*

Arranging the exact traveling schedule is the responsibility of the secretary. She must do it in away that will reduce time spent on the road. The typical route involves visiting Microsoft head office in Amsterdam in the morning, then meeting a large client in Utrecht; afterward having an afternoon appointment with another client in Den Haag, and finally arriving at the SoftCom office in Rotterdam.

Therefore, all components are present and increase significantly the coordinative complexity (see Table 53). Holding double roles implies a constant balancing between them. This balance is achieved through shifting the priorities and relocating time and effort.

Dynamic complexity is determined by the drive of the external environment. The IT industry, undoubtedly, is one of the most dynamic industries where new technologies are introduced and new products are launched on a daily basis. Keeping up with all these changes is often the equivalent to staying in business. At the same time, not only a deep understanding of the available IT solutions is required, but also a knowledge of the consumer market trends. DVV acknowledges explicitly the need for continuous self-education and suggests the following approach to it:

> *The MS environment changes a lot, a lot of growth is observed there. In addition, our clients are changing a lot. Every year, we are invited by MS for the number of events. The major event is the World Wide Partners' Conference and then you are informed about all the news. There are all kinds of smaller events during which you are informed about the particular products, technologies. I also read the general magazines and newspapers. You see what's going on in the business, because I am in the market-oriented division, so it's important to be informed. The mergers, for instance, are happening every day; it's quite relevant to know. {DVV}*

Rather than become overwhelmed by the amount of information that must be addressed, DVV actively utilizes a "learning by doing" approach to updating one's own knowledge. Thus, attending the conferences, talking to the clients, consulting the experts, are among the dominant strategies that help to eliminate extensive and time-consuming searches. Therefore, no link between information overload and dynamic complexity has been observed.

Time constraint

Though not emphasized explicitly, the issue of time underlies the whole discussion on information overload. Interestingly, DVV suggests that during recent years the dividing line between the working and non-working hours has shifted, if not disappeared, in favor of the former. In the quotation below he suggests that working at home, or during days off or weekends, is something normal rather than something "extra":

> *I do not see it as extra hours: I just see it as part of work. You do not want email stress. I think when my mailbox is getting beyond 150 emails in the inbox just then I am getting more the feeling that I am not in control any more, and I am a control freak. Then you are doing some investments at night and making sure that you are in control over everything going on. The same is with my peer in MS, he is always on MSN in the evening. When I really have an urgent question at night, I can always ask him.{DVV}*

Thus, communicating with the peer from Microsoft during non -working hours means that he is willing to accept this communication and considers it a normal way of working.

Task-contingent perspective on information overload summarized: linking data to theoretical propositions

Proposition	Empirical evidence
The risk of information overload goes up as time complexity increases:	
1) The risk of information overload goes up as the component complexity of the task increases;	Supported: the mediating role implies that a lot of information must be processed, evaluated, and re-directed to the interested parties.
2) The risk of information overload goes as the coordinative complexity of the task increases;	Supported: holding a dual role imposes conflicting demands on managerial time and attention and requires complex coordination at the personal level.
3) The risk of information overload goes up as the dynamic complexity of the task increases;	Changes originate from two sources, the IT sector and the customer's market. Keeping up with the changes within both means staying in business. Utilization of learning by doing approach" is a preferred way of updating one's own knowledge.
The risk of information overload increases, as time constraint becomes binding.	The notion of time underlies the discussion of information overload. The distinction between working and non-working time has been re-defined, making working extra hours a normal, institutionalized practice.

Table 54. *Task –contingent perspective on information overload: linking data to theoretical propositions {DVV}*

7.2.2 Human-related perspective on information overload: DVV

Decision-making style

Earlier in the thesis, we have defined decision–making style as a function of the amount of information an individual prefers to collect and the number of alternatives the individual derives and incorporates into the decision-making model.

DVV reveals the preferences towards being thoroughly informed and remaining in possession of all information. He says that, being a "control freak", he likes to be informed and have information readily available:

> *I like to be informed about everything, which is related to my team, me, the alliance, or any information that is related to my roles within the company. {DVV}*

The example of keeping the emails in a systemized archive on the personal drive is also representative. He claims that when he needs information on Microsoft-related issues he is always able to find it on his own local disk. At the same time, he prefers to keep all options open. In all, DVV belongs to the information–intensive category of decision-makers.

Experience

DVV is in his early forties. At the moment of the study he held the position of Microsoft Alliance Director within SoftCom. In line with the arguments presented in Chapter 3, we made a distinction between five types of experience and evaluated all of them using the five-point scale from high to low (see Table 55).

Type of Experience	Evaluation
Experience of information –intensive types of tasks	Average
Decision-making experience	High
IT knowledge and experience	High
Work experience (total)	High
Experience in the current position	High

Table 55. *Experience: the empirical evaluation {DVV}*

In all, his work experience includes 15 years of working in IT companies at various positions. He started as a programmer and then gradually moved to managerial positions. At the moment of the study, he had been involved in MS related business at SoftCom for five years. DVV explicitly claims that within SoftCom having a personal network is essential. He reflects on the idea in the quotation below:

> *We are a company where we phone a lot. If we need to find some information we try to phone the person who you think has this information. I have my own network, I am working here for 5 years already, then I think I start with this person, and this person re-directs you to someone who is probably having this information. {DVV}*

Therefore, contacting the right person is equivalent to getting the right information. Under the conditions of merger-driven organizational re-designs having a personal network helped him personally to find his way through the ambiguous information flows.

Having an education in computer science and working in the IT field, makes DVV IT-knowledgeable and in possession of the necessary skills. He makes use of most of the company's standard applications, and terms himself as an advanced technology user and early adaptor. In day-to-day life, he uses all possible devices that assist personal planning and mobile working. At the same, having deep IT-related knowledge does not make him confident in IT. Thus, when asked to reflect on the use of inbuilt filters he explicitly claimed that he couldn't trust the technology.

Only experience of information-intensive tasks has been evaluated as average. DVV clearly indicated a preference to delegate the information-intensive part of work to subordinates and colleagues.

7.3 Human coping with information overload

In the section below, we present an analysis of human coping using the structuration theory as an analytical tool underlying the discussion. We first consider the human-enabled, technology-enabled, and organization-enabled types of coping separately. Next, we construct a model of structuration that depicts all three types in an ongoing interaction. The logic of presentation of the analytical arguments is similar to the one used in Chapters 5 and 6.

7.3.1 Human -enabled coping: background

Human-enabled coping is defined as the use of personal routines aiming at reducing the information load by selecting the relevant pieces and neglecting the irrelevant ones, and organizing information in a way that facilitates its further processing. It is a patterned, and thus repeated, response of human actors under critical conditions. Being a form of habitual behavior, routines are formed on the basis of the individuals' knowledge and experience. Therefore, the process of relating already existing knowledge frames to the emerging situation is central. For instance, the *ex post* organizing of incoming mail (see Table 56) entails the use of interpretive schemes that enable categorization. These interpretive schemes are retrieved from the human's mind. At the same time, the use of interpretive schemes only is not sufficient for proceeding with the action. Thus, the human agent draws on the notion of power. In particular, by delegating the assignment by a trivial forwarding of an email, the individual exercise the power that enables the relocation. Finally, the existing organizational, norms, traditions, and acceptable behaviors underline any human action. Thus, instant deleting of certain categories of email is legitimate under a particular organizational setting.
In the course of data analysis, we have outlined a number of coping routines employed by the individuals. The summary of the analysis and illustrative empirical evidence is presented in Table 56.

Human –enabled coping	**Empirical evidence**
Selectivity: applying interpretive schemes, particularly selection procedures;	*Something very intuitive I think. I think I try to recognize what is it all about, you can see it is based on who is sending it, and sometimes I also look at the subject. I also ask my consultants to add something in heading if they really want me to do something, something like "action" or "request" in the subject line. And they are quite good at it*

	because they do not use it often; they use it only when it is really needed. I have several emails from clients, colleagues, etc, and it really depends on who is sending it. I can recognize which issue it concerns. Everything is important, but urgency is something else. Urgency is importance plus timing. Sometimes even not important things can be more urgent. {DV} *I think I scan them quickly on the sender and subject filed. Then decide which are the most important ones, and I deal with them first. Then if I have some time left I look for the other ones. If there a second possibility maybe I do the second scan and if not, I just move them somewhere else. Subconsciously maybe I have a structure or strategy, but not consciously. You just quickly decide what is important or not. {AB}* *I try to scan all emails very quickly on the subject. Then I am just taking the deadlines and answer them {DVV}*
Ex post organizing of the inbox based on the results of the scanning: organizing the content of the email inbox based on the results of the initial processing. The emails are moved to certain folders or deleted.	*I have tried to implement the filters once. Then I realized that all incoming mail is placed somewhere so I do not see it any more. I decided to go back to an easy system. Now I have all my emails in the inbox, I know it's there, I scan, I treat it and I try to keep as few email in my inbox as possible. Emails I like to keep, I place in the folders. I am making my own filter, in a way, by getting all the emails, first, into the inbox and filtering them by myself. {EM}*
Blocking of time: reserving time for specific activities unconditionally on all of the rest of the daily activities;	*What I've tried to do is to make my Friday as an office day to do all the administration and similar kind of work. But it didn't work out. Our kind of work is very driven by the moment. It is always difficult to make fixed blocks. {RR}*
Regulating own accessibility: changing the accessibility mode to regulate the	*Because we are working on the open floor when you really want to work quietly and really want to*

intensity of information and communication flows	*focus on your work then you have to book a room like this and then just work non-disturbed. Or you have to go to your home and work there, it's also possible. When I really need to make a big document I will do it, than I will stay at home in the morning and block my agenda, I'll also send a note that I am working at home, and will not be bothered {DVV}* *It is much more convenient to sit here in the meeting room instead of upstairs. Here I do not get consultants at my desk, I get less phone calls. If you have to focus on a piece of text or think something out, I even have colleagues who go to the restaurant and sit down there…{RR}*
Stretching of working hours: relaxing the time constraint by expanding working hours	*Checking email during the non-working hours* *Answering the calls during the non-working hours*
Face-to-face contacts: filtering the incoming information by verifying, clarifying and assigning relevance to it in the course of face-to-face contacts.	*We are a company where we phone a lot. If we need to find some information we try to phone the person who you think has this information. {DVV}* *I get in touch with colleagues. In my experience is that you only need to call two colleagues and you'll get the required information. {DV}*

Table 56. *Human-enabled coping: personal routines*

Many personal routines observed in this case are similar to thoes already discussed in Chapters 5 and 6. Selective addressing of the incoming information is qualified as a dominant routine. Scanning of emails and deciding which emails are worth further consideration is the most representative example of a selective approach to the information available. The distinctive characteristic of the process is its subconscious, intuitive nature when the decision about the importance of an email is accomplished in ten to fifteen seconds. The selectivity is guided by the "signs" or "indicators" that serve as the anchors attracting the attention of the decision-maker. Thus, many interviewees suggested that looking at the "sender" field and relating it simultaneously to the "subject field" could produce a close approximation of email relevance. Using particular codes in the subject field, such as "for your information" (FYI) or "action required" (AR) facilitates the process of sense making.

The scanning can be followed by the ex post organization of the information received according to the results of the initial selection. Again, the example of email is representative. Although all incoming mails are admitted into the mailbox, the first scan allows the individual to divide them into the "relevant" and "irrelevant" categories. The latter are deleted, while the former are either addressed instantly or re-directed to a sub-folder. The human agent performs the functions of a filter, staying in full control over the incoming information. In so doing, he reduces the risks of missing potentially important information but, at the same time, organizes information logically and makes its retrieval easier.

Blocking of working hours and regulating one's own accessibility have been discussed in the previous chapters. Both aim at restricting the demands on the interactions by the physical exclusion of oneself from the social space.

Stretching of working hours, initially being a forced response of the human to the increasing workload, became a normal, standard way of working. Thus, checking emails at home in the evening saves time next morning. Receiving and making telephone calls during the weekends reduces the number of action points and interaction load during the week.

Use of face-to-face contacts to acquire, verify, and make sense of information is a particularly viable practice within SoftCom. Calling people, rather than searching the digital information sources, proved to be the most efficient strategy for getting the right information with the minimum effort. In deciding whom to contact, the individual routinely draws on his personal network and prior experience in similar situations. Here, the personal network is represented as the constellation of colleagues with a certain area of associated expertise.

7.3.2 Technology -enabled coping: background

Technology–enabled coping implies the use of technological features and functionalities to filter out the unwanted or unsolicited information and reduce the overall information load by the improved information representation, information structure, and reduced redundancy. The number of coping functionalities has been elicited in the course of the data analysis (see Table 57).

While the personal routines were rather similar to the ones discussed in the previous chapters, the technology-enabled coping exhibited greater variety. In the section on information overload, we have demonstrated that most interviewees associate it with the use of electronic mail, mobile phone, and Intranet.

Technology-enabled coping	Empirical evidence
Use of email filters: use of the automatic rules to delete and structure the incoming mail	*Only email can be filtered. I tried it [using the filters]. But I do not understand exactly how it works. I tried to filter all my team members into a special folder, because all the personal things are likely to be there. And these are the things I really should take time to address. For some reason it didn't work out very well. {DV}*
Saving all emails on the hard disk: saving all emails at the local disk to eliminate the effort to organize or systemize it but being able to retrieve it later	*I never delete emails; I always keep them on my disk. And I do not have any indexing system so I just transfer them to my local disk. I am doing it because I do not have time to order the emails, delete the ones I do not want to keep, save the ones in the proper files. I just keep them all {DS}*
Using of email lists: creating the email lists and targeting the information towards the interested audience	*We have several mailing lists. Within SoftCOM we have several divisions; within every division a competence is present. We have competence-based mailing lists. {JPB}* *You really want to create more or less the target group where you can be sure that they will read it and this information is interesting only for them, and at the same time you do not bother the other groups in the company which just see it as being spammed again. {DVV}*
Use of indexing system: use of an indexing application that assigns a numerical code to the information piece and thus facilitates retrieval	*I have some system now, which is called Blinks. It is indexing everything that is on my local disk. I used it for the first month, after I've never used it. I do not need it. I know where my information is at my desktop {DS}.*
Use of advanced communication devices that support communication and scheduling at the individual level, such as Blackberry	*Pilot with Blackberry communication device that combines the functionalities of email, calendar and organizing, and mobile phone. It is synchronized with the PC and facilitates out of office working.*
Changing the modes of mobile phone use: regulating one's own accessibility to interactions by changing the mode of mobile phone use	*Management in our company has to be reachable during the holidays, days off etc. When I am on holidays, two times a day I listen to the voice mail and decide if I have to call back. The rules are the same for the evenings and weekends. {AB}*

Table 57. *Technology-enabled coping*

Electronic mail, the standard office application that facilitates remote communication and information exchange, is utilized routinely. The use of this application does not require any specific knowledge or skills. In time, the individuals develop certain strategies of dealing with emails. These strategies are collection of procedures or distinct acts aimed at reducing the number of email in the inbox, organizing information in a way easy for further retrieval, and reducing the time spent on email. Each strategy is a combination of available functionalities, such as filters, clean-up etc, with a particular rule or logic that underlies the use of these functionalities.

The email rules or filters are used to delete certain categories of incoming mail or to re-direct the emails into the folders. To specify the filtering logic the individuals draw intensively on their prior experience and attempt to anticipate the relevance of an email by capturing certain signs or symbols. At the same time, the individuals incorporate the knowledge of the organization and its operational processes into the filtering logic. For instance, emails from bosses are directed to the folder with the highest priority and addressed instantly. The use of emailing list that helps to target the audience and thus increase the efficiency of communication implies a thorough understanding of the organization and its major process.

With regard to the use of the mobile phone, the number of coping strategies has also been outlined. Thus, for instance, in changing the ring tone or using the telephone in the voice mail mode, the mobile device provides an option for regulating and controlling one's own accessibility. In this, the mobile phone changes from being obtrusive and aggressive into an unobtrusive means of communication, with the individual being still in full control over the demands on interaction. Again, in time, the individuals develop certain strategies of using the mobile phone. In particular, all interviewees were able to provide a clear, step-by-step indication on how it is used under different circumstances and what are the possibilities to cope with the ever-increasing interaction load.

7.3.3 Organization-enabled coping: background

The organization-enabled coping has been defined earlier as affecting the information streams by using such mechanisms as organization re-design, information and knowledge management initiatives, introduction of certain cultural and behavioral norms, and training. In the Table 58, we outline the coping structures that have been elicited in the course of data analysis.

Organization-enabled coping	Empirical evidence
Implementation of reorganization initiatives	*We have done last reorganization on 1st of March. We saw internally some blocks and we have removed them. Responsibilities were not clear to everybody. Not in the last place, to people who were supposed to perform these responsibilities. Now it is more clear where the responsibilities lie and where you can reach people who are responsible for certain areas or businesses. {AB}*
Design and implementation of standard operating procedures	*What is annoying me is that there is too much freedom within this company about procedures and processes. It is not standardized. Divisions have different organizational structures. And I find it hard to believe that is of any good to have such freedom. We have introduced a new performance management system, but when you give so much freedom it becomes difficult to get someone in that project management system and than to review and say are you doing well or not. {RR}* *We are now implementing he procedures on informing. We used to have a formal procedure in our Business Management system, it has not been neglected but it has not been implemented well. Lot of people are not reporting {RC}*
Design and implementation of gate-keeping roles	*I see a lot of managers who have nicely organized mailboxes because their secretaries aredoing that. I have not done that. I've tried that 5 years ago, but it seemed to be very difficult for the secretary to grasp the essence of things. It is very difficult for her to catch up with the speed of issues, so I do it myself. She often reminds me of emails she thinks are important. Her perception of importance is different from my perception of importance; she is very much focused on her task. {DV}* *Secretary cannot handle it because she just cannot. {RB}*
Training aimed at enhancing the skills, domain-specific knowledge, and efficiency of personal-level procedures	*Time management course* *Professional training* *Skills training*

Table 58. *Organization-enabled coping*

The organization-enabled coping is defined in terms of structures as defined by the structuration theory. Structures include the interlinked dimension of signification, domination, and legitimation. For instance, by implementing the wide-scale re-organizational initiatives, the company's management attempted to align the information flows with the formal structure of the organization. The reorganization initiative, in itself a rather abstract and all-inclusive notion, has the objectives of restricting and directing information flows and relating them to the formal organizational structure. Above all, it aims to secure that right information is delivered to the right person, and that information content correlates with the major processes. In so doing, a uniform way of sense-making is introduced, the existing divisions of power and hierarchy are formalized, and a set of legitimate behaviors is defined. The initiative is framed by the concepts of efficiency and effectiveness, standardization and centralization.

Similarly, the intended centralization of power, standardization of processes and reinforcing control were partially achieved through the introduction of standard operating procedures. In these procedures the exact way of organizational sense-making is codified, the reporting chain is determined, and the particular behaviors are granted the status of norms and institutionalized.

Although training is meant to enhance the employee's proficiency, skills, and knowledge, it also can be considered as a countermeasure against information overload. In the course of training, individuals are exposed to the way of sense-making supported by SoftCom, are introduced to organizational norms and standards, and are trained to exhibit particular behavior under the particular circumstance.

7.3.4 Structuration theory perspective: integrated view on human coping

In this section, we consider human-enabled, technology-enabled, and organization-enabled coping as being in constant interplay. We suggest that none of the three could be sufficient to address the problem of information overload. We construct a model of structuration, in which we relate the individual actions to the organizational initiatives and place technology in between, assuming it is a depository of interpretive schemes, resources and legitimate behaviors. As in the previous cases (see Chapters 5, 6), we reflect on how the social structures are translated into the technology features and how the individual, by appropriating these structures, either reconfirms or changes the social order.

Earlier in the chapter, we have suggested that the research participants associated information overload with the use of electronic mail, mobile phone, and the Intranet. We have also provided evidence illustrating that with time individuals develop a stable, patterned approach to the use of email that reduces the time and effort spent on email significantly. A somewhat similar pattern has been observed with the use of the mobile phone, when individuals change their own accessibility depending on the external environment and their own preferences and, in so doing, affect the intensity and frequency of communication acts.

The Intranet, the internal organizational network, is built in order to create a comprehensive, but at the same time flexible information environment in which up-dates can be done in an easy way and on an on-demand basis. The Intranet is created to stimulate and facilitate knowledge sharing and reuse and to support collaborative processes, allowing for the simultaneous involvement of multiple parties. In general, the Intranet is designed to promote the spirit of unconstrained collaboration, with the geographical, social, and hierarchical borders compressed or demolished. The culture of openness, the willingness to share information and knowledge, both underlie the use of the Intranet. In return, everyone granted access is free to use a large, centralized pool of knowledge accumulated over time.

The use of the Intranet on a daily basis is essential since it is one of the major internal information sources of the company. At the same time, the Intranet, the organization–level information resource, can neither be changed by the individual easily, nor can it be "filtered" in a direct way. The maintenance of the Intranet is done often by single organizational entity, while all the users have a pre-defined degree of freedom in using it. Thus, although the individual is free in choosing how to use the Intranet, for which purposes and to what extent, he often, has no rights to change the structure of the Intranet and its content in a voluntary manner.

In studying the Intranet, three dimensions must be taken into account:

(1) Intranet as an individual level application that supports the individual processes;

(2) Intranet: the technical features of the application;

(3) Intranet: the organizational-level application that links the major information depositories;

In terms of a model of structuration, the Intranet embodies interpretive schemes, provides coordination and control facilities, and encapsulates norms, and thus mediates the processes of the human–social system interaction, in which the structures of signification, domination, and legitimation are either supported or altered. The Intranet, the centralized depository of

general information, is a collection of templates, standard forms, and reports that maintains a particular way of doing things and a particular way of sense–making. In so doing, it supports the structures of signification.

Next, it indirectly supports the structure of domination. Though, as suggested earlier, the Intranet is essentially a decentralized technology that dissolves barriers and facilitates unconstrained communication, by accumulating various tools of control and making them available the Intranet reinforces the existing structure of domination and reaffirms the actual social order.

Finally, the Intranet supports the structure of legitimation, being a collection of codified norms, standards, and legitimate behaviors. Thus, for instance, providing shared workspaces and capacities to store and retrieve information on an on-demand basis, the Intranet helps to translate the organizational intention to enhance the reuse of knowledge and expertise in terms of the legitimate, company-supported behaviors.

Figure 32 depicts the model of structuration and links organization, technology, and individual. First, we have outlined a number of strategic initiatives of SoftCom, such as:

(1) Restructuring and wide-scale organizational re-design;
(2) Centralization of power, information and knowledge;
(3) Formalization of organizational culture and emphasizing the importance of control;
(4) Standardization of work processes, procedures, and information flows;
(5) Reuse of knowledge and expertise and stressing the value of knowledge sharing,
(6) Global approach to business shown in serving the clients across the globe and exploiting distributed working.

Restructuring and organizational re-design was largely merger-driven and aimed at reducing the differences and incompatibilities between organizational entities and converging to a uniform organizational structure and management. In the process of restructuring, the organizational power has been shifted upward, moving the responsibilities from the unit to the divisional level. Accordingly, centralization of information flows and knowledge depositories has been targeted.

Placing more emphasis on formality was accompanied by reinforced control. The controlling function, in turn, implied the design and utilization of standard operating procedures, similar across the units and the divisions.

To address the clients' needs at best but, at the same time, to reduce the costs of each project, the reuse of knowledge and expertise was proclaimed to be the central factor of business success. Finally, to comply with the demands imposed by globalization, serving clients across the globe and exploiting distributed working were targeted. Therefore, in all, the institutional context can be characterized as being focused on centralization and standardization of structures, processes and procedures, aiming at increased efficiency and enhanced reuse of existing knowledge and expertise.

Second, in terms of structuration theory, the Intranet has all the characteristics of modality since it accumulates the interpretive schemes, provides the resources, and stores the organizational rules and norms. As defined earlier, the Intranet is the internal network that underlies the company's information environment. Therefore, in order to address the needs of a new, emerging organization, the Intranet underwent a process of re-design. Although the organizational reform has been accomplished in a formal, essentially top-down manner, introducing changes into the existing IT platform and thus aligning the information architecture with the new organizational structure have been done in a much loose, informal style.

First, no central authority has been assigned to the Intranet maintenance and support. As a result, the empirical evidence demonstrates that employees are not aware of who is responsible for the Intranet maintenance and support. Second, though the responsibilities for uploading the project closures and other project-related information on the Intranet were defined, the actual compliance with these guidelines was minimal since no incentives or directly observable benefits for the employees have been communicated. As a result, the guidelines were too open-ended and flexible, providing excessive freedom and producing a lack of discipline or uniform approach. In the quotation below, DVV illustrates how information is placed on the Intranet:

> *We were asked [to put information into the Intranet] in a logical but not in a standardized way. We were just asked to put it in the way we thought was logical. And in that way, it's difficult to find the things in the Intranet for other subjects, because everything is so different For instance, the alliance information for sales and marketing purposes should be done like this, and for other purposes, like that. We were totally free. We were asked to do it in a logical but not in the standardized way. We were just asked to put it in the way we think is logical. And in that way, it's difficult to find the things in the Intranet for other subjects, because everything is different. No templates. {DVV}*

Similarly, the old COM-culture, under which information transmission was done informally through personal networks, still prevailed. When asked whether they place some information on the Intranet in the course of a project or when the project is finished, the interviewees explicitly acknowledged that they do not do it. As a result, all initiatives had a local scope. Naturally, the company's information environment could be characterized as fragmented, consisting of disconnected "islands", as described in the quotation below:

> *Our company in ICT services and solutions is based on repeating what you have done before with another customer and doing better next time, more easy in a shorter time and make more money on that. Therefore you need to write down and store that information about the projects, customers, tools etc. If you are making a proposal to a customer, let's say an Oracle implementation or implementation of data warehouse you need to slice and dice explaining all the components and tools. Some islands exist, to say mildly. But for myself, for instance when I need to make a presentation about some subject, I always have the feeling that I need to start from zero, with no tags and proposals that can be reused. The reusability of information, besides the information that is stored on my local hard disk and the information form the colleagues from the nearest neighborhood, is very low. {RR}*

Finally, as the projects of SoftCom became bigger and more international in scope, the demand for the global platform was articulated. At the same time, the Intranet is still treated as essentially a local platform that can neither provide the information resources on an international project, nor can facilitate or stimulate knowledge sharing at the international level. Therefore, as depicted in Figure 32, there is an internal conflict at the level of technology, when the actual changes in the technology differ from the ones declared by the company management and defined as necessary to support the ongoing process of organizational change.

Thus, in theory, the process of reorganization should be synchronized with the re-design of information flows and with the implementation of the changes in the existing IT architecture (see Figure 32). The centralization of power could be achieved if accompanied by the centralization of information flows and accumulation of information at the higher levels of the formal hierarchy.

The expertise and knowledge, presumably, should be shifted in the same direction as power. In practice, no central depository was created and the information flows became even more de-centralized and widespread. Since much emphasis has been placed at the formalization of organizational culture and the reinforcement of control over all operations, the central depository of the templates, standard forms and reports were created. Moreover, to overcome

the difference that existed between the units and divisions in terms of structure, management, and major processes the standard operating procedures were introduced at the level of the entire organization. To support this initiative, the alignment of organizational structure and creation of standardized and unified information were defined as necessary.

In practice, the changes in information flows have been delayed or have not been subject to thorough implementation. As depicted in Figure 32, only the control function has been successfully mapped into the technology solution. All the remaining organizational initiatives, though clearly defined and articulated, were not supported by the technological changes.

Third, the individuals are reasonably free to decide how to use the Intranet, to what extent and for which purposes. The actual use of technology by the individuals is defined through the concept of appropriation. The backward loop in Figure 32 illustrates the idea of appropriation. As in the previous cases, we suggest that the nature of appropriation determines whether the existing social order is reaffirmed or altered. The summary of the appropriation analysis can be found in Table 59.

In all, the appropriation process is dominated by criticism of the Intranet and demonstrating its inefficiency in terms of structure, search, and content. The Intranet is explicitly appropriated only for satisfying trivial information needs and, otherwise, is ignored by the users. Although the potential of the Intranet is explicitly acknowledged, the poor quality of it at the moment of the study predetermined the negative attitudes of users and affected adversely the users' willingness to proceed with its appropriation.

The actual use of the Intranet was restricted to certain areas, where the efforts of its use were minimal and the chance to get the right information high. In this way, the direct appropriation moves were exhibited. Considering the potential of the Intranet, most of the research participants acknowledged explicitly that it could be particularly valuable for acquiring general information about the company, such as human resource issues, company policy and regulations on particular issues, contact information etc, or general information about a specific area, such as White Papers on certain innovations or technology, reports on particular projects, marketing information, or information about clients.

At the same time, due to the functional imperfection of the Intranet (poor search engine, lack of structure), the intention to use it was affected negatively. Thus, a corrective combination, defined as the use of one structure as a corrective for the perceived deficiency in another, was enacted. To overcome the inefficiency of the Intranet, two strategies were mostly applied. First, the task of information search was delegated to subordinates. Second, different

channels, such as face-to-face or telephone, were utilized. In both, the technology feature is substituted by the non-technology feature on the grounds of the inadequate performance of the former. This type of appropriation is both unfaithful and does not coincide with its intended instrumental use. At the same time, it can be qualified as a forced response of the individual and a form of adaptation.

Explicitly criticizing the structure and constraining the structure, by far, dominated the process of appropriation. While the first implies expressing the critical evaluations of the Intranet in general, the second involves criticizing particular functionalities. The individual's perceptions of the Intranet vary from "drama" to "so-so", with search functionality, the structure, and the up-to-datedness of information criticized mostly.

Finally, negation, the explicit rejection of appropriation, is an extreme form of criticism. Several interviewees indicated that they did not use the Intranet due to a negative experience with it in the past, such as being unable to find the right information with reasonable effort.

The negative nature of appropriation of the Intranet, dominated by criticizing and negating, challenges the underlying social structures and explains the observed discrepancy between the organizational intention expressed in the strategic guidelines and the actual behaviors of the individuals.

7.3.5 Human coping: concluding remarks

At the beginning of the section, we provided an empirical illustration of three types of human coping with information overload. First, we outlined a number of personal routines that an individual utilizes to address the problem of information overload. These routines are the form of automated behavior driven by personal experience and prior knowledge.

The greatest variety has been observed within the technology coping features. The overload was mainly associated with the use of electronic mail, mobile phone, and the Intranet. The use of electronic mail does not require any specific knowledge or skills. Therefore, drawing on individual preferences and knowledge of the environment, in time, the individuals develop a stable approach to the use of email, which is a complex combination of available functionalities and logic.

A somewhat similar pattern has been observed concerning the use of the mobile phone. To regulate one's own accessibility, the individuals combine the available technical functionalities with the rules of their use. The rules are constructed individually. Moreover, the use of devices that enhance the pool of available resources by combining the functionalities of several applications is also representative of this case.

In using the Intranet, the individual has significantly less leverage or fewer mechanisms then when using the email or mobile phone. First, the content of the Intranet cannot be filtered in a direct and straightforward manner. Second, the Intranet cannot be easily adapted or customized by the user, but, at the same time, can be easily rejected or neglected. As a result, three interlinked lines of reasoning emerge: (1) the Intranet as an individual level application, (2) the Intranet and it's technical characteristics, (3) the Intranet as an organization level application. The model of structuration is developed as an analytical tool to merge all thee perspectives in a meaningful framework.

Organization-enabled coping structures included the organizational redesign, introduction of standard operating procedures, gate-keeping roles, and training. In the model of structuration, we first demonstrated how the organizational initiatives are translated into the technical requirements. Thus, we outlined several organizational initiatives such as: restructuring and wide-scale organizational re-design; centralization of power, information and knowledge; formalization of organizational culture and emphasizing the importance of control; standardization of work processes, procedures, and information flows; reuse of knowledge and expertise and stressing the value of knowledge sharing; a global approach to business revealed in serving the clients across the globe, and exploiting the distributed working.

Above all, the initiatives aim at organizing and readjusting the information flow in accordance with the organizational structure and emerging business processes and thus eliminate the negative effects of information overload.

Next, we depicted how these structures are related or mirrored by the technology features. We demonstrated that there is a significant discrepancy between the organizational intentions and the existing technological platform. In particular, the changes in information flows have been delayed or have not been subject to a thorough implementation. Rather than explain this as a by-product of the wide-scale organizational change, we have outlined two factors that contributed to the situation. First, no central authority has been assigned to develop and implement the required changes. Second, the loose culture of sharing information and following procedures inherited from the former COM still prevailed.

Finally, we analyzed the process of appropriation by looking at how the individuals use the Intranet. We suggested that the appropriation has been dominated by the explicit criticizing of the Intranet in general and its structure, search and quality of information in particular. Though many individuals acknowledge the potential of the Intranet and its value for the business, the current application was characterized as a “drama”, “awful” etc. Therefore, by exhibiting the negative appropriation human agents undermined the origin social structures.

7.4 Information overload and human coping: an integrated perspective {DVV}

In this section, we suggest a way to integrate the study on information overload with the study on human coping. We use a graphic model (see 0) to demonstrate how information overload evolves and which strategies humans use to cope with it. The discussion is structured in terms of sequences, with the top sequences acquiring the maximum explanatory power.

Sequence 1 depicts how the duality of roles, such as being the MS Alliance Director and MS Sales Manager, is translated into information overload. Though, formally, the equal time should be spent on both responsibilities, often the responsibilities impose conflicting demands on managerial time and attention, and require non-trivial coordination in terms of sequencing and frequency of acts and complying with the locational requirements. As a result, the coordinative complexity goes up, contributing to the increase in information overload. Since the component complexity is also high, the cumulative effect of both on information overload is significant.

Sequence 2 is somewhat related to Sequence 1. It illustrates how the gate-keeping nature of the Alliance role can trigger the information overload. In particular, DVV, holding a central position at the cross–roads between SoftCom and MS receives, and dispatches large amounts of information in both directions. At the moment, the processes of information accumulation and transmission is not supported by the technological solution. First, the absence of a company-wide platform for information and knowledge sharing results in the use of conventional communication media. At the same time, the absence of a central, company-wide depository of information makes information collection a painful experience. Together, they cause an increase in component complexity leading to the information overload.

In the **Sequence 3,** the composition of daily interactions overload is shown. The informal style of communication, inherited from the former COM, still prevails within the company. The communication with the immediate superior is easy and non-constrained. An open working space reinforces openness to communication. At the same time, under the conditions of frequent reorganizations, the personal network proved to be the most efficient way to get the right information and at right time. In all, the openness to communication and the strong tradition of rich communications, raise the interaction load significantly. Given that almost no mechanisms for restricting one's own accessibility exist, the number of both

formal and informal interactions goes up, leading to increased component complexity and information overload.

Finally, **Sequence 4** illustrates how the centrally imposed emphasis on control leads to information overload. Holding the position of the Alliance Director, DVV is responsible for the major part of reporting. After the initiative to increase the control over the business processes and performance was proclaimed, the number of reports that must be filled in and submitted in time went up. The absence of a central depository of Alliance-related information and delays in adapting the information resources to the new organizational structure increased the time spent on information search, adjustment, and checking. This led to increased component complexity and information overload.

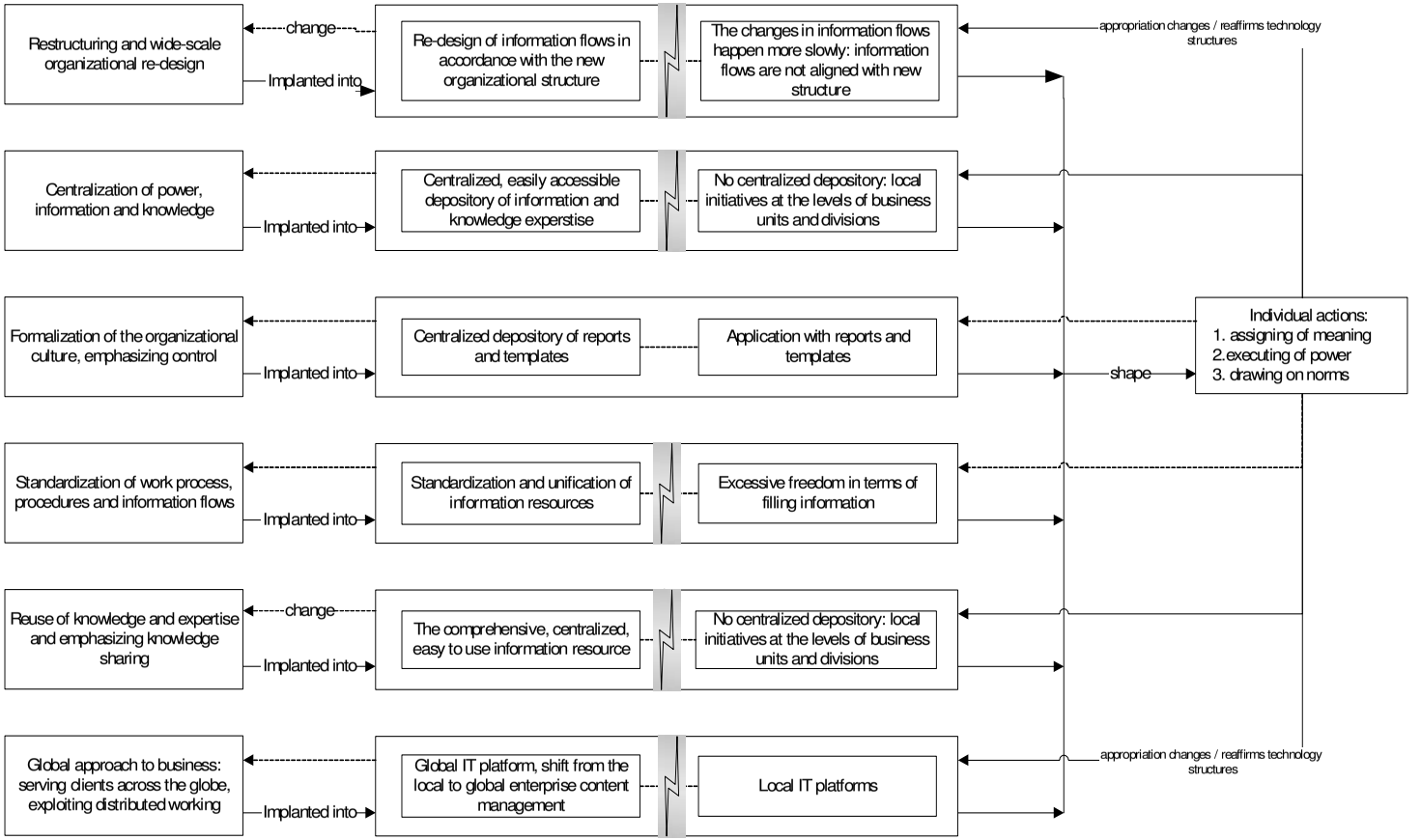


Figure 32. Model of structuration

Organization-enabled coping					
Description of structure	Appropriation move	Type of appropriation	Instrumental use	Attitude towards structure	*Empirical evidence*
Explicit inferences on how the structure is used and for which particular purposes	**Direct appropriation**: open use and referring to the structure	Faithful appropriation	Intended use	Positive	*Intranet is a source of commercial information for me; a lot of legal information is there also.{FK}* *I use Intranet for finding White Papers, information about people, various human resource issues, leasing cars etc.{JR}* *There is much information there on how do we do projects: the status, financial reports, different templates etc.{EM}* *I have been disappointed too often, but still believe in it and keep trying {RC}*
Instead of keeping searching the Intranet, delegation the task to subordinates or secretaries, or calling in order to get information needed	**Corrective combination**: Use one structure as a corrective for a perceived deficiency in the other	Unfaithful appropriation since the spirit of the technology is violated	Unintended instrumental use		*I seldom search the Intranet, I ask my secretary to find what I need {EM}* *I get in touch with colleagues. My experience is that you only need to call two colleagues and you'll get the required information {DV}*
Commenting on general features of Intranet, such as structure of information and search that underlie its quality.	**Criticism**: criticizing the structure without explicit reference to particular functionalities	Faithful appropriation	Intended instrumental use	Negative	*Intranet is a drama {FB}* *I would evaluate Intranet as "so-so" , beneath average {DB}*

Demonstrating the limits of the structure by explicitly indicating its deficiency in terms of information structure and the insufficiency of the search engine.	**Constraining the structure**: diagnosing how the structure is working, either positive or negative	Faithful appropriation	Intended instrumental use	Negative	*I cannot find things there; the structure is not clear at all. {FB}* *Information there is not structured, also search engine is not good {RC}* *t is extremely hard to find anything there {DVV}* *Lot's of information is not structured, so it's hard to find it {RS}* *Structure of Intranet is awful; only if you know exactly where to look you will find it{FK}*
Explaining the process of placing the information on the Intranet and reflecting on the consequences	**Demonstrating how the structure evolved**	Faithful appropriation	Intended instrumental use	Negative	*We were asked to put information at the Intranet. We were totally free in deciding how to do it: no structure, no limits, no control, nothing, Everyone has done it differently, so, at the end, it was hard to find something {DVV}*
Explicitly admitting non-use of Intranet	**Negation**: explicit and implicit rejection of appropriation	Unfaithful appropriation	Intended instrumental use	Negative	*I never use Intranet. {DV}* *I almost never use Intranet {RB}*

Table 59. *Appropriation of technology-enabled scoping structures*

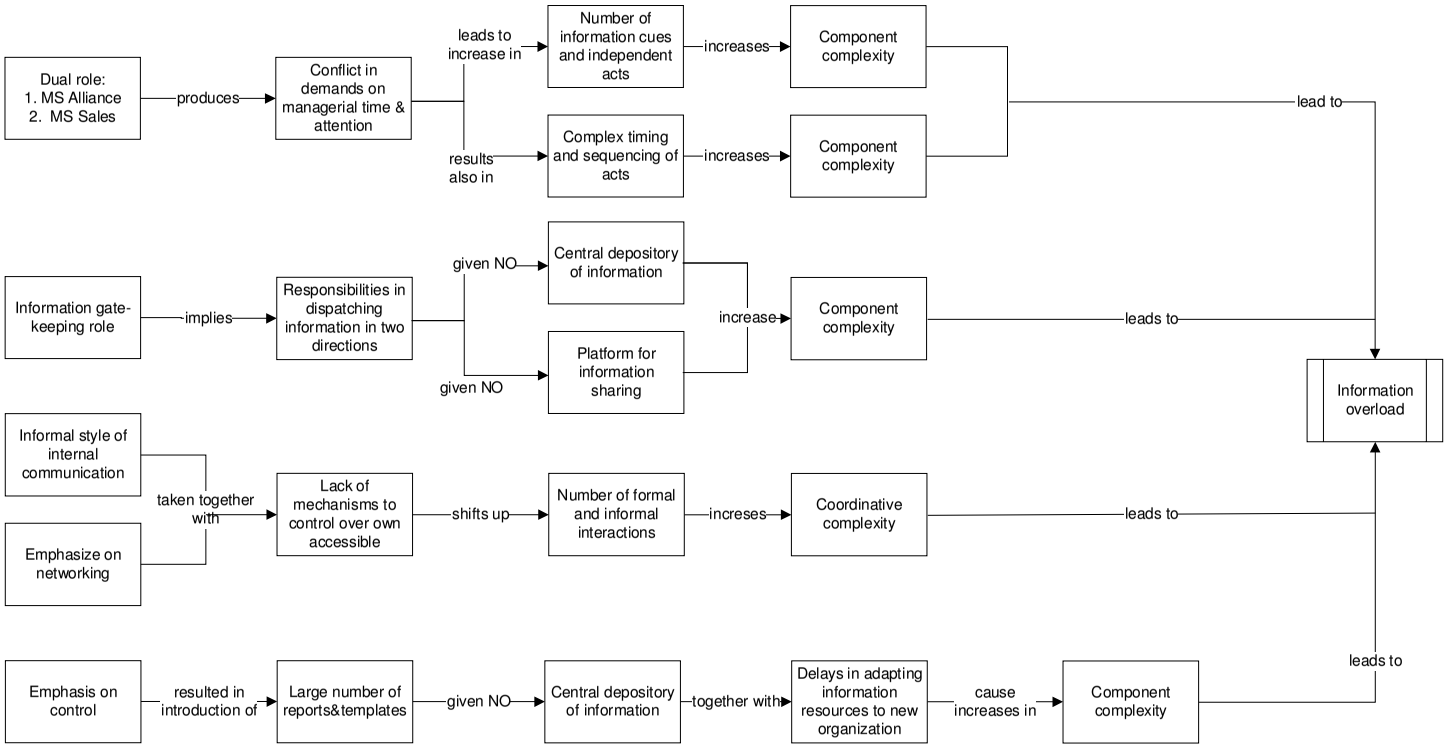


Figure 33. Individual profile, DVV

Chapter 8

Interpretation and conclusions

In this chapter, we summarize the findings and present the discussion of the research results. We revisit the conceptual framework and demonstrate how the empirical data relate to the theoretical propositions.

First, in Section 8.1 we provide a brief summary of the conceptual model. Second, we proceed with the cross-case analysis, in which the findings from the cases presented in Chapters 5, 6 and 7 are compared. We then discuss the research results by addressing the issues of the theoretical contribution of the thesis (Section 8.3.1) and the implications and lessons for managers and organizations (Section 8.3.2). In addition, in Section 8.4 we outline the limitations of the current research and suggest the possible directions for further theoretical and empirical inquiry.

8.1 Introduction

In this thesis we have explored a wide range of issues that are either directly related or can be logically extended to the problem of information overload or human coping. The research objectives were, first, to enhance our understanding of information overload and the factors that contribute to the establishment and proliferation of it and, second, to reveal how decision-makers adapt to it, adjusting their own behavior and changing working practices. In all, we aimed at advancing the studies of information overload in general, and placing them in the broad decision-making and organization behavior framework in particular.

This research consists of two parts: the study of information overload and the study of human coping. Though both are different in terms of the conceptual framing and the method applied, they are tightly connected. The contextualist research perspective has been adapted for this study, under which the phenomenon and the context are considered as being in constant interplay. This perspective serves as an analytical lens of the study, provides the directions for sense-making, and guides the research design and execution.

A conceptual model of information overload was developed to unfold decision-making under the assumption of information overload and to demonstrate how information overload is translated into decision-making inefficiencies. The model consists of three building blocks, i.e. human-contingent, task-contingent, and context–contingent perspectives on information

overload. Each offers competing explanations of information overload. Ultimately, an interactionist perspective is suggested.

First, under the human-contingent perspective, information overload is defined as a function of various personal characteristics of the decision-maker, such as, for instance, decision-making style and experience. It is argued that in the situation when personality characteristics are incompatible or insufficient given the information processing and communication requirements, information overload takes place. Eliminating this imbalance means eliminating information overload.

Second, within the task-contingent perspective information overload is treated as a product of various task characteristics, e.g. task complexity and time constraint. Aligning task characteristics with the information processing requirements reduces information overload.

Third, within the context-contingent perspective the importance of contextual factors is emphasized. Here, the problem of information overload is treated at the level of the entire organization by targeting wide-scale organizational initiatives.

Finally, although all the three approaches are credited with a certain explanatory power, none of them seems to cover the entire complexity of the phenomenon. That is why the need for the interactionist perspective is advocated. Under this perspective, information overload is a cumulative product of all the three groups of factors. Interacting, the factors either reinforce or partially cancel out one another. Therefore, to address the issue of information overload a complex research initiative should be designed.

Next, we have defined human coping as removing the unwanted pieces of incoming information by means of knowledgeable reasoning, selection and organization, and enhancing the human information processing capacity by using limited resources more efficiently. We suggested that this is a patterned, stable behavioral response of the individual to the conditions of information overload. To conceptualize human coping, we drew on the analytical apparatus of the structuration and adaptive structuration theories. We suggest three types of coping, i.e. human-enabled, technology-enabled, and organization-enabled, should be considered. All three exists in constant interplay, since none is sufficient to satisfy the demands for coping. While modeling of information overload has been accomplished in a more positivistic fashion, the interpretive approach was favored in the study of human coping. At the same time, both studies are essentially explorative.

The integrated conceptual model has been applied in the course of empirical study. Three companies participated in the investigation: BANK, a global financial service provider, REKLAME, a middle-sized communication agency, SoftCom, NL, a global IT solutions

company. The case descriptions and the preliminary research results have been presented in Chapters 5, 6 and 7 respectively. The cross-case analysis and summary of research results follows.

8.2 Cross –case analysis

8.2.1 Information overload

The conceptual model presented in Chapter 3 motivates the cross-case analysis. First, we analyze the effect of contextual factors on information overload in all the three cases. Second, we elaborate on the role of task characteristics in defining the problem of information overload. Third, we offer concluding thoughts on the effect of personality characteristics on the degree of information overload. Finally, we elaborate the interactionist perspective on information overload. In so doing, we draw on evidence from the three cases.

A. Contextualist perspective

As mentioned above, three different companies have been studied in this thesis. All three come from different industries, provide different types of services, and serve different clients. At the same time, all three are qualified as information intensive companies: information processing takes a significant fraction of the working time of employees, and is characterized as non-trivial. The size of companies or structural units in the study is comparable.

The diversity of companies contributes to our understanding of the contextual aspect of information overload and allows for making stronger inferences about how the contextual factors, i.e. organizational structure, internal culture, the efficiency and amount of internal communication, and the characteristics of technological platform, add to the overall degree of information overload.

With respect to the effect of **organizational structure** on the degree of information overload, the following inferences were suggested:

- The structure of the companies in all the three cases belonged to the mechanistic type with a well-defined hierarchy, formal chain of control and reporting, high independence of structural entities, and reliance on standards in fulfilling coordination and control. In the case of REKLAME, a direct link between the type of structure and information overload has been found. In particular, high independence of all business units with one unit having a central location produces

information transmitting and communication bottlenecks, when the information processing inefficiencies mostly are enacted within the central unit.

- At the same time, not the type of the structure per se but another characteristics of organizational structure dominated and guided the analysis. In particular, we have outlined the following factors that proved to have a significant effect on the degree of information overload:
    1) *Stability of organizational structure*: in the cases of BANK and SoftCom the instability of organizational culture contributed significantly to information overload. Thus, in BANK the instability of structure and frequent reorganizations caused a significant mismatch between the formal structure and the actual structure. Moreover, structural changes were not aligned among the units and were often delayed. These produced significant inefficiencies in terms of organizational information processing, revealed via the increased amount of information communicated, the high redundancy of information, and the misalignment between the work processes and information flows. As a result, managers, the central "consumers" of information in fact, suffered most. Thus, we have observed how the organizational–level information processing inefficiencies have been translated into the individual-level information overload. In SoftCom, the instability of organizational structure resulted from a recent merger and the dynamism of external markets. The consequences were similar to the ones listed above. Only in REKLAME was the organizational structure stable, and the organizational changes infrequent and marginal.
    2) *The existence and efficiency of coordination and control mechanisms* that define the patterns of information transmitting, its directions, content, and frequency: in all the three cases, the analysis of interdependencies among the structural entities indicated that coordination and control must be accomplished through the utilization of standards and planning. At the same time, in the cases of REKLAME and BANK these mechanisms were not in place. To overcome the resulting lack of coordination, sub-optimal informing practices and the excessive use of rich communication media have been observed. This allowed for the correcting of structural

ambiguities but increased the individual information and communication load significantly.

3) *The impact of the external environment:* at BANK, a global financial service provider, the role of the external environment was most vivid. It not only increased the amount of information dispatched through the company from the outside, but also enlarged the demands on flexibility and responsiveness. Therefore, organizational change became a norm rather than an exceptional state of transition. A similar observation has been made for the case of SoftCom, a global IT solutions company. At REKLAME, the local scope of operations and relative stability of the market demand mitigated the effect of the external environment on the organizational information processing.

To summarize, the results of this study indicate that not only the organizational structure per se is important but also the stability of organizational structure, the availability and efficiency of coordination and control mechanisms; the impact of the external environment and external demands on flexibility of structure. All these factors should be considered in any further investigations.

Though no direct evidence has been obtained, the size of organization might be a significant determinant of degree of information overload. Moreover, the results of the study suggest that the actual composition of information overload is a function of the size of the company. In fact, in both BANK and SoftCom, large multinational companies, the effect of contextual factors on information overload was stronger than in REKLAME, where the personal and task–related factors were more conspicuous.

The empirical evidence indicated that, indeed, there is a link between **organizational culture** and information overload and that the routes of information overload are grounded in the organizational culture. Below we list the "themes" relevant to the information overload discourse that emerged during the data analysis. These practices explain how the specific features of the corporate culture shape the internal information processing and result in information overload:

1) *Copy terror*: the informing practice that implies sending information to multiple recipients in self-securing mode. This information might be of little or no interest to the recipient but represents the form of self-security to the sender. Thus, sending an

email to a large number of recipients is perceived as fulfilling one's job responsibilities in a better way. This practice has been observed in all the cases, being enacted mostly in the case of BANK.

2) *Dysfunctional upward communication*: the informing practice that implies redirecting all information towards the recipients at the higher levels of the hierarchy. In so doing, the rights of unconstrained bottom-up communication are abused. In response, the recipients tend to adapt a defensive, even aggressive, attitude to this information when instant deleting, non-responding, delaying are the dominant ways of treating it. Therefore, despite its relevance or urgency, the information conveyed is not attended to and, as such, has no value for the decision-maker. Again, this practice has been observed in all the cases, being enacted mostly in the case of BANK.
3) *Competition rather than collaboration among the structural entities:* this implies that information is treated as a strategic resource that must be preserved. As a result, faithful information sharing is impeded. As a result, the information is constantly produced and reproduced within each structural entity with no reuse possible. This practice was particularly noticeable at REKLAME and SoftCom.
4) *Cultural differences between the structural entities* produce differences in information transmitting, collecting, and sharing. Though not replicated in the other cases, the effect of cultural differences on the efficiency of organizational information processing has been observed in the case of SoftCom. It helped to explain significant redundancy in information flows, and why the same information is constantly produced and reinvented.

The first two practices, (1) and (2), explain why the amount of information communicated internally increases. In all, both practices are characterized as widespread and generally accepted. Thus, sending an email to multiple recipients, though essentially dysfunctional, is considered normal, and represents a form of compliance with the practice used by the majority. Practices (3) and (4) provide a valuable insight into how information redundancy is created and facilitated.

With respect to the amount of **internal communication**, the empirical evidence has been strongly supportive and indicated that, as the amount of internal communication goes up, the risk of information overload increases. The finding was replicated in all the three cases. In

addition, we have found that face-to-face, mobile phone, and electronic mail are the dominant communication channels. The face-to-face communication channel is often used as a corrective medium to verify, clarify, and, otherwise, evaluate information obtained through other communication channels. The use of the mobile phone, besides suggesting new ways of working "anytime" and "anywhere", redefines the concept of working time by literally eliminating the boundary between working and non-working hours. Though the advantages of the mobile phone use are numerous, a number of drawbacks have been detected, e.g. increased interaction load. In all, the attempt to combine the use of different communication media in a corrective or complimentary manner, often on a simultaneous basis, has been observed. In so doing, managers try to increase the own accessibility, manage the interaction load and impose the control over events.

In all cases, the style of communication was evaluated as informal, with insignificant social barriers. The informality of internal communication contributed to managerial overload significantly. As a result, managers were engaged in non-stop interactions both formal and informal, having no mechanisms to restrict or control their own accessibility.

An interesting finding has been obtained with regard to the content of communication. In particular, the notion of "spam" content could be reconsidered in light of of the empirical evidence obtained. Internal newsletters that communicate general issues about the company are largely considered as spam. Most of the research participants acknowledged that the content of these letters is irrelevant in terms of current time and task frame: it is of low urgency, and has no news value.

With respect to the use of advanced **information communication technologies** and their effect on information overload, the empirical evidence was generally supportive. Indeed, the introduction and the use of certain technologies can cause or, otherwise, facilitate information overload. In Table 60, we present a summary of the cross-case analysis.

In the category of transacting technologies, we have included all applications that support key information production and transmission functions. Besides standard office applications (e.g. MS Office), the specific corporate information systems have been placed here as well. The link between the use of transacting software and overload was the most conspicuous in the cases of REKLAME and SoftCom.

Type of technology versus type of overload	*BANK*	*REKLAME*	*SoftCom*
P.8.A The use of transacting technologies increases the risk of data overload.	Not supported	Supported*[10]	Supported*
P.8.B The use of interpreting technologies increases the risk of structure overload.	Supported	Supported*	Supported*
P.8.C The use of connecting technologies increases the risk of interaction overload.	Supported*	Supported	Supported
P.8.D The use of collaborating technologies increases the risk of transaction overload	Indirectly supported	Indirectly supported	Indirectly supported

Table 60. *Summary of cross-case analysis: Proposition 8*

The insufficiency of interpretive functionalities and their restrictiveness in terms of data input requirements and decision models supported, have affected negatively the use of these applications. In particular, both in the cases of REKLAME and SoftCom the use of interpretive applications and the mismatch between information requirements and system output have been associated with overload.

Electronic mail has been the dominant connecting technology. Though in all cases the use of electronic mail was synonymous with overload, in case of BANK it was critically hampering. Not only the number of emails, but the size of each mail, the number and the size of attachments, and the appropriateness of use of electronic mail as a communication means given certain content, have been cited as the possible factors of overload.

Finally, with respect to the collaborating software, the absence of a collaborating platform and the use of conventional media, such as email, telephone, and face-to-face, produced the additional reasons for the overload. Moreover, in all cases the need for such an application has been indicated, since the work processes implied intensive cooperation among geographically dispersed team members.

At the same time, based on the results of empirical inquiries, we suggest that a number of additional factors should be considered in future investigations, such as:

- *Compatibility of the internal applications* in terms of system design and structure of data: both in the cases of BANK and SoftCom, the IT platform has been characterized as complex, consisting of a large number of smaller applications each supporting particular process or flow. In BANK the number of internal applications has been exceptionally large, producing significant data redundancy, search inefficiencies, information losses, etc..

[10] * - marks the strongest effect

- *Stability of technological platform:* the technical characteristics of the platform and their effect on information overload, although underlying the discussion in all three cases, were particularly manifest in the case of REKLAME. There, the technological platform was characterized as volatile and unstable. To overcome this instability human actors invented a number of "walk around" solutions.

B. Task-contingent perspective

Three components of **task complexity** and the effect of each on information overload have been studied (see Table 61 for a summary of the cross-case analysis). In all three cases the component complexity, defined as the number of information cues to be processed and distinct acts to be performed, dominates over all the three types and contributes most to information overload. Though the actual composition of component complexity differed across the cases, the overall effect of component complexity on degree of overload was in line with that predicted. Indeed, as component complexity of task goes up, the risk of information overload increases.

Proposition	*BANK*	*REKLAME*	*SoftCom*
P.3.A The risk of information overload goes up as the component complexity of the task increases.	Supported*[11]	Supported*	Supported*
P.3.B The risk of information overload goes up as the coordinative complexity of the task increases	Supported	Supported	Supported
P.3.C The risk of information overload goes up as the dynamic complexity of the task increases	Supported	No evidence available	Supported
P.4 The risk of information overload goes up as the time constraint becomes binding	Indirectly supported	Indirectly supported	Indirectly supported

Table 61. *Summary of cross-case analysis: Propositions 3 & 4*

Since managers were treated as a focal unit of analysis in all three cases, the coordinative complexity originated from two sources. First, the demands for interpersonal coordination impose additional communication and interaction strain and require managerial time and attention. Second, the coordination of one's own interaction and activities, in itself, is non-trivial.

Although the effect of coordinative complexity on degree of information overload is in line with what we expected, we found that individuals perceive high coordinative complexity as

[11] *-marks the strongest effect

an essential part of the job, which can neither be avoided nor changed. Such an attitude mitigates the subjective evaluations of information overload.

The empirical data suggested that, indeed, dynamic complexity contributes to information overload. Only in the case of REKLAME, has no evidence been found with regard to the effect of dynamic complexity on overload. In all, dynamic complexity originates from two sources: the internal organizational instability and constant restructuring, and the changing nature of the external markets. As a result, the breadth of knowledge necessary and sufficient to fulfill daily job responsibilities expands. To catch up with the internally and externally driven changes, information acquisition and processing are accomplished in a non-stop mode.

With respect to time constraint, the empirical evidence obtained from all three cases was indirectly supportive. Though time constraint was rarely mentioned as the reason for information overload, it underlay the entire discourse. In addition, the following inferences were made:

- At each moment in time, time constraint is a complex function of multiple time constraints. Often, time constraints are externally determined and, thus inflexible. Significant coordination efforts are required to attend to the multiple tasks and divide one's efforts and attention.
- As mentioned earlier, the distinction between working and non-working time has been shifted towards the former. In fact, working extra hours became normal, largely accepted practice.

C. *Human- contingent perspective*

With respect to the relation between **decision-making style** and information overload, we expected that information intensive decision-makers would perform better under the conditions of information overload. However, the empirical evidence obtained has been mixed (Table 62).

Proposition	*Case I*	*Case II*	*Case III*
P.1 Decision-making style determines the individual's vulnerability to information overload. Information intensive decision-makers are less vulnerable to information overload.	Mixed evidence	Not supported	Mixed evidence
P.2 Experience increases significantly the individual's ability to cope with the increasing information load. The greater the experience, the less vulnerable the decision-maker is to the information overload.	Supported	Supported	Supported

Table 62. *Summary of cross-case analysis: Propositions 1 & 2*

In particular, the analysis of the empirical data suggested the following:

- From one perspective, an information-intensive decision style contributes significantly to information overload. Indeed, the preference towards more information leads to a constant search for new information and, eventually, results in information overload.
- From other perspectives, by frequently processing large data sets managers, indeed, develop certain techniques and approaches that increase the speed of information processing and allow for using cognitive resources more efficiently. At the same time, continuous information search often becomes a trap when more information is not enabling but, in fact, prohibiting efficient decision-making. In this case, reliance on minimal information and intuition proves to be efficient, speeding up the decision process significantly and saving managerial time and efforts.
- Furthermore, holding a managerial position implies significant responsibility, leaving no room for mistakes. To accommodate this responsibility, managers pursue intensive information searches. Therefore, to some extent, information overload is a price that a manager prefers to pay to reduce the risk of decision mistakes.

With respect to the effect of experience on information overload, the inferences drawn from the empirical data were in line with the expectations. Extensive work experience, indeed, proved to be a strong countermeasure against information overload, particularly helpful in accommodating high coordinative complexity. The empirical evidence suggests also that experience allows for acting in a proactive mode, and relocating time and efforts based on

anticipations. The work experience in the current job served as good approximation to the size of one's personal network, which is utilized in the course of information search and information evaluation.

D. *Context-contingent, task-contingent and human- contingent perspectives: synthetic view*

Though each of three perspectives discussed above provide valuable insights into the nature of information overload and the factors that might contribute to it, the idea that information overload is a cumulative effect of a wide range of factors has been emphasized continuously throughout the study.

The individual profiles presented at the end of Chapters 5, 6 and 7 were used to summarize the findings. The analysis suggests the following:

- The composition of information overload differs among the individuals and depends on the context (organization). In particular, each profile illustrates a unique mixture of human-related, task-related, and context-related factors. Context–related factors, however, dominate. This validates the starting point of this research, where we claimed that information overload is a context– contingent phenomenon.
- At the same time, the replication can be made. First, similar patterns have been observed within the same organization (e.g., Case II: Individual profile, KR and Individual profile, LS; Sequence 2 and Sequence 1 respectively). This finding suggests that contextual perspective of information overload matters. Indeed, moving down the organizational hierarchy and addressing the problem of information overload at different levels of authority, we were able to observe similar patterns.

  Second, similar patterns have also been observed across organizations within comparable managerial functions (e.g., Case I: Individual profile, HL versus Case II: Individual profile, KR; Sequences 3 and Sequence 3 respectively). This indicates that, besides contextual factors, other factors, such as characteristics of task and personality, matter indeed. In particular, a certain degree of homogeneity of the composition of information overload might be expected when studying managerial overload in different organizations. Naturally, this homogeneity can be ascribed to the task characteristics, responsibilities, and approaches to decision-making.

- The effect of personality factors on degree of information overload is ambiguous. The elements of dynamics or instability have been observed with respect to the personality factors. Thus, we have found that decision-making style is not a stable construct but rather the evolving property of a human being. In the short term, decision-making style changes in response to the current decision-making context. In particular, as the time frame becomes binding individuals tend to abandon information search and the elaboration of alternatives, and shift towards more intuitive, experience-based decision-making. In the long term, decision-making style is changed in line with experience and accumulated knowledge. Therefore, we suggest that the cumulative effect of personality and task-specific factors should be considered.
- With respect to the task-specific factors, a high degree of agreement on the definitions, composition and effect of these on information overload has been evidenced. Thus, component, coordinative, and dynamic complexities were defined similarly in all cases. Component complexity arises from the utilization of multiple information transmission and communication channels in a simultaneous, complimentary modes. Coordinative complexity originates from the requirements imposed by the managerial positions (interpersonal coordination) and the requirements related to coordinating one's own activities (personal coordination). Finally, dynamic complexity is driven by the turbulence of the external business environment and the constantly increasing breadth of knowledge required to respond to these changes.

8.2.2 Human coping

In line with the conceptual model presented in Chapter 3, we have considered three types of coping, i.e. human-enabled, technology-enabled, and organization-enabled coping. We have paid specific attention to the patterns of interaction between the three.

First, human–enabled coping implies the use of personal routines aimed at reducing information load by selecting the relevant pieces and filtering out the rest. Being a form of habitual behavior, routines incorporate the accumulated knowledge and experience of similar situations. By repeatedly drawing on these routines, individuals "automate" the process, making it habitual.

Each routine contains the elements of signification, domination, and legitimation, in the terminology of structuration theory. The example of prior processing of incoming mail is representative. In scanning the content of their mailbox individuals apply interpretive schemes, draw on the notion of power, relate the act of sense-making to the organizational norms, traditions, and accepted behaviors. In Table 63, we present the collection of personal routines. The majority of routines were identified in all three cases. However, some are unique to a certain case.

Personal routines	*Description*
Selectivity	Applying interpretive schemes and particular selection procedures to process the information available.
Ex post organizing of the inbox	Organizing the content of the email inbox based on the results of the first scan. Emails are located in the folders or, otherwise, deleted.
Blocking of time	Reserving time for specific activities
Regulating own accessibility	Changing the accessibility mode to regulate the intensity of information and communication flows
Stretching of working hours	Expanding the time available to fulfill the job responsibilities by working during the leisure hours
Facet-to-face contacts	Filtering information by verifying, clarifying, and assigning relevance to it in the course of face-to-face contacts
Summarizing / Reporting back	Writing a summary or short follow-up reports after an appointment and distributing it among all the parties involved
Working ahead	Executing actions in a proactive mode

Table 63. *Personal routines: cross-case analysis*

Second, organization–enabled coping is defined as affecting the information streams by using such mechanisms as organizational re-design, information and knowledge management initiatives, introduction of certain cultural and behavioral norms, training, etc.. In Table 64 we summarize the structures observed. Again, the majority of organization-enabled coping structures were evidenced in all three cases. However, some, for instance, “Werkdag”, were unique.

Each structure contains the dimensions of signification, domination, and legitimation, which are constantly interlinked. Each structure is a rather abstract and all-inclusive concept aimed at restricting and re-directing of information flows and aligning them with the organizational structure and major work processes.

Personal routines	*Description*
Design and implementation of gate-keeping roles	Introducing boundary roles with the information gate-keeping function assigned. Secretaries and personal assistants are the example.
Training	Providing training course to enhance the employees' knowledge and skills
Structuring and organizing the internal communication	Formalizing the internal communication by defining the frequency, intensity, and content of meetings.
"Werkdag"	Blocking of one day for the particular, often internal, activities that suffer lack of attention otherwise.
Standardization of workflow, processes, and roles	Design and implementation of job descriptions that formalize all processes and activities.
Implementation of reorganization initiatives	Design and implementation of reorganization initiatives aimed at eliminating various organizational, structural, and management inefficiencies.
Management by exception	Introduce an internal informing practice that restricts the amount of information that must be communicated in a top –down manner.

Table 64. *Organization-enabled coping structures: cross-case analysis*

In line with the structuration and adaptive structuration theories, the structure is instantiated only via the human actions. As suggested in Chapter 3, we adapt the concept of appropriation, as introduced and framed by the proponents of adaptive structuration theory. In particular, we suggest that social structures can be appropriated directly or, otherwise, first implanted into the technology and thus translated into the technology structures and in this way appropriated by humans. Under the latter scenario, the technology acquires all elements of modality, as defined by the structuration theory.

In the case of BANK, we have observed the examples of direct appropriation of social structures and technology structures. In the cases of REKLAME and SoftCom, the process of appropriation has been mediated by the technology.

In case of BANK the electronic mail, in the case of REKLAME – Symsys, the enterprise resource planning system, and in the case of SoftCom –Intranet, the internal network that establishes the basis for the overall information environment, were each mostly associated with information overload. Therefore, in this thesis, three distinct technologies, i.e. electronic mail, enterprise resource planning system, and Intranet, were considered. Though the three technologies are different, they possess a number of similarities, e.g. all three are considered the major sources of information and all three have a wide range of functionalities that facilitate information processing, storage, and retrieval.

First, electronic mail is a part of all standard office application packages. The inbuilt functionalities of the electronic mail application are standardized and do not vary across organizations. Therefore, the electronic mail application in itself does not reflect the specific characteristics of an organization or its internal processes. Based on the results of this research, we suggest that *the use* of this application is what makes it different. With respect to the use of email, the following tendencies have been observed:

- Only the basic technology features are utilized. The use of these features does not imply any prior training or deep system-related knowledge.
- Most individuals perceive that the constraining nature of technology still dominates over its enabling capacity. Thus, the variety, functionality, and ease of use of available technical features are often judged as insufficient. For instance, the research participants repeatedly suggested the attempt to use the rules to organize the incoming mails and re-direct them to subfolders according to a specified logic (rule) as an example of compensating for the insufficiency of the technical functionalities.
- The individuals avoid the direct appropriation of technology features aimed at filtering of incoming information. In so doing, they reveal a poor trust in technology and express a preference to stay in control over the information flows. Technology is used on an ex post basis, or in a proactive manner, and thus complements the filtering, selection, and organizing done by humans.
- The appropriation of many features is often unfaithful. The example of the deleting of an entire mailbox without reading or otherwise evaluating the information content is one of the examples of unfaithful appropriation. Besides being a simple, fast, and effortless way to deal with excessive information load, instant deleting of information makes it dysfunctional. This, in turn, undermines the potential of electronic mail as an efficient information transmission and communication medium. Indeed, the empirical data demonstrates that the recipient of an email a priori knows that he would not read the email; at the same time, the sender of this email also expects that the recipient would not read it or react to it.

In all, the study reveals that, although electronic mail is a dominant communication and information transmitting application, a negative attitude towards it and a growing concern regarding its efficiency prevail. Not only did the research participants link email with

information overload, but also exhibited consistently negative attitude towards it. Moreover, the high agreement among the research participants in evaluating email, its contribution to information overload, and the insufficiency of their coping strategies has been observed. Furthermore, the attempts to explore the electronic mail application and implement filters or categorization rules often fail, since the actual outcome does not meet the expectations.

Second, both in Case II and Case III, information overload has been associated with the use of company-specific applications. Naturally, in this case, the definition of what exactly coping with information overload is becomes complex. From one perspective, it might relate to the way individuals use the systems (level of individual action). From another perspective, it relates to the quality of the system and its functionalities (level of technology). Finally, it may be linked to how well the organizational information management initiatives are aligned with the capacities of the technology (organization– technology interaction) and how well these initiatives address the needs of individuals and facilitate the individual performance (organization-technology–individual interaction). Therefore, the use of the model of structuration, which helps to overcome the problem of levels of analysis proved to be beneficial.

In the case of ERP (Case II, Chapter 6), despite the fact that the package is standard, significant customization has been accomplished. In the course of customization the organizational processes, flows, values, and norms, are translated into the system functionalities. Consequently, the system accumulates and makes available interpretive schemes, provides coordination and control facilities, and codifies norms and legitimate behaviors, all of which are context-specific. In Chapter 6, we have demonstrated how the organizational initiatives aimed at reducing information load, organizing information flows, and otherwise structuring internal communication and information processing, are translated into technology and further downsized to the level of individual employees. Appropriating the technology, the individuals either accept or alter the underlying social structures. In Chapter 6, we have illustrated how the process of appropriation of Symsys alters the existing social order and undermines the attempts of management to structure, organize, and formalize internal information and communication flows. Actively rejecting the technology structures or appropriating the structures unfaithfully, individuals challenged the organization-enabled coping measures. As a result, Symsys has been used only to a very limited extent, all organizational initiatives have been boycotted (please refer to Table 66 for the summary of the appropriation analysis). Moreover, the whole strain and responsibility for coping with information overload have been shifted to the level of the individual, and the

potential of both the organization and the technology in terms of coping has been undermined. Therefore, we have not only suggested a method for detecting the coping strategies applied but have also provided an explanation of why certain strategies fail.

A similar analysis has been conducted and presented in Chapter 7. There, we have suggested that the Intranet also reflects the structure of the company, replicates the internal information and communication flows, supports the collaborative processes, and introduces and propagates the company's values. We have again argued that the broad organizational initiatives are translated into certain IT requirements and, in this way, represented to the employees. We have indicated that the disruption, expressed as a misfit between formulated IT requirements and the actual state of IT, affects negatively the appropriation of technology by humans. Indeed, we have shown that the process of appropriation was dominated by criticism, and implicit or explicit rejection of the use of the Intranet. As a result, the Intranet was used only to a limited extent (refer to Table 66 for the summary of the appropriation analysis). Similarly to the previous case, the underlying social structures have been altered again.

Based on the results of the empirical investigation, specifically the inferences drawn from Case II and Case III, we have concluded that two groups of factors must be considered when describing the nature of appropriation of technology and technology use. First, the technical characteristics of application such as the availability of functionalities, performance, quality of output, stability etc. are antecedent to the individual's attitude to the system and willingness to use it. Second, other factors that do not relate directly to the technical characteristics of the application, but explain why technology is used in the particular way, must be considered. A number of such factors have been extracted in the course of data analysis (Table 65).

First, the sufficiency of system–related knowledge and technical skills of employees define the nature of appropriation significantly. In REKLAME, both were evaluated as low and not only impeded the system use but also formed the basis for the a priori negative attitude towards the system. By contrast, in SoftCom the technical skills of the personnel were high, so other factors dominated the process of appropriation.

Factors	*Chapter 6: Symsys*	*Chapter 7:Intranet*
Sufficiency of system-related knowledge and technical skills of personnel;	Insufficient system-related knowledge, low level of technology-related skills of personnel;	Sufficient system–related knowledge, all employees have technical education and are advanced technology users;
Degree of fit between the spirit of the technology and the spirit of the company;	Spirit of company: creativity, flexibility, lack of discipline Spirit of technology: formalism, repeated procedures, processes and flows, standardization, high discipline	Spirit of company: informality, orientation towards results, no history of sharing knowledge, undisciplined use of internal systems. Spirit of technology: requires disciplined approach to the system use, promotes the idea of information and knowledge sharing
The nature of system implementation (the success of implementation initiatives, the quality of implementation etc., the top-down versus bottom-up nature of implementation initiative	The long history of unsuccessful implementation; Unorganized process of implementations; The lack of mutual understanding with respect to the internal issues and priorities; The top-down style of implementation initiative;	No single entity that is responsible for the translating of organizational transformation and initiatives into technology changes; for its update, and maintenance ; The guidelines for system use are too flexible and open-ended; No incentives / benefits for knowledge / information sharing; The top-down style of implementation initiative;

Table 65. *Factors that define the nature of appropriation: cross-case summary*

Second, degree of fit between the spirit of technology and the spirit of organization defined the process of appropriation of technology. In both cases, a hidden conflict or mismatch between these two has been observed. Thus, in REKLAME the emphasis was placed on creativity and flexibility. At the same time, discipline in following the internal procedures and regulations was never stressed as crucial. As a result, the use of a system that was based on a disciplined repeating of acts and procedures, on regular filling in of data and reports, did not coincide with working practices and style of working prevailing before the system implementation. A similar conflict has been observed in SoftCom. While the internal spirit of the company rested on the principles of informal communication, networking, and a focus on current results and current projects, the sprit of technology implied a willingness to share information and knowledge, a disciplined filling in of information into the system and the use of this information.

Third, the process of system implementation has an effect on system appropriation. As suggested in Chapter 6, the implementation of Symsys underwent the typical

"implementation fiasco" scenario, with a long history of unsuccessful implementations, a non-structured, "rush" implementation time frame, the lack of shared understanding of the system value, and top-down nature of the implementation initiative, with the stress on imposing rather than smoothly introducing the system. In SoftCom, the absence of a single unit responsible for the Intranet maintenance, the excessive flexibility of guidelines on what should be done and how it should be done, the lack of clear motives and incentives for doing this, and the top-down nature of all awareness initiatives defined the appropriation.

In all, the role of technology in assisting human information processing is only marginal. While the use of technology in a suboptimal manner (e.g., use of Symsys by the employees of REKLAME) causes information overload, its potential and actual use for coping with information overload is insignificant. In the course of the thesis, we have suggested several explanations for this:

- Desire to stay in control of all incoming information so as to eliminate the risk of missing potentially important pieces prevents the individual from exploring the available applications and using them in the course of information search, processing, and retrieval;
- The irreversible nature of technology-enabled filtering, often compared with erasing, forms the a priori cautious attitude towards it;
- The poor functionality of available interpretive and filtering features results in significant investments in terms of managerial time and efforts necessary to obtain the needed proficiency in terms of technology use.
- Lack of trust in technology solutions motivated by a long history of non-fulfilled expectations, breakdowns, and critical failures reduces the initial expectations of technology significantly.

Features	Case I: Electronic mail	Case II: ERP	Case III: Intranet
Spirit of the technology	1) Supports easy and efficient information transmitting and sharing; 2) Facilitates informal interactions; 3) Supports collaborative decision-making processes; 4) Provides wide range of tools and functionalities to support and facilitate information processing at the individual level;	1) Supports all major processes and flows so as to increase their formalization and efficiency; 2) Enhanced collaborative functionalities: real-time communication, information transmission and production; 3) Standard information management functions that aim at increased efficiency of information processing; 4) Organizational structure is replicated by the decomposition of functional modules;	1) Built to create comprehensive but flexible information environment; 2) Changes can be made easily on an on-demand basis; 3) Stimulates and facilitates knowledge sharing and information reuse; 4) Unconstrained collaboration with no social or geographical borders; 5) The rights to alter the structure of data, data format, etc. vary;
Nature of appropriation	The inbuilt filtering functionalities are not used and actively rejected by the individuals; Most of the available filtering and ordering functionalities are applied on an ex post basis and imply the use of "clean up"; Most of appropriation moves are unfaithful, limited to instant deleting, and, otherwise, ignoring of email as an information-communication medium.	Explicit or implicit rejection dominated the process of appropriation; Most appropriation moves qualified as unfaithful, contradicting the spirit of the technology; Latent conflict between the spirit of the system and the culture of the company; Most of the structures have been used differently than intended; Negative attitude towards system in general predefined the nature of appropriation;	Dominated by explicit criticism and demonstrating inefficiencies in terms of structure, search, and content; Explicit appropriation to satisfy the trivial information needs and active rejection and ignorance otherwise; To overcome the insufficiency of the Intranet corrective strategies have been used, such as delegating the task of information search and utilization of different channels (face-to-face, telephone etc.).

Table 66. *Appropriation analysis: cross-case summary*

8.3 Discussion and interpretation

8.3.1 Theoretical framework revisited

A number of general observations have emerged from this research. These observations are used for both assessing the theoretical contribution of the thesis and formulating guidelines for future research in the area.

First, we classify information overload and human coping as collective terms. Both are used to represent a collection of a wide range of concepts, which have independent meaning and are not always related to either information overload or coping. However, when incorporated into the study of the information overload and the study of coping, the concepts are arranged and collected in accordance with a specific logic. The example of such logic has been presented and depicted in the conceptual model of this thesis. The further refinement can certainly be accomplished.

Second, this research has attempted to study the phenomenon of information overload and human coping in a real-life context. Thus, a contextualist theoretical lens has been chosen in which individual action is embedded in a context, being enabled, defined, and restricted by this context. At the same time, the context has been approached as a product of human actions constantly altered or reconfirmed by further human actions. Several reasons have motivated this choice:

- The analysis of the available literature indicated that research on information overload has been dominated by the experimental research method. In all, most research attempts aimed to trace the effect of increasing information load on decision quality. Despite their elaborate research designs, experiments exclude the real-life decision contexts from the study and, in this way, possess limited value in addressing the real challenges with which contemporary decision-makers are confronted.
- Furthermore, we suggested that information overload could migrate from the individual to the organizational level and back. Thus, both levels are equally important and should be studied simultaneously.
- In Chapter 3, we elaborated the conceptual model, in which information overload is defined as a cumulative effect of many factors considered as being constant interaction. In the same way, human coping is also addressed as a collection of diverse measures that address different needs and are complementary rather than substitutes for one another.

The results of the empirical research demonstrate that the contextual study of information overload is beneficial indeed, since it not only helps to evaluate the role of the organizational context and includes it in the general decision-making framework, but also suggests that a wide range of "social factors" are important for studying information overload. These factors are often context-specific and can neither be defined prior to the study nor operationalized in a positivistic sense.

Based on the research results the initial conceptual model has been evaluated and adapted accordingly. However, it proved to be a valid approach for conceptualizing and for the empirical study of information overload. With respect to this, the conceptual model developed in this thesis must be considered as an analytical strategy that possesses necessary interpretive flexibility, but, at the same time, provides clear guidelines for pursuing theoretical investigations into information overload and related issues.

Third, we suggest that specific attention should be paid to the research method and measurement of key constructs. In particular, being aware of a distinction between the perceived and objective measures is of a paramount importance. In this thesis, for instance, we have demonstrated that coordinative complexity, if measured objectively by counting and weighting the effects of the various components, would be high for all the individuals under the study. However, the perception of it as being "normal" and "inevitable" leads to a situation in which objectively high coordinative complexity is not translated into information overload.

Fourth, the study of human coping presented in the thesis should be considered as a starting point for further investigations in the field. The results of the current research could be used in further research aimed at a sharpening of the relationships. Though within this study we preferred the interpretive method of data analysis, because it facilitates exploration, further research could have an objective of formulating and testing the propositions. We suggested the combination of structuration theory and adaptive structuration theory as an analytical lens, as a way of thinking about the subject matter. In this way, we were able to overcome the problem of levels of analysis, unfold the complex processes occurring in the contemporary organizations, and put the emphasis on both the restricting and enabling nature of coping structures. In so doing, we have contributed to the studies that investigate the interaction between technology and organizations. The results of this research demonstrate that the role of technology in human information processing and decision-making is still

marginal. Moreover, often not the availability, but the actual use of technology and the factors that define the patterns of this use, matter most.

In all, keeping in line these recommendations should result in a better understanding of information overload and human coping, but also suggest the perspectives, which will be useful for studying the complex organizational phenomena.

Text Box 9. Detailed Guidelines to information overload diagnoses

I. Organizational structure

Step 1: Define organizational structure

Comments: *Use organizational charts and information from internal corporate sources*

Interview the key figures to find the de facto structure

Step 2: Evaluate the fit between structure "in theory" and structure "in place"

Step 3: Define the inefficiencies / blocks

Examples of inefficiencies: *The structural incompatibilities among the structural entities*

Differences in roles and management chains among the structural *entities*

Structures that produce redundancies

Step 4: Develop re-design initiatives based on the results of Step 2 and Step 3

Recommended Method: Analysis of secondary data + structured interviews

II. Organizational culture

Step 1: Identify critical informing practices and evaluate their efficiency

Examples of practices: *Management by exception*

"Copy terror"

Dysfunctional upward communication …

Step 2: Evaluate the "email culture" in the company

Comments: *Recommended use of email as a communication media as compared to the actual use*

Company's policy on sending one-to-many emails

Current initiatives relating to stimulating effective email communications

Content of internal emails and its relevance

Step 3: Evaluate the quality of centralized informing initiatives

Comments: *Amount of information communicated by the centralized authority and frequency of communication*

Style of communication

Employee's evaluation of the content communicated

Step 4: Evaluate the attitude towards information sharing

Comments: *Identify the critical factors that form the attitudes of employees towards sharing information*

List the current initiatives to promote information sharing and reuse

Step 5: Identify the possible improvements based on the results obtained at Steps 1-4

Recommended Method: ***In-depth, non-structured interviews are preferred***

III. Technological Platform

Step 1: Identify the business-critical applications and evaluate their use

Comments: *Identify the business processes supported*

Analyze the structure of data

Evaluate the system output

Appraise the ease of use

Define the skills sufficient for the efficient system use and compare them with the skills of the average user.

Step 2: Define the possible measures that will help to enhance / improve the use of technology based on the results obtained at Step 1.

Step 3: Align the changes defined at Step 2 with the organizational initiatives proposed in Section I.

Recommended Method: ***Secondary data + in-depth, non-structured interviews are preferred***

IV. Internal communication

Step 1: Develop a questionnaire and launch an internal communication survey

Comments: *Standard questionnaires for the evaluating of internal communication can be applied*

Step 2: Develop the questionnaire and launch the internal communication survey

Step 3: Assess the employees' satisfaction with communication

Step 4: Based on the results obtained at Steps 2 and 3, design and implement possible improvements

Recommended Method: ***Survey (Step 1&2) + In-depth, non-structured interviews (Step 3)***

8.3.2 Relevance to practice: implications and lessons for managers and organizations

In this thesis, we have studied three companies. They come from different industries, serve different markets, and address different needs of clients. However, the results of the research indicate that all types of business gradually converge to what is known as "information intensive business", when internal information processing becomes the core activity and when information is placed in the range of the strategic resources (see Shapiro and Varian, 1999). This requires the establishment of not only new business models but also a significant alteration in the supporting tools and a shift of focus towards the efficiency of internal information transmitting and communication.

Under the conditions when a whole business becomes nothing else but information acquisition, processing, and analysis, many managers still feel uninformed. Moreover, "uninformed" does not mean the lacking in information, rather, it means a lack of the right, relevant, or high-quality information.

While since 1997 the Internet traffic has indeed doubled every year, making information production and transmission extremely simple and cost-free, the tools that facilitate monitoring, filtering, and analysis of information flows are still inherited from the "old economy". As The Economist puts it, "today, businesses are mostly shooting in the dark" (The Economist, January, 2002). Thus, the limited human information processing capacity, exacerbated by the insufficiency of information processing techniques and tools, produce information overload that goes beyond the scope of a single individual, affecting the entire organization.

We have demonstrated how an elaborate research strategy can be applied and replicated in diverse organizational settings. Moreover, we have studied three different applications and suggested the ways to link these studies.

To control the risks imposed by the complexity of the internal information environment, organizations must manage a number of critical areas, which will be discussed in the section below. To do this, we suggest detailed guidelines for "Information overload diagnoses" (see Text Box 9). These guidelines not only help to detect the level, the scope, and the factors behind information overload, but also provide actual methods for fulfilling diagnoses and a basis for developing countermeasures.

- First, the organizational structure should be revised. Organizational structure defines the patterns and directions of internal communication and information

transmission, establishes the mechanisms for coordination and control, and formalizes the chains of responsibilities. As suggested by the research results, the "structure in theory" often differs from the "structure in place". Thus, a poor fit between the two results in the insufficiency or inappropriateness of coordination and control mechanisms, and the sub-optimality of internal processes and flows. In many cases, it leads to duplicate efforts, information and communication breakdowns, excessive reliance on personal networks, and delayed decisions. Moreover, the existing structural inefficiencies and blocks must be indicated. The examples of such inefficiencies are: (1) incompatibilities in terms of the structure of entities (business units, departments) that impede free flows of information and make information incomparable; (2) differences in roles and management structures; (3) designs that produce redundancies and repeated circles.

- Second, the internal corporate culture should be evaluated, since it informally defines and imposes certain traditions, ways of behavior, and attitudes. Moreover, as suggested in the thesis, information is often considered a strategic resource and tool for manipulation, bargaining, and executing power. The critical informing practices should be identified. Dysfunctional upward communications, "copy terror", management by exception, are examples of informing practices that were discussed in this thesis.

Since electronic mail is considered a major communication application, specific attention should be given to evaluating "email culture". The actual use of email should be benchmarked against the recommended use. In so doing, such characteristics of email as length of email, content, number of recipients, the objectives of email, the subject line etc. should be considered.

Next, the company's' policy on sending one–to–many emails and the responsibility for sending unsolicited and irrelevant messages are to be evaluated.

The quality of the centralized informing initiatives must be assessed further. The general information emails, and newsletters that communicate general issues relating to the company, its strategic directives, position at the market, and recent successes and challenges are examples. Again, the volume and frequency of such communication should be estimated. As demonstrated in the thesis, the excessive amount of general information reduces its perceived value and removes the "news"

component from it. Therefore, besides simple counting of emails, also the individual evaluations of the content communicated must be considered.

Since the attitude to information sharing proved to be critical to free and unconstrained internal information transmission, accessing it should be the next step. Both the factors that form the employees' attitude and current initiatives undertaken must be taken into consideration.

- Third, a wide range of factors with respect to the IT functionality must be studied. The technical quality of the system, the quality of the system's output, the degree of its alignment with the major business processes supported, and the ease of use and sufficiency of skills should be considered. As demonstrated in the thesis, often the core of the problem is not related to the technical characteristics of IT but rather originates from the way technology is used and how it fits into the broad organizational and cultural context. In particular, the availability of tools and technologies is necessary but not sufficient to guarantee the improved organizational information processing. Thus, drawing on the examples from the thesis, in REKLAME the insufficiency of system-related knowledge and lack of technical skills impeded its efficient use in the course of information processing. By contrast, in SoftCom the skills of employees were at a very high level but the use of technology was mediated by the negative attitude towards it. Next, the existing gaps in the IT platform must be considered. In all three cases in the thesis, we have indicated the need for a collaboration platform that would facilitate distributed team-working, information and expertise sharing, and would therefore eliminate part of the load imposed by the use of conventional communication media such as face-to-face, telephone, and email.
- The efficiency of internal communication must be assessed next. The standard internal communication survey evaluates the intensity, content, directions of communication and employee's satisfaction with the communication.

Based on a critical analysis of the four aforementioned areas, the current inefficiencies will be detected and a set of countermeasure developed. The outcome of all four stages must be considered simultaneously so as to prevent the misalignment of measures and policies.

Furthermore, the complex of measures could be developed to enhance the individual information processing skills. Though these measures are context-specific, some general

recommendations can be made. For instance, time management training sessions, in which the basic rules of time allocation and priority setting are defined, is one example. Increasing proficiency in IT use via expanding the system-related knowledge of employees and their general proficiency is another.

8.4 Limitations of the study and future research

Finally, we discuss the limitations of this research and suggest the directions for future research.

In this thesis, we presented the findings from three case studies. In one case (Case II, Chapter 6) the whole company has been studied. In Cases I and III (Chapters 5, 7), division level studies have been conducted, where divisions possessed high operational and decision-making independence and functioned as sovereign organizations. Due to the fact that case study approach has been chosen as the preferred method of research, particularly valuable for an explorative, ground-touching study, the limitations traditionally associated with the case studies investigations must be kept in mind. Lee (1989) has outlined three challenges pertinent to case study research.

The first problem is related to making controlled observations. While in lab experiments the researcher investigates the effect of one variable on another, keeping the rest constant, a similar approach to the study of cause-effect relationships is not feasible within case study research. In a real world situation, the effects of all factors are enacted simultaneously, so the strength of the influence of each particular factor is not clear. To overcome this problem, Lee (1989) suggested using natural controls. As mentioned in Chapter 4, we defined four different approaches to explaining information overload. All four refer to the existence of phenomena that are neither directly observable nor easily discernible. None of the four approaches is therefore directly verifiable. However, all produce predictions of events that were observable, providing the basis for making conclusions on the validity of the research. Earlier in the chapter, we have suggested that the interactionist perspective, the perspective in which the relevant outcomes of all three is synthesized, is preferred when studying information overload. Though our conclusions are only tentative, they allow for theory falsifiability and indicate the areas where additional research is necessary. The part of the study on human coping was conducted in an interpretive manner, meaning that both data collection and data analysis were guided by the researcher's subjectivity. While objective data are always preferred, it was not always possible to obtain an objective verification of the

stories and explanations suggested by the interviewees. Where possible, the subjective data were verified, reconfirmed, or challenged by objective data. Furthermore, the interview narratives were sent to the interviewees so to verify the researcher's understanding of the subject matter.

The second problem of case study research concerns the replicability of the findings (Lee, 1989). In this thesis, we have demonstrated how the same theory and method could be applied in different contextual settings. In so doing, we replicated the findings.

Finally, the problem of generalizability is traditionally associated with case study research. In line with the recommendation of Lee (1989) and Eisenhardt (1989), we have applied analytical generalization based on the logic of replication of findings across several cases.

While this research has contributed to our understanding of the phenomenon of information overload and has outlined the ways of coping with it, a number of topics are suggested for further investigations. First, a similar analytical strategy can be applied within different organizational settings so as to refine and sharpen it further. In particular, the investigation of the relative importance of the factors that contribute to information overload is needed.

Second, the phenomenon of human coping deserves further investigations. Based on the results of this research, different methodological approaches can be applied. Thus, for instance, experimental research that aims at studying the human appropriation of the interpretive and filtering functionalities of technology is particularly interesting. The investigations of this type should be motivated by a willingness to understand why certain functionalities are used and others neglected. In this thesis, we have suggested some of the possible explanations; however, much research in this area is still required.

Finally, current research suggests new research avenues in such disciplines as knowledge management and knowledge transfer within organizations, the role of technology in organizations, and the effect of internal culture on the efficiency of organizational information processing. Thus, we have demonstrated that information overload both impedes the free flow of information within companies, and, at the same time, is caused by the inefficiencies in the area of knowledge management. We have paid specific attention to the interplay between humans, technology, and organization and have demonstrated how the nature of technology use can be central to explaining the broad organizational processes. Furthermore, we have suggested that information overload is a part of contemporary business culture that often can neither be avoided nor changed.

In this thesis, we have aimed to improve our understanding of the information overload phenomenon and to investigate the possible strategies to cope with it. In the course of the

study, we have demonstrated that the problem of information overload is likely to emerge as a result of the interaction among a wide range of organizational, task-related, and human-related factors. We have suggested that under the pressure of a turbulent external environment, organizations and individuals strive for greater flexibility and responsiveness, and thus alter the traditional ways of working. We have argued that the research problem lies at the crossroads of several disciplines, e.g. management information systems, organizational behavior, human cognition and offers an unconstrained freedom for the researcher in terms of choosing the focus and perspective, making the research process exciting, demanding and challenging at the same time.

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Appendix I: Effect of information load on decision quality: the experimental findings summarized

Study	Type of task	Research method and participants	Independent variables	Dependent variables
Chewning, Harrell, 1990	Financial prediction	Laboratory experiment 3 groups: graduate accounting students undergraduate accounting students auditors	Information load: 4, 6, 8 cues Domain related knowledge	Cue usage Decision consistency
Stocks, Harrell (1995)	Judgment task	Field experiment Bank loan officers	Information load: 6 or 9 cues Individual vs. group decisions	Judgment quality: Cues used Accuracy Consistency Consensus
Stocks, Tuttle (1998)	Financial prediction	Laboratory experiment Accounting students	Information load: 6 vs. 9 cues Categorical vs. numerical data	Cue usage Decision consistency
Tuttle, Burton, 1999	Estimate stock price	Undergraduate accounting students	Information load: 6 vs. 9 cues Monetary incentives: yes vs. no	Cue usage Decision consistency Decision time

Casey, 1980	Financial judgment task	Laboratory experiment 122 bank loan officers Between-persons manipulation of information	Information load: 3 levels	Predictive accuracy Decision time
Schields, 1983	Financial judgment task	12 graduate of the executive MBA program Within –person manipulation of information	Information supply: number of rows in the report, number of columns in the report, or the product of rows and columns	Information demand: frequency of selection, order of information selection, subjective importance Judgment accuracy Judgment consensus
Chervany, Dickson, 1974	Production planning decision	Laboratory experiment 22 graduate business administration students	Information format: raw data vs. statistically summarized	Decision accuracy Decision time Decision confidence
Iselin, 1988	Financial judgment task	Laboratory experiment 79 undergraduate students without decision-making experience 71 subjects with decision-making experience	Repeated dimensions: 4 levels Relative diversity: 2 levels Decision-making experience: 2 levels Task learning : 4 levels	Decision accuracy Decision time

Hahn, Lawson, Lee, 1992	Performance questionnaires	High school students	Information load: 4 levels Time pressure: time pressure vs. no time pressure Level of involvement: high vs. low involvement	Decision quality
Speier et al., 1999	Judgment tasks delivered by computer-based decision support system	Laboratory experiment 238 undergraduate students	Task complexity: simple symbolic and simple spatial vs. complex symbolic and complex spatial tasks Work environment: interrupted vs. non-interrupted Interruption characteristics: low vs. high interruption frequencies and content similar vs. content-different	Decision accuracy Decision time
Snowball, 1980	Financial prediction task	90 students: 30 graduate students already employed 30 students that will receive the accounting degree in more than 2 academic quarters 30 students who has completed only one accounting course	Expertise: 3 levels (high, moderate, and low Disclosure variation: high vs. low disclosure Time: unlimited vs. moderate vs. sever time condition	Dispersion of predictions Prediction confidence interval

Appendix II: Details of the empirical data analysis

Interviewee	Task-contingent perspective				Person-contingent perspective					
	Task complexity			Time	Decision style	Experience				
	Component	Coordinative	Dynamic			II	DM	IT	WE	CWE
Case I: BANK										
HL	++	++	++	++	I	H	H	A	H	H
LL	++	+	++	++	I	H	H	H	H	A
JP	+	+	+	+	II	H	H	A	H	A
AL	++	++	++	++	I	H	H	A	H	A
TH	+	+	+	+	I	H	H	H	H	H
HF	+	+	+	+	I	H	A	A	H	H
LM	+	++	+	++	I	A	H	A	H	H
MD	++	++	++	++	I	H	H	H	H	H
PVH	+	+	+	++	II	A	H	H	H	A
FK	+	+	+	+	I	H	H	H	H	H
RZ	++	++	++	+	II	H	H	H	H	H
RJS	++	++	+	++	II	H	H	H	H	H
Case II: REKLAME										
KJR	++	++	++	+	I	H	H	A	H	H
JS	++	-	+	++	I	H	A	H	A	A
WH	++	++	+	++	II	A	H	H	H	H
RC	-	+	+	+	II	L	H	A	H	H
LS	++	++	+	++	I	H	H	A	H	A
HG	-	+	-	N/A	I	L	A	H	H	L
DJ	+	+	+	++	I	H	H	A	H	A
RR	+	+	-	N/A	I	L	L	A	H	H
WS	+	+	+	+	I	H	H	H	H	A

Case III: SoftCom										
DS	+	++	+	+	II	H	H	H	H	H
JPB	+	+	+	+	II	A	H	H	H	A
FK	+	+	+	+	II	H	H	H	H	H
AB	++	++	++	+	II	H	H	H	H	H
DV	+	++	+	+	I	A	H	H	H	H
DVB	++	++	++	++	II	A	H	H	H	H
FB	++	+	++	+	I	H	H	H	H	H
RK	+	++	+	+	I	H	H	H	H	H
BR	+	+	+	++	II	A	A	H	H	H
RVR	++	++	+	++	I	H	H	H	H	H
RVS	+	++	++	+	I	H	H	H	H	H
EM	++	++	+	++	I	H	H	H	H	H
JVR	++	++	++	++	I	H	H	H	H	H
RB	++	+	+	+	II	H	H	H	H	H
DVV	++	++	++	++	I	H	H	H	H	H

Summary

At the beginning of the 20th century, a key characteristic of information was its scarcity. The expansion of information and communication technologies however brought some dramatic changes in terms of volume of information and communication, driving society towards the information age with novel economic, social, and ethical rules. The problem of having too little information has been transformed into a problem of having too much information and has generated feelings of deficiency in the face of constantly increasing information flows. At the same time, information overload is a relatively new theme of study, in which academic interest is generated and stimulated by the practice. In the past decade, a number of articles on information overload have been published in academic and non-academic journals. Besides the common claim that information overload is an undesirable state that has significant negative consequences on individual decision-making and overall organizational performance, very few parallels between the studies can be identified. The research produces mixed, often controversial, and generally incomparable results. Since a significant fraction of research has adopted the experimental research design and assessed the effect of variation in the number of information cues on the degree of information overload, the effects of the immediate and broad decision-making context were not included into the research design.

In this research, we developed, tested, and refined a conceptual model of decision-making by introducing the assumption of information overload. In so doing, we anticipated to attain theoretical clarity of the concept and to improve the model of managerial decision-making. We also aimed to develop practical recommendations, such as a collection of coping strategies and approaches to dealing with information overload.

We developed conceptual model of information overload and human coping. Following the guidelines for contextualist research, we outlined several levels of analysis and suggested that all the levels are interconnected and should be considered through an ongoing interplay. We perceived context not as the "passive" background against which actions take place, but as an "active" intermediating and regulating environment that defines actions and, at the same time, is changed by these actions.

Three generic groups of factors that contribute to the emergence and proliferation of information overload were specified: personal factors, situational factors, and contextual factors. Correspondingly, three perspectives of the information overload study, i.e. human–related, task-related, context–related, were identified. In addition, we assumed that the combined effect of factors from all three groups should be taken into consideration.

Within the human-related perspective on information overload, the effect of personality factors, i.e. factors that are internal to the person, was studied. It was argued that in a situation when personality characteristics are incompatible with or insufficient for information processing and do not coincide with the communication requirements, the information overload takes place.

The task-related perspective describes the effect of task-specific factors on information overload. In particular, the impact of task specification, task mode, and the quantity and quality of task-related information available for the decision–maker was investigated.

Finally, information overload could be defined as a context-contingent phenomenon. In this case, information overload at the individual level results from higher–rank (in other words, organizational) inefficiencies. We assumed that all individual actions are embedded in the organizational context. Through its institutions and coordination and control mechanisms, organizations enable, constrain, and define the possibilities for individual actions. Information processing, the dominant activity of individuals in contemporary organizations, is also subject to organizational regulation. Therefore, the central problem of organizations is one of determining how to organize the process of information processing. As a result, individual information processing rules and schemata are established, promoted, or even prohibited by organizational policies, norms, and resources.

We argued that human-related, task-related, and organization-related factors, while often having an independent effect, produce certain interactions reinforcing or eliminating each other. Therefore, information overload is neither human–determined nor situation or context-determined but rather a consequence of these interactions.

The results of research indicate many managers still feel uninformed. Moreover, "uninformed" does not mean the lacking in information, rather, it means a lack of the right, relevant, or high-quality information.

Contextual factors indeed dominate and define the composition and the scope of information overload. This validates the starting point of this research, where we claimed that information overload is a context–contingent phenomenon. The role of the personality factors in establishing information overload is ambiguous. The elements of dynamics or instability have been observed with respect to the personality factors. Therefore, we suggest that the cumulative effect of personality and task-specific factors should be considered. With respect to the task-specific factors, a high degree of agreement on the definitions, composition, and the effect of these factors on information overload have been found.

Furthermore, based on the context of the themes, which emerged from the literature survey and during the empirical data analysis, we made a distinction between three types of coping, i.e. human –enabled, technology-enabled, and organization –enabled. The enabling entity, in particular the entity performing the filtering, selection, or clustering functions, such as the individual, technology, or organization, is the criterion for classification.

Human–enabled coping was defined as removing the unwanted pieces of incoming information by means of knowledgeable reasoning, selection and organization, and enhancing the human information processing capacity by using limited cognitive resources more efficiently. Individuals employ a number of routines to cope with information overload. Each routine is a form of habitual, and, in a way, mechanical behavior that is deeply embedded in and shaped by the individual's knowledge and prior experience. A list of such routines is offered as an outcome of the empirical data analysis.

Technology-enabled coping implies the use of inbuilt technological features and functionalities aimed at filtering out unwanted information. We defined technology through its structural features and spirit that, if combined, form its structural potential. Technology inherits all the characteristics of modality since it embodies the interpretive schemes, enables and facilitates coordination and control, and contains the rules and legitimate behaviors.

The organization-enabled coping embraces the filtering of information streams by means of organizational restructuring, calibrating of organizational information management activities, and imposing certain cultural and behavioral norms. Applying the structuration theory, we approached the organization–enabled coping through the prism of social structures, and introduce the concept of coping structure.

At the end, we focused on the ongoing interaction among the structures, paying specific attention to the role of technology. The structuration model of interaction was proposed and empirically tested, explaining the rationale behind the interaction and visualizing the existing links between the three types of coping mentioned above.

Accordingly, three distinct technologies that facilitate information processing, storage, and retrieval, i.e. electronic mail, enterprise resource planning application, and the Intranet, were considered. In all, we found that the role of technology in assisting human information processing is still only marginal. Moreover, while the use of technology in a suboptimal manner causes information overload, its potential and actual use for coping with information overload is insignificant. In the thesis, we have suggested several explanations for this.

To validate the conceptual framework, we have shown how an elaborate research strategy can be applied and replicated in diverse organizational settings. In the thesis similar studies conducted within the three companies are presented, linked, and related. We have not only suggested a method for detecting the coping strategies applied but have also provided an explanation of why certain strategies fail. To control the risks imposed by the complexity of the internal information environment, we believe organizations must manage a number of critical areas. To do this, we suggest detailed guidelines for "information overload diagnoses". These guidelines not only help to detect the level, the scope, and the factors behind information overload, but also provide actual methods for fulfilling diagnoses and a basis for developing countermeasures.

Biographical Note

Ksenia Iastrebova was born in Ekaterinburg, Russia in 1977. She received her BA and MA in Economics (both cum laude) from the Urals State University. In 2000, she defended her master thesis on the topic "The effect of the shadow economy on the economic growth in Russia". She also worked as a teaching assistant and a lecturer at the Department of Theoretical Economics. In 2000, she was awarded a scholarship from the European Union for visiting Erasmus University, Faculty of Economics.

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Managers' information overload

The impact of coping strategies on decision-making performance

At the beginning of the 20th century, information was a scarce resource. The expansion of information and communication technologies, however, brought dramatic changes in terms of volume of information, driving society into the information age with new economic, social, and ethical rules. The problem of having too little information has been transformed into a problem of having too much information and has generated feelings of deficiency in the face of a constantly increasing information load. In this thesis, we develop an analytical approach to study the problem of information overload and human coping with it. Three generic groups of factors that contribute to the emergence and proliferation of information overload are specified. While often they have an independent effect, they also produce interactions reinforcing or eliminating each other. Hence, information overload is a complex phenomenon that results form the interactions among a large number of factors. Based on literature review and empirical data analysis, we made a distinction between three types of coping, i.e. human-enabled, technology-enabled, and organization-enabled. We further model human coping behavior using the analytical apparatus of the structuration theory, paying specific attention to the role of technology in assisting and facilitating human information processing. In so doing, we not only suggest a method for detecting the coping strategies but also provide an explanation of why certain strategies fail. Three qualitative case studies are presented in this thesis and are used to test and refine the conceptual model. The results suggest that to control the risks imposed by the complexity of the information environment, organizations must manage a number of critical areas. We propose detailed guidelines for "information overload diagnoses". These guidelines not only help to detect the level, the scope, and the factors behind information overload, but also provide methods for fulfilling diagnoses and a basis for developing countermeasures.

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