

UNIVERSITY OF CALIFORNIA,  
IRVINE

The Nature of Managing Multiple Activities in the Workplace

DISSERTATION

submitted in partial satisfaction of the requirements  
for the degree of

DOCTOR OF PHILOSOPHY

in Information and Computer Science

by

Víctor Manuel González y González

Dissertation Committee:  
Professor Gloria Mark, Chair  
Professor Bonnie Nardi  
Professor Alladi Venkatesh

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## DEDICATION

To my wife,

Karyna María Luisa Luna Avila,

For all your love, support, and complete trust during all these years of study.

To my Lord

For confirming each step of this way.

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# CURRICULUM VITAE

Víctor Manuel González y González

## EDUCATION

**2006**

University of California, Irvine, United States of America  
PhD in Information and Computer Science

**2002**

University of California, Irvine, United States of America  
M.Sc. in Information and Computer Science

**1997**

University of Essex, Colchester, United Kingdom  
M.Sc. in Telecommunication and Information Systems

**1994**

Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM)  
Querétaro, Mexico.  
BSc. in Electronic Communications Engineering

## RESEARCH INTERESTS

Human-Computer Interaction  
Computer Supported Cooperative Work  
Home Informatics  
Medical Informatics  
Ubiquitous and Mobile Computing

## PROFESIONAL DEVELOPMENT

**March 1995 to August 1999**

University of Guanajuato, Guanajuato. México.  
Manager of the Information Systems and Computing Unit  
Voice and Data Network Administrator.

**August a October 1995**

ALCATEL Bell Telephone Bell Education Centre Antwerp, Belgium.  
Software Engineer

## RESEARCH EXPERIENCE

### **September 2003 to December 2005**

CICESE Research Center Mexico

Supervisor: Professor Jesus Favela Vara

Research Fellow

### **September 2002 to December 2005**

University of California, Irvine – Center for Research on Information Technology and Organizations and School of Information and Computer Science

Supervisor: Professor Gloria Mark

Research Assistant

### **April to June 2002**

University of California, Irvine – Center for Research on Information Technology and Organizations

Supervisor: Professor Alladi Venkatesh

Research Assistant

### **January to March 2002**

University of California, Irvine – Center for Research on Information Technology and Organizations and Department of Information and Computer Science

Supervisor: Professor Gloria Mark and Professor Alfred Kobsa

Research Assistant

### **May to September 2001**

University of California, Irvine – Center for Research on Information Technology and Organizations

Supervisor: Professor Gloria Mark

Research Assistant

### **September 1999 to April 2000**

University of York - Department of Computer Science

Supervisor: Professor Chris Kimble

Research Assistant

## PUBLICATIONS

### **Journals**

#### **2004**

J. Favela, M. Rodriguez, A. Preciado and V.M. Gonzalez (2004): “Integrating Context-Aware Public Displays Into a Mobile Hospital Information System”. *IEEE Transactions on Information Technology in Biomedicine*. vol. 8. no. 3. September 2004. pp. 279- 286

## 2003

Muñoz, M.A., Rodriguez, M., Favela, J., Martinez-Garcia, A.I., Gonzalez, V.M. (2003): "Context-aware mobile communication in hospitals". *Computer IEEE*. vol. 36. no. 9. September 2003. pp. 38-46.

## 1999

Gonzalez, V. and Ghanbari, M. (1999): "Resource reservation management". *Computación y Sistemas*. Computing Research Center of the National Polytechnic Institute - Mexico. vol.3. no. 1. September 1999. pp. 50-57.

## Book chapters

### 2005

Alladi Venkatesh, Steven Chen and Victor M. Gonzalez (2005): "Designing The Family Portal for Home Networking," in Robert Kraut, Malcolm Brynin & Sara Kiesler (Eds.) *Domesticating Information Technologies*, Oxford University Press, 2005

### 2003

Miguel A. Muñoz, Victor M. Gonzalez, Marcela Rodríguez, and Jesus Favela: (2003): "Supporting Context-Aware Collaboration in a Hospital: An Ethnographic Informed Design". *Lecture Notes in Computer Science*. vol. 2806. September 2003. pp. 330-344

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### 2005

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Santana, P., Rodríguez, M., González, V., and Favela, J. (2005): "A Web-Based System to Facilitate Elders Communication With Their Families Living Abroad". *Proceedings of Sixth Mexican International Conference in Computer Science (ENC 2005)* IEEE Press, Puebla, Mexico.

Pedro C. Santana, Marcela D. Rodríguez, Víctor M. González, Luis A. Castro, Ángel G. Andrade (2005): "Supporting emotional ties among Mexican elders and their families living abroad". in *Extended abstracts of the ACM Conference on Human Factors in Computing Systems (CHI 2005)*. ACM Press. Portland, USA. pp. 2099 - 2103.

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#### **2004**

Morteo, R., Gonzalez, V., Favela. J. and Mark, G. (2004): "Sphere Juggler: Fast Context Retrieval in Support of Working Spheres". *Proceedings of Fifth Mexican International Conference in Computer Science (ENC 2004)*, IEEE Press. Colima, Mexico, pp. 361-367

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#### **2003**

González, V. and A. Kobsa (2003): "A Workplace Study of the Adoption of Information Visualization Systems". *Proceedings of 3rd International Conference on Knowledge Management, Graz (I-KNOW'03)*, Journal of Universal Computer Science. Vienna, Austria. pp. 92-102.

González, V. and A. Kobsa (2003): "Benefits of Information Visualization Systems for Administrative Data Analysts". *Proceedings of the Sixth International Conference on Information Visualisation (IV03)*, IEEE Press, London, U.K. pp. 331-336.

#### **2002**

Mark, G., A. Kobsa, V. Gonzalez (2002): "Do Four Eyes See Better than Two? Collaborative versus Individual Discovery in Data Visualization Systems". *Proceedings of the Fifth International Conference on Information Visualisation (IV02)*, IEEE Press, London, U.K. pp. 249-255.

Mark, Gloria., Gonzalez, Victor., Sarini, Marcello., and Simone, Carla (2002): "Reconciling different perspectives : an experiment on technology support for articulation". *Proceedings of Fifth International Conference on the Design of Cooperative Systems (COOP 2002)*. Saint Raphael, France.

## **ABSTRACT OF THE DISSERTATION**

The Nature of Managing Multiple Activities in the Workplace

By

Víctor Manuel González y González

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Professor Gloria Mark, Chair

This dissertation is a report of an empirical observational study conducted in order to broaden the understanding of the nature of managing multiple activities in the workplace. The aim was to analyze the phenomenon as it was experienced *in situ* with the object of deriving and consolidating a set of insights and findings, that can be used to fundament the design of computer tools which aim to support the management of multiple activities. The study was conducted at two different companies where I observed the practices of 36 information workers. Among these workers were financial analysts, project leaders, software developers, support engineers and managers. As a result of the analysis, the notion of *working sphere* is proposed for representing the practical units in which individuals conceptualize their work, and that thematically connect chains of actions towards the achievement of a purpose. The dissertation describes and analyzes the dynamics involved in the enactment of working spheres, as well as the extent of work fragmentation experienced by individuals in practice. It was found that informants managed an average of 12 working spheres per day, but they were fragmented by internal and external interruptions, which resulted in sustained engagements of just 12 minutes for

a given sphere before switching to another. Informants averaged about 23 minutes before resuming an interrupted working sphere, but during this time they engaged in an average of two other spheres. The study identifies a set of fundamental processes and strategies used by information workers for managing multiple activities, and coping with the fragmentation of their work. These processes involve a consolidation, and continuous renewal of overviews of the working spheres in which one is engaged, the adequate maintenance of a flexible window of focus over working spheres demanding attention, and the management of transitions leading to switching among working spheres. The study identifies a set of core capabilities provided by physical and digital tools that play a central role in facilitating the consolidation of overviews and the management of activities. It is argued that those capabilities should be seen as fundamental requirements for new information technologies aiming to support personal activity management.

# Chapter One: Introduction and Overview

## 1. Introduction

Framed within the area of human-computer interaction research, this dissertation is a report of an empirical observational study conducted to understand the phenomenon of how people manage multiple activities in the workplace. In particular, the study focused on the practices of information workers using electronic computerized tools, and working at companies within a team-based organizational structure. Over a period starting in February, 2003, and ending in March, 2005, fieldwork was conducted at two different information technology companies in Southern California (U.S.) where I documented the experiences of thirty-six information workers with many different roles and responsibilities. The analysis of the practices of those informants was designed to reveal particular aspects of the phenomenon of managing multiple activities, as it was enacted *in situ*. With such understanding, my dissertation's goal was to derive and consolidate a set of insights and findings that can be used to guide the design of computer tools which aim to support the management of multiple activities.

This first chapter of the dissertation presents the background of the study, highlights the motivation behind it, specifies research questions as well as the research approach followed, and describes the contributions and significance of this study for the understanding of the phenomenon. This chapter concludes by noting the delimitations of the study, and presenting an outline of the dissertation.

## 2. Background: Managing Multiple Activities

The work of this dissertation is centered on understanding the practices that information workers use to complete the different activities they are assigned to do. The term “information workers” is meant to refer to those whose occupation principally consists of creating, interpreting, and sharing information. Financial analysts, accountants, lawyers, consultants, software developers, specialized technicians, intellectuals, managers and administrators are all examples of information workers. A central part of what information workers do relates to the organization and administration of demands for the different activities they are responsible for. Accomplishing a variety of endeavors becomes then a challenge, which translates into specific efforts to coordinate, plan, manage, and keep track of these activities in which the individuals themselves are engaged. Those efforts, termed here *personal activity management*, can be understood as a type of work, which spans all activities and goes beyond the efforts related to directly achieving the purposes of each specific activity. The study of personal activity management, and the phenomenon of managing multiple activities in the workplace, is highly relevant today as it is a skill increasingly required of information workers, due to their constant involvement in varied responsibilities and diverse collaborations. Previous research has indicated an increasing demand on professional workers for attending to multiple and varied activities, due, among other factors, to the flattening of organizational hierarchies, changes in operative structures of work, and relaxation of the formalization of job roles (DiMaggio 2001; Gallie et al. 1998; Nardi et al. 2002).

The research presented in this dissertation is focused within the area of human-computer interaction research, and, in particular, within investigations exploring

computer support for personal activity management. The focus, then, is on the individual and his interactions with technology to support the management of multiple activities.

Since computers became personal, many of their applications have been oriented towards supporting the productivity of information workers. Automation of some tasks such as word-processing, spreadsheet calculations, slide presentations, or e-mail messaging have been so popular, and are so embedded in business practices that nowadays it is not easy to conceive the nature of information work without them. Unfortunately, among those productivity applications, the ones aiming to help people manage their activities have been less successful in providing an adequate benefit. Research has found that information workers use the functionality of activity management tools on a limited basis, adapt tools which were not intended for activity management (e.g., e-mail clients), or continue using non-automated technologies for those purposes (e.g., paper planners) (Blandford and Green 2001; Ducheneaut and Belloti 2001; Gwizdka 2002; Belloti et al. 2004). The consistent observation from those studies is that there is a mismatch between what designers assume is involved in personal activity management, and the realities of its enactment. What previous research indicates is that personal activity management is a complex endeavor that involves, to some extent, the management of elements such as time, documents, contacts, messages or physical space (Kincaid and Kaye 1985; Blandford and Green 2001; Ducheneaut and Belloti 2001; Belloti et al. 2004; Boardman and Sasse 2004). However, there is no consolidated understanding of the interrelationships of those elements which can indicate how they complement each other, and the way in which people integrate them in practice to support personal activity management as a whole. Lacking that fundamental

understanding, designers of information technologies are left without a consolidated frame by which to guide them about what ought to be supported, and what particular forms of support are most needed.

### **3. Motivation: Set of Aspects Demanding Further Investigation**

This dissertation is motivated by the need to reorient the research on personal activity management by engaging in empirical studies over a wide scope of inquiry covering a set of the fundamental aspects of the phenomenon. Empirical studies are necessary, as they can help reveal how the management of multiple activities is experienced *in situ*, providing a rich representation of all the aspects of the phenomenon and their interactions. Through the analysis of previous research, my study departed from the identification of the following aspects demanding further investigation, in order to enhance the understanding of the nature of managing multiple activities in the workplace:

- Firstly, many previous studies, which exclusively focused on managerial positions, have placed little attention on the specific strategies and tools for carrying out multiple activities, and were conducted back when working conditions were very different. Consequently, it was essential to expand the scope of the inquiry toward a modern organizational context, study information workers with a wider diversity of roles, and to focus on the actual practices used for managing activities.
- Secondly, little attention had been placed on the understanding of how actions are aggregated, and thematically connected, on higher-level units of work, and on the understanding of what kinds of units of work people typically handle. Consequently,

an inquiry had to be oriented toward the understanding of how individuals conceptualize their activities, and how specific challenges might be imposed for the management of their temporal frames, interactional demands, or representational requirements. Many previous efforts to understand how people manage multiple activities have been based on very generic definitions of those units of work that people multi-task. Focusing on the understanding of the conceptualization of activities allows for a more appropriate evaluation of what exactly it is that people are multi-tasking, how different tools can be supportive of particular types of activities, and as to what the effects of interrupting those activities are.

- Thirdly, further investigation was required in order to understand the dynamics exhibited, in regard to how people engage in activities and carry them out. Emphasis has to be placed on revealing how individuals move from one activity to another each day as they go about their work, handling interruptions and resumption of work, interacting with others, and adjusting the execution of activities to the changing circumstances they face. This understanding has to consider the differences among roles, organizational structures, or workplace conditions where people perform their work.
- Finally, because previous research informing design had focused mainly on the *tools* that people use to manage activities, rather than on the *strategies*, an investigation was required to analyze the strategies used by individuals to manage multiple activities, and on understanding how different tools serve the purposes of particular strategies. Such an approach was envisioned in order to establish a foundation for developing new information technologies supporting personal activity management,

as it would reveal the fundamental capabilities, and aspects that have to be supported, which then can be translated into specific requirements for particular tools or ensembles of them.

#### **4. Research Questions and Research Approach**

Based on the gaps left by previous research, the investigation presented in this dissertation is focused on the phenomenon of how information workers manage multiple activities, with an emphasis on people working in modern organizations, with access to current technologies, and with varied roles and levels in the organizational hierarchy. The investigation was oriented to solve the following specific research questions:

- What are the types of activities that information workers manage, and what are their characteristics?
- How is multi-tasking among multiple activities experienced, in practice, by information workers?
- What are the strategies that information workers use to multi-task among their multiple activities?
- What are the implications of the findings, coming from the previous three questions, for the design of technologies aiming to support the management of multiple activities for information workers?

The study was oriented to reveal both the perspective of individuals with respect to their preferences and reflective accounts, and the perspective of the actual enactment of activity management as an everyday experience. Consequently, the research approach

was based on the systematic observation of information workers as they conducted their activities in the workplace, and complemented with interviews that were focused on various aspects of the phenomenon, as well as their reflective accounts about observations. Follow-up interviews were also conducted to verify the evolution of some the activities over time. Data collected in those studies were then analyzed using a systematic process inspired by the Grounded Theory approach (Strauss and Corbin, 1998). The process was oriented towards producing conceptual and theoretical characterizations that then served to respond to the research questions that this dissertation has aimed to solve. Although the methodology employed is essentially qualitative with respect to its data collection and data analysis techniques, the nature of the phenomenon demanded the strategic use of quantitative analyses for some portions of the data. Single and Multi-factor analysis of variance were the statistical techniques used for that analysis. This combination of qualitative and quantitative techniques resulted in a more precise understanding of the data, which lead to deriving richer findings.

## **5. Significance of the Study**

The research presented here was identified as a necessary effort to contribute to the research on the area of human-computer interaction in regard to the understanding of the phenomenon of multiple activity management, as there were limited efforts in that direction. Most of the efforts in this line of research had been limited, and had made difficult to consolidate a more robust understanding of the phenomenon. Such understanding is very much needed in novel areas, such as ubiquitous computing which

aims to implement personal information environments with varied computer technologies embedded in it (Weiser 1991; Weiser 1993). The design of those new personal information environments, as pointed out by Kirsh, will require us to move from concepts related to the management of activities, such as *triggers*, *reminders*, or *placeholders*, to the level of more abstract terms describing the fundamental characteristics of artifacts, arrangements of them, and the processes and mechanisms supporting personal activity management (Kirsh 2001). It is at this level that concepts and models will result beneficial for the design of better and novel computer and information technology; and it is at this level that my research was aimed at contributing.

Furthermore, the research presented here was required for contributing to the understanding of the nature of information work in general. It is well recognized within the human-computer interaction community that there has not been similar efforts for understanding the nature of information work, like those of the magnitude of the seminal managerial studies conducted by Mintzberg or Sproull (Hudson, et al. 2002). Therefore, by contributing with empirical research at the level of those previous efforts, but focusing now on a wider range of types of information workers, this study provides a renovated understanding of the nature of this kind of work, and results in identifying relevant aspects for the designers of computer and information technology.

## 6. Summary of Contributions

The following is a summary of the contributions from the research presented in this dissertation:

- The study provides an updated and expanded perspective on the nature of information work, as it is experienced in modern organizations. The results let us understand the interactive demands of information work, as individuals interact with their co-workers, as well as with communication and information artifacts, the relevance of automated and non-automated technologies on their work practices, and the effects of the physical characteristics of workplaces on the way individuals enact their work.
- The study proposes the notion of *working sphere* to describe the practical units in which individuals conceptualize their work, and that thematically connect chains of actions towards the achievement of a purpose. The notion of a working sphere emerged as a grounded empirical concept that serves to explain the practical instantiation of activities, guided by the responsibilities of the individual, and enacted through specific actions. The notion of working spheres can be used to guide other analyses within the area of human-computer interaction research.
- The study describes and analyzes the dynamics involved in the enactment of working spheres, and the degree of fragmentation that the execution of work experiences in practice. These findings contribute and enhance the understanding of the sources and effects of interruptions at work, the variety and number of working spheres that individuals handle per day, and the typical duration of continuous engagement with a particular working sphere. The quantitative results,

and its statistical analysis, provide a detailed perspective of the characteristics of work enactment, and the effects of factors such as the role and function of information workers, their organizational operative schemes, and their collocation with respect to their co-workers.

- The study identifies a set of fundamental processes and strategies used by information workers for managing multiple activities and coping with the fragmentation of their work. These processes involve a consolidation and continuous renewal of overviews of the working spheres in which one is engaged, the adequate maintenance of a flexible window of focus over working spheres demanding attention, and the management of transitions leading to switching among working spheres. These three processes are enacted and combined as individuals move throughout their day, and influence, and are influenced by, the collaborative relationships established with others. These findings contribute to research in this area by providing a frame of processes that can serve as a guiding set of requirements for the design of information technology.
- The study highlights potential contributions to the two main theoretical frameworks that oriented this dissertation. The results suggest that the hierarchical framework of human work, proposed by Activity Theory, should be modified to include and consider an intermediate notion, equivalent to the notion of working spheres used for the information work domain, but which accounts for the aggregation of goal-oriented actions towards a particular purpose, yet not described as being the higher and ultimate motive for the human work represented by activities. Similarly, related to the Interactionist Theory of Action, the results

suggest a contribution towards the understanding of the articulation of work, as perceived by the individual, and contributions to the refinement of the notion of *line of work*, as proposed by Anselm Strauss.

- Finally, the study identifies a set of core capabilities provided by the tools used by the informants to manage multiple activities. These capabilities are based on the ability of tools to provide succinct views, single-point integration, monitoring, timed notification, flexible listing, visual representation, and mobility. By identifying those capabilities, and identifying how they are provided by different tools and ensembles of them, my study aims to provide guides for designers of information technologies, who, based on the analysis of the particular needs of their users, can refer to those capabilities and envision the most practical ways to integrate them into their designs. Consequently, rather than serving as specific requirements, those capabilities function as core properties that a complete solution which supports the management of multiple activities, should aim to provide.

## **7. Delimitations of the Study**

This research effort is delimited around a particular set of information workers, those operating within a workplace environment and sharing it with other co-workers. This study did not attempt to explore scenarios of mobile work, where people enact their work-related activities outside of the office environment for most or some significant part of the day. Similarly, although some of the information workers studied might have

performed portions of their work at home (e.g., checking e-mail or voice messages in the evening or before coming to work), the observation of their practices was limited to the time they spent on the company's premises, and during their usual working hours. Finally, I aimed to focus on environments where technology was already in place, routinely used, of easy access, and fully adopted by the information workers. This study was not one exploring the effects of adoption of particular technologies or the challenges of accessing them.

## **8. Dissertation Outline**

The rest of the dissertation is organized in the following manner:

- **Chapter Two - Related Work:** This chapter examines previous investigations regarding particular aspects relating to how people manage multiple activities. The literature reviewed covered a varied set of disciplines and areas, including organizational and managerial research, psychology, human-computer interaction and computer-supported cooperative work. The goal of the chapter is to synthesize previous work, and to discuss a set of core elements to be further investigated in order to advance the understanding of the nature of managing multiple activities in the workplace.
- **Chapter Three - Theoretical Foundations:** This chapter discusses how notions from Classical Activity Theory and the Interactionist Theory of Action were used to shape

the initial conceptualization of the phenomenon of how people manage multiple activities.

- **Chapter Four - Methodology:** This chapter explains the methodology used to empirically study the nature of managing multiple activities in the workplace. It explains how observational techniques, together with interviewing, were applied in my study, as a way to collect data and how they complemented each other. The chapter also explains how data analysis was conducted and, in particular, how the techniques proposed by Grounded Theory were used in combination with quantitative analysis of some parts of the data.
- **Chapter Five - The Context of Activity Enactment:** This chapter describes and identifies the conditions defining the context of work for the informants studied. It describes the physical, organizational, and operational characteristics of each company and the group of informants studied, as well as the characteristics of the individuals, including their roles, and the nature of their jobs. The main emphasis of this chapter is on describing a set of core conditions that can be used to characterize the context of activity enactment for those informants studied. These conditions have an impact on the nature of the activities of the informants, the dynamics of their enactment, and the strategies used to manage them.
- **Chapter Six - The Nature of Activities in the Workplace:** This chapter presents the results after analyzing and identifying the practical activities that the informants managed on a day-to-day basis. Derived from this analysis is the notion of a *working sphere*, used to emphasize that practical activities are based on the individual's conceptualization of his work, pointing to the things that people consider that they

manage and multi-task among. The notion of a working sphere is used to distinguish and contrast against lower-level work efforts, such as actions. Some patterns of working sphere types are discussed, as well as the developmental dynamics experienced by working spheres over time.

- **Chapter Seven - Dynamics of Carrying Out Activities in the Workplace:** This chapter focuses on analyzing the dynamics involved while carrying out multiple activities. The analysis presented here is based on the notion of the working sphere and the different types that people manage. The understanding of the dynamics of carrying out activities is approached by looking at three main aspects: the execution of actions contributing to a working sphere, the continuous engagement in a working sphere, and the fragmentation of working spheres. Thus, the chapter presents the analysis of each of those three elements, guided by a set of fourteen hypotheses that explore the effects due to the different conditions that characterize the work of the informants.
- **Chapter Eight - Strategies to Manage Multiple Activities:** This chapter presents an analysis of the different processes and strategies used by individuals to manage multiple activities and multi-task among them. The analysis is done from a perspective that considers that individuals are not just passively coping with streams of work, but are actively involved in planning, prioritizing, and sometimes self-modifying courses of work by their own volition. This chapter discusses findings which point out the way that the informants articulated and reflected on the need to multi-task, and related preferences. The chapter focuses on presenting three grounded processes identified as fundamental to understanding the phenomenon of multi-

tasking in the workplace, as well as the strategies used for each one. The chapter also presents an analysis of the properties of digital and physical information artifacts in supporting specific strategies.

- **Chapter Nine - Conclusions:** This chapter concludes the dissertation by presenting a summary of the results for the study, as well as discussing some of its theoretical and design implications. The chapter draws together the analysis presented in Chapters Six, Seven and Eight, and discusses results with respect to the conceptualization of practical activities, the dynamics of carrying them out, the fragmentation of work, the general life-cycle of a working sphere, and the strategies used by individuals to manage multiple activities. This chapter also discusses implications of my research with respect to the nature of information work today, the refinement of theoretical frameworks such as Activity Theory and the Interactionist Theory of Action. Furthermore, this chapter discusses the implications of the results for the design of new forms of information technology aiming to support the management of multiple activities, and concludes with a discussion of some of the areas into which research in this area can focus on in the future.

## **Chapter Two: Related Work**

### **1. Introduction**

This chapter examines previous investigations regarding particular aspects of how people manage multiple activities. Such aspects include the influence of personal preferences of people engaging in more than one activity; the characteristics of some professional roles, in particular, roles relating to information work that requires the management of multiple activities; and the different technological approaches that have been envisioned to support multi-tasking practices of information workers. This chapter synthesizes previous work and discusses a set of core elements to be further investigated in order to advance the understanding of the nature of managing multiple activities in the workplace. These elements constitute the object of the research presented in this dissertation.

### **2. Managing Multiple Activities as a Matter of Personal Preference**

To some degree, the fact that individuals are involved in and switching among different activities as they go about their work can be explained as coming from a personal preference for this kind of behavior. This section briefly explores some of the research efforts oriented toward understanding *polychronicity*, a behavior exhibited by individuals who tend to prefer simultaneous involvement in more than one activity. Drawing from that research, this section introduces some of the elements that originate from the

adoption of a polychronic style. In addition, it highlights some of the effects for the management of activities in the workplace.

## **2.1. Preference to Engage in More than One Activity: Polychronicity**

The concept of polychronicity was originally proposed by the anthropologist Edward T. Hall (1983) and has been further developed by other scholars (Bluedorn, et al. 1992; Cotte and Ratneshwar 1999; Kaufman-Scarborough and Lindquist 1999; Bluedorn 2002). While analyzing the way that people from different countries handle time, and engage in activities, Hall identified two main behavioral styles: monochronic and polychronic. A monochronic style describes a preference towards a linear behavior, thus a new activity is performed only when the preceding one is finished. A polychronic style, on the other hand, describes a preference towards engaging in several activities simultaneously. Adopting polychronic or monochronic styles reflects not just what people do, but also what they consider to be the best way to do things (Bluedorn 1998).

Hall suggests that people from Mediterranean countries (e.g. Spain, France, Italy, etc.) are more polychronic than those from England, Germany, the United States, and the Nordic countries (Hall 1983). However, Hall also points out that within those countries, some social groups might develop their own styles. For instance, at the level of organizations, Bluedorn and Ferris found that larger firms tend to be more polychronic than small ones, and they noticed that this tendency increases during periods of fast growth (Bluedorn and Ferris 2001). Bluedorn and Ferris argue that as the size of the organization increases, so does the scope of the work, and that this increase sometimes cannot be followed by the proper changes in the division of labor resulting from an

accumulation of activities among a few individuals. No relation has been found between polychronic styles and other factors such as the type of industry.

In addition to cultural or organizational influences, research on polychronicity has explored those personal characteristics that play a role in an individual's preference for a polychronic style. Among other aspects, the level of education of the individual is the demographic characteristic that has been found to have a clear influence towards a polychronic behavior (Kaufman, et al. 1991). The more educated the individual, the more likely he is to prefer to be involved in many activities. According to some researchers, the reason for this connection is that education allows an individual to develop the ability to handle more things per unit of time (Bluedorn 2002). Similarly, it is argued that people with higher educational levels might take jobs that require them to behave polychronically (Slocombe 1999). Although other demographic characteristics such as gender or age have been studied, a direct influence has not been found (Kaufman, et al. 1991). Furthermore, research has found a relationship between the preference for a polychronic style and the personality of the individual. People identified as polychronic appear to show a more extroverted character, a favorable inclination toward change, and a stronger motivation for achievement as well as higher levels of impatience and irritability (Conte, et al. 1999; Conte 2000).

The fact that cultural background, organizational context, and learning skills can provide a partial explanation as to why individuals multi-task among activities, highlights the need to look at the phenomenon, not just as something that individuals cope with or experience, but to some extent, as one that is even actively pursued. Based on the findings of polychronic research, we can think about situations where individuals, of their

own volition, will look for opportunities to simultaneously engage in more than one activity. Consequently, one must consider the effects of self-motivated multi-tasking when analyzing the behavior of people.

## **2.2. Practical Effects of a Polychronic Preference in the Workplace**

Research in the area of polychronicity can be fruitfully used to understand how the preference of the individual towards engaging or not engaging in a polychronic style can affect some practices in the workplace. It is said that polychronicity affects the channeling and flow of information, the structure of networks connecting people, and the perception towards the fragmentation of work due to interruptions. Those three aspects are discussed here, as they shape the daily practices of information workers, and are essential when trying to understand the nature of managing multiple activities, as the research presented in this dissertation aims to do.

Hall found that the adopted polychronic style affects the channeling and flow of information (Hall 1983). Monochronic style favors the scheduling of activities and therefore the compartmentalization of time. Consequently, each time unit is devoted to a single activity, which results in the filtering of what will be or will not be attended to at that time. Flows of information are then restricted to those related to the topic at hand.<sup>1</sup> In contrast, the polychronic style imposes a preference for the attention to multiple topics, which allows one to be open to any information flow at any unit of time. This aspect can be seen, for example, in the way that business meetings are conducted. Monochronics

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<sup>1</sup> This filtering behavior has been also identified within the context of social interactions in what is called the 'cocktail party phenomenon' that occurs whenever individuals react to their name being called even if they are in a crowded environment (Moray 1959). The outcome is pointed out by psychologists to be due to the selective attention mechanisms of human mind (Allport 1980).

will prefer to devote meetings to discussing a single planned topic, whereas polychronics will tend to be more flexible and typically will introduce various topics during the meeting in an ad-hoc fashion.

The preference of style also affects the structure of networks connecting people. Polychronics tend to be people-oriented, and therefore develop a preference towards face-to-face contacts in the form of public gatherings. Hall describes how government ministers from some polychronic countries commonly use reception areas outside private offices (Hall 1983). In those areas, groups of people can be visited by the minister and be attended to in a more flexible fashion, as he or she will move from group to group without extended preambles. This eliminates the need to interact in private meetings in the inner office. Hall also notes that the public multiple-person pattern of interaction promoted by the polychronic style results in individuals becoming deeply immersed in each others' business, and consequently, developing very strong social links between them (Hall 1983). In contrast, the monochronic style favors face-to-face contact in private meetings, which results in a prevalence of dyadic relationships among peers, but less awareness about the concerns of others.

The way that fragmentation of activities is perceived can be also affected by the style of the polychronicity adopted. Bluedorn indicates that people with a monochronic style tend to perceive potential activities, other than the one they have in hand at the moment, as interruptions (Bluedorn 2002). Consequently, people adopt shielding strategies to avoid diverting over other activities and are less tolerant of unscheduled events. In contrast, polychronicity involves openness to other activities, and people with a polychronic preference will anticipate and tolerate their involvement in unexpected

events, moving back and forth among several activities in a time period (Bluedorn, et al. 1999). It has been found that people with a polychronic style even perceive such interruptions as contributing positively to reaching daily goals (Kaufman-Scarborough and Lindquist 1999).

### **2.3. Job Characteristics and Polychronicity**

Managing multiple activities can be part of what is required on a job. In spite of the fact that some jobs might let people have a certain freedom in imposing their own polychronic styles, others have intrinsic characteristics that demand the execution and management of multiple activities in order to successfully perform the job. For that reason, it is argued that the matching between individual preferences, and the characteristics of a job with respect to polychronicity, is very desirable, whenever possible, as it will guarantee that individuals will perform the job in a more comfortable and less stressful manner (Slocombe 1999). Here, a couple of job characteristics are discussed to illustrate how these can result in people's adopting a polychronic style.

Some polychronic jobs demand that individuals execute activities under conditions of time-pressure. Some examples would be the jobs performed by air traffic controllers and aircraft pilots. Aircraft controllers have to coordinate the landing of planes that are approaching the airport by issuing a series of turn and descent authorizations to each one (Bentley, et al. 1992; Freed 1998). Each action involved in the landing series takes a few minutes, and controllers have to switch constantly among different plane-handling tasks to attend to all the landing requests in an efficient way. Similarly, for aircraft pilots, the phases of departure or landing demand the coordination of their actions with those of

other people as well as the constant monitoring of different navigation instruments (Dismukes, et al. 2001; Loukopoulus, et al. 2001). Extensive training is required for pilot apprentices to learn to manage and coordinate the multiple operations required during the phases of taxi, take-off, climb, cruise, approach and landing (Chou and Funk 1990).

Other polychronic jobs demand going back and forth among several activities within a single work period. Medical work such as that of doctors or dentists is a good example of this. The typical workflow of most American medical practices is structured in such a way that physicians have to work polychronically (Schein 1992; Bluedorn 2002). They have limited time to attend to each patient, and as soon as they finish attending to one, they have to turn to a new one who is already waiting in another office. Following this scheme, doctors throughout the day end up attending dozens of different patients, each one representing a distinct case which has to be documented, studied and followed up. Scheduling and document management practices then become fundamental elements to cope with the demands of the different types of cases handled.

### **3. Information Work and the Involvement in Multiple Activities**

As a guiding principle, the notion of polychronicity can be useful in understanding why information workers manage multiple activities. The preference for one particular style affects the way that an individual handles the flow of information, interacts with others, and attends to emerging dynamic demands; and those three elements are fundamental to the management of multiple activities. However, as was discussed, the adoption of a particular style might not depend only on personal preferences, but certainly is influenced

by the intrinsic characteristics of the job. This section analyzes in detail how the characteristics of information work can affect the adoption of a polychronic style.

This section starts by analyzing some recent perceived changes in organizations that are fundamental to understanding the context in which information work is conducted today. From there, the section presents an analysis of one particular type of information work, managerial occupations, and describes in detail a set of characteristics common to their activities: fast pace of execution, variety of content, brevity, the fragmentation of work and interactions required. Finally, the analysis concludes by moving to the notion of managerial agendas as resources that help managers to cope with the management of short- and long-term activities. The focus on managers aims to take advantage of the vast research already conducted to understand the nature of their work and to illuminate some important aspects that can apply to information workers in general.

### **3.1. Information Work: Some Characteristics**

A fundamental aspect of the research presented in this dissertation is that it aims to reveal what is necessary for the management of multiple activities for a particular kind of occupation, the information worker. In accordance with an original definition proposed by Peter Drucker (Drucker 1959), information work is commonly defined<sup>2</sup> as an occupation which mainly consists of the creation, interpretation, and sharing of information; therefore, it predominantly demands intellectual skills, rather than manual abilities. Examples of some kinds of job which are characterized as information work include the occupations of: financial analyst, accountant, lawyer, consultant, software

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<sup>2</sup> The term “information work” or “knowledge work” is used indistinctly in this document. The Webster dictionary defines a “knowledge worker” as someone “*whose occupation is predominantly concerned with generating or interpreting information, as contrasted with manual labor*”.

developer, specialized technician, and managerial and administrative positions (Kidd 1994; Schultze 2000). As some studies have shown, although the nature of the work of all those information workers can be quite different in many aspects, a common characteristic is the need to divide their time and efforts among multiple projects, initiatives and teams in which they are engaged (Panko 1992; DiMaggio 2001; Malone 2004). This need seems to be increasing nowadays as companies experience a flattening of organizational hierarchies, they turn over team-oriented forms of organization, they run over downsizing and constant changes in organizational structures, they relax the formalization of job roles and they demand from their employees to focus on multiple and varied initiatives (Gallie, et al. 1998; DiMaggio 2001; Nardi et al. 2002). Today, the nature of information work seems to resemble one that used to be exclusive to top-level managers, and that has been characterized by fast-paced and varied activities, frequent fragmentation of actions and constant interpersonal interactions (Horne and Lupton 1965; Stewart 1967; Mintzberg 1973; Kurke and Aldrich 1983; Sproull 1984).

### **3.2. The Case of Managerial Work**

One of the types of information work most extensively investigated by researchers is that of managers. With the purpose of understanding the nature of managerial work, studies have been conducted focusing on top, middle, and low-level managerial positions (Horne and Lupton 1965; Mintzberg 1973; Kotter 1982; Kurke and Aldrich 1983; Sproull 1984). Common among all those studies is the finding that the job of a manager is intrinsically polychronic, as they are required to be involved in multiple projects, initiatives and teams. Having to manage multiple activities shapes the job of managers both at the level of the

activities themselves and at the level of the way these are executed. These shaping effects are discussed in the following sections.

### **3.2.1. Fast Pace of Execution**

A fundamental characteristic of managerial work is the fast pace with which activities are executed. Many managerial studies describe typical scenarios where managers go from project to project without gaining a feeling of closure (Horne and Lupton 1965; Mintzberg 1973; Kotter 1982; Kurke and Aldrich 1983). Henry Mintzberg, commenting on the practices of top-level managers, observes:

“The manager is responsible for the success of his organization, and there are really no tangible mileposts where he can stop and say, ‘Now my job is finished.’ The engineer finishes the design of a casting on a certain day, the lawyer wins or loses his case at some moment in time. The manager must always keep going, never sure when he has succeeded.” (Mintzberg 1973, p.30).

Kotter, drawing from his study of general managers, says that the rapid-pace and high-pressure environments in which many managers perform is in part due to their involvement with activities that have short, medium and long temporal scopes (Kotter 1982). Managers not only attend to the day-to-day operations of the organization but also envision and define the long-term initiatives. This results in managing parallel activities with different time-frames and deadlines. As pointed out by Mintzberg, this makes managerial jobs very open-ended in nature, keeping managers perpetually occupied with different aspects (Mintzberg 1973).

### **3.2.2. Variety, Brevity and Fragmentation of Activities**

The activities of a manager present a high degree of variety with respect to their final ends. The purposes of a manager's activities are quite varied, as they include the assessment of long and short term impacts, the specification of human and material resources, the prioritization of tasks, and the regulation of resources (Horne and Lupton 1965). Activities are also determined by the multiple kinds of roles that managers might play in the organization (leader, liaison, informational, monitor, disseminator, spokesman, entrepreneur, disturbance handler, resource allocator or negotiator) (Mintzberg 1973) and the multiple organizational areas possibly under their supervision (human resources, production, accounting, sales, maintenance, etc.) (Stewart 1967). Variety of activities, as pointed out by Panko, also results from the fact that managers have a greater degree of specialization, have more personal contacts, and travel more (Panko 1992).

Managerial activities are not only varied in content but are also very brief. Activities are conducted in brief periods of time, which might last just a few minutes. Mintzberg observed that on average, half of his informants' activities were completed in less than nine minutes, and that only ten percent of them lasted more than an hour (Mintzberg 1973). He found that phone calls took an average of six minutes, uninterrupted work on the desk averaged twelve minutes, and unscheduled meetings took an average of fifteen minutes. Similar results indicating the short duration aspect of activities have been confirmed by other studies like the one conducted by Sproull where she found that the typical day of her informants comprised an average of fifty eight activities, with an average duration of nine minutes each. She observed that phone calls lasted an average of approximately five minutes, and that the periods working alone at the desk averaged

about seven minutes. Kurke and Aldrich also confirmed those results in a study where they replicated the methods used originally by Mintzberg (Kurke and Aldrich 1983).

Mintzberg pointed out that this characteristic of brevity might reflect a response mechanism used by the chief executive officers that he observed, in order to optimize their time and reduce their interactions to a minimum:

“The manager actually appears to prefer brevity and interruption in his work. He becomes conditioned by his workload; he develops an appreciation for the opportunity cost of his own time; and he lives continuously with an awareness of what else might or must be done at any time.” (Mintzberg 1973, p. 51).

Although many activities can be fully completed within brief periods, the studies also indicate that managers commonly experience fragmentation of their activities (Horne and Lupton 1965; Mintzberg 1973; Kotter 1982; Sproull 1984). Due to interruptions or other demands resulting from the characteristics of the job, a manager cannot complete his activities in a single uninterrupted period, and these activities have to be broken down into segments and attended to as conditions permit. Kurke and Aldrich attribute the sources of activity fragmentation to the attention given to people and problems (Kurke and Aldrich 1983). In part, their observation can be justified by observing that managers spend a large percentage of their time dedicated to unscheduled interactions. Managers, as pointed out by Hales, often have to engage in those unplanned interactions in order to respond to changing circumstances:

“Much of what managers do is, of necessity, an unreflective response to circumstances. The manager is less a slow and methodical decision maker, more a ‘doer’ who has to react rapidly to problems as they arise, ‘think on his feet’, and take decisions in situ.”  
(Hales 1986, p. 102).

Interestingly, while Sproull also points to interactions as determinant of activity fragmentation, she also argues, that in many instances are managers themselves who decide to stop the execution of an activity and turn to another one. She found that when the managers that she observed were alone, they did not spend more than fifteen (15) minutes on their own before they looked to initiate a conversation with another person (Sproull 1984). She suggested that managers in general interrupt themselves as much as they are interrupted.

### 3.2.3. Constant Interaction with People

Together with other scholars, Mintzberg points out that managers have a strong preference for verbal communication, and in general, that constant interaction with other people is an important characteristic shaping their jobs (Mintzberg 1973). He found that the top-level managers he studied spent 78% of their time interacting with people. Other studies have found that conversations account for between 58% to 81% of the time of managers per day (Horne and Lupton 1965; Kiesler, Siegel et al. 1984; Sproull 1984). Table 2.1 shows some results found with respect to the percentage of time spent on different kinds of interactions.

	<b>Horne and Lupton 1965</b>	<b>Mintzberg 1970</b>	<b>Sproull 1984</b>
Desk work alone	26%	22%	19%
Phone	9%	6%	13%
Scheduled meetings	10%	59%	34%
Unscheduled meetings	55%	10%	34%
Tours		3%	
Total	100%	100%	100%

Table 2.1: Percentage of time spent on activities in previous studies

Constant interactions are required because many of the activities that managers are engaged in are actually performed through other people. Here, as indicated by Stewart, we are referring not just to the act of delegating, which in many cases might apply, but also to the mutual interdependence among individuals to get an activity done (Stewart 1967).

Managers play partial roles in the execution of some activities, many times just engaging in listening to people and providing their opinions (Kotter 1982). Consequently, the importance of interactions highlights the social nature of managerial work. Individuals cannot do what they are suppose to do just by working alone, but by having a sufficient number of interactive sessions that let them integrate expertise, coordinate their work and obtain information (Horne and Lupton 1965; Perlow 1999).

### **3.3. Managerial Agendas as a Resource to Get Things Done**

Most empirical studies of managerial work have aimed at identifying its nature in terms of the functions, skills, and general behaviors of the people in these roles, rather than actually aiming to identify the resources or strategies that help managers handle their multiple activities. Among those studies, John Kotter's study of general managers was one of the first to identify the role of managerial agendas as a resource that helps individuals to approach their jobs in a successful way (Kotter 1982). Kottter found that managers, as they were hired, initiated the development of agendas that contained goals and plans to address their long-, medium- and short-term responsibilities. Their agendas pointed to items related to different functional areas (finance, marketing, human resources, and so forth) and were specified with different levels of detail. As managers became increasingly familiar with their work and the company, they updated and

modified their agendas accordingly. Though many of those agendas were physically maintained in written documents, Kotter also noticed that some managers maintained all or some of the items of their agendas in their minds. Managers then referred to their agendas to orient their decisions according to their immediate future responsibilities (e.g. 1-30 days) but also according to the strategies that they aimed to implement in their organizations in the very long-term (e.g. 5-20 years).

Building on the findings of Kotter, David Barry and his colleagues conducted a study of the “agendizing processes” of forty-five managers (Barry, et. al. 1997). Their findings confirmed Kotter’s observations of the role of agendas in supporting the setting of goals and tasks to be achieved, not just in the case of upper-level managers, as studied by Kotter, but also for middle and low-level managers. They also found that the need for agendizing is not just dependent on the styles of the people, but is also affected by the level of workload that they experience, their degree of interdependencies with other people and the unpredictability of their work (Barry, et. al. 1997). According to them, a major role of their agendas was that they provided managers with a mediating mechanism between the long-term organizational goals and plans and the changing circumstances experienced moment by moment in the process of managing. Through agendas, managers consolidated a vision of their responsibilities across different temporal frames.

### **3.4. Limitations of Managerial Studies in Understanding the Nature of Managing Multiple Activities in the Workplace**

Although the empirical studies discussed in this section are useful in understanding some aspects of the nature of managerial work with respect to the management of multiple

activities, three important points have to be considered when trying to interpret and apply those findings to a comprehensive understanding of how information workers, in general, manage multiple activities. First, it is important to recognize that because those researchers aimed at understanding the *nature of the job* of managers, with the goal of revealing the competencies required to be effective in those positions, they did not put much effort into it and did not provide specific accounts about the nature of the activities managed; the conditions and factors characterizing the situations experienced by those managers while engaged in multiple activities; nor more details about the practices and tools they used to manage them. Although previous studies have looked at agendas as tools supporting some aspects of activity management, it is not clear if the emphasis of managers is on using them as guiding resources containing general plans for their companies, rather than on the more practical day-to-day aspects of executing activities. Second, it is possible that some variation of findings might exist for professional roles other than managers, because information workers in other positions can experience very different conditions. For instance, the ability of managers to delegate work, administer a budget or have access to private offices is not always possessed by other kinds of information workers. Finally, another important consideration is the fact that the technological infrastructure available in the sixties, seventies and eighties has changed tremendously as information workers now have easy access to personal computers and global communication networks. The availability of those technologies makes likely to assume some changes in the rhythm of communications and its effects on the execution of work. Those three points highlight the need to conduct further research which is

focused on revealing the nature of activity management, for more varied sets of information workers, and in modern workplace environments.

#### **4. Technological Approaches to Support the Management of Multiple Activities**

Additional efforts to understand how information workers manage multiple activities have been made within a framework of research that aims to explore opportunities for new forms of computer and information technologies. Remarkably, some of those initiatives have departed from characterizations of information work provided by seminal managerial studies (e.g. Mintzberg 1973). This section presents a review of those efforts organized into four general approaches to supporting the management of multiple activities. As will be discussed, each approach serves to emphasize that the nature of managing multiple activities is dependent on the management of three key elements: time, collection of resources, and communication threads.

##### **4.1. Schedule Management Approach**

The use of time and its management has been commonly targeted to be supported by information technology as it is identified as a key component for activity management. Functionality for keeping appointments, coordinating meetings, setting reminders or storing notes has been usually embedded in calendar automated systems (Kincaid and Kaye 1985; Palen 1998). Such systems have imitated much of the functionality found in traditional paper-based calendars incorporating additional advantages such as the ability to set

multiple views of the calendar (e.g. week-at-a glance, month-at-a-glance, year-at-a-glance), to program recurrent activities, and to coordinate individual with group activities. Other systems have tried to complement that with support for estimating the availability of co-workers for informal conversations (Rodenstein, et al. 1999), or, based on past records, predicting the attendance to planned events (Tullio, et al. 2002).

Studies on the use of electronic calendars have found that the schedule management approach faces two common challenges to supporting the management of activities. The first is that activities have to be defined with a sufficient level of detail to be entered into the system. That definition can be considered straight forward for some activities, however it has been found that users often find it difficult to define up front many of the details of their activities (Kincaid and Kaye 1985; Tullio, et al. 2002). It is a complex task for users to provide specific information with respect to the duration, the type or the priority of an activity. Furthermore, a second challenge identified by those studies is that activities contained in the system are an accurate representation of *all* the activities that the individual has committed to, or actually did perform. The scheduling of group activities or the retrieval of time efforts for billing purposes typically demands this kind of accuracy from the records (Brown 2001). However, that accuracy is rarely achieved because users do not always list all the activities in which they are involved. It has been found that activities that arise and are completed the same day are less likely to be written down than those appointments that are made two or more days in advance (Kelley and Chapanis 1982). In addition, in many cases, a single calendar is not used, or some of the activities are kept in a mental list or written on other kinds of artifacts such as pieces of paper or sticky notes (Kelley and Chapanis 1982; Blandford and Green 2001).

Although in using current systems, following a schedule management approach can suffer from the limitations just discussed, it is clear that the scheduling of events related to activities is a critical element to be considered in the analysis of how people manage multiple activities. Furthermore, beyond scheduling functions, it has to be noted that calendars or diaries can help people characterize certain days or periods within the temporal continuum. For instance, Blandford and Green found that their users tend to mark and place notes in their calendars, to indicate periods of vacation, deadlines, or absences of colleagues (Blandford and Green 2001). All together, the schedule management approach illuminates the need to look at time-management practices and temporal aspects as a very important facet of the nature of managing multiple activities. Further investigation is required to understand how calendaring practices fit with the rest of the strategies that people use to manage their activities.

## **4.2. Multiple Workspace Approach**

Many studies have shown that information workers use physical space to organize resources related to particular activities (Miller 1968; Malone 1983; Tyson 1992; Kidd 1994). People organize piles of documents, label folders and identify particular places in their offices or desks to establish physically the spatial boundaries for resources associated with particular activities. The preference for spatial organization of documents can directly support the management of activities, as it has been found that for some information workers, the way in which a pile of documents is organized can reflect priorities among activities. In addition, the layout of documents can describe a grouping scheme, or certain areas of a desk can even indicate that documents placed there are at a particular stage of a

process (Malone 1983; Mander, et al. 1992; Tyson 1992; Rouncefield, et al. 1994; Gruen 1996).

Although the desktop metaphor aims to support the ability of spatially structuring resources in the digital realm, it has been found that users do not employ their computer desktops to integrate activity-related resources (Nardi, et al. 1994; Barreau and Nardi 1995; Nardi and Barreau 1997; Kaptelinin 2001). Among a variety of reasons, the limited real state of the screen makes difficult the grouping of a large number of items on the desktop, or the simultaneous visualization of many applications on the screen. Moreover, perhaps the most important desktop interface deficiency is that it provides little support for constant switching of activities and the rapid recuperation of resources associated with them. A study conducted by Bannon and his colleagues in the mid-eighties revealed that computer users switch constantly among computer activities (Bannon, et al. 1983). The authors highlighted the importance of preserving the state of the activity and its resources in order to promptly reassume it after an interruption<sup>3</sup>. Those ideas inspired Card and Henderson to build an interface called ROOMS that aimed at minimizing the effort needed to switch activities by providing an integration of resources (Card and Henderson 1987). The system let the user specify a number of workspaces where documents and tools associated with a certain activity could be stored. Whenever the user wanted to work on a particular activity, he just had to “go” to the specific room and continue the work where it was left as the status (e.g. position in the screen) of documents was preserved. The same approach of

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<sup>3</sup> Without strong emphasis over supporting the management of multiple activities, many other systems have been developed focusing on supporting the recall of deferred tasks, the tracking of tasks, or the recovery of documents. Systems proposed focus on providing users with a way to review logs of snapshots of past actions performed in the computer environment. For instance the time-machine computing system designed by Rekimoto provides a time line where desktop contents are visualized based on frequency of access (Rekimoto 1999). Other systems such as Lifestreams (Fertig, et al. 1996) are oriented towards similar approaches at the level of documents.

using multiple workspaces has been implemented by other, more recent systems such as the Task Gallery (Robertson, et al. 2000) and Manufaktur (Sharples 2000). Both systems introduce 3D spaces that users can employ to organize spatially the resources associated with projects.

A departing, but slightly similar implementation of the workspace approach is represented by systems using multiple displays. Kimura is an environment that uses projected displays of “working contexts” – clusters of tools, documents and communications related to an activity (MacIntyre, et al. 2001). Peripheral projections of background activities (working contexts) are visualized as a *montage* of images of applications used for the activity. Those montages are projected onto digital whiteboards. A central monitor presents the current working context, and switching to a different context is done by selecting it from the peripheral displays. That action brings the selected working context to the central display in essentially the same state it had the last time it was used. The design of Kimura facilitates the function of demarcating spaces by dragging and dropping elements to them. Kimura, as with other systems based on multiple displays, provides the additional benefit of letting users partition their spaces, which has been identified by Grudin as the main factor influencing the adoption of multiple displays (Grudin 2001).

The main assumption of the workspace approach is that people will easily define what workspaces are required and what resources should be in each one. This represents two challenges. One, as indicated by Kaptelinin, is overhead: people will have to make an extra effort to set up, maintain and update the workspace (Kaptelinin 2003). On the other hand, and similar to the schedule management approach, this approach faces the

challenge that users might not know upfront what resources are associated with an activity or even when it would be necessary to set up a new workspace.

Again, as in the case of electronic calendars, the workspace approach, in spite of its limitations, has served to highlight some relevant aspects of the role of physical representation and organization of resources around activities. People, after gaining a certain familiarity with the activity, usually associate resources that serve the purposes of that activity (e.g. paper documents in folders, or electronic messages in particular mailboxes). This points to the relevance of looking at the archiving structures that people build (e.g. mailboxes trees, folder hierarchies, or web addresses collections) to facilitate the identification of meaningful activities. Consequently, looking at the processes that people follow to relate resources to particular archiving structures and the way that those structures are built is necessary to understand how people manage multiple activities.

### **4.3. Communication Container Approach**

Recently, much attention has been directed to how many of the activities of information workers gravitate around e-mail (Belloti, et al. 2002; Boardman, et al. 2002; Gwizdka 2002; Kaptelinin 2002; Muller and Gruen 2002; Rohall and Gruen 2002; Belloti, et al. 2003). The relation of e-mail activity management is quite important now given the increased use of this medium to support communication in the workplace. E-mail messages are kept as reminders of pending activities, as records of previous activities, and as repositories of documents attached to messages. In spite of the great popularity of e-mail and its increasing use for activity management, it has been seen that users experience problems integrating e-mail with the rest of the tools required to support their activities

(Whittaker and Sidner 1996; Ducheneaut and Belloti 2001). This lack of integration even emerges at the level of popular and well-established personal information management tools (PIM) such as Microsoft Outlook, where the inbox and the “to-do” list remain disconnected (Belloti, et al. 2003). Trying to alleviate this situation and looking to further understand how the management of activities can be supported, many researchers have explored the creation of what we can call a communication container approach. Among the systems following this approach, such as E-mail Task View (Gwizdka 2002), or Remail (Rohall and Gruen 2002), perhaps the most complete and well-tested is Taskmaster, developed by Belloti and Ducheneaut (Belloti, et al. 2003). The Taskmaster system evolved from detailed studies of the practices of information workers in different companies (Belloti and Smith 2000; Ducheneaut and Belloti 2001; Belloti, et al. 2002; Belloti, et al. 2003; Ducheneaut and Belloti 2003). The system supports the aggregation of resources under threads of messages called *thrasks* (threaded tasks). Taskmaster provides e-mail functionality plus the ability to associate messages to thrasks automatically, the ability to establish deadlines for each thrask, reminders, visualization of progress, in-context display of attached documents, and tracking of thrasks performed with other individuals. Following a slightly different approach, the Contact Map is another example of an integrated container where the emphasis is on organizing project-related resources around contacts (Nardi, et al. 2002). With a strong emphasis on visualization of personal social networks, Contact Map supports communication and the integration of information related to contacts. In the case of Contact Map, the focus is on contacts rather than messages.

The container approach highlights the relevance of communication patterns in the management of multiple activities. As more and more activities are mediated through

e-mail messages, the patterns of communication can often coincide with those activities that people are currently engaged in. Consequently, the inboxes can be a source of multi-tasking as people can easily move among different messages that refer to different activities. In spite of current research and design efforts that suggest integrating communication with activity management is desirable, it is still not clear how such integration will work in practice. It is clear that complexity will be added to the tools and that this can defeat the approach. On the other hand, some activities do not revolve around e-mail communications. Certainly an analysis of how people manage multiple activities has to account for the strategy of using e-mail for activity management. However, research inquiries have to be extended to contrast this strategy with others, especially those that aim to support the management of activities that are not mediated through e-mail.

#### **4.4. Efforts Towards an All-Encompassing Approach**

Following the reasoning that multiple computer tools are involved in the management of activities, some systems such as WorkspaceMirror (Boardman, et al. 2002) and UMEA (Kaptelinin 2003) have been developed to provide cross-tool support. WorkspaceMirror is based on the sharing of task-management functionality between e-mail and other tools, and sharing organizational categories for files, messages and bookmarks. The purpose of WorkspaceMirror is to create task-management functionality that might be applied to any tool and will help to reduce the current lack of integration among tools. On the other hand, under the assumption that communication patterns do not always coincide with activities, UMEA has tried to focus instead on support for what the author calls *high-level* tasks (Kaptelinin 2003). This system provides cross-tool mechanisms to associate different kinds

of information related to a high-level task, such as documents, folders, web addresses, and contacts. UMEA provides a central interface where all high-level tasks and their resources are listed. From here, the user can start working on any task. From the point in time that users pick a task, the system automatically monitors the use of computer tools, keeping a history of the different tools used while working on that particular task. The user has as an option to associate particular documents or folders to high-level tasks, which facilitates easier retrieval. UMEA also provides functionality to establish deadlines, set priorities and reminders for the different high-level tasks.

Although both Workspace Manager and UMEA present interesting options for moving from application-based computing to direct support for activity management, it is still unclear how those technologies would fit in the practices of individuals as they are used on a daily basis. For instance, systems like UMEA depart from a flexible scheme to demarcate workspaces (as opposed to Kimura) and impose a monitoring mechanism to create automatic demarcation for the user. UMEA presents to the user a list of documents, called interaction history, which corresponds to those documents used while working on an activity. Given the constant switching among activities experienced by information workers, UMEA might erroneously associate documents with the wrong activities if the user fails to indicate explicitly that he has switched to a new one.

#### **4.5. The Need for Re-analyzing Contributions of Different Approaches**

In the preceding sections, it can be seen that each approach contributes to covering a portion of what is needed in order to manage multiple activities. At the same time, each approach highlights fundamental insights into the understanding of the phenomenon. However, just putting together those insights cannot be enough. The fact that each of those approaches is based on different assumptions regarding which aspects are most relevant to management of multiple activities (time, resources, or communications) makes it difficult to estimate the precise contributions of each approach to the general strategies that aim at managing multiple activities. In order to consolidate the foundation for new technological designs, we need to take a step back and re-analyze the practices of information workers with a perspective that does not depart from assuming primary relevance of any particular element and that aims to consolidate a comprehensive understanding of their interplay.

#### **5. Core Aspects around Activity Enactment in the Workplace to be Further Investigated**

A number of studies that have looked at the different characteristics of how information workers carry out activities in the workplace can provide some relevant insights into the nature of managing multiple activities. This section presents and organizes results around four fundamental aspects that, together with those discussed in previous sections, served as a basis of departure for orienting and framing the research presented in this dissertation. Those aspects, described in Figure 2.1, include the influence of the organizational context, the conceptualization of activities, the fragmented nature of

activity engagement, and the variety of tools for supporting activity management. Each aspect is discussed with respect to what previous research has found and what remains to be understood.

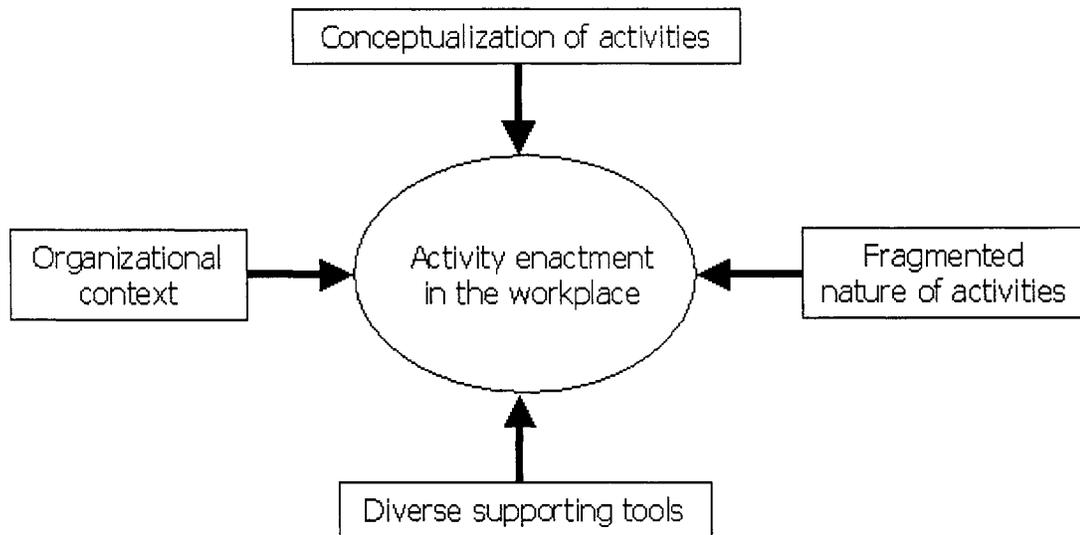


Figure 2.1. Fundamental departure aspects around activity management in the workplace

### **5.1. The Organizational Context of Activity Enactment**

Researchers have pointed out the relevance of considering the factors giving form to the context under which the management of multiple activities is conducted. An understanding of those factors must start from a perspective that sees the activities conducted by individuals as part of the collective efforts involving the participation of many people. The collective that information workers belong to is the organization that they work for, which divides the work among the individuals, based on their functional specialization, capacity, and experience (McGrath and Kelly 1986). Thus, from an organizational perspective, some degree of coordination is always required in order to

achieve the goals of the collective activities, and to integrate the partial results from many individuals into a single and coherent unit. Contextual factors specific to the organization will affect the way that this essential coordination is achieved. Two examples of those contextual factors can help to illustrate the effects on activity enactment.

One contextual factor identified by previous studies is the physical characteristics of the working environment where people work. Many of the seminal studies about the nature of managerial work explored the practices of people working alone in offices without considering shared environments (Horne and Lupton 1965; Mintzberg 1973; Sproull 1984). More recent studies have highlighted some of the effects of working in shared office space, one of those being the likeliness of being interrupted while executing an activity (Rouncefield, et al. 1994; O'Conaill and Frohlich 1995). As shared spaces, (such as cubicle environments,) do not provide much privacy, people often find themselves engaged in face-to-face interactions thematically unrelated to the activity they were working on before the interruption. The interruptions resulting from the openness of the working environment are illustrated, for instance, in the workplace study conducted by O'Conaill and Frohlich, which found that sixty three percent (63%) of interruptions occurred as face-to-face interactions (O'Conaill and Frohlich 1995). A similar observation was made by Rouncefield, et al., from a workplace study of a small office in charge of a hotel and training facility, where it was found that workers experienced constant interruption due to enquiries from customers showing up at the office or calling by phone, and due to questions from their colleagues about work processes being performed (Rouncefield, et al. 1994). The point to highlight here is the likeliness of being aware of different topics (and potentially switching between them) as a result of being

situated in a shared open environment. This gives rise to questions about what the effects are on the coordination of activities with co-workers, or on the incidental gathering of information related to the activities that the person is engaged in, but not currently working on.

An additional contextual factor identified by previous research refers to the organizational environment of the company. In a study regarding the practices of a team of engineers at a software company, Perlow analyzed the impacts of an organizational environment charged with pressure to deliver a product under a tight schedule (Perlow 1999). She observed how the engineers continuously had to handle urgent requests, taking out time from other deliverables and resulting in a recurrent, high-pressure, crisis-filled atmosphere (Perlow 1999). The frustration of the engineers resulted in a phenomenon which Perlow describes as the “time famine”: “*a feeling of having too much to do and not enough time to do it*” (Perlow 1999, p. 57) and which affects negatively their capacity to wisely put work effort on the items they have to focus on. Circumstances which characterize the organizational environment, such as those described by Perlow, are likely to impact and shape the way that activity management is enacted, as people might experience stronger external influences to juggle priorities in ways which differ from their own preference. Being aware of the particular organizational environment conditions experienced by the information workers is a fundamental element to understand their behavior.

The way that organizational context shapes personal activity management’s strategies is an area that demands further research. In particular, the fact that individual activities are a result of collective efforts raises questions about how organizational and personal

perspectives merge in practice. As indicated by McGrath and Kelly, although organizations can outline plans, set allocation schemes, define schedules or implement other structural elements, the individuals who are facing a particular situation adapt their behaviors to it with independence of any preconceived notions or plans (McGrath and Kelly 1986).

## **5.2. Conceptualization of Activities**

Researchers have argued that there is a great diversity in the type of activities that people handle on a daily basis (Belloti, et al. 2004; Czerwinski, et al. 2004). This diversity is not only manifested in the content of the activity, but also in other aspects such as its temporal scope and the kind of interactions required to execute it. Those studies indicate that while representing activities in digital or physical media, people tend to list long-term projects with short-term engagements; to include routine work with events occurring only once, such as trade meetings; to list personal and work related items together; and to differentiate things they can do by themselves from things which require interdependence with other people. Consequently, the recognition that everyday individuals juggle units of work of a very diverse nature has commonly resulted in researchers recommending that designers provide flexible mechanisms whenever a system requires the user to specify the attributes of an activity (Kincaid and Kaye 1985; Kaptelinin 2003; Czerwinski, et al. 2004). Unfortunately, whereas such an approach is practical, it contributes very little towards a more precise understanding of the types of activities that people handle and multi-task in practice.

Based on previous studies, it is possible to say that information workers distinguish among different types of activities that thematically connect actions and resources. Such distinction can be understood in two ways: first, that there are some units of work, or activities around which work is organized, that frame some of the tasks that people do (e.g. messages, meeting, interactions), and second, that there are different types of those activities. As was discussed, the fact that there are distinct activities that connect actions and related resources is an explicit assumption from which the workspace approach is based. For instance, systems like Kimura or UMEA are said to be designed to support easy switching among different *collections* of digital artifacts (e.g. e-mail messages, text documents, spreadsheets, and so forth) associated with particular “working contexts” (MacIntyre et al., 2001) or “higher-level tasks” (Kaptelinin 2003). These systems assume that beyond the goals of particular actions, people need to create collections of documents to support long-term tasks or projects. However, what exactly those units of work are is either implicitly assumed as in “a higher-level task (or project)” (Kaptelinin 2003, p.353) or stated in very general terms, as in “working contexts [are] coherent sets of tasks typically involving the use of multiple documents, tools and communication with others” (MacIntyre et al. 2001, p.41). Similarly, the studies conducted by Bellotti (2003) and her colleagues exploring the use of e-mail to support task management, pointed out that individuals manage threads of messages that are thematically connected around particular tasks or topics (e.g., preparing a paper for submission to a conference). Although Bellotti et. al. did not conduct an analysis of different thrasks (threaded chains of messages) that were created by users evaluating their system, they pointed out that many of their users have found it natural to organize their work around thrasks and that the aggregation of

resources in thrasks (e.g. documents and messages) facilitated the discussion that they had with each other about those particular topics.

In another study, Czerwinski and her colleagues, while analyzing the relationship between interruptions and task switching, aimed to capture “users’ personal descriptions of their work” and to define the particular tasks that people multi-task (Czerwinski et al. 2004). Using a diary collection technique, these researchers asked a group of information workers to keep a record of those things that they did during their workday. The description of each thing, together with the time it took to complete and other details, was annotated in a spreadsheet format. The analysis of the data collected in those diaries pointed out that people usually tended to organize actions around higher-level tasks that transcended individual actions. The informants’ diaries pointed to things such as “working on an annual performance review”, “work on PPT slides” or “create/edit web pages” that encompassed a number of actions extending over time. Although it is clear that Czerwinski’s effort was oriented in the right direction in order to capture people’s descriptions of their work, it failed to capitalize on it by failing to conduct an analysis that would reveal more specific details of the nature of those higher-level tasks. The authors limited their characterization of tasks to contrast project-oriented tasks with routine tasks but did not elaborate further on this. At the same time, they opted for a codification scheme that put at the same level project or routine tasks with clearly lower level actions such as e-mail or telephone calls. This makes difficult the assessment of how many of those actions were related to higher-level units of work and fails to orient the analysis towards a higher level of conceptualization.

Given the lack of frontal analysis on the nature of activities, there is a clear need for research that aims to identify the types and the characteristics of activities that information workers manage, as this understanding is absolutely necessary for determining what exactly are the units of work that individuals are multi-tasking among.

### **5.3. The Fragmented Nature of Activities**

Researchers have identified that the activities that individuals enact are fragmented at many different levels. The most common area of analysis of this phenomenon refers to the local fragmentation emerging from the interruption of a particular task and its resumption within a short period. As researchers have found, depending on how simple the interrupting task is or its similarity to the interrupted one, individuals can require less time for recovering from the interruption and continue the task without problems (Broadbent 1982; Gillie and Broadbent 1989; Czerwinski, et al. 1991). Scholars have also explored the effects of local fragmentations with respect to who benefits when they occur. Based on the analysis of the behaviors of a couple of information workers, O'Conaill and Frohlich found that the benefit is obtained in 43.2% of the cases by both the initiator and the recipient, in 32.8% by the initiator, and in 20.8% by the recipient only (O'Conaill and Frohlich 1995). In 2.4% of the cases, the benefit is obtained by a third party. On the other hand, researchers have found that the positive effects of an interruption are associated with its potential to contribute to completing the ongoing activity or to provide input for other activities handled by the individual (Perlow 1999; Jett and George 2003).

In contrast with local fragmentations, a less explored area of the phenomenon is the nature of fragmentation over extended periods. Research findings indicate that activities

are fragmented for reasons other than interruptions (Jett and George 2003). Activities can become fragmented just by the fact that individuals sometimes have to wait for resources or for people to become available so that they can continue on with the work activity. While the activity is in this state, the individual will have to remind himself to get back to it as soon as the condition impeding the execution is modified. This, as indicated by Belloti et. al., can result in some sense of overload for the individual when the length of the interval is prolonged for long periods (Belloti, et al. 2003). On the other hand, fragmentation can also occur as a result of the way that work rhythms are organized (Jett and George 2003). Workers are expected to work a certain number of hours during certain periods of the day and during certain days of the week. At some point, they naturally have to leave some work pending. Fragmentation then arises just as a natural result of having to work within certain time constraints. Furthermore, fragmentation often emerges as a result of the fact that individuals cannot engage in continuous uninterrupted work for the entire eight or ten hours that they spend at the office. Short breaks and recesses typically arise and interrupt the activities' flow and continuity. Breaks serve to accommodate personal needs, social gatherings or periods of rest (Jett and George 2003). However, beyond being recreational recesses, breaks also have been pointed out as useful for the incubation of ideas. Studies indicate that when people engage in creative activities such as developing new products, they require specific periods to think and discuss their ideas with co-workers (Csikszentmihalyi and LeFevre 1989).

Consequently, central to a new research effort on the phenomenon of managing multiple activities is a reorientation of the inquiry toward looking for a definition of the general dynamics of engagement on activities, on revealing the general patterns

describing the way that individuals relate to their activities, the nature of those engagement (and disengagement) processes, and the strategies for coping with different kinds of fragmentations that impede the continuity of activities. Therefore, fragmentation should be analyzed in a way that allows us to consider it, not just as an unexpected situation as is the case with external interruptions, but as one that is a result of people's normal work rhythms, and one that on occasions, is induced by individuals in the form of self-initiated switching.

#### **5.4. Diverse Forms of Support for the Management of Activities**

Researchers have found that to manage their activities, information workers use a variety of tools to support specific functions. As was discussed before, many of the technological approaches to support activity management highlight needs that include elements such as time, documents, contacts, messages or the physical space (Kincaid and Kaye 1985; Blandford and Green 2001; Ducheneaut and Belloti 2001; Belloti, et al. 2004; Boardman and Sasse 2004). Illustrations can help to explain how this occurs. Calendars are typically used to manage time by keeping activity appointments, coordinating meetings, or setting reminders. On the other hand, tools such as file cabinets, or electronic versions of them, serve to classify and store information related to the activities. Rolodexes and address books (both electronic and paper versions) help individuals to keep track of the contact information of the people they collaborate with. On the other hand, e-mail management tools help to cope with the organization of messages related to activities. Finally, the environment itself, the desktop, either physical or digital, can be used to organize artifacts related to particular projects or tasks.

Because the collection of artifacts involved in the management of activities can be quite diverse, this can present challenges to consolidating functional supporting infrastructures. Among those challenges, as noticed by Boardman, the handling of such a diversity of tools often results in the creation of duplicated organizational structures (mailboxes, files, bookmarks) which makes difficult to consolidate an unified view of the resources related to a particular activity (Boardman and Sasse 2004). In addition, other challenges stem from the fact that records of activities, such as appointments, can be maintained in two or more calendar systems or among several different devices (e.g. paper-planners, computer calendars, etc.). Finally, in many other cases, the challenge is not one of duplication but one of a lack of a formal record, as some of the activities are kept in mental lists or written down on other kinds of artifacts such as pieces of paper or sticky notes (Kelley and Chapanis 1982; Blandford and Green 2001).

Similarly, the consolidation of those supporting infrastructures for activity management often involves dealing with the challenges of linking the digital with the physical worlds. A consistent finding of previous studies has been that people rarely turn exclusively to digital tools for activity management. Other more mundane artifacts such as paper notes, daily planners, sticky notes, notepads, or printouts, play as important of a role as the one played by computer and information technologies (Blandford and Green 2001; Sellen and Harper 2002). Therefore, one might expect that the functional infrastructures that people use to support the management of multiple activities are constituted by combinations of digital and non-digital technologies that will lead to considering activity management as a kind of physical-virtual activity as proposed by Pederson (2003).

However, beyond a prevalent emphasis on tools, a more fruitful and sensible approach would be one that looks at the particular strategies that information workers use to manage their multiple activities and what ensembles of tools they use to support those particular strategies. We need an analysis that looks at the strategies that people use to manage their activities, identifies the strategic roles and capabilities of each tool and their combinations to support different kinds of activities. Such an approach has been suggested by Bellotti et al. by looking at the specific task management strategies that people use to keep track of their “to-dos” regardless of the resources used to maintain them (Bellotti, et al. 2004). They suggested an emphasis on studying the tools used to plan and organize work, rather than the tools used for task execution<sup>4</sup>.

## **6. Summary**

The analysis of previous work highlights a set of aspects that have to be further investigated in order to develop a consolidated understanding of the nature of managing multiple activities in the workplace. Each of those aspects is summarized in this section.

First, previous research highlighted the importance of expanding the scope of the inquiry into this phenomenon towards modern organizational context and the study of information workers with a wider diversity of roles. As was indicated, the managerial studies can provide many insights about the nature of the phenomenon in regards the pace of execution, variety, fragmentation, and interactive demands of activities, but they illustrate just part of the story of activity management in the workplace as they only

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<sup>4</sup> For the purposes of understanding how people manage multiple activities, their effort is limited. In particular Bellotti et al. (2004) work was oriented to study the “to-dos” that their informants had and how they manage them. Their work lacks of a detailed definition for what those “to-dos” are.

include managerial positions and place little attention on the specific strategies and tools that people use to get things done. However, it has to be said that the descriptive character of those studies and their methodological techniques are important aspects to be imitated.

A second aspect is in regards the attention towards the characteristics of the individuals studied and the organization they work for. As was pointed out, multi-tasking among activities can be in part a result of a personal preference but also as a result of other contextual factors. Consequently, future inquiries should balance detailed records of the practices of information workers with reflective accounts from them concerning those practices. In a similar way, the analysis has to include the operational schemes, organizational cultures and climates of their companies.

Previous research also points to a third aspect to be considered: a frontal emphasis on the analysis and characterization of those activities that information workers multi-task. It seems paradoxical that until now, many of the efforts to understand how people manage multiple activities have been based on very generic definitions of those units of work that people multi-task. Little attention has been placed on understanding how tasks are aggregated and thematically connected on higher-level units of work and what kinds of units of work information workers typically handle. Referring to “projects”, “routines”, and other types of characterizations is usually used to serve as an illustration mechanism, but never with the purpose of describing in detail a type of activity. It has to be said that the emphasis should be placed on providing characterization of the activities that respond to an external interpretation of the work, but also to the conceptualization that individuals make of their efforts. Such understanding allows for a more appropriate evaluation of

what exactly it is that people are multi-tasking, how different tools can be supportive of particular types of activities, and what are the effects of interrupting those activities, among other things.

A fourth aspect to consider is the analysis, description, and consolidation of understanding about the dynamics exhibited regarding the short and long term processes of engaging with activities. Emphasis has to be placed on revealing how individuals each day, as they go with their work, jump from one to another activity, handle interruptions and resumption of work, interact with others, and adjust the execution of activities to the changing circumstances they face. Analysis of the differences among roles, organizational structures, or environment conditions are also very important.

Finally, previous research points to the need for focusing the analysis on the strategies used by individuals to manage multiple activities rather than on a more narrow focus on the tools. Tools have to be analyzed as they serve the purposes of particular strategies. Such an approach can result more fruitful on establishing a foundation for developing new information technologies supporting activity management, as it will reveal the fundamental aspects that have to be supported which then can be translated into specific requirements for particular tools or ensembles of them.

## **Chapter Three: Theoretical Foundations**

### **1. Introduction**

This chapter presents and discusses some theoretical influences that shaped the initial conceptualization of the phenomenon of how people manage multiple activities. My investigation drew from the notions of Classical Activity Theory and the Interactionist Theory of Action to establish a departing understanding of some of the aspects of the phenomenon. The way that those notions were consolidated into the initial conceptualization of the phenomenon is explained in the following sections.

### **2. Departing Theoretical Influences**

Notions from Activity Theory and the Interactionist Theory of Action were integrated as part of the initial foundation to understand the phenomenon of how people manage multiple activities in the workplace. The use of those frameworks and the notions extracted from them came as a result of an effort to identify theoretical perspectives that would provide initial insights about the area of study and would help orient the inquiry. To mention those theoretical influences here has the double purpose of recognizing my own position as a researcher, and to situate my work in contrast to other theoretical frameworks. However, given the grounded-theory nature of my study, it is important to clearly state that I drew on notions from those frameworks with the sole purpose of consolidating an initial perspective for the inquiry, not to limit or constrain it. On the contrary, my goal was to use the notions as aids to highlight some aspects that might

otherwise have been ignored. The usefulness of those notions and how I built upon them is fully commented on in subsequent chapters. In part, my motivation for using Activity Theory and the Interactionist Theory of Action also arises in an attempt to modestly contribute to the theoretical development of each perspective, as the phenomenon under my investigation represents an area for which none of them provides a robust and comprehensive account.

## **2.1. A Hierarchical Perspective of Human Work: Activities, Actions and Operations**

A fundamental notion on which the research presented in this dissertation is based is the notion of activity. As it was explained in the previous chapter, among those studying or designing technologies to support the practices of information workers, there is no consensus on what is meant by the term *activity*. However, it is possible to perceive that in those studies, *activity* generally refers to some kind of high-level purposeful effort that can be described at different conceptual levels. For instance, while working on a project, an individual might be required to compose an e-mail message, which consequently would require him to move his hands over a keyboard in order to type the message. For an external observer, the analysis of such episode could focus on the manual operations of the individual (e.g., the keystrokes), or it could focus on the act of creating a message, or even on the attention the individual devoted to that particular project. From there we can say that, in general, the work efforts of human beings can be conceived and understood from different levels which range from the description of physical interaction with artifacts, people or environments, to a level focusing on the ultimate motivations or

desires behind their performance. In part, the lack of a consensus on the notion of activity as a high-level purposeful effort, and its use, comes as a result of not having a framework to distinguish it from more operative levels of human work.

A theoretical framework that favors a multi-level perspective of human work is Activity Theory. Activity Theory considers the *activity* as the central unit of analysis to describe human work (Leont'ev 1979; Leont'ev 1981; Kuutti 1996). An *activity* is seen as having a motivating object, either material or ideal, oriented towards the satisfaction of a need. Activities consist of *actions* or chains of them that can be broken down into *operations*. Actions are oriented toward satisfying specific goals which together make it possible to achieve the object of the activity. Similarly, operations are subordinated to actions and get determined by specific conditions when the activity is performed.

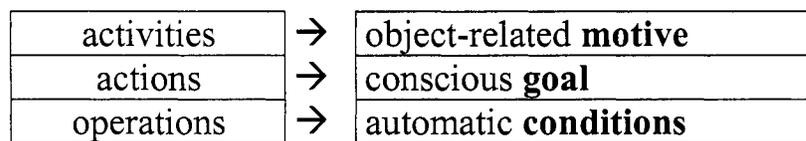


Figure 3.1. The multi-level perspective of classical Activity Theory

Activity Theory points to the actual action-operation dynamic as a central aspect to understand human behavior in practice (Kuutti 1996). For Activity Theory, actions operate at the conscious level and require decision-taking, planning and sequencing. In contrast, operations occur at an unconscious level and are done automatically. Movement from actions to operations occurs when the individual becomes skilled and fluent such that there is no need for a conscious effort. Such a dynamic, as exemplified by Kuutti, can be observed during the process of learning to use a manual gearbox for driving a car (Kuutti 1996). The steps required in the process (ease the gas pedal, push the clutch pedal, move the gear level, etc.), are very conscious at the beginning of the learning

process but once the procedure is mastered, individuals can drive without consciously thinking over the particular steps. Similarly, movement from operations to actions can occur when problems arise, forcing individuals to analyze the circumstances and become conscious again about the previously automated operation. For instance, if the manual gearbox suffers a malfunctioning that makes it difficult, if not impossible, to change the gear level, the individual might have to consciously retry the sequence of operations in order to verify if he is doing something wrong. This will move his efforts to the level of actions.

Observing actions alone then gives us just a partial understanding of human behavior and it is only by understanding the *why* behind those actions that we can grasp the real meaning of them. According to Activity Theory, activities give the *why* and serve to explain human behavior in a broader context. Activities, fueled by objects, expand over the long-term, giving sense and serving as a guide to define the “horizon of possible actions” (Engeström 1995; Kuutti 1998). Thus, the activity represents the “true motive” behind people’s behaviors (Leont'ev 1978, p. 62), the “ultimate reason” or “the sensemaker” of work (Kaptelinin 2005).

## **2.2. Individual vs. Collective Efforts in Human Work**

The relationship between individual and collective efforts in human work is the second fundamental aspect of the initial understanding of the phenomenon, and it can be illuminated by Activity Theory. Some important aspects of this relationship are highlighted by following the famous example of primeval hunting suggested by Leont'ev:

"When a member of a group performs his labour activity he also does it to satisfy one of his needs. A beater, for example, taking part in a primeval collective hunt, was stimulated

by a need for food or, perhaps, by a need for clothing, which the skin of the dead animal would meet for him. At what, however, was his activity directly aimed? It may have been directed, for example, at frightening a herd of animals and sending them toward other hunters, hiding in ambush. That, properly speaking, is what should be the result of the activity of this man. And the activity of this individual member of the hunt ends with that. The rest is completed by the other members. This result, i.e., the frightening of game, etc., understandably does not in itself, and may not, lead to satisfaction of the beater's need for food, or the skin of the animal. What the processes of his activity were directed to did not, consequently, coincide with what stimulated them, i.e., did not coincide with the motive of his activity; the two were divided from one another in this instance. Processes, the object and motive of which do not coincide with one another, we shall call 'actions'. We can say, for example, that the beater's activity is the hunt, and the frightening of game his action." (Leont'ev 1981, p. 210)

Leont'ev's example illustrates how in scenarios of collective work, an individual's efforts can be meaningless unless they are considered as partial contributions to achieve the collectively motivated objects (Leont'ev 1979). In those situations, activities are enacted by goal-directed actions which are performed by individuals, but it is the *sum* of those actions that allows the group of individuals to achieve their collective need. However, from the perspective of the individual, the activity can be circumscribed to those particular actions in which he or she participates: "the activity of this individual member of the hunt ends with that." This highlights the value of contrasting individual and collective perspectives, not just when analyzing the individual actions and how they connect with the object of the activities, but also when trying to understand how activities are conceptualized from the perspective of the individual. The way that individuals conceptualize their own work and the definition of what constitutes an activity from their perspective is a central aspect that my dissertation aims to discover.

Engeström proposed an additional development of Activity Theory to serve as a tool to analyze collective efforts (Engeström 1987). His approach conceives that the object of any activity is a collective one and limits an individual's contributions to the level of goal-oriented actions. Engeström proposed that activities are framed within activity

systems that are constituted and differentiated by particular communities, schemes of division of labor, and rules:

“The community comprises multiple individuals and/or sub-groups who share the same general object and who construct themselves as distinct from other communities. The division of labor refers to both the horizontal division of tasks between the members of the community and to the vertical division of power and status. Finally the rules refer to the explicit and implicit regulations, norms and conventions that constrain actions and interactions within the activity system.”

(Engeström 1987, p.78)

To identify the characteristics of the activity system allows one to understand the contextual factors around the activity and the implications that these can have in its practical enactment. Rules, communities and the division of labor can shape the way that activities ought to be enacted, their temporal frames, schemes of priority, and so forth. Consequently, activities cannot be analyzed in isolation without referring to the system that they are part of.

### **2.3. The Temporal Aspects of Human Work**

The temporal aspects of human work is a third central element in the initial understanding of the phenomenon of managing multiple activities. Activity Theory makes a particular emphasis on the fact that activities are framed within a temporal line, and that their nature cannot be explained without considering their *historicity* (Kuutti 1996; Engeström 1999). Activities do not arise anew each day; their form and structure is a direct result of previous interventions and actions of other individuals. Therefore, it is by considering the *history* of the activity that individuals can base their decisions on how to perform in it, what to expect from others, and how to move the activity from one phase to another. The historicity of the activity then serves as a container for the *state* of the activity, which is also distributed among people, artifacts and settings (Gruen 1996; Kirsh 2001). Because

an activity's historicity can be considered as a cultural production, and defined as part of the culture of the collective enacting the activity, it is necessary to examine and analyze the organizational culture of the company in order to understand how the activities that people manage became what they are today.

Temporal aspects of the nature of human work are also palpable when taking into account that activities are executed through actions which expand over different periods (hours, days, weeks, months and so forth). A theoretical perspective which emphasizes the temporal aspects of activity enactment is the one proposed by Anselm Strauss, called Interactionist Theory of Action<sup>5</sup>, which consists of a set of propositions and concepts with which to approach the understanding of human action (Strauss 1993). Strauss conceived human work as characterized by its temporality and constituted by acts that add up in courses of actions of varied durations (Strauss 1993). According to Strauss, those courses of actions can define long-term initiatives such as *projects* which entail sequences of tasks to be accomplished by many individuals who contribute with different kinds of work based on their individual skills and abilities (Strauss 1985). Strauss highlighted that the involvement of an individual can be an *intermittent state* depending on his ability to contribute on different parts of the project at certain points in time (Strauss 1988). This aspect is relevant as it reflects that the managing of multiple activities can be a result of being involved in activities that demand intermittence.

In his work, Strauss proposed the notion of the *arc of work* (or *trajectory*) to refer to the totality of tasks composing a project as it evolves over time (Strauss 1985), and to

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<sup>5</sup> Compared with Activity Theory, this perspective does not constitute a well characterized sociological position mainly because Strauss's original idea was to embed in it a set of principles and conceptual tools that can support the development of substantive theories (Strauss 1993).

refer to the actions and interactions that contribute to its evolution (Strauss 1993). Strauss proposed that any arc or trajectory is characterized by its different phases which are marked by changes occurring in the project or phenomenon. He suggested that people involved in the arc will develop *schemes* which will serve as plans consciously designed to shape the trajectory, but will also engage in *trajectory management* to cope with unexpected contingencies that might arise (Strauss 1993). This notion of trajectory can be useful as a way to frame an understanding of the gradual definition and maturation that activities experience.

## **2.4. The Need to Articulate Human Work**

The Interactionist Theory of Action highlights articulation work as a fourth essential element to establish an initial base for the study of the phenomenon of managing multiple activities. As pointed out by Engeström's approach of Activity Theory, an activity system assumes a division of labor that makes it possible to achieve the object of the activity (Engeström 1987). In his work, Strauss gives a major relevance to how this division of labor is achieved so that individuals can determine what types of tasks are required, how many of them, who will be the most capable person to conduct them, as well as a specification of a deadline for when those tasks should be delivered, in what format, and at what cost. The effort to articulate those details is what Strauss calls *articulation work*:

“Articulation work amounts to the following: First, the meshing of the often numerous tasks, clusters of tasks, and segments of the total arc. Second, the meshing of efforts of various unit-workers (individuals, departments, etc.). Third, the meshing of actors with their various type of work and implicated tasks.” (Strauss 1985, p.8)

Strauss pointed out that all workers, depending on their accountability and for each of the initiatives that they would be involved in, will have to articulate something: a task, a task

cluster, or a small or large segment of the project. In this way we can understand that articulation refers to both the organizational efforts and the individual's efforts to define what has to be done in order for the adequate actions and measures to be taken to achieve the objective of the activity. In spite of the fact that the concept of articulation work has been mainly used to analyze the processes involved with respect to collective efforts, some research has also suggested the usefulness of the notion to describe individual ones (Belloti, et al. 2004).

Strauss did not ignore the fact that many simultaneous *arcs of work* can be managed at any point in time by an organization or an individual. He used the term *line of work* to refer to a bundle of projects which were simultaneously attended by a unit of work, and commented about the challenges for organizations to establish priorities among them. Strauss, however, did not further develop this conceptual component and left it as an area for further inquiry and analytic work as the next quote indicates:

“Sufficient here to suggest that division of labor specialist would need to develop adequate theory and analytic means for studying both lines and arcs of work, if one accepts the distinction between them. While some analytic terms developed for arcs in this paper will fit lines of work, undoubtedly the latter entail a considerably different approach because of their sheer magnitude as enterprises, their increased importance to the organizational units involved, and their inclusion of several or very many ongoing projects, each with its own arc. The articulations among arcs and lines of work also would then need special attention from analysts.” (Strauss 1985, p. 14)

A possible interpretation of Strauss's perspective is that he conceived that the effort to articulate among arcs of work is a challenge at the organizational level and is experienced by the *organization*. However, organizations set the structure of plans, allocation schemes, schedules and other elements, but it is the *individual* who face the phenomenon in a situated manner. I argue that rather than this just being an organizational challenge, we can also talk about an individual managing different arcs of work. Revealing how this

management is achieved is a central area of inquiry for the study presented in this dissertation.

### **3. Summary: Initial Theoretical Foundations**

In summary, Activity Theory can be used to illuminate certain aspects of the phenomenon as: (1) the multi-level nature of the activities that information workers engage in, by separating those actions such as “composing an e-mail message” from activities such as projects or high-level initiatives; (2) the identification and distinction of goals and objects which are behind the acts of individuals; (3) the connection between the individual’s perspective and the collective perspective with respect to the conceptualization of activities and their management; and, (4) the way that different activity systems (each with its own rules, divisions of labor, communities, and instruments) collide in the daily practices of the individual.

Similarly, the Interactionist Theory of Action provides the temporal perspective for the understanding of the activity, and emphasizes, as well, that individuals manage activities in different stages of evolution as defined by their trajectories. Instead of a momentary static focus on activity, looking at its trajectory lets us understand the role that information technology plays at each of the different stages of the activity’s trajectory. An analysis of the practices of people is then required to understand how the evolution process takes place, under which conditions, and how individuals manage activities with different levels of evolution.

Those two theoretical perspectives provided a departing understanding of the phenomenon and helped highlight relevant aspects to explore through the study presented

in this dissertation. The results, as it is discussed in the final chapter of this dissertation, revealed some interesting aspects that can nurture the development of both Activity Theory and the Interactionist Theory of Action.

## **Chapter Four: Methodology**

### **1. Introduction**

This chapter presents the methodology used to study the phenomenon of managing multiple activities in the workplace. In essence, the research was based on an ethnographic observational study of information workers as they conducted their activities in the workplace, and complemented with interviews that were focused on various aspects of the phenomenon and their reflective accounts about observations, as well as follow-up inquiries to verify the evolution of some of the activities across time. Data collected in those studies were then analyzed using a systematic process inspired by the Grounded Theory approach (Strauss and Corbin 1998). The process was oriented towards producing conceptual and theoretical characterizations that served to respond to the research questions that this dissertation aimed to solve.

Although the methodology employed is essentially qualitative with respect to its data collection and data analysis techniques, the nature of the phenomenon demanded the strategic use of quantitative analyses for some portions of the data. This combination of qualitative and quantitative techniques resulted in a more precise understanding of the data which lead to deriving richer findings. Furthermore, as is characteristic of qualitative studies, this one was an unfolding study, as opposed to being a rigid pre-structured study. Therefore, generating results involved constant interaction between the data collection processes and the analysis processes, resulting in the refinement of some of the data

collection instruments and the research processes as the phenomenon was assimilated. Those aspects are explained in the following sections.

## **2. The Need for a Qualitative and Quantitative Perspective of the Phenomenon**

The general approach to study the phenomenon of managing multiple activities in the workplace is framed within the tradition of ethnographic qualitative studies (Orlikowski 1993; Bergman 2003; Pace 2004). My research required that I observe and interview informants in their working environments in order to understand how they managed their activities within the context of their work and while facing real situations. In that sense, the data collected (notes, transcripts and documents) have a qualitative nature as might be expected from any other ethnographic study. At the same time, given the dynamic aspects of the phenomenon under investigation, the inquiry demanded the collection of detailed records documenting how the activities were executed in practice. As with previous studies of managerial work, the investigation required recording, with as much accuracy as possible, the activities and actions of the individuals as they executed them, their duration and any additional information that could provide a means by which to determine how things moved along during the day. In this way, the data collected (observation records) have a quantitative nature.

Given the characteristics of the research questions, the analysis of the phenomenon required integrating both qualitative and quantitative methods. Some aspects, such as the determination of contextual factors around activity management and the strategies to

manage activities, were analyzed primarily with qualitative methods. Other aspects, such as the nature and type of activities as well as the dynamics of its enactment, demanded both qualitative and quantitative methods. The details with respect to how those methods were used are explained in Section 5. The emphasis that I want to make here is that the analysis was not constrained by a qualitative perspective, but aimed to take advantage of the nature of the data collected in order to achieve the best understanding of the phenomenon in spite of the traditional boundaries of the qualitative approach. Consequently, some stages of the analysis were characterized by the initial use of qualitative analysis to derive a grounded understanding of some characteristics of the phenomenon, which then resulted in a quantitative analysis to assess the weight of those characteristics in the data collected. Then findings from there guided further the qualitative analysis. In this way, the analysis used in my investigation was based on a combination of quantitative and qualitative procedures that were used strategically according to the particular demands imposed by the research questions, the quality of data obtained, and the limitations of the study.

### **3. About the Use of Grounded Theory**

The analysis of data was mainly guided by a particular qualitative analysis approach: Grounded Theory. The grounded theory methodology is based on a systematic process which involves the cross-comparative analysis of data aiming to identify concepts and categories that stand for the phenomenon, its properties, dimensions, as well as its casual and intervening conditions (Strauss and Corbin 1998). This process is achieved by the

codification of data (interview transcripts, notes or textual documents), the writing of memos, and the diagramming of relationships.

According to Strauss and Corbin, grounded theory uses three main sub-processes to analyze and code data: open coding, axial coding and selective coding (Strauss and Corbin 1998). *Open coding* is a process of breaking down data, examining and comparing it, in order to derive conceptual labels describing components of the phenomenon, as well as the grouping of those conceptual labels into categories. *Axial coding* involves the reassembling of data to define the relationships between categories and their subcategories at the level of properties and dimensions. Axial coding also involves the definition of the structure of the category which refers to the casual and intervening conditions defining the context in which the category is situated. Finally, *selective coding* is the process of refining and defining the grounded theory by selecting core categories, validating them and filling their subcategories until they are fully developed with respect to its structure. The application of those processes guarantees that the emerging theory is faithfully connected to the data from which it emerged, and that the theory possesses both descriptive and explanatory power about the phenomenon.

Considering the phenomenon under investigation, the grounded theory approach has a number of advantages to produce robust answers for the research questions that I was attempting to solve. First, it provides a way to consolidate a grounded perspective of the phenomenon and derive theoretical propositions about its nature. This moves the findings of my investigation beyond pure descriptive accounts to the level of theoretical propositions that can then explain the phenomenon in more fundamental ways. This guarantees that the results of my investigation serve not just to explain the scenarios,

people and situations studied, but that they can also be used as analytical tools by other researchers and be further developed. Secondly, the grounded theory approach has the advantage of bringing organization and order into the analysis process. The methods suggested by grounded theory, although not prescriptive, provide a well structured set of sequential steps that guarantee that all the data are gradually reviewed, coded, integrated and compared. The emerging conceptual categories are the result of constant comparative analysis among many instances of one person. And across instances experienced by many different persons, the analysis is comprehensive and attempts to include all data collected.

Finally, the techniques proposed by the grounded theory approach can be applied to different forms of data. Although traditionally the kind of data analyzed by analysts using grounded theory consist of transcripts of interviews, there are not intrinsic limitations that prevent one from analyzing data such as formats, copies of documents, observation logs, or pictures. Preserving the spirit of constant comparative analysis of evidence and using the analysis processes (open, axial, selective), it is possible to produce grounded theoretical explanations of the phenomenon out of that kind of data. In particular, the analysis performed in my investigation highlights how a combination of sources of data can be analyzed using the methods of grounded theory.

#### **4. Main Characteristics of the Study**

To gain a grounded empirical understanding of the phenomenon of managing multiple activities in the workplace required me to design a study that facilitated the close observation and detailed documentation of the daily practices of information workers as

they conduct their work. The departing characteristic of the study is that it was focused on understanding the practices of information workers involved in multiple projects, activities and collaborations, and well versed in the use of computer and communication technologies. In addition to that, and with respect to the working environment on which those information workers perform, this study advocated settings where people work under deadlines and a degree of time pressure; and where the effects of working in either open-office environments or closed offices can be observed. Those aspects were pursued in order to provide the richness and enough variety needed to understand different dimensions of the phenomenon and their relationships.

In contrast with previous research that focused on studying individuals with similar characteristics but working for different companies, my investigation was oriented to studying individuals that shared the same organizational context, working for the same team, department or company. Having informants sharing the same culture, procedures, main projects or routines, was not only useful to understanding the effects of those aspects in the phenomenon under investigation, but also was very useful in complementing the understanding of each informant as his or her data was enriched with the data collected from the other informants.

The study was designed to include a variety of information workers with different job roles and different levels of responsibility. The study included a total of 36 informants, including eleven managers, nine analysts, eight software developers, five project leaders, and three support engineers. No other specific demographics such as gender, age, or experience were considered as a factor in this investigation. Nevertheless, the aim was to include, as much as possible, a certain degree of variety on the latter aspects.

With the goal of having a base to compare the effects of the phenomenon that the different organizational environments produce, the study consisted of three different sub-studies in two different companies. The first company, IT-Services<sup>6</sup>, provides information technology, accounting and financial services as an outsourcer for a major bond investment manager, Atlantic Investments, located in Southern California. In this company, two sub-studies were conducted. The first focused on the Trading team, composed of about twenty-five people who were in charge of maintaining the financial systems used by the brokers at Atlantic Investments. Fourteen of the twenty-five team members from the Trading team volunteered to participate in the study. The second sub-study focused on the Operations team, composed of about forty-five people who were in charge of maintaining different transactions and accounting systems used by people at IT-Services. Ten people from the Operations team volunteered to participate in this study. A third and final study was conducted in a company called Venture, also located in Southern California. Venture specializes in providing process re-engineering solutions and software systems for small and medium-sized medical practices. Venture attended to hundreds of clients that were distributed throughout the United States. At the time of observation Venture had a headcount of about 65 employees. Here, twelve people from various departments and roles participated in the study. Complete details about each sub-study, characteristics of informants, and other aspects are presented in Chapter Five of this dissertation. Table 4.1 presents a summary of the distribution of the informants from each company and their roles.

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<sup>6</sup> IT-Services, Atlantic Investments, Venture and all the names of informants and products are pseudonyms.

Study	Role					Total
	Analyst	Developer	Engineer	Leader	Manager	
IT-Services – (Trading)	6	4			4	14
IT-Services – (Operations)	1	4		2	3	10
Venture	2		3	3	4	12
<b>Total</b>	9	8	3	5	11	36

Table 4.1. Breakdown of informants by study and role

## 5. Data Collection Methods

The robust understanding of the phenomenon demanded to collect data that captures the perspectives, opinions and explanations of informants, as well as the enactment of their actions as these occur in everyday practice. Consequently, it was not only necessary to capture information about *what* informants did and *how* they did it, but also *why* they did it. Those needs led to the use of the following two central methods of inquiry:

### Semi-structured Interviews

Interviews following a semi-structured format were conducted with informants with the goal of getting their own accounts about the phenomenon of managing multiple activities in the workplace. The way to structure and conduct the interviews was inspired by the techniques suggested in the texts of (Lofland and Lofland 1995), and (McCracken 1988). The aim of the interviews, as suggested by McCracken, was to “*allow the respondents to tell their own stories in their own terms*” (McCracken 1988, p.34). Therefore, the interviews were handled in a way that encouraged the informants to talk and express what he or she perceived as relevant for each topic, and to elaborate in as much detail as he or

she wished. In order to provide some degree of structure and to guarantee that all topics were covered, the interviews were organized with the help of *interview guides* which listed the topics, prompts, and potential questions to be asked (Lofland and Lofland 1995). Also, an effort was made to conduct the interview in their workspace (offices or cubicles) so that the interviewees could refer to artifacts or physical settings in order to make their accounts more meaningful for the interviewer (Beyer and Holtzblatt 1998). Pictures of settings and relevant objects were made during interviews. Informants also were asked to provide photocopies, samples or other materials which were perceived as useful for the documentation of the activities and the subsequent analysis of the interviews.

### Systematic Observation

Systematic observation of the practices of individuals was used to gain a full immersion in the way that informants in practice experienced the management of multiple activities. Compared with other indirect forms of data collection used in previous studies, such as diaries (Czerwinski, et al. 2004), or activity sampling (Hudson, et al. 2002), the observation *in situ*, although more demanding for the researcher, provides the contextual richness necessary to understand the phenomenon in a way that is not achievable by any other means (Spradley 1997).

The particular form of systematic observation used in this study was fundamentally inspired by the structured observation methodology proposed by Henry Mintzberg (Mintzberg 1970) and by the empirical works of Lee S. Sproull (Sproull 1977) and Leslie A. Perlow (Perlow 1995). The methodology was refined in some aspects by following the

experiences and insights gathered by other empirical investigations in the field of human-computer interaction (Malone 1983; Suchman and Wynn 1984; Mander, et al. 1992; Tyson 1992; Whittaker, et al. 1994; Gruen 1996).

The systematic observation technique used in my investigation can be summarized in the following way: Informants were asked to be observed in their offices or cubicles as they conducted their work, from the time they arrived to the office to the time they left. The researcher sat at a convenient distance right behind or beside them so it was possible to observe their actions as well as the contents of the physical or digital documents they handled. While the observation took place, the researcher remained quiet, taking notes and documenting the activities of the informants, their duration, tools used, people involved, and brief descriptions of the actions performed. Indications of fragmentation or interruptions in activities were also fully documented, as well as the actions taken to resume activities. Each single observed action (e.g., composing an e-mail message, interacting with co-workers, speaking on the telephone, etc.) was time-stamped to the second using a clock watch. Time stamps, observation notes, and diagrams were annotated in blank sheets of paper attached to a clipboard.

Whenever possible, informants were shadowed outside their cubicles or offices. They were followed to formal and informal meetings, social gatherings with co-workers (e.g., for chatting or having short breaks), or to activities outside the office (client visits, provider exhibitions, etc.). Before beginning the observation, informants were asked to indicate when it was or was not appropriate to follow them outside the cubicle or office. In the same way they were told to feel free to ask the researcher to step out of the office

or cubicle whenever they considered it necessary to protect their privacy or that of their co-workers, clients or providers.

In order to avoid the researcher becoming a source of interruptions that could affect the flow of the informant's actions, all questions or clarifications required to complement the notes were postponed to two specific times: (1) during breaks that informants had (e.g., while walking over a meeting, or while preparing a snack or a cup of coffee for themselves), or (2) at the end of the day before they left the office. Informants were requested to reserve the last few minutes of their day to allow for any questions or clarifications that I might have.

In addition to observation notes, data collected from informants during observation also consisted of photocopies, or samples of materials used for some of the activities performed during the day. Those documents were requested to the informants at the end of the day. During the final day of observation, pictures of their workspaces and office were taken to document the way that the space looked during the observation period.

## **6. Data Collection Process**

This section describes the processes used to get access to informants and to study the general characteristics of each company studied as well as the specifics of how the data were collected from each informant.

### **6.1. Process Used in Each Study**

In each of the studies the process to collect the data included the following steps:

### Identification of Primary Contact

A primary contact in the company (IT-Services or Venture) was identified and introduced to the goals, procedures and benefits of the study. With the help of this person, potential teams having information workers with the desired profile were explored and one of them identified. A meeting to present the project to them was then scheduled.

### Presentation to the Team

During a 45-minute presentation, the team was introduced to the goals, procedures and benefits of the study. In this session, team members were also informed of the details regarding the confidentiality, and how we would treat the information collected, as well as the way in which it would be used, and protected<sup>7</sup>. At the end of the session, team members were invited to participate in the study and asked to contact me or talk to the primary contact in the company.

### Preliminary Period of General Observation:

A preliminary period of general observation was conducted at the company with the goal of getting familiar with their organizational structure, history, procedures, projects, and routines. During this period, the primary contact was asked to let the researcher attend some meetings, observe his work as he did it, consult documents and conduct a semi-structured introductory interview with him. During this time some preliminary informal interviews were conducted with key persons contacted through the primary contact. This period of observation lasted between five and ten days with each company, and it ended

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<sup>7</sup> Each person participating in the study had to sign a consent form approved by the Institutional Review Board (IRB) of the University of California, Irvine. My research study titled "Managing Information in Multiple Spheres of Work" HS #2002-2669, was approved by the IRB on October 15<sup>th</sup> 2002.

when I perceived that enough information had been obtained to initially understand the way the company and the team worked. This initial time of semi-formal observation was very helpful in that the team became familiar with me and got used to having a researcher at the workplace (Spradley 1997). Also, this period was essential for obtaining a first impression of the organizational environment where informants worked.

## **6.2. Process Used with Each Informant**

For each person participating in the study, the next steps were as follows:

### Preliminary Observation (Half-day)

A half-day period of observation was conducted at the informants' cubicle or office in order to become familiar with their main projects, people they interact with, and other general practices. At the beginning of this day, some time was devoted to signing the consent form and to explaining to the informant the procedures of observations and subsequent interviews.

### Systematic Observation (Three Full Working Days)

During three full working days<sup>8</sup> individuals were shadowed and their actions, activities and interactions documented. At the beginning of the first day, the procedures of the

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<sup>8</sup> Deciding for a period of three working days reflected a compromise between the coverage that it is aimed to have for each person, the number of people to be observed, and the expectations of what could be a fair period of time for the informants to be willing to be observed. The compromise is also along the lines of previous research efforts. For instance, Henry Mintzberg observed five informants for five full working days (Mintzberg 1973). Lee Sproull observed seven managers for a total of 29 working days (between three and six days per manager) (Sproull 1977). Other studies, which do not follow closely the structured observation technique, such as the one conducted by Leslie Perlow, have reduced the amount of shadowing to one or two days per informant and have used complementary techniques such as diaries to document the actions when direct shadowing is not done (Perlow 1995).

observation were briefly explained again and the informant was reminded to provide short debriefs of phone conversations that I wasn't able to hear, or meetings that I wasn't able to attend. At the end of each observation day, a short session of about five minutes was conducted with the informant to clarify issues and resolve any questions.

### General Interview

A 60 to 90 minute semi-structured interview was conducted several days after the systematic observation period. Informants were asked about the nature of their job, the ways they organize their information, ways they interact with other individuals, communication devices and strategies used to manage and coordinate multiple projects, time and contacts. During this interview, I referred to specific aspects or situations that were observed during the shadowing which were particularly interesting, or helped me clarify the intentions of observed actions. The progress and status of some of the activities observed during the systematic observation were also verified. The protocol and interview guide of this interview is included in Appendix A.

### Follow-Up Interview

An additional follow-up, non-structured interview was conducted some weeks after the observation to present preliminary results of the analysis to informants, get feedback about them, answer additional questions, verify the status of some of the activities observed during the observation, and check for changes in their work or priorities. An example of a general interview guide for this is in Appendix B.

In total, the inquiry comprised more than 920 hours of systematic observation with an average of about 26 hours per informant, more than 100 hours of interviews, 132 observation reports, and the collection of hundreds of other documents including catalogs, brochures, e-mail printouts, photocopies, and pictures.

### **6.3. Implementing the Data Collection Processes in Each Study**

This section describes the aspects related with the implementation of the data collection processes in each study.

#### IT-Services – Production Team

In January of 2003, a primary contact was identified at IT-Services in Southern California. Due to the workload demanded from Atlantic Investments, IT-Services had them as their only client. About 250 employees worked at IT-Services during the study period. Interviews were scheduled with the primary contact, his boss and his team in order to present the study and explain the procedures. In February of 2003, after a presentation meeting with all 25 employees working in the Trading team, 11 of them signed up as volunteers to participate in the study. Three additional team members signed up as the study was conducted to make a total of 14 members volunteering for the study.

The study started on mid-February of 2003 with the observation of the primary contact, Jim, one of the managers in the Trading team, for a period of ten non-consecutive days. During that time, I sat in his cubicle and took informal notes about his activities. I also joined him at several meetings with his team, his boss and with other teams within the company. Due to confidentiality reasons, I was not allowed to follow

Jim or any of the team members to meetings with people from Atlantic Investments, their client.

After this initial period, and over a period extending for the following seven months, interviews and systematic observations proceeded as explained before. Among the 14 informants participating in the study four of them were managers, six financial analysts, and four software developers.

### IT-Services – Operations Team

In mid-October 2003, after presenting preliminary results to a high-positioned executive at IT-Services, we were invited and encouraged to continue the study with other teams within IT-Services. After working for sometime with Jim, we were introduced to Alfred, the manager of the Operations team. From this point on, the primary contact for this second study was Alfred, and with his help I planned a presentation for the people from his team. After the presentation, ten people volunteered to participate in the study.

Given the experience gained in the prior seven months at IT-Services, the study with the Operations team did not demand an extended period of preliminary general observation. By the time the Operations team was selected, I was already familiar with their activities, composition and interrelationships with other teams at IT-Services. Many of the meetings and interactions observed while studying the Trading team included people from the Operations team. Consequently, for this study, the preliminary observation consisted of attending a couple of weekly meetings, and spending time with Andy in his office for a couple of days.

Systematic observations and interviews proceeded with each of the ten informants starting in mid-November 2003 and extending over the following five months. Among the ten informants participating in the study, three of them were managers, four software developers, and three financial analysts.

The major methodological change for this study was the introduction of a paper format that informants were asked to complete at the end of each observation day. In the format (a copy of which is included in Appendix C), the informants were asked to list the “*things they worked on in that particular day*” and characterize their level of importance and urgency (normal, higher than usual, lower than usual). The introduction of this format was considered necessary in order to facilitate the codification of the practical activities that people engaged in, and became an excellent source of additional information used during follow-up interviews to reflect on the observed activities.

### Venture

In June 2004 a meeting was conducted with executives from Venture, a local company specializing in providing administrative and consulting services to small and medium-sized medical practices. The introduction of this final study was necessary, as my supervisor and I understood that it would provide a way to contrast the effects of organizational environments within two different companies. Contrasted with IT-Services, Venture is a company attending to hundreds of clients, and experiencing an organizational transformation from being a software provider to being a service-oriented company.

With the support of the Chief Executive Officer (CEO) of the company, and his executive assistant acting as the primary contact, in July 2004 a preliminary general observation period began. To gain a good understanding of the company, its operations, and routines, I conducted interviews with three individuals, each having different roles in the company. I attended a general company meeting and a planning meeting where the strategies and plans for implementing the service model were discussed. In addition to that, I analyzed documentation provided to me by the employees, and from the company's Web site. With the help of the primary contact, a presentation of the study was scheduled. From this meeting, six persons signed up to participate in the study.

At the end of July 2004, for a six-month period, interviews and systematic observations were conducted as explained before. As the study advanced, other volunteers signed up to make a total of 12 informants. Among the 12 informants, four had managerial positions of different levels, four worked in support positions (either supporting internal or external customers), two were analysts, and two worked as sales representatives. The resulting set of informants represented most of the positions at Venture and was beneficial in gaining a more robust understanding of the company as a whole.

Two major methodological changes were introduced in this study as suggested by the parallel ongoing analysis of data collected at IT-Services. The first change consisted of substituting the half-day preliminary observation with a preliminary one-hour semi-structured interview which was conducted days before the observation. From the analysis of the results obtained at that point in time, it was perceived to be more advantageous to ask the informants about their current concerns, projects, the names of

people they collaborate with, and working styles in an interview. The second change consisted of having an additional follow-up interview two or three weeks after the observation period. The follow-up interviews aimed to track the progress and evolution of the practical activities that they had engaged in during the observation.

## **7. Data Analysis**

Here I present the analytical processes that were used to analyze the data collected and derive the responses from each of the research questions that this dissertation addressed.

### **7.1. Organization and Formatting of Data Collected**

The data collected from each individual were processed in mainly two different ways. Tapes of interviews were fully transcribed and integrated into a software tool for easy retrieval and analysis. MAX QDA, a software for qualitative data analysis, was used for this purpose. On the other hand, the observation notes were fully transcribed into a format so that it would be possible to identify the time when the action occurred, as well as a brief description of the action, the tools used (or type of interaction), the individuals involved, and general notes. Appendix D shows an example of this format. Observation notes of this format, pictures, and other documents were all placed in a folder for each participant. From there, data from the observation notes were transferred to Microsoft Excel spreadsheets to facilitate its computation. Visual-basic script macros were designed and programmed to compute data, generate individual reports and aggregate results. The

statistical package SPSS (Statistical Package for the Social Sciences) was used to conduct the quantitative analysis of the data.

## **7.2. Analysis Processes**

The analysis of the data started by focusing on the factors characterizing each of the three sub-studies with respect to the nature of the work, organizational structure, operative schemes, and physical characteristics of working environments. This analysis served as the basis for understanding the context in which informants performed their activities, the nature of those activities, and the strategies adopted in order to manage them. The results of this analysis are presented in Chapter Five of this dissertation. The analysis of the data focused on each of the specific research questions, and was conducted in the following way:

### Nature of Activities

For each informant, the observation notes were used to identify and characterize the actions performed and their corresponding activities. Actions referring to interactions with artifacts (e.g., composition of documents, annotations on paper, responding to e-mail, etc.) or interactions with other individuals (e.g., meetings, chatting, etc.) were coded and computed to determine the total time spent per day and the average time per event of each kind of action. An *event* was defined as a continuous engagement on a particular action. On the other hand, sets of interrelated actions associated with the same purpose (e.g., a project, or initiative) were also coded. As will be explained in detail in Chapter Six, these sets of actions are called *working spheres*. The identification and isolation of

those working spheres was based on an exhaustive analysis of all the evidence collected from each informant. Comparative analysis of evidence was used in order to determine whether or not a particular identified action belongs to a particular working sphere (Strauss and Corbin 1998). Once coded, the total average time spent per day on working spheres as well as the average time of continuous engagement on them (*segment* time) was computed. More details about the way that working spheres were derived from the data and examples are included in Chapter Six.

The working spheres resulting from the previous codification were then qualitatively analyzed to generate a set of categories defining the different *patterns* of activities that people handle. Both observation notes and transcripts of interviews were used in this process. Using open and axial coding processes, a grounded scheme of the *patterns* of types of activities, including its properties and dimensions, was produced. This scheme was then complemented with a quantitative characterization of the frequency and time duration for each *pattern* of working sphere as experienced by informants. This quantitative analysis was useful in understanding the relevance of different types of working spheres in the work of informants.

#### Dynamics of the Enactment of Activities

Data from the observation notes were used to analyze the degree and nature of fragmentation of the activities conducted by individuals. The data were analyzed to determine the different kinds of switching that occurred among different activities which included, among others, abrupt interruptions (e.g. somebody arriving to the informant's cubicle), concluding the actions related with an activity (e.g. a phone call), or resuming

work after a break. As a result of this analysis, the sources of switching among activities were characterized by type and frequency. Chapter Seven explains the specific statistics procedures used in the analysis to test a set of fourteen hypotheses.

### Strategies to Manage Multiple Activities

A qualitative analysis was conducted to determine the strategies that people use to manage the fragmentation of their activities and keep their continuity. Both transcripts and observations notes were analyzed extensively with this purpose using open and axial coding. The purpose was to identify the fundamental processes involved in multi-tasking activities and the set of strategies that people used. Conceptual categories were created to refer to those processes, strategies and other elements describing this part of the phenomenon. An example of the coding process used to derive the findings is shown in Appendix E and F.

A close examination of data from interview transcripts and observation notes was conducted in order to identify the way that individuals create ensembles of digital and physical tools to support particular activity management strategies given the particular activities they handle. A qualitative analysis was oriented to identify the core capabilities provided by those tools on supporting the management of multiple activities.

The relationships between the identified strategies enacted by individuals to manage their activities and the coordinative efforts to plan, allocate, schedule efforts among the members of a team was determined through the analysis of data collected from interviews and from the identification of those scenarios on the observational data.

## **8. Summary**

As explained earlier in this chapter, the investigation was based on conducting three observational studies in two different companies including a total of 36 information workers with a diversity of roles such as managers, analysts, software developers, sales personnel, project leaders and support engineers. Each informant was shadowed for a minimum of three working days and interviewed. After the observation, at least one follow-up interview was conducted with each informant for the purpose of: confirming various aspects of the information collected, resolving questions, and to check the status of their activities. The data collected in the inquiries consisted of transcripts of interviews, time-stamped observation notes, pictures, photocopies of documents and other printed materials. Data were analyzed using a grounded theory approach that, for some parts of the data, was complemented with the integration of quantitative analysis. Further details of the context of work of each study and the characteristics of informants are presented in the following chapter.

# Chapter Five: The Context of Activity Enactment

## 1. Introduction

An initial aspect of understanding of how people manage multiple activities is identifying the conditions that define the context within which activities are enacted. The focus of this chapter is to describe the conditions defining the context of work of those information workers studied.

First, the descriptions focus on the companies where the investigations took place, including the nature of their business, types of clients and providers, organizational structure, and operational schemes. Then the teams and job positions that were studied are described, including the nature of the work, the organizational climate at the time of the study, their main projects, and the physical characteristics of the settings. The description is organized by company, but in the case of IT-Services, I highlight the main differences between the two sets of informants studied within the company.

Drawing from those descriptions, and the analysis of their differences, this chapter presents a set of four conditions that I found can be used to characterize the context of activity enactment for those informants studied. The conditions, as will be discussed in subsequent chapters, impact the nature of the activities of the informants, the dynamics of their enactment and the strategies they use to manage them. Those conditions include: the organizational operation of the group from where informants came from, the job roles they had in their teams, the characteristics of their workplace, and their level of physical collocation in relation to their co-workers.

## **2. Context of Work at IT-Services**

The first investigation for this study was conducted at IT-Services. Given the nature of their business, this part of the study helped me understand how people manage multiple activities within the context of large companies, being one with a solid financial and organizational structure, immersed in a strong market, and making use of state-of-the-art technologies to support their operations. In this section, I detail those aspects relating to the nature of the work for the two sets of informants studied at IT-Services.

### **2.1. Characteristics of the Business and its Operational Structure**

IT-Services is the Southern California branch of an international investment management company with headquarters in Boston, Massachusetts. With offices around the world, IT-Services provides financial services to many organizations, groups and governments, by either managing or maintaining custody of their assets. The company also specializes in outsourcing services for other institutions such as technical support or administrative functions. Such was the type of services offered by the Southern California branch, which, due to the volume of operations, attended exclusively to one client: Atlantic Investments.

Atlantic Investments was an investment management company specializing in fixed income bonds. On behalf of their clients, they invested and managed bonds from the US government, Municipalities or Corporations. Founded in the early 70's, the company had grown from having just three management professionals, to having more than six hundred employees, most of them operating in Southern California, but also internationally with offices in cities such as London, Tokyo and Munich.

In the year 2001, Atlantic Investments partnered with IT-Services and outsourced to them a portion of the technology and administrative support functions. From that point forward, IT-Services took control of key components of the technical infrastructure for Atlantic Investments, including systems development, databases, servers and networking. Additionally, IT-Services started operating the back-office of Atlantic Investments, which is an administrative function corresponding to the settlement of trades and the maintenance of resulting records in the accounting system. Many people that had previously worked for Atlantic Investments were re-hired by IT-Services and then integrated together with new employees into a new organizational structure. Early in 2003, when the investigation at IT-Services started, the integration of the organizational structure and the operational schemes were well-established. The following was pointed out by a senior manager in an IT-Services press note that was handed to me by one of the informants:

*“We are hard to pull apart. We are joined at the hip—we are their back office. You can’t tell what’s Atlantic Investments and what’s IT-Services—we are woven into their businesses.”<sup>9</sup>*

In Southern California, IT-Services was organized into two main groups: Technology and Back Office. The Technology group was responsible for the design, support and maintenance of the systems used by the management professionals (brokers) at Atlantic Investments. The group was divided into a number of teams devoted to attending to specific systems, administer servers, and database infrastructure, and run the help-desk and the network-operations center (NOC). At the same time, the Back Office group was

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<sup>9</sup> Press note from the IT-Services Web site: “Extreme Outsourcing” (February 1, 2003).

responsible for maintaining the records for all of Atlantic Investments' transactions, including the transfers of funds to banks, as well as the consolidation of reports, and the maintenance of accounting processes. The Back Office group was organized into a number of teams that attended to different kinds of financial transactions, different countries, and administrative operations. About 200 employees were working at IT-Services at the time that the study was conducted.

The diagram in Figure 5.1 depicts the operations between Atlantic Investments and IT-Services at a high level. Through their computers and terminals, management professionals and analysts from Atlantic Investments accessed trading systems to conduct operations and get reports. The systems were physically located in IT-Services, but people at Atlantic Investments had access to them through a dedicated high-speed-data pipeline. The transactions were done through terminals provided by Berg, a provider of financial information, which provided customized applications for Atlantic Investments. When a trade was done on a Berg terminal and acknowledged by the Berg systems, it would then be transferred to IT-Services. The trade would then enter the compliance systems at IT-Services. Each trade had to be verified according to a number of compliance rules before it could actually be processed. Investors usually established compliance rules for their funds that specify how and where their money can be invested. For instance, a petroleum company would not allow using their funds to buy bonds from another petroleum company, as it would affect their interests. Similarly, some organizations would forbid buying bonds from tobacco or alcohol companies. Thus, checking for compliance is an essential part of the trading process. Once the trade is deemed compliant, it could then be transferred to other systems where it would be processed until the funds had been

verified to have been transferred to the proper bank accounts. Financial brokers from Atlantic Investments traded all day long from six o'clock in the morning to past three in the afternoon. However, the registration of those trades in the accounting system was usually not concluded until sometime after seven each evening.

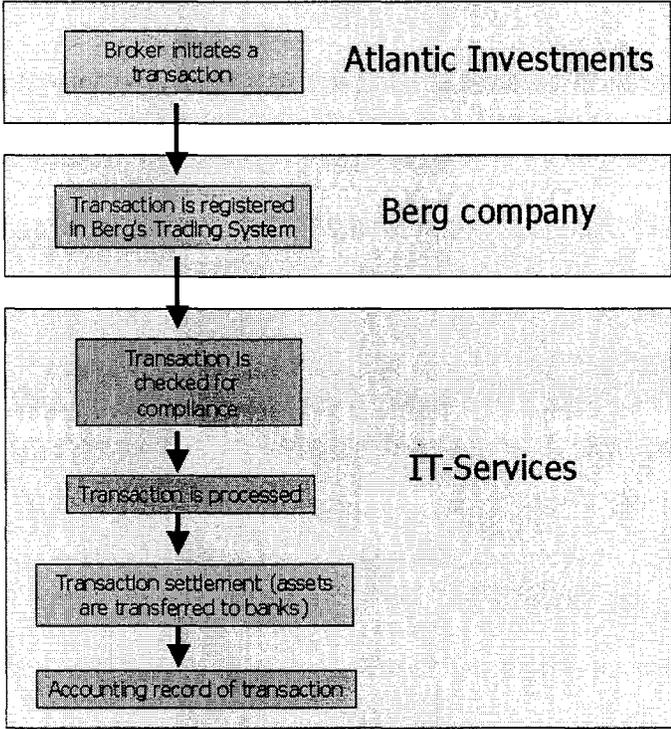


Figure 5.1. The basic operation process between IT-Services and Atlantic Investments.

Given that all transactions executed by Atlantic Investments were conducted using the Berg terminals, the relationship with the Berg Company was strategic for the goals of IT-Services. As explained by Chris, a manager in IT-Services: *“Atlantic investments is our client, Berg is our peer... to have a good support for Atlantic, we have to have a good relationship with Berg.”* People in IT-Services negotiated on behalf of Atlantic Investments with regard to requests for upgrades and improvements within the systems,

as well as calling for support whenever problems arose. The general feeling among the people at IT-Services was that the relationship with Berg was very effective and professional, especially in the case of requests done to resolve problems.

Given the access granted to this particular group, my study focused on the operations of IT-Services' Technical group, and within it, I observed people working in two different areas: the Trading team and the Operations team. The Trading team was in charge of what it is called the "upstream" part of the transaction: the compliance checking and processing of the trades. In contrast, the Operations team supported the "downstream" part of the process that included the settlement of the trade and its registration in the accounting system. Those two teams, as explained in detail in the next sections, conducted the core operations for the execution of trades.

## **2.2. The Trading Team at IT-Services**

The Trading team was composed of twenty-two<sup>10</sup> people, including managers, software developers and financial analysts. The team was divided into four main sub-teams: the Compliance team, the Transactions team, the Applications team, and the Analysts team. Each team had a manager who reported directly to Bob, the general manager of the Trading team. The compliance team administered the servers that ran the compliance rules for each transaction and maintained the applications that sent the compliant trades to the rest of the system. Meanwhile, the Transactions team managed the systems that received trades from Berg, as well as other systems required in order to start the processing of those trades. The team of Analysts tested new software components created

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<sup>10</sup> The team's composition suffered some changes while the study was conducted--two employees were let go and their positions were not filled.

by the developers but also acted as architects for the design of the systems and the implementation of those new components. Finally, the Applications team developed and maintained systems that delivered information to the Back Office and Operations teams. As depicted in Figure 5.2, most of the people worked in a common semi-open cubicle area. Table 1 shows the positions occupied by the informants by role.

The informants from the Trading team included people with different job roles, such as managers, developers and analysts. The managers were in charge of coordinating development activities and the day-to-day support of the systems used by people at Atlantic Investments. They also interacted with individuals from the Berg Company and other providers as well, as they coordinated their efforts with managers in the Back Office and other teams within the Technology group. Financial analysts attended to requests from people in Atlantic Investments, designed ad-hoc reports for them and verified errors in transactions. They were also the main architects defining the requirements for system upgrades and provided testing support for the developers. Software developers concentrated their efforts on designing, coding and debugging software components for the systems in use at Atlantic Investments, as well as supporting the financial analysts and managers with day-to-day production problems. As indicated in Table 5.1, the 14 informants came from all teams, except the compliance team, as nobody from that team volunteered to participate in the study. Nonetheless, given the open nature of the office, and after having attended many meetings where I observed interactions that they had with my informants, I was able to understand the dynamics of how that team operated and how their work related to that of other teams.

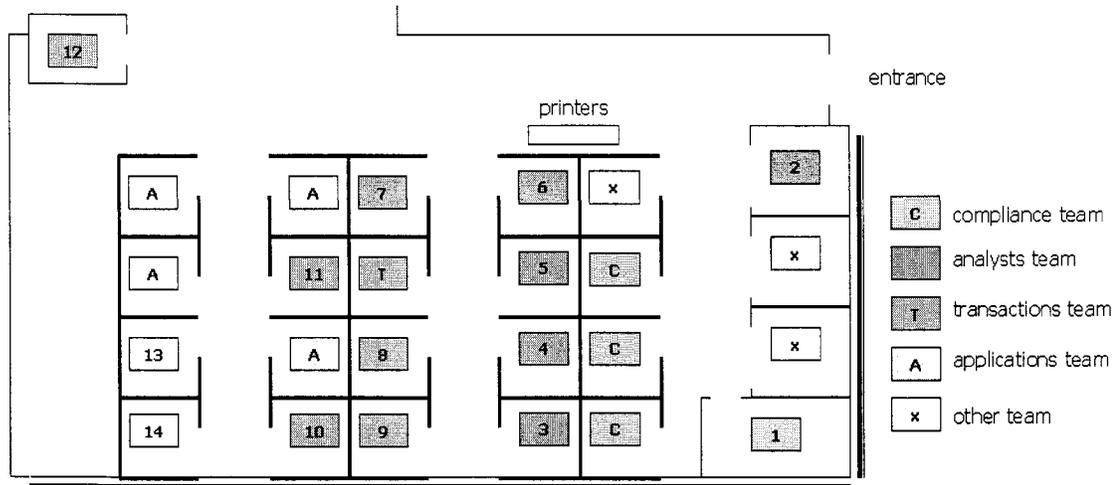


Figure 5.2. Floor map for the Trading team.

Position	Code name	Team	Role	Area
1	Bob	Trading	Manager	Office
2	David	Analysts	Manager	Office
3	Andrew	Analysts	Sr. Analyst	Cubicle
4	Eric	Analysts	Analyst	Cubicle
5	Thomas	Analysts	Analyst	Cubicle
6	Peter	Analysts	Analyst	Cubicle
7	Deana	Analysts	Jr. Analyst	Cubicle
8	Andy	Transactions	Sr. Developer	Cubicle
9	Chris	Transactions	Manager	Cubicle
10	Bryan	Transactions	Sr. Developer	Cubicle
11	Mark	Transactions	Developer	Cubicle
12	Charles	Transactions	Analyst	Office
13	John	Applications	Developer	Cubicle
14	Jose	Applications	Manager	Cubicle

Table 5.1. Distribution of the Trading team in the office.

The work of the Trading team was mainly guided by a scheme of scheduled software releases and delivered to the client on a monthly basis. The first week of the release period, managers from the Trading team sat down with people from Atlantic Investments and discussed open issues, development plans for the month, the priorities, testing, and the

plans for future releases. After this meeting, the managers defined a list of software components and items to be developed for that release, and assigned the items to the developers and analysts. The team then had two weeks to complete the release. The third week of the month was usually reserved for the testing scenarios when these beta versions were tested by users from Atlantic Investments. Finally, during the last days of the fourth week, commonly called “code freeze week,” developers sent their tested code to another team that handled the release. On Friday and Saturday of the fourth week, the code is released and the systems tested, so that operations can start seamlessly on the first hours of Monday. Although another team was in charge of the actual release and promotion of the code, people from the Trading team had to be accessible by phone during that release weekend in case something went wrong and their help was needed: “*We are always on-call on release weekends. Saturday I got a call from Eric asking about some things, and some things we have to fix,*” says Andy, a developer of the Transactions team.

In order to manage the release, the Trading team made use of a spreadsheet where they indicated the items to be developed for each release, the applications that those items corresponded to, the people who requested them, and the names of the software developers and analysts involved. The “Compliance-Transaction list”<sup>11</sup> as it was called by the people in the Trading team, was stored in a server and was often printed out by the team members in order to keep track of their items, or to support their planning and design discussions with other co-workers or users. During the study, that spreadsheet was replaced by a more formal project management system called ClearQuest from the Rational Rose Company.

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<sup>11</sup> This list was also called “the STP list.”



Figure 5.3. Berg terminal sitting on the desk of an analyst from the Trading team.

Other than their work on the monthly release, people on the Trading team had to be sure that the “production systems” (those systems already in operation), were working correctly. Many of the analysts had Berg terminals on their desk as the one shown in Figure 5.3. Through these terminals, they were able to monitor the trades being processed by the brokers in Atlantic Investments and other testing environments, as explained by Bob, the manager of the Transactions team:

*“Here I have three computer screens at once, so that I can have production [the production systems] in one side over here on my Berg terminal, and on the right, I can have the test Berg side [testing environment] so I can quickly monitor what is*

*going on at any one moment, and I don't have to divert from what I am doing on my personal computer.”*

When there are problems in the systems that prevent brokers from doing their work, people tend to leave other activities pending until they have solved the problem. Among those in the Trading team, problems that prevented users from working, or problems involving serious financial implications, were colloquially called “*production issues*.” The contrast of the urgency to solve the production issues with respect to the importance of release work can be seen in the comments of Deana, an analyst:

*“Important is this Rational project. They are pressuring me to get this by..., they want it done by December. So, for the next release, that’s very important, that project. Urgent [underline added] is a production issue. You know, like if position reconciliation didn’t work, or a ticket was missed; that’s urgent. Or a cash trade has a deadline at 12 noon. The ticket form has to be out right then, because it has an immediate deadline, so that is urgent.”*

Consequently, people in the Trading team often described their work as a combination of release work with production support. In addition to that, other initiatives and projects, independent of the release, required the participation of certain people within the team.

### **2.3. The Operations Team at IT-Services**

Compared with the Trading team, the Operations team was a larger team with about 65 employees distributed among seven or more different sub-teams. Given its size and the fact that I had access to just some of the people working on that team, I was not able to observe the whole set of operations performed by them. However, the informants who I was able to observe provided me an understanding of the different nature of the work performed by them in contrast with that of the Trading team.

Although the work of the Operations team was linked to the operations in Atlantic Investments, the people there were in charge of systems supporting processes that were farther away from the trading operations performed by the brokers. Their main users were those from the Back Office group and several analysts at Atlantic Investments. The informants that I observed from this group included those in charge of the Trade Management System (TMS), as well as those in charge of the main accounting system (called here MAIN), and individuals supporting the Multiple Banks Exchange (MBE) system. Each of those teams was composed of a number of developers along with a manager. Five developers worked in the TMS team and were in charge of the system used by administrators in the Back Office to keep track of the transactions executed by brokers at Atlantic Investments, as well as initiating the processing of transfers to the banks. Four other software developers worked on the MAIN system which was a legacy system based on Cobol supporting the central repository of trades, accounting functions and others reports used by the Back Office team. Finally, the MBE team, comprised of four developers, was in charge of the actual transfer of funds to bank accounts corresponding to the trades. Figure 5.4 shows the distribution of the teams in the office,



Operations team would have to develop software components in their systems (e.g., the TMS) to manage them. Many of their other assignments came as a result of meetings with their internal client which was the Back Office group. They maintained regular meetings where they discussed open issues and the items to be delivered for that month. The schedule for the releases followed the same distribution of weeks as it did for the Trading team. The first days of the first week were devoted to settling on items to be developed. In the days and weeks to follow, work was completed and then promoted to the Beta servers in order to run testing. During the testing period, changes were made up until freeze week when no more changes were allowed. And then the code was released that weekend. People from these teams were also required to be on-call during the release weekend in case something needed to be fixed at the last minute. In contrast with the Trading team, developers in the Operations team had more frequent interactions with the final users, given that they shared the same buildings, which allowed for testing and monitoring the system in a more direct way.

Position	Name	Team	Role	Area
1	Alfred	TMS	Manager	Office
2	Susan	TMS	Developer	Cubicle
3	Paul	TMS	Developer	Cubicle
4	James	TMS	Analyst	Cubicle
5	Ben	MAIN	Manager	Office
6	Gian	MAIN	Developer	Cubicle
7	Tom	MBE	Manager	Office
8	Nit	MBE	Developer	Cubicle
9	Louis	Munich	Project leader	Cubicle

Table 5.2. Distribution of the Operations team in the office.<sup>12</sup>

<sup>12</sup> An additional informant, Kim, a financial analyst is not listed in the table as she was located in another building together with the Back Office team and had her own office. Given the nature of her work, she was coded with a role as a project leader.

In regard to the systems used to manage the releases, the Trading team used a more elaborate and formal system called “Case Tracker.” The system was an internal development that aimed to provide a more effective way to organize and track the items being developed for each release, as well as other requests from users. At that time, the system was operational; however, people were just learning to use it, and the process of adoption was just starting. In spite of this, it was clear that this system provided a more solid infrastructure as compared to the Compliance-Trading spreadsheet being used by the Trading team.

As with the other teams, the Operations team had to juggle their assignments during each release with the continual support of their users whenever problems or special requests arose. Many developers were not only supporting their own systems, but also the systems maintained for others, as a result of the cross-training efforts that were being promoted by their managers.

## **2.4. Working at IT-Services: Relevant Aspects Affecting the Way People Do Things**

Besides the organizational structure, and the operational aspects of work, such as the monthly software releases, production support, and the nature of work, for the informants within this study, there are other aspects equally relevant that define the nature of the their activities, as well as the strategies they use to manage them. In this section, I discuss some of those aspects found coming from the analysis of the data from informants at IT-Services. Whenever it is appropriate, I try to clarify differences between the two groups studied.

A unique characteristic of the outsourcing relationship between IT-Services and Atlantic Investments is the common history linking the employees at both companies. As explained earlier, many of the employees at IT-Services had worked for Atlantic, before the acquisition of the technical arm and back office. Fourteen of the 24 informants at IT-Services had worked previously for Atlantic and were re-hired by IT-Services. Consequently, many of them used to refer back to the time when they were at Atlantic, and sometimes complained about the lack of flexibility that the new operation scheme offered them. Some informants pointed out that the old way of doing things was not only more convenient but also provided a way to react quicker to requests from the users. John referred to this situation when talking about some of the procedures that now they have to do in order to make changes in the systems:

*“Well, to give you an example, we all were support production, so if the user called us up: ‘Hey we are trying to run this report and [it] comes out with non-data or it is coming back with something that is weird,’ we would go to production and run some queries against it to see, you know, what’s going on. But now, they have restricted it, so that none of the developers have access to [it], the only way, is to formally request it from the DBAs [Data Base Administrator] giving like some sort of explanation of, you know, why we need it. So, you know, whereas before, we just go in there and instantly say: ‘Hey, this is what’s going on.’ I mean, there are some good reasons for that, too, but it is just a lot different than when we were at Atlantic. Because there, we had to promote stuff, but there were no forms, it was a lot more relaxed, and now it’s just, I mean, everything has to be signed off and so.”*

The shared history not only resulted in individuals referring back to alternative ways of doing things, but also impacted the way that people responded to requests from others. Familiarity between persons often resulted in handling the request based on something other than just its importance, such as the fact that they have known each other for some time. Eric, an analyst who previously worked for Atlantic Investments, referred to it as “*a way to support each other, in spite of the fact that we don't work for the same company anymore.*” We can say, then, that those invisible links connecting the two companies such as the fact that many employees shared a common history, affected the personal prioritization of activities and the kinds of interactions established between them.

Another aspect we need to consider when looking at the context with respect to the informants is the way that engagement and attention to work is sometimes expanded beyond the limits of the work week or the normal working hours. Because transactions were being performed by brokers in different international markets, some teams were assigned to cover early morning hours or late evening hours as explained by Thomas:

*“Well, we see it in that way. We have that coverage because Atlantic Investments does trading from six in the morning. Basically, they trade until four or five at night, but the trade, the booking, putting trades into the accounting system, doesn't get finished until eight o'clock at night, sometimes seven o'clock. So, I stick around until they close their business. [I] make sure that every transaction that came down from Berg through Atlantic Investments is correctly booked into the accounting system at IT-Services.”*

However, it was not just that people shifted their working hours, but also, problems often arose in the systems and they had to be called in while at home. An experience like that, among many mentioned by the informants, was described by Andy, a software developer:

*“Well, in fact, a couple of releases ago, we had an issue with one of the servers, that the settings on the server were incorrect. And I was at home, and someone called me and he said: ‘Hey what are we supposed to do?’ And I pointed to the right page in the folder, and they [went] over and set it, and then it was fine. So I had a screenprint of what the setting should be [for] this one particular server, they reset it to that, and everything was fine.”*

Consequently, they knew that at any particular moment they could be called, because people at IT-Services are aware that the operations of the company continue even when they are out of the office. As stated by Charles, *“This is a 24-hour job, man.”*

A final aspect, common among all informants of IT-Services, is their awareness of the monetary value of the operations carried out through the systems they maintained. That created an atmosphere where employees were conscious of the implications of errors and the accuracy in their work, as can be illustrated with comments from Thomas, the analyst in IT-Services:

*“Atlantic Investments [The client] expects 100% accuracy. They don’t want 99.9%. A lot of people like developers think: ‘Oh, we can fix it tomorrow.’ IT-Services does not work like that. In this kind of industry you have to correct it right away.*

*Every time with one issue is like a major issue. You know, every trade is a minimum of a million bucks.”*

Consequently, for people at IT-Services, the priorities can be influenced to some extent by this high monetary value involved in the action performed. I noticed that whenever they faced a production issue in the production systems, people reacted immediately and tried to resolve it in the best way possible.

### **3. Context of Work at Venture**

Aiming to complement and contrast the data collected from IT-Services, further investigation was envisioned at another company where informants were also required to manage multiple activities but operating under a different context. This guided the investigation towards the second study conducted at the Venture Company. Although this company has an important difference with respect to its size, target market and operative structure, the people at Venture were also involved in multiple projects, interacted frequently with clients and co-workers, and had access to modern information technologies. Given the conditions at Venture during the time of the investigation, this part of the study let me understand how people manage multiple activities within the context of a small company, with a changing and fractured organizational structure, and in the process of defining processes, operational schemes and responsibilities. In this section, I detailed those aspects related to the nature of the work with respect to the set of informants studied at Venture.

### 3.1. Characteristics of the Business and its Operational Structure

Venture was a Southern California company providing consulting services to medical practices with the goal of maximizing their revenue by optimizing their administrative procedures. Back in 1996 when the company was founded, Venture started to offer a software system, referred to here as MASYS, that was designed to support billing, scheduling, and claim procedures of small and medium-sized physician practices<sup>13</sup>. The system's main characteristic is to eliminate the need to keep paper records as they were scanned and stored in computers systems that were accessed through a computer terminal, personal digital assistant (PDA), or remotely via Internet web access. By the end of 2003, MASYS had more than 10,000 users throughout the United States.

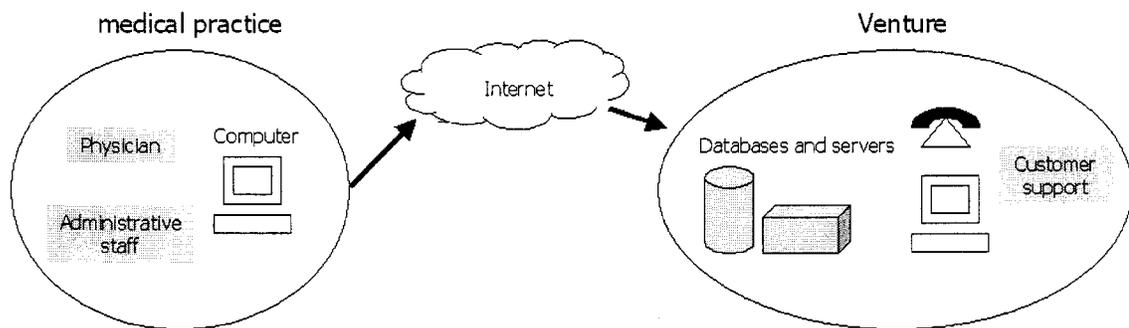


Figure 5.5. The basic operation model of Venture.

The basic model of operation between Venture and its clients is depicted in Figure 5.5. The software was offered through a so-called product subscription business model. In that model, the practice, as advised by Venture project executives, installed computer and network infrastructure on their premises, which was connected through the

<sup>13</sup> According to Venture's metrics, a small practice is composed of two or four doctors whereas a medium one is composed of five to twelve doctors.

Internet to the network and database center located at the Venture offices in Southern California. The systems and the information from the practices were stored locally in Southern California, but accessed remotely by the practices wherever they were located. This model of operation aimed at reducing the need for practices to have technical personnel maintaining their systems, making backups or solving problems. It also is aimed at reducing their costs as they did not invest in a database or servers. Furthermore, it provided a way to safeguard their information at all times. Whenever a user at a medical practice experienced a problem with the systems or had questions, they could contact the customer support team at Venture either by phone or e-mail. In order to keep the service running, medical practices would have to pay a monthly fee.

At the time of the study, Venture was experiencing an organizational transformation from a product-oriented business model to become a service-oriented company. In spite of being successful in selling MASYS, Venture was not doing well financially and there were concerns about the future of the company if changes were not introduced. For this reason, the board of directors envisioned a transformation of the company where the main goal was to not just sell a subscription and the MASYS system, but to actually become partners with their clients and offer them a set of services designed to increase their cash flow. Starting in January of 2004, Venture began the transformation to what was called “the Service Model.” Due to this reorganization, Venture went through a period of drastic downsizing that took the company from around 130 employees to about 65 employees by the fall of 2004. Changes were done across the organizational structure starting with a new Chief Executive Officer who had brought with him a new executive staff, including Financial and Operations Officers. All teams and departments were reduced in a

significant way, as well as the personnel working outside the headquarters in Southern California. The focus was on maintaining support for those clients already in the Subscription Model and to freeze any new development of MASYS until the company was re-structured.

When the study started at Venture, the company was organized into nine teams. The Executive team included the Chief Executive Officer, Chief Financial Officer, Chief Operations Officer, Chief Information Officer and a Chief Medical Officer. The Administrative team included the accountants, lawyers and assistants. The Software Design team included software developers, testers and interface designers. The Customer Support area that attended to the requests from clients included the phone operators and support engineers. The Information Technology team was composed of database and network administrators who were in charge of the servers and the networking infrastructure of the company. The Operations team was in charge of coordinating new installations of MASYS. The team of trainers provided classes for the customers on their premises and attended monthly or bi-monthly meetings at the offices of Southern California. The Sales team was composed of three executives. And a Service team was in charge of setting up and implementing the new Service Model.

### **3.2. The Roles of Informants, Characteristics of Settings, and Main Work Processes**

For this study I was granted access to any individual who worked for Venture, and therefore, I aimed to cover as many roles and teams as possible. However, the roles of

those people who volunteered to be informants covered just certain areas as detailed in Table 5.3.

Twelve informants with different roles and from different teams within Venture participated in this part of the investigation. Among them, five had managerial positions of different levels, three others worked in support positions (either supporting internal or external customers), two of them were analysts, and the two others worked as sales representatives. The resulting set of informants represented and covered most of the positions at Venture. This was beneficial to gaining a wider understanding of the company and its operations.

Position	Name	Team	Role	Area
1	Ronald	Executive	Manager (CEO)	Office
2	Donald	Executive	Manager (CMO)	Office
3	Douglas	Executive	Project leader	Cubicle
4	David	Executive	Manager	Office
5	Mike	Engineering	Engineer	Cubicle
6	Danielle	Engineering	Engineer	Cubicle
7	Cecile	Support	Analyst	Cubicle
8	Ana	Support	Engineer	Cubicle
9	Leonard	Sales	Sales executive	Cubicle
10	Vincent	Sales	Sales executive	Cubicle
11	Jennifer	Sales	Analyst	Cubicle
12	Joe	Software	Manager	Office

Table 5.3. Distribution informants from the Venture company.

Most of the employees at Venture work in an open cubicle area surrounded by a set of private offices as shown in Figure 5.6. Team members were located in close proximity to each other, and it was possible to interact just by talking through the cubicle wall, or by standing and facing each other. At the time of the study, many of the offices and cubicles were vacant, given the downsizing. Not shown in Figure 5.6 are the meeting rooms and other common areas that were located within a close distance just left of the Figure. Due to

the nature of their work, many of the trainers and sales executives visited the office from time-to-time and did not have specific cubicles assigned to them. However, there were a number of unassigned offices available to them when they were in town.

Venture operated Monday through Friday and most people worked from eight o'clock in the morning until five o'clock in the evening. Just one of the phone operators in the Customer Support team initiated her work at seven o'clock in the morning in order to provide coverage for practices located on the East Coast. For the sales executives, their schedules were relatively more flexible as some of them, on occasion, would start work before six o'clock in the morning or would visit customers late in the evening.

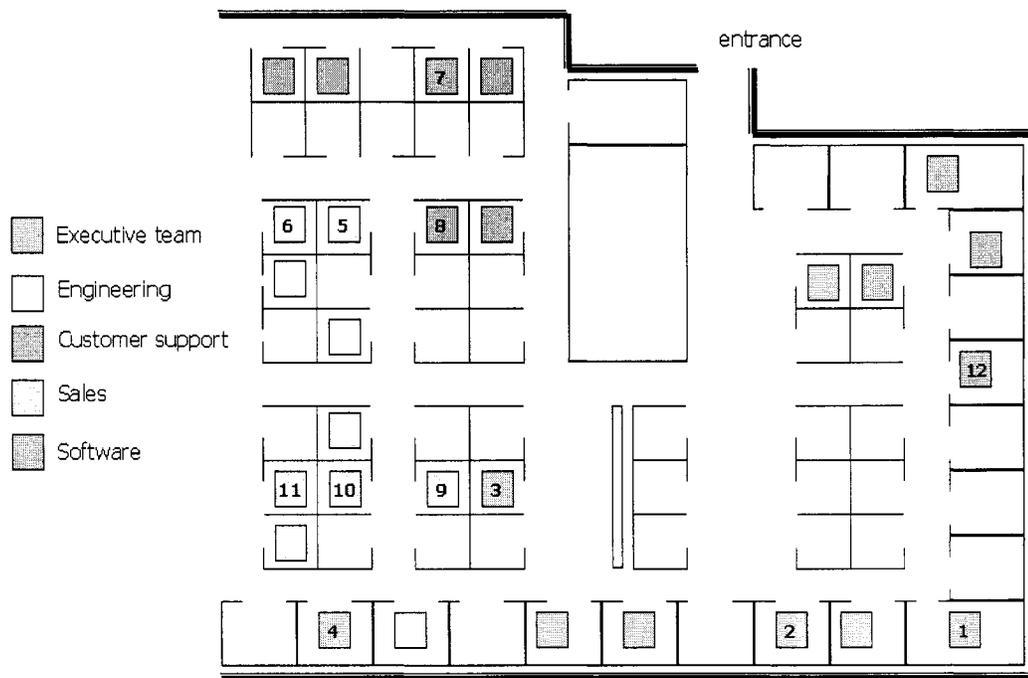


Figure 5.6. Floor map for Venture.

The work at Venture was devoted to supporting, mainly, two kinds of clients: those currently using MASYS and those targeted to enter the Service Model. Venture had

hundreds of clients using the MASYS systems that had to be attended to and supported. The Customer Support team, Information Technology team, Operations team and Trainers were mainly focused on attending to those specific clients. Their work centered around two main efforts: first, to guarantee the continuous operations and resolution of problems that practices might have; second, to upgrade all clients to the latest version of MASYS, version 4.8. Because practices were using different versions of the MASYS system (4.4, 4.6, 4.7 and 4.8), the Executive team decided that upgrading all practices would make it easier for the support teams to manage. The upgrade was offered to clients at no cost as part of an effort to gain or maintain their trust and to keep them as clients.



Figure 5.7. Sales cycle process in Venture.

In addition to the production support and upgrade program, another part of the company focused on the sales cycle for the new Service Model. Figure 5.7. shows a simplified diagram of the cycle as it was defined back in August 2004. The cycle begins with leads<sup>14</sup> from the Sales team and senior executives, who've identified candidate medical practices through personal contacts, current Venture clients, or marketing events (e.g., tradeshow, dinners, and so forth). The business consultants in the Sales team were directed to those leads and, once confirmed, they would then move to the next phase of the cycle. During the Pre-sales phase, the business consultants would set up appointments, visit a medical

<sup>14</sup> In the language of sales professionals, each potential candidate for a sale is called a lead.

practice, and introduce the Service Model and the offering of Venture. Once the practice's administrator or principal (in many cases a physician) accepted, the cycle would move to the next phase, and the business consultants would hand off the potential client to the practices-executives in the Service team. The Qualification Assessment phase involved a visit and brief analysis of the financial and operative status of the practice in order to determine if they would benefit from the Service Model. Once the practice was analyzed, the practice executives from Venture forwarded the results to the potential client, and for the case of a good candidate, they would request an additional visit in order to conduct a more elaborate study, called the Guarantee Assessment phase. During the Guarantee Assessment phase, the Service team conducted a detailed study of the practice as explained by Vincent, one of the practice executives of Venture:

*“What we do in a guarantee assessment is that we go through the entire work flow, and we go through the entire revenue cycle. And we go through the analysis of all of the P&L's and all of balance sheets and all of the cash flows, and we determine whether our services are going to help them or not. And the result of that is a presentation to their group that says we can guarantee this amount of additional revenue to what you are currently collecting and our fee will be based on the additional revenue; the delta revenue that we can bring over the course of the next three years, or 36 months.”*

With the assessment finalized and the information presented to the potential client, the Legal team and members of the Executive team visit the practice to negotiate the contract

and start the implementation of the system. At the time of the study, Venture had one or two clients already in the contract phase. It was not really clear, at that time, what the post-contract phases would be, and the Sales team pretty much followed the old implementation model. Some of the specific activities observed were related to those efforts to define the post-contract phase.

Venture used two main tools to manage their activities and projects: ACTS, and “Sales-Support.” ACTS was a customer relationship management (CRM) system developed in-house by Venture, which responded to requirements and procedures of the Subscription Model by which they operated. The system supported the tracking of clients’ requests, the distribution of workload among employees, and the escalation of reoccurring issues to the software design department. Everyone in the Customer Support and Operations team made extensive use of the ACTS system. In addition, and as result of the Service Model, the company bought a commercial CRM application called here “Sales-Support” which was customized to cover the different phases of Venture’s sales cycle. At the time of the study Sales-Support was just starting to be used by the people in the Service team, Operations team, and Executive staff.

### **3.3. Working at Venture: Relevant Aspects Affecting the Way People do Things**

Similarly, as with the IT-Services Company, informants observed at Venture experienced particular conditions that shaped the context in which their activities were enacted beyond ones relating to the organizational structure and operative schemes. At Venture, those conditions were linked to the transitional state of the company. In this section, I

point to some of those conditions that seem to me more relevant in their impact on the nature of activities, and the strategies used to manage them, derived from an analysis of the data.

Perhaps the most relevant and palpable condition shaping the way things were done at Venture was the degree of uncertainty concerning the future of the company. Venture was making great efforts to raise money and maintain the confidence of its board of directors. The Executive team was optimistic about the future, but aware that overcoming the current state would be a challenge. That situation, combined with the drastic reduction of personnel in the previous months, created conditions for the creation of rumors inside and outside the company. Clients were concerned about Venture's continued support, and whether or not they should be looking for another company. One particular episode that reflected those concerns was observed as I spent time with Donald, one of the managers of the company. The following is a fragment from one of his phone conversations to one of their sales executives:

*Donald: "Up on the Northwest area, somebody has started to say that we are going out of business."*

*Donald: "It has been not just once, but many times... six."*

*Donald: "I have talked to the customer... to assure [them that it] is not true."*

The feeling of uncertainty also emerged during conversations among other Venture employees in another areas of the company. Primarily people were concerned about losing their jobs, which also affected their planning of long, and even medium-term, work

efforts. During a meeting to discuss the plans for the release of a new version of the MASYS system, I noticed how managers raised the issue of the future of the company when discussing the schedule:

*Joe: "We have a contract ending on March 2005. What if in March we run out of money?"*

*Phil: "Then none of this would make sense."*

A second condition that manifested itself continually during the study was the challenge to fit two very different models within the daily workflow at Venture. The objective of the company's executives was to redefine Venture's identity and its mission, and to make sure to have the employees buy in to the new Service Model, and for them to support it. Many meetings and training sessions were devoted to reshaping the identity and to clarifying the characteristics of the new model. New people were hired to support the Service Model, and they were the promoters amongst their new co-workers. However, in spite of those efforts, the daily work of many individuals at Venture was still based on the practices and procedures of the old Subscription Model. They still had to support hundreds of medical practices around the country. This resulted in a polarization of identities among Venture employees. People talked about having two groups in Venture--*"the service model people and the 'old school' people"*--and they argued about whether or not the other group had really understood their model and, consequently, what the company was all about. Leonard, a practice executive, expressed such concern during an interview:

*“The success of this whole company is really going to be an absolute shift from the Product Model as we knew it, to the Service Model. A lot of people [think] this won’t affect them because the Customer-Support folks are still going to be dealing with product issues ...dealing with the fact that maybe the system isn’t working ... it’s going too slow, and how do I write this report? They’re still going to be involved in that piece of it, so, from that perspective, their jobs really aren’t going to change much, but the essence of the company and the layers above them are going to change... I think, as more and more contracts get signed under the Service Model, people who have not come to understand this will start to understand this. You’ve got to have a critical mass there, and really see the ball rolling, and either I get sucked up by it, or I get tossed out. A lot of people have already been tossed. And I have to say it just like that because that’s really what it was. Either you come with us, or you go. And a lot of people left or didn’t last a week because they couldn’t grasp the concept of product versus service, and we still have people here who don’t understand.”*

In practice, the main problem affecting the way that people conducted their work was that it was not possible to have a single perspective of the objects that motivated their work. The polarization made it difficult for people to place themselves in an intermediate position that would accommodate and integrate both models.

A final condition that also shaped the work of individuals at Venture was a result of the downsizing experienced by the company months before. As expressed by Donald, the

chief medical officer of Venture, part of what was lost along with the personnel, was the modus operandi of the company:

*“And one of the biggest challenges that we had is that this other sort of reporting relationship and organizational chart were changing every week or day, [or] in a month. So it was hard to figure out who was responsible for what--kind of because you are used to seeing the same people that you used to work with, and then new people came, and it took some time to figure out the modus operandi and what you can do, and what you can't do, you know, with people, those kinds of social norms that have to be really established slowly. So people can figure out what is acceptable, and what is not acceptable. What used to be normal and OK before is not OK anymore. This takes some time.”*

Consequently, Venture employees were involved in what one of them described as “*writing the book*” or “*setting the rules of the game*,” and much of the work centered around reorganizing and reestablishing what each group was, and what their responsibilities would be. Many committees were created for that purpose. They ranged from a Product Prioritization Committee, deciding the main characteristics to be supported in new versions of MASYS, to the Pricing Committee, in charge of establishing fees for both the legacy clients, and the new service model clients, according to the kind of setup, training or support that they received. Another committee was created to define the content of the new company’s Web site, and another to determine the schemes of operation for customer support, and so forth.

All the previous conditions created a context that clearly is distinct to the conditions experienced in IT-Services and shaped the work in particular ways.

#### **4. Contextual Conditions Giving Form to the Work of Informants**

For the purposes of understanding the management of multiple activities in the workplace, the context of work of the informants can be contrasted along four different lines or contextual conditions. In this section, I discuss each of those contextual conditions. To some extent, the relevance of each condition emerges as a retrospective analysis based on the results presented in subsequent chapters. Those conditions prove to be important to consolidate an understanding of the nature of activities, the dynamics of its enactment, and the strategies used by informants to manage those activities. In Chapter Seven, these conditions are used to quantitatively analyze some of the data and determine significant differences across those lines. Table 5.4 describes the distribution of informants across the four conditions defining the context of activity enactment.

##### **4.1. Organization's Operational Frame**

The three groups of informants studied varied in the way their work was made operational by their organizations. As a result of the analysis, three distinct characteristics were identified as being the most relevant.

Group	Collocation	Place of work	Roles							
			Analyst	Developer	Engineer	Leader	Manager			
IT- Services Trading	Adjacent	Cubicle	5	4			2	11	14	
		Office								
	Semi	Cubicle						2		
		Office					2	2		
	Separate	Cubicle								1
		Office	1					1		
IT- Services Operations	Adjacent	Cubicle		4				4	10	
		Office								
	Semi	Cubicle								2
		Office					2	2		
	Separate	Cubicle	1			1		2		4
		Office				1	1	2		
Venture	Adjacent	Cubicle	2		2	2		6	11	
		Office								
	Semi	Cubicle								2
		Office					2	2		
	Separate	Cubicle				1		1		3
		Office					2	2		
			9	8	2	5	11	35		

Table 5.4. Distribution of informants across the different conditions.

A first characteristic is the scope of the clients they aimed to serve. Due to the volume of operations, the Trading team at IT-Services focused essentially on a single client, Atlantic Investments. The Trading team had then a critical role for IT-Services as a whole, as they were the first point of contact with Atlantic. Physically, Atlantic Investments' premises were located a mile away from IT-Services and consequently much of the contact with them was done through the phone and via e-mail. In contrast, the informants from the Operations team at IT-Services have reduced contact with Atlantic Investments as, in practice, their client was the Back Office team. Being located in the same building, informants from the Production team were more likely to interact with co-workers/"clients" in the Back Office. In clear contrast with those two groups, the informants from Venture had to serve hundreds of medical practices of different size and

medical specialty, and geographically distributed in different time-zones. That naturally brought more diversity to the kind of activities handled by people at Venture as each client had their own projects and requests.

Stability of the organizational structure is a second important characteristic. In spite of the general economic decline experienced in the U.S. during the period of the study, IT-Services remained a very solid company reporting good financial results, while managing to preserve its human resources, and growing in some areas. Consequently, during the period of observation, IT-Services did not experience any dramatic changes in its organizational structure. In contrast, Venture experienced many changes in its structure due to the major business reorientation, which resulted in a constant redefinition of roles, positions and responsibilities as employees left and new ones came in. The transformations were ongoing at all levels of the company over the entire course of the study. This unstable structure imposed some challenges for those individuals who had to engage in articulation processes often in order to define new agreements for the *what*, *who*, *how* and *when* of the activities, and the meta-articulation processes defining the priorities among different activities. In a clear contrast, the stability of IT-Services<sup>15</sup> created a more stable environment, which provided a greater sense of control for individuals, as there was less of a need to redefine the way of doing things, and prioritizing among them. However, there were some differences among the two groups studied at IT-Services. In particular, the Trading team was of more recent formation than the Production team. And the systems they were in charge of developing and supporting were still new at the time of the study. In contrast, many of the systems supported by the

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<sup>15</sup> In saying that IT-Services experienced a stable organizational structure during the time of observation is not to say they did not experience changes, or even some movements of personnel. However, those changes were not as dramatic or as sustained as the ones observed at Venture.

Production team were legacy. For instance, some of the COBOL software systems in operation at IT-Services had a history of more than 15 years, and many of the procedures dated back to when Atlantic Investments was founded 25 years ago. To some extent that made their work processes more unstable and fixed.

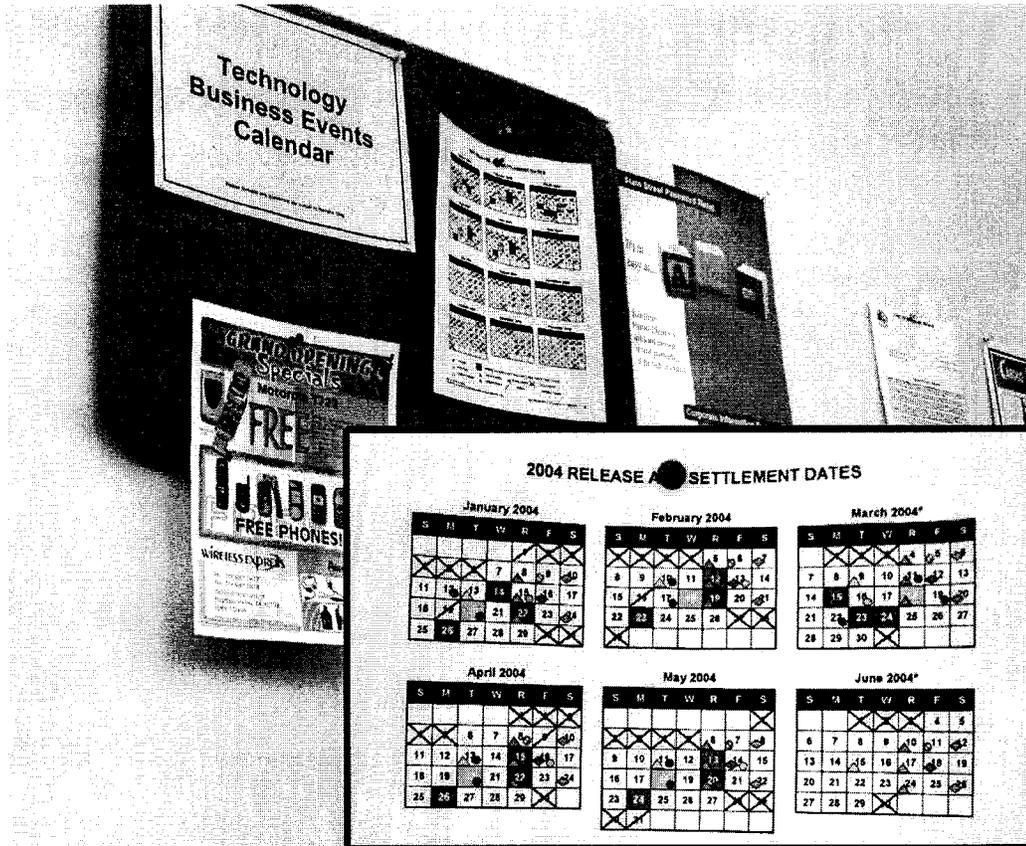


Figure 5.8. The Release Schedule used in IT-Services.

A third characteristic distinguishing the groups of informants was the temporal aspects characterizing their operational schemes. Both sets of informants from IT-Services operated under a monthly release schedule that was used to determine the temporal order for their activities. Testing week always was followed by the Freeze week, and then by the monthly release meeting with the client, and so on. People were conscious about the

schedule, and many times placed it on the walls or in public areas. The only difference between the two groups at IT-Services is that the Production group has less influence in shaping the products to be developed each month and, to some extent, depended on the Trading team which was the one establishing priorities. Other than that, the monthly schedule release scheme served to coordinate the work of all people at IT-Services. Figure 5.8 shows a picture of the release calendar, which was posted in the employees' lunchroom.

In contrast, Venture did not have a major temporal pattern characterizing their employees' activities. For many years, the release cycle of the MASYS system was the determinant temporal pattern of many activities at Venture including the presentation of the product in tradeshows, training cycles, upgrade programs, and so forth. However, during the time of the study, such pattern had been lost as new releases were held up for some time until the Executive team decided the direction and role of MASYS in the new Service Model. Although other temporal cycles existed, like the bimonthly meeting of the Board of Directors, or the weekly meeting of the Service Model team (called the Pipeline Meeting), those did impose some regularity of interactions, but did not extend to the whole organization at Venture.

## **4.2. Roles of Informants**

The nature of the informants' work was based on the roles and responsibilities assigned to them. Although some variations existed among the informants, an analysis of their activities and behaviors made it possible to group them in a set of five main roles: analysts, developers, support engineers, project leaders, and managers.

Analysts were those informants who were experts in business processes used within their own companies and by their clients. Consequently, they were involved in the definition of those processes, as well as their adjustments, or documentation. For instance, in IT-Services, financial analysts support the development of software systems by defining the specification of requirements and mediating between developers and people representing the client. Their work involved much analysis and thought. Part of their work also consisted of testing software systems that were ready for release, preparing reports for clients and co-workers, supporting the operation of systems by providing training or consultation, or solving problems which resulted from exceptions to the business rules programmed into software systems. In a similar way, analysts in Venture were in charge of evaluating the work processes of medical practices, suggesting recommendations or defining whether or not those practices should be integrated into the Service Model.

Informants with the role of software developers were responsible for designing, coding, and testing of software components used to support the work processes of their companies, or those of their clients. All informants having this role came from IT-Services. Software developers were using different software languages (e.g., Visual Basic, C++, Java and so forth). However, the nature of coding was similar. As part of their responsibilities, they had to support those systems used by their users, as well as provide training and documentation. In general, the work of software developers involved higher levels of creativity, problem- solving skills and concentration.

Support engineers were in charge of operating and maintaining the technical infrastructure of the company, including the computers, servers and networks. All informants with this particular role came from the Venture Company. A small part of

their work consisted in the routine execution of maintenance process. Most of the work, however, consisted of attending to requests from co-workers concerning unexpected problems with equipment, answering questions regarding the operation of software, or executing changes in servers or databases. In general, the work of support engineers was characterized by their unpredictability as new requests arrived throughout the day and constant re-prioritization was typical.

Project leaders were individuals who had the responsibility of leading new initiatives that were, to some extent, independent from the main work processes that their co-workers were involved in. Their work was defined by projects that generally extended over weeks or months. Given the similarities in responsibilities, within this role were included those individuals working at Venture as sales executives. In general, I noticed that project leaders have to be self-motivated and have to engage in more negotiations and lobbying in order to get things done. They had to negotiate with other co-workers (e.g., software developers) so that their requests could be attended promptly.

Finally, many of the informants observed had managerial roles. In spite of their differences, all managers were in charge of leading and coordinating others employees within their companies. Independent of their hierarchical level, managers observed had no more than five people reporting to them directly. Only one of the managers observed had a personal assistant. All of them had private offices and were involved in different long-term projects. In general, the work of a manager was characterized by the need to supervise the work of others, the ability to delegate work, and their roles as liaisons for their team with the rest of the organization.

### **4.3. Characteristics of the Workplace**

The informants participating in this study differed with respect to the kind of workspaces in which they execute their work. They can be divided into two general groups: those who occupied private offices, and those who shared a common open-area and worked in cubicles. Most informants worked in cubicle areas and just a few of them, in general managers, had a private office. The more palpable effect of these conditions for the work of informants was the level of privacy that they could have. Many people, especially managers, pointed out that one of the reasons to have an office was to be able to talk privately with their employees or other persons whenever they were discussing sensitive issues. Examples of such situations were when individuals had to discuss annual evaluation reports with employees, or to admonish them if something was poorly executed.

### **4.4. Level of Collocation**

A final condition defining the context of work of informants refers to the extent to which they were collocated with their teammates within a distance that permitted communication without the need to move from their workstations. Informants were considered adjacent when in a cubicle with at least one shared cubicle wall. Informants were considered semi-adjacent while in a private office with at least one teammate sitting in front of their office such that they could talk without leaving the office. Informants were considered to be separated when they did not have at least one teammate sitting at an adjacent cubicle or in front of their office. As was explained by Jim, in the Trading team the collocation arrangement was strategically defined so that his team would have

direct communication with him, and so that he could be aware of the issues going on in the office:

*“Well, let me answer it this way. Bob has asked if I want an office and I said that I did not. In fact, when we did the reorder of all these cubes I put myself right in the middle, because I find it very effective to be able to communicate through the walls and also hear what's going on around me, so that I can provide better support for Atlantic Investments and others.”*

By being within close proximity, people were more aware, and listening to what others were doing, and this effect was reciprocal. Such awareness often worked in favor of the operative schemes of the organization that aimed to provide quick responses for clients. For instance, in the case of the financial analysts and software developers at IT-Services, who were in close proximity to each other, this allowed for an intense and close collaboration every time urgent problems were reported by brokers at Atlantic Investments. Similarly at Venture, many clarifications and responses that were provided in response to a client's inquiry came from responses sent by co-workers who were not talking directly with the client but overheard the conversation and participated at their own initiative. Beyond those short-term benefits of accessibility, individuals obtained a better sense of “what's going on in the team” when the degree of accessibility to other co-workers was high. Incidentally, by overhearing conversations, they become aware of relevant facts, often gaining key information, without being forced to turn to some new activity.

## **5. Summary**

This chapter provided a descriptive account of the context of work experienced by those informants studied. The context can be analyzed along four main conditions pointing to the nature of work in each particular group studied: the role played by the informant in his team, the characteristics of his workplace, and the level of collocation with respect to their teammates. Each of those conditions shaped the nature of the activities of the individuals, and the way they carried them out. Although each informant experienced different conditions, all of them worked on multiple activities and had to manage them. The subsequent chapters will explain how the meshing of those conditions affected the dynamic enactment of work and the strategies and practices to carry it out.

## **Chapter Six: The Nature of Activities in the Workplace**

### **1. Introduction**

This chapter presents the results from the analysis of the practical activities identified for the informants who participated in this study, and draws from the evidence collected to illustrate the nature and characteristics of those activities. Derived from the constant comparative method proposed by Grounded Theory (Strauss and Corbin 1998), I present a general model describing the framing factors that guide the conceptualization of practical activities, as well as the main types of activities emerging from the work practices of the informants. Central to this model is the notion of *working sphere* used to emphasize that practical activities are based on individuals' conceptualization of their work, pointing to those things among which people consider that they manage and multi-task. This chapter presents and discusses five different patterns of working sphere types that have emerged as being most relevant for the work practices of those individuals studied. Each type of working sphere is defined in terms of its characteristics and illustrated with examples. Finally, the chapter presents a discussion of the developmental dynamics experienced by working spheres across time pointing to how they start, evolve, mature and conclude after their purposes have been achieved.

## **2. Conceptualization of Practical Units of Work**

A primary aspect in understanding how these informants managed their activities consisted in defining what the nature of their activities were, and to understand, from the perspective of those being observed, what were the practical units of work that they carry out. Such emphasis on the individual's perspective is a fundamental tenet of this investigation. Although it is possible to conceptualize work efforts on many different levels, my investigation gives primary relevance to the ways that individuals themselves talked about, represented and described their own work efforts in relationship to management of it. With this premise, the data collected were analyzed to identify and understand the characteristics and nature of their practical activities. In this section, I describe the results of that analysis, and draw from the evidence collected in the studies to illustrate the points.

### **2.1. Moving Beyond Actions: The Need for a Notion**

While observing the enactment of work, and as the investigation moved into the phase where informants, during interviews, talked and reflected on their work, it became clear that although executed through specific actions, the practical units of work that informants managed were not defined solely in terms of the immediate goals of the actions that they pursued at any particular moment. While discussing with me the things they did, the informants not only often referred to their immediate goals, but also the higher-level purposes that gave context to those actions. These references were common during the interview as well as during the actual enactment of work. For instance, after hanging up the phone, Chris, a manager in IT-Services, mentioned to one of his colleagues sitting in a

cubicle nearby: *“I was calling to ask about the license server for the Rational software plan.”* In this case, the action of making a phone call, and its goal of finding out about a software license, was framed within the larger purpose of implementing a new project management system using a product from Rational Rose called Rational ClearQuest. At the time of observation, Chris was in charge of coordinating the purchasing and installation of that product at IT-Services. I observed many other actions (e.g., writing an e-mail message or checking a Web site) that were framed with the same higher-level purpose as well. Thus, the informants casually referred to those purposes orienting their work, and whenever it happened I documented it. This conscious conceptualization of the reason behind their behaviors was captured more directly when I had the opportunity to interview them. For instance, Ronald, a manager in Venture, during an interview where he discussed his schedule for that day, commented about a phone call that he was about to make to one of their clients later on that day:

*“I am going to call to check with them, as they are not happy right now, even though we put a lot of resources, because our trainer made a mistake--sending bills to the Medicare intermediary instead of the Southern California intermediary. So they were not paid for three months and they are not happy. So I will try to smooth the relationship; try to do something to make them happy, or at least to accept our apology.”*

As Ronald points out, the immediate goal of making a phone call was framed within a higher-level purpose of solving a problem that the client was experiencing. The immediate

goal was to express an apology and smooth the relationship, but this was just part of the plan for achieving a solution to the problem, and, therefore, part of the chain of actions to achieve the purpose, which was to solve the problem. Later on that day, and after making the call, Ronald met with another manager at Venture to coordinate a solution for the problem.

Consequently, because the practical units of work that people manage are the result of connected actions around a specific purpose, my analysis was oriented toward understanding how actions, such as composing an e-mail message, preparing a presentation, making a phone call or having a conversation, were related to other actions that people thematically linked together with phrases such as “*the Rational software plan.*” This level of conceptualization could be identified in comments from interviews where participants directly discussed a particular work effort, in comments that were captured as part of my notes during the period of observation, or even in some of the documents that they shared with me. What became clear early on was that there was a distinct notion that people were using to conceptualize their practical units of work, a notion that transcended and thematically connected individual actions, a notion that served as a means to encapsulate their work efforts into distinct purposes. I refer to this notion here as a *working sphere*.<sup>16</sup>

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<sup>16</sup> The notion of working sphere is introduced by Mark and Poltrock within the context of technology adoption (Mark and Poltrock, 2004). The notion is used to emphasize the different social worlds that individuals are involved in within an organization: “A social world can refer to any type of collective unit, such as a task force, an academic department, or a distributed project team” (p.299). Here I develop the notion of working sphere to emphasize the way that individuals conceptualize activities.

## 2.2. Identification of Practical Units of Work: Working Spheres

A systematic process was implemented to identify those working spheres in which people worked on any particular day. Data were analyzed considering four main sources of reference. First, the informants were aware that I needed to identify the things that they were working on each day, and this influenced some of them to verbalize some of their work as they conducted it. Often they pointed out the purpose for the things which they were doing. This information was very important in order to understand what workers were thinking while instantiating their activities. A second source of data was the comments made by the informants while interacting with co-workers. While talking to each other, the informants referred to things they were doing at the moment: “*As soon as I’m done with the ATRACK stuff, I will move over to the R6 spec,*” or, “*I cannot take [the call] right now, I am attending to Jim’s production issue.*” In the first case, “*the ATRACK stuff*” referred to a computer system implemented at IT-Services to track the time that employees devoted to different projects. Such tracking was a mandatory everyday activity. “*The R6 spec*” referred to a major software release that IT-Services was planning to deliver in the following months. A third source of data came from brief, informal interviews conducted with informants at the end of each day. These interviews served to clarify events and interactions. Twenty-two informants filled out a paper form at the end of the day, listing the things they had worked on. Informants were asked to list as many things as they liked, and to describe them in a way that was meaningful to them. Finally, a fourth source of data came from post-observation interviews in which I inquired about activities conducted during the period of observation. These four primary data sources were complemented with analysis of documents gathered during the research.

Using those four sources of information, I tried to identify all the working spheres that informants worked during the period of observation. The descriptions of observed work recorded in the observation reports were compared with specific mentions made during follow-up interviews concerning those activities. In the following section, I present a set of cases that illustrate the kinds of working spheres that people work on. In this and the subsequent chapters, I will refer to those cases for illustrative purposes.

## **2.3. Illustrative Cases**

This section exemplifies the kinds of working spheres that three of the informants worked on, over the span of one day, while I observed them. These cases describe the work of a financial analyst at IT-Services, a support engineer working at Venture, and a manager at IT-Services.

### **2.3.1. The Case of Kim**

Kim was a senior financial analyst at IT-Services who served as a liaison between the Operations and Trading teams and some departments at the Back Office group in charge of processing trades. Given her vast expertise, she was often consulted by developers, other analysts, and the administrative personnel. Within the Trading and Operations teams, Kim played the role of an architect for business processes, defining specifications for major releases, and advising managers on how to implement procedures, test systems or train users. Within the Back Office, she interacted with operative personnel solving problems or supervising the use of the systems, and interacted with managers to gather requirements and procure solutions for problems. Kim was physically located at the Back

Office, close to the users. She often went to the Operations and Production teams' areas in order to interact with people there.

End of the Day Session Sheet

Informant Code: WIM  
Date: 03/31/04

Issues or things that I worked on today

1. Creation of TMS Baseline Doc.
2. Review Futures STP Spec
3. CP Bloomberg Prod Trades
4. Smarts validation on VST Repos
5. Future STP Release support
6. \_\_\_\_\_
7. \_\_\_\_\_

Figure 6.1. Report filled out by Kim during the second day of observation.

Figure 6.1 shows a list of five items which constitute the practical activities that Kim had worked on during that day as identified by her. They involved things such as the preparation of documents, interactions with others, phone calls, exchange of e-mails, and so forth. For example, the first item on the form, “*Creation of TMS Baseline Doc.*,” refers to the elaboration of a document describing the way that new financial products were planned to be supported by the Trade Management System (TMS). Days before the observation took place, this document was requested by managers from the Trading Team, as they needed it to coordinate the work for a series of future software releases.

During that day of observation, she spent a number of hours working on the document, checking other files and making a couple of phone calls to the software developers for clarification of things needed in order to complete the document. This working sphere continued into the third day of observation and a few days following the observation period until the document was finally completed by Kim and sent to the managers.

A similar working sphere involving the preparation of a specification was the one listed as “*Review Futures STP Spec.*” In this case, she had to work with Andrew, a senior financial analyst on the Trading team to put together a specification for implementing and supporting the transactions of futures commodities within the systems. A future is an instrument of exchange which specifies the prices for future production of grains, metals, livestock, or other goods. Futures are instruments commonly traded in the financial market. At the time of the observation, the document was mainly edited and modified by Andrew. He called Kim a couple of times during the day to clarify issues. In addition to those phone conversations, she also received and sent e-mails to Andrew related to this working sphere. These two spheres, “*TMS baseline*” and the “*Future STP specification*,” were items in which Kim focused most of her attention that day.

Although people might attend to working spheres based on their importance of the projects they correspond to, some working spheres arise unexpectedly, without a specific project related to them, which have to be attended to in a prompt manner. Such is the case for the work that Kim had referred to as “*CP Bloomberg Prod Trades*” for item 3. Early in the day, Kim’s boss came to her office and told her that something wrong was happening with the production systems used by the brokers at Atlantic Investments. She quickly walked to the other building to find out what was happening. She talked with

Chris, a manager in the Trading team, who explained that the problem was with Berg, and they were working with them on it. She then returned and alerted the Back Office of the possibility that they would go into “emergency mode.” The emergency mode involves documenting all transactions on paper, and notifying banks about the problem by phone. The relevance of this working sphere as a significant problem was detailed by Kim during a follow-up interview when she commented about the incident:

*“Oh that was a huge issue. It was a huge issue, but it wasn’t something I could fix. I was nearly being informed, so when I went over there to ask [Chris] as to what was going on so that I understood more about what the problem was, versus Tony knew it was going on, he might now have enough details about what is causing it.... Basically Berg was down, Berg sent us all our cash trades, we have cash deadlines, so we could have overdrawn accounts by millions or billions of dollars because we didn’t get down the information in order for them, the bank, to manage the cash. So being even that it was only down, I think it was down about an hour to an hour and a half total. That’s huge for us.”*

Once she talked with the personnel of the Back Office, she returned to her office and continued working on other things. Not much later, her boss, Tony, came and told her that Atlantic was reporting that the systems were working properly. As this example demonstrates, working spheres such as that one, although not representing an extended effort, are well identified and remembered as having strong financial implications for the companies, and can result in punishment or even firing for individuals.

Another unexpected situation in which Kim was asked to participate was a problem experienced in one of the systems while generating a report. That item was listed as “*Smarts validation of UST Reports.*” Three hours before concluding her activities for that day, Kim received e-mails about the problem requesting her help. She exchanged e-mails regarding this working sphere, and had a couple of conversations. Toward the end of the day, an analyst and a manager from the Operations team came to her office and spent time with her to figure out the origin of the problem. She went home without the developers having reached a solution. The next day she exchanged e-mails with that manager and the developer informing her that they had stayed until late into the night before finding the origin of the problem and fixing it.

The last item listed “*Future STP Release support*” corresponds to a meeting that she attended relating to a forthcoming software release where she obtained information about the components that were to be included. She commented that her participation in that meeting was helpful to her since she was made aware of the implications of those components on other systems and on the operations of the Back Office as it would be requiring training for some people.

### **2.3.2. The Case of Mike**

Mike was a support engineer working on the Engineering team at Venture. His main role was to administer the database systems and the servers that were used to support the hundreds of medical practices using the MASYS system. Most of the servers and database were physically located in a data center miles away from the Venture offices. As Mike’s role was so critical, he carried with him a cell phone with functionality to receive

e-mail messages so that he could be contacted by other people from Venture anywhere and anytime. While away from his desk or the office, he regularly received e-mail notifications from the systems monitoring the infrastructure. His other responsibilities included performing changes in databases as requested by the Customer Support department. Through the ACTS system, their customer support management application, he received “cases” with requests to add, delete or copy records for some of the clients’ databases. This kind of activity, although simple, required considerable amounts of time for some cases, and involved dealing with the data of many different clients.

End of the Day Session Sheet

Informant Code: MIKE  
Date: 08/23/04

Issues or things that I worked on today

1. Support Cases
2. Data Center Statistics
3. Limited Availability Meeting
4. Weekend Issue Investigation
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_

Figure 6.2. Report filled out by Mike during the second day of observation.

Figure 6.2 shows the way that Mike described his activities for the third observation day. As can be seen in that Figure, item number one corresponds to those cases which he supported by making changes in the databases. While filling out the report, he mentioned

that, for the sake of simplicity, he just listed all his cases as a group, “*Support Cases*,” although he had dealt with many of them throughout the day, and he distinguished among them. A second item in the list of Figure 6.2 corresponds to a project identified as “*Data Center Statistics*.” This specific label “*Data Center Statistics*” was used to identify the project, not just by Mike, but also by others of his team. I was able to observe these mentions of “*Data Center Statistics thing*,” while hearing his colleagues talking about it as it was a shared assignment. The origin of this project was as follows: during a meeting with his boss’s boss, a week before the observation began, they discussed the need for a report to be put together for the Chief Operations Officer (COO) of Venture. The COO wanted to determine the costs of operation for the data center, and how they should be distributed among the practices that they were serving. He wanted to determine the disk space consumed by practice (in megabytes) as well as the number of transactions performed in the systems and number of kilobytes transferred monthly to each practice. Mike and his boss needed to gather that data and report it back, so that a complete report could be prepared for the COO. During that day, Mike worked on this working sphere running queries on the databases and gathering information in a document that was sent to his boss. As Mike and his boss were located close to each other, they also had a couple of conversations about this working sphere, to clarify points while Mike was working on it.

During that third day of observation, Mike was introduced to a new working sphere, “*the Limited Availability*” project; the third item listed by him. Right after lunch, one of the senior developers from the Software team came to his cubicle and asked him meet together later on so they could discuss the requirements of a project. At about 5:00 p.m.

they discussed the details of this new project which involved the copying of databases and creating backups of them on disks. The database involved belonged to a practice that was splitting because some of the partnered doctors were leaving. They needed to provide a way to limit the access of doctors to the records of just those patients who they were attending. This working sphere was not concluded during the time of observation. During follow-up interviews with Mike, I found out that this Limited Availability project elapsed about three weeks, as the other processes to copy and backup data involved many failed trials.

Finally, the fourth item on the list refers to a problem that he had detected that weekend with the servers. While at home, in the middle of the night, he began receiving e-mails from the monitoring systems. The messages reported errors on the servers. He woke up and tried to find the problem from home. He could not detect any problem and everything seemed to be working normally. He waited until Monday to clarify the origin of the false alarms. On Monday, the day of the observation, Mike performed tests on the systems and discussed this working sphere with other engineers on his team.

### **2.3.3. The Case of Alfred**

Alfred was a mid-level manager leading a team responsible for the development and maintenance of information systems supporting financial transactions at IT-Services. He supervised 12 people including software developers and financial analysts. He reported to the General Transaction Systems Manager and the Chief Information Officer (CIO). Alfred worked in an office but his door was always open. Most of his interactions were spontaneous and based on informal meetings, either at his office, or in employee cubicles.

Figure 6.3 shows Alfred’s work, as he conceptualized it, during the first day of observation. His descriptions point to different kinds of practical activities involving things such as discussions, requests, meetings, and solo work. For example, the first item listed as “*Arrangements for Boston Trip*” referred to a set of actions for arranging a trip to the IT-Services headquarters in Boston. On that morning, his boss informed him of the visit and asked him to prepare quickly, as Alfred would be flying to Boston the following week. His boss gave him few details about the purpose of the trip, but mentioned that it was related to a new project. Alfred booked a flight on-line, phoned the human resources office to obtain a company credit card, and walked over to the IT staff office to request a laptop to take with him.

End of the Day Session Sheet	
Informant Code:	<u>AUG</u>
Date:	<u>2/19/2004</u>
Issues or things that I worked on today	
1.	<u>ARRANGEMENTS FOR BOSTON TRIP</u>
2.	<u>ARRANGE CELL PHONE REQUEST FOR S. MERRILL</u>
3.	<u>MANAGEMENT REPORT</u>
4.	<u>PROMOTION RECOMMENDATION LETTER</u>
5.	<u>TAPS TEAM MEETING</u>
6.	<u>TROUBLESHOOT USER CREATION PROCESS</u>
7.	<u>DISCUSS USER PROFILE APPLICATION ISSUES</u>
8.	<u>CASE TRACKER REVIEW / <del>UPDATE</del> UPDATE</u>
Notes:	<u>9. TOUCH BASE WITH ALL DEVELOPERS ON PROJECT</u>

Figure 6.3. Report filled out by Alfred during the second day of observation.

Item 2: Alfred arranged to get a cell phone for Steve, one of his subordinates, and noted this on the form as “*Arrange Cell phone request for S. Merrill.*” Steve came that morning to his office and explained that he would be covering a major server update, and that he would like to be available at any time in case of problems. Alfred suggested that Steve should have a company cell phone so that he would not have to pay for calls out of his own pocket. Alfred did not engage in more actions related with the cell phone that day, but he annotated the request in his electronic agenda (Microsoft Outlook) and the next day he made a couple of phone calls and talked to Steve again about the arrangements.

The third item on the report form, “*Management Report,*” refers to a working sphere that Alfred worked on over the course of three consecutive days. Alfred was asked to report to his boss on the status of certain projects, and to prepare a spreadsheet with the information. A less time-consuming, but no less important activity, was the elaboration of a “*Promotion Recommendation Letter.*” At a meeting, Alfred and the CIO had discussed the promotion of employees from other teams. Alfred suggested considering Susan, one of his subordinates, as a person deserving a promotion. The CIO asked Alfred to write a recommendation letter and send it to him so that Susan could be included in the promotion process.

The first four items on the report form were not scheduled activities. Item five, the “*TAPS team meeting*” was a regularly scheduled weekly meeting, held so that people collaborating on the TAPS project could discuss the status of the monthly release, report problems, and define plans. Similarly, the “*Case Tracker Review*” was a regular meeting that Alfred scheduled with the developer of a system called Case Tracker.

Other activities arose as problems to be solved and were characterized as urgent. The “*Troubleshoot user creation process*” item referred to a problem reported by phone to Alfred just before lunch. People at the accounting group in the Back Office were having problems accessing an application and requested immediate attention so they could continue their work. After receiving the phone call and trying to clarify the issue, Alfred talked with Susan and together they worked out a solution. Then Susan walked over to the accounting department at the Back Office to help the users reconnect to the system. Later on, they met again to discuss the problem and found that the user creation process was still not working properly. They defined some changes in the configuration of the servers so that the problem would not appear again in the future.

### **3. The Notion of Working Spheres**

The illustrative cases presented in the previous section are just examples from a rich set of evidence pointing to the way that people conceptualized, delimited and organized their work efforts around distinct units of work defined here as working spheres. As the examples show, there is a variety of working spheres which differ with respect to what is to be achieved, the time allotted to achieve them, or the ways through which they are to be achieved. This section presents a definition of the notion of working sphere, the practical value of working spheres in people’s work, an analysis of the factors originating the conceptualization of working spheres, as well as the characteristics of the main working sphere types observed among the informants.

### 3.1. Definition of the Notion of Working Sphere

Derived from the comparative analysis of the experiences of the informants studied it was possible to define the notion of *working sphere* in the following terms:

*A working sphere is a unit of work that, from the perspective of the individual, thematically connects a number of actions and their goals towards the achievement of a specific purpose, has a unique time frame, and involves a particular collaborative structure.*

In this definition, actions refer to the interactions that individuals have had with other people or physical artifacts and devices. For instance, Ronald making use of the phone to talk with Venture's client will be an action. Similarly, Alfred opening a Web browser and making a flight reservation for his trip to Boston is another example of an action. Consequently, as the particular goals of those actions are achieved, individuals get closer to achieving the purpose of the whole working sphere that thematically connects all of those actions.

Depending on its purpose, a working sphere will be enacted within an elapsed time frame from portions of an hour, to days or weeks. For instance, the working sphere performed by Kim, the "*TMS Baseline document*," was a working sphere that elapsed about a week's time, whereas her involvement with the problem of the "*Smarts Validation Reports*" was a work effort of a few hours, although it extended from one day and into the next when she was finally notified that the problem had been solved.

It is important to emphasize that the time frame of a working sphere is defined from the perspective of the individuals, and is based on his or her active participation in a work effort through the enactment of a working sphere. For instance, the “*Data Center Statistics*” working sphere performed by Mike, involved his participation in this project to the extent that he produced the data required to complete a section for the report that the COO was preparing. Once completed, his involvement ceased, and the purpose of his working sphere had been achieved.

Although the emphasis on the notion of a working sphere is to describe the work efforts for which individuals are responsible for their completion, the purposes of working spheres are often achieved with the participation of others. As informants defined what it was that had to be achieved, they also defined the constellation of people with whom they would have to interact in order to gather information, resources, or guidance. These particular collaborative structures often involved other co-workers, supervisors, clients or providers. For instance, as Alfred became more aware of the details regarding his trip to Boston, he had to interact with people who would help him to complete his working sphere. At the initial stages, the collaborative structure for the working sphere included an employee in the Boston office who served as his key contact there, his boss who had requested that he travel, and his boss’s assistant who had helped him to arrange for lodging and local transportation. As Alfred moved into the stages of actually going to Boston and meeting people there, it is possible to say that Alfred integrated more people into this particular collaborative structure referred to as the “*Boston trip*” working sphere.

### 3.2. The Value of Working Spheres in People's Practices

Through the analysis of my informants' experiences, it was possible to identify at least four ways in which the conceptualization of work as working spheres results in having a practical value for the informants. First, working spheres served to provide a frame of reference for the actions executed by the individuals. Working spheres make actions meaningful beyond the scope of short-term goals, and help map actions onto higher-level practical purposes. I noticed this mapping emerging as workers reflected on their actions. Sometimes these reflections occurred while the informant was alone with the researcher, but they were also expressed during interactions with co-workers while communicating the way in which a particular action related to a higher-level purpose. For instance, David and Joe, two managers at Venture, discussed the way to produce a particular report in a spreadsheet. David brought the issue up with Joe to tap Joe's expertise in generating reports with spreadsheets. At the beginning of the discussion, Joe was not aware of the purpose of the report. For some time the discussion centered on the goal of formatting the report in a certain way; however, it was when David asked Joe to work on the spreadsheet and help him generate the entire report that David referred to the working sphere. The reference to the working sphere was introduced as: "*...I'm doing this to project October revenue, the revenue monthly summary.*" David referred to a particular working sphere, "the October revenue summary." When asking for help beyond just formatting, David brought into play the purpose of the working sphere.

A second way that working spheres were useful is that they served to envision and define workloads. Informants used working spheres to establish goals, then to define the particular actions to be executed. Their working spheres were commonly represented in

physical or digital artifacts. Some informants constructed and displayed lists of their working spheres and kept them handy to be consulted throughout the day as they progressed with their work. Louis, a project leader at IT-Services, kept a list of his working spheres on a whiteboard in his cubicle. Referring to the things written there, Louis explained: “*Those are like my bigger projects and the things I have to do.*” He also had a notebook where he kept track of the specific tasks for each working sphere. He took the notebook with him whenever he moved around the office to interact with others. This artifact supported his daily actions. As he explained: “[This is] *my notebook with the day-to-day stuff... just to keep me straight and make sure I don’t forget anything.*”

Third, I found that working spheres served to set the boundaries of collaboration with other co-workers, to establish a context, and to reveal interdependencies among their actions. Thus, working spheres functioned as points of reference that related individual efforts with collective efforts, and facilitated communication among workers. In some situations, such as planning meetings, the use of working spheres as reference points to communicate the relevance of efforts was very clear. At both IT-Services and Venture, I attended meetings where people presented their work to others in terms of working spheres, talking about the effort required for each working sphere, the temporal frames of those working spheres, the people involved, and the expected outcomes. During the meetings, people discussed dependencies among co-workers’ actions (e.g., Andrew must finish something before Kim can do what she needs to do), and they negotiated schemes to optimize their efforts in light of the involvement of others.

Finally, it was at the level of working spheres that people understood and evaluated the work of others. An example of this is seen in this conversation between Jim and

Bryan, two financial analysts at IT-Services, when discussing Andrew's working spheres for defining the specifications for a software release for Atlantic Investments to be able to support a special kind of financial transaction called "pair-offs." In a "pair-off" transaction, analysts apply a special set of complex rules to validate operations. Andrew worked for many weeks to define the specifications of the pair-off process:

Jim: "Is Andrew around?"

Bryan: "Yeah, I think so, but he is working on the specs for pair-offs, hiding, getting some work done (laughs)."

By naming their working spheres and referring to them as specific units of work, informants were able to distinguish and characterize the efforts for which they were involved and establish shared notions defining the context of their collaborations. The mention of "specs for pair-offs" explained why Andrew would be "hiding"; the specs were a significant chunk of work that required his attention and the need to work privately. Bryan is unlikely to have said, "Andrew is hiding so he can write an e-mail" (or make a phone call or fill out a form). But reference to the "specs for pair-offs" made sense of Andrew's need to remove himself from his co-workers for a time.

### **3.3. Origin and Instantiation of Purposes Through Working Spheres**

Working spheres that individuals engage in do not emerge out of nothing, but are part of the goals and aims of their companies and the reasons for which the individuals were hired. This section introduces a model, depicted in Figure 6.4, in order to understand the elements framing working spheres, the level of involvement with them, as well as the

types of working sphere sets that were identified as characteristic for those individuals studied.

### 3.3.1. The Framing Elements

The origin of a working sphere and the establishment of its purpose can be understood as resulting in part from the job responsibilities of the individual. While describing their work, the informants usually pointed out the general responsibilities that they were assigned to cover as part of their roles within the companies and within their teams. Informants referred to their responsibilities in such terms as “programming software components,” “testing applications,” “attending to phone calls from customers,” “preparing revenue analysis,” or “supporting my teammates.” Those responsibilities served as general frames for them from which specific working spheres were derived.

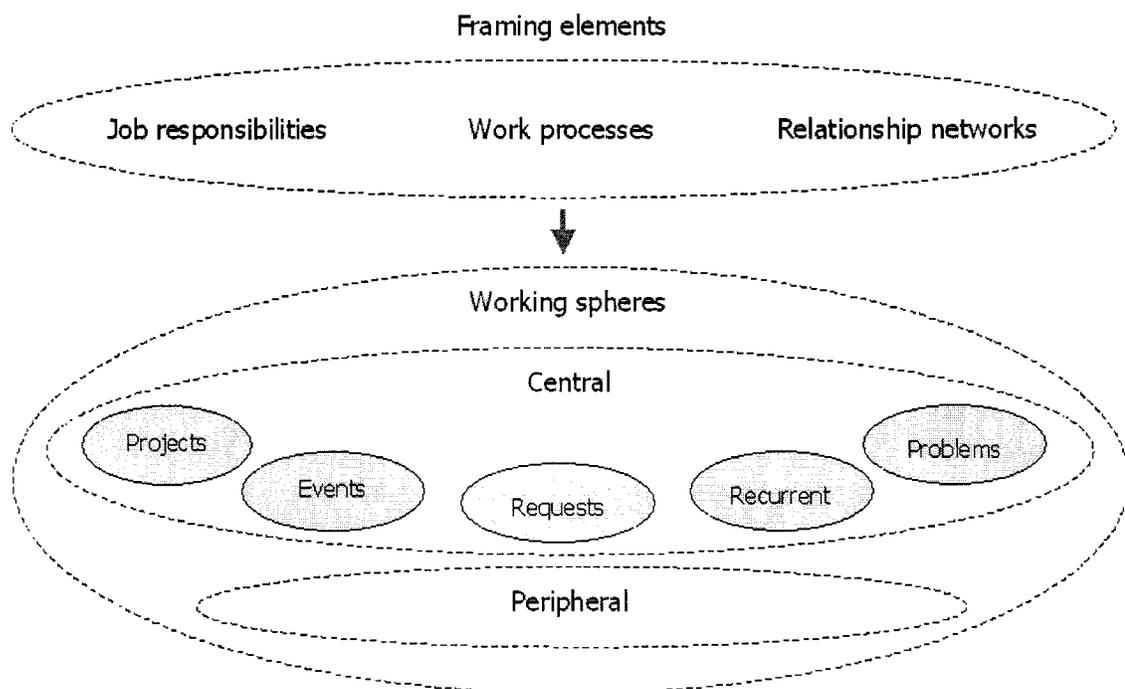


Figure 6.4. A model of the framing elements and types of working spheres.

By themselves, the responsibilities did not describe nor define concrete working spheres, but served to delimit the characteristics and nature of those working spheres. For instance, a responsibility such as “testing applications” involves knowledge about regression testing as well as knowledge about programming languages; however, although those kinds of skills are assumed to be required and possessed by the individual. In contrast, the responsibility by itself did not indicate a specific application to be tested, or the business process to be supported by the software. Those details were defined as part of the *instantiation* of the responsibility through a specific working sphere. As individuals became familiar with their jobs, they were able to identify the set of responsibilities they were able to cover, as well as the nature of the working spheres derived from those responsibilities.

A second aspect framing the way in which purposes are established results from the nature of those work processes that individuals take part in. Those work processes emerge as part of the articulation work described by Strauss, where individuals and their teams divide labor to optimize the achievement of purposes (Strauss, 1985). The analysis of the practices of my informants revealed that some of those job responsibilities were articulated through work processes. For instance, the software releases that guided the work of many of the developers and analysts in IT-Services were well-established work processes through which people enacted some of their responsibilities. At IT-Services, developers created software components for specific monthly releases, defined requirements early in the month, and developed them for a couple of weeks before testing the components in the days prior to the release. Similarly, the analysts and practice executives at Venture, followed a sales cycle that specified the periods and number of

weeks for each phase of the Service Model, giving them guidance about the temporal frame and nature of the outcomes to be achieved for each phase. Thus, for a developer at IT-Services, a working sphere's purpose generally has to be achieved within a monthly cycle. For a practice executive of Venture, a working sphere related to one of the phases of the sales cycle, was framed with the specific purposes of the phase, which, in most cases, implied producing a document, having it evaluated by senior executives, and then presented and discussed with the client at their premises. Work processes then served to define the characteristics of the working spheres, imposing order, sequential structure, and expected outcomes of the work.

Another important observed aspect that frames working spheres is the relationship networks that individuals developed as they worked within the company. From the comments during interviews, and while observing them working, it was clear to me that individuals not just collaborated with each other, but also nurtured social relationships between themselves. People talked about the personal aspects of their lives, joined together for exercise, celebrated birthdays, and even mourned with their teammates when they shared personal problems. Thus, relationships were not just based on the work processes or projects connecting individuals, but also as part of personal interests and affinities. The establishment of relationship networks, transcending organizational schemes, gave form to some of the working spheres that my informants ended up being involved in. I noticed that in some cases, informants were requested to do things for others that were not necessarily part of a formal responsibility. For instance, at IT-Services, a developer that was about to leave for vacation asked an analyst to keep a list of network addresses updated and give information to whoever might request it while

he was away. In this case, the analyst took this on as a working sphere for a few days and did it as a favor for his fellow teammate.

Similarly, the effect of relationships in the creation of working spheres was clearly seen as resulting from the links connecting employees of IT-Services with employees of Atlantic Investments. As I pointed out in Chapter Five, many employees at IT-Services used to work for Atlantic Investments, and some requests were shaped in part by the fact that individuals had known each other for many years. Consequently, people acted on those working spheres, not just because it was part of their responsibility, but mainly, because they were motivated by fellowship.

Furthermore, I noticed that relationship networks were in part built as part of the history that informants developed within certain projects. Thus, if in the past an informant was involved in a particular project or function, it was possible that they could be called on for assistance, given their expertise, in spite of not being involved or responsible for that area anymore. Kim, the analyst from IT-Services mentioned that when reflecting about a working sphere that she engaged in during the time of observation:

*“...even though, actually I don't, I am not supposed to be supporting this application, it is not in my job responsibilities, but I have a lot of history with it, and considering that it is the client that is asking for that information, I wasn't going to ... we have to [be] brought up to speed.”*

### **3.3.2. The Level of Involvement with Working Spheres: Central vs. Peripheral**

The analysis of the working spheres resulted in identifying that individuals were involved in some working spheres but those were not essentially part of their job. Those working spheres resulted from them providing brief advice to others. Many times I noticed that co-workers come with “quick questions” or asked “for a minute” and talked to my informants about what they were doing, some asking for specific information, or just an opinion. The most important characteristics of those working spheres is that they did not demand the individual to do work beyond the time they spent in the interaction with the co-worker. Therefore, those spheres that were directly connected with the individual and for which he or she was responsible, were called *central* working spheres. In contrast, other spheres for which the individual was just briefly involved due to his or her expertise or knowledge and for which somebody else was responsible were called *peripheral* working spheres. Depending on their roles and responsibilities, people became involved in a different number of working spheres of each type. The number of working spheres of each type that people dealt with per day as well as the time spent on each will be discussed in the next chapter.

## **4. Typical Patterns of Central Working Spheres.**

Following Figure 4, this section discusses the characteristics of some of the typical patterns of working spheres, as found in the practices of the individuals observed. The presentation of those patterns by no means aims to be an exhaustive account of all the working sphere types that my informants engaged in, or even the types that can arise in

the work that information workers do in general. However, pointing out those patterns illustrates the richness of work efforts that individuals manage, and sets the stage for the discussion presented in Chapter Eight about the different strategies required to manage different types of working spheres. Table 6.1 shows a summary of the main characteristics that distinguish five main patterns of working spheres in terms of their time frames, level of involvement, relation to formal work processes, demands on their enactment, and the way that they connect with previous or subsequent working spheres. It is important to highlight that some types of working spheres were more common than others. Of all the working spheres that were identified for the informants, 45.1% of them were projects, 21.2% requests, 5.6% urgent-problems, 4.2% events, 5.2% recurrent and the rest (18.7%) were of other type.

Characteristic	Type of working sphere				
	Event	Project	Recurrent	Problems	Requests
<b>Duration</b>	A few hours	Weeks or months	Fraction of hours or a few hours	A few hours	Hours or days
<b>Involvement</b>	Total immersion during the day-hour that the event takes place. Minimum during the days before the event.	Continuous through the duration of the activity. Increases as the deadline approaches.	Limited to the time required to execute the actions related with the sphere.	Total immersion until a solution is found for the problem or a partial solution is achieved.	Flexible involvement as time and other responsibilities allow it.
<b>Time frame</b>	Fixed to a certain date and time.	Rigid schedule.	Recurrent execution with some level of flexibility.	Unpredictable starting and ending.	Flexible and negotiable.
<b>Formality</b>	Pre-negotiated agendas and schedules.	Pre-negotiated procedures, division of labor, and deadline.	Assigned in a formal way, but executed in an informal one.	Ad-hoc forms of assignment and execution.	Ad-hoc forms of assignment and execution.
<b>Subsequent work</b>	No direct subsequent work. The purpose is achieved when the event takes place.	Very likely, especially for big projects enacted through a series of working spheres.	No direct work as the purpose is achieved periodically.	Minimum and just for documentation or reporting purposes.	No subsequent work. The purpose is achieved when the request is completed.

Table 6.1. Characteristics of five main patterns of working spheres.

## 4.1. Events

The purpose of this type of working sphere is to gather a group of people for a particular time period, for instance, to administer training, or information, or to have a time for social fellowship. In general, these working spheres were planned and coordinated weeks or months in advance. Usually the involvement of the individuals was to a minimum before the event took place, except for those organizing it. The event itself lasted a few hours, during which time the individuals were totally immersed in the working sphere. Consequently, during the time the event took place, they were impeded to be engaged in any other working sphere. Due to the effort to coordinate the schedules of participants, events, generally, could not be postponed. This type of working sphere is of a “single time” nature, as subsequent actions or work is not demanded from individuals as a result of the event. The following examples can help to illustrate some of the typical events that individuals engaged in during this study:

### Personality Training in Venture

The Venture Company wanted to provide classes for their employees so they could improve on some skills. One of those classes was a personality training class which aimed to help individuals discover their own character, to be able to identify areas to improve upon, and to be able to understand how their personality could affect their relationships. The class was open to all employees at Venture, and was taught over the course of an entire day. One of the individuals who took the class was Tom, a project leader, and he commented about it during follow-up interviews. This is a typical example of an event-type working sphere. Tom had to enact a number of actions to enroll in the

class, like sending an e-mail message and printing an outline of the topics for the class, but, for the most part, his involvement was to a minimum until the day of the event. During the day of the training, he could not work on other things, and was fully immersed in the class for an entire day. After the training, he received some materials but never came back to them other than to check his results and comment about them to me. The idea of the class was to provide this training but subsequent working spheres were not derived from it.

#### The IT-Services Beach Party

In contrast with working spheres such as the training at Venture, other events were organized by the informants themselves. Bob, a manager at IT-Services, organized a party for the purpose of celebrating the achievements of his team during the previous months. The party was organized for the people on the team and their families, so that they could enjoy some time together at the beach, share a meal, and participate in some games. A copy of the invitation sent to all team members is shown in Figure 6.6.

## **Systems Team Party**

The management team is looking forward to our team party tomorrow to celebrate the outstanding effort of team this year. We are looking forward to getting together with friends and family. The forecast is cloudy tomorrow, but we are going ahead with the party as planned. Below is a summary of the RSVPs for the party. Everyone is welcome whether you have RSVPd or not.

We would like everyone to bring something to the party to help out. I have made assignments summarized below. Please let me know if you will not be able to bring what you have been assigned.

Please come in early tomorrow if possible to offset some of the time we will be out of the office

█ will arrive at the beach around 2 PM to begin setting up. From 2:30 PM to 5 PM we will have snacks and drinks and just hang out. We will start cooking dinner around 5 PM, probably eat between 5:30 and 6 PM. The volleyball team's game will start around 5:30 PM. The games are always a source of good humor for all.

**Directions:** From PCH in Corona Del Mar turn on Marguerite towards the coast. Marguerite ends overlooking Big Corona Beach. You can park up top for free or drive down to parking on the sand. Parking costs \$6 per car.

Please don't discuss the party with people outside our team. Please be careful about leaving this print out on the printer for all to read. Please change down at the beach rather than here at the office. This will help avoid the publicity that █ Systems is having a beach party while the other groups will be working through the end of the day. There is a bathroom down at the beach where you can change.

### **Coverage**

STP coverage – PK through 5 PM or completion of STP trading (between 4 and 5:30 PM typically)– direct STP calls to cell phone after 5 PM

ACE coverage – █ through 5 PM

STP recon – █ following the party to ensure all BB trades were published to SMARTS

Figure 6.6. The invitation to the Beach Party.

As in other event-type working spheres, Bob's involvement was limited to a few interactions that he had in planning the party, which intensified as the date approached. As can be seen in Figure 6.6, some of the coordination with one of his managers was necessary to establish a coverage scheme in order that operations running at Atlantic Investments could be supported in spite of the majority of the team being away from the office for the afternoon hours. Some people who were assigned to cover the shift went to the party later. I noticed that, other than some of them making brief comments about the event the day after the party, there were no subsequent actions for any of the individuals involved.

## 4.2. Projects

This type of working sphere has the purpose of producing and delivering a product by a specific pre-negotiated deadline. In general, due to the characteristics of the companies studied, the products were in the form of software components, documents containing reports, or specifications of processes. Shaped by work processes, many of those working spheres lasted for a few weeks, or, at most, several months. However, it is important to say that working spheres, being personal conceptualizations of work, could, in fact, be part of a long-term project in which individuals were only involved for a short period.

Whatever the temporal extension, project-based working spheres involved rigid schedules, as explained by Mike from Venture: “... *they have hard deadlines. September 10th, this needs to be done. October 1st, I must implement it. Those are things that, you know, if I don't do, someone is going to notice.*” People negotiated and knew what the deadlines for the delivery of products were, and, based on that, they planned and managed those working spheres, and prioritized them with respect to the others that they were also engaged in. Thus, the involvement was continuous through the period from the time the working sphere was assigned to the deadline to deliver the product. However, as indicated by Deana, the level of involvement intensifies as the deadline approaches:

*“Yes. At some point it becomes urgent. When you have that deadline coming up like next week, it is when it becomes very urgent. Like this presentation I have for next week, actually today it is urgent. Because there is one issue that I have to resolve, there is one requirement on how they want a report printed, so I have to figure out a way to have that report printed, and that is a pr-requisite to do the*

*presentation next week, before even scheduling the meeting. Once I get that resolved, then I can proceed with the other stuff.”*

Because project-oriented working spheres usually result from big projects, there could be other working spheres related to the same project, which could be executed either serially or in parallel. As observed with this study, it is important to say that each working sphere was conceived by individuals as independent from each other. For instance, for some projects, requirements were divided into a number of releases. Therefore, each release, and the working sphere for that release, had a different purpose. In other cases, many working spheres were conceived and executed in parallel during the same release period and they all belonged to the same project. The difference between those working spheres was that each one pointed to a different purpose or “subject matter” as explained by Louis:

*“These projects, the seven specific projects, will be kind of like adding, but we are keeping them separate since this is such a big important project... Why not two or something like that? Because we can divide it up. This is specifically to one of the teams; this might be to another team; this might be the same team, these one, two, three, four pieces, but there are different subject matter. So, this is a parting interface, this is a book value, which is different. So there is a specific module attached to it... It could be the same people, but they are about different subject matters, there is different requirements and there is... you know, different deliverables.”*

Project-based working spheres were very common among informants. Examples are: the “Data Center Statistics” project of Mike from Venture, where he had to provide some statistics for his boss so that a report could be elaborated; the “Creation of TMS Baseline Doc.” project of Kim, from Venture, referring to the elaboration of a document describing the way that new financial products were planned to be supported by the Trade Management System (TMS); or the working spheres resulting from the monthly software development releases in IT-Services, or the sales cycles of the Service Model in Venture.

### **4.3. Recurrent**

This type of working sphere demands a recurrent involvement in order to achieve its purposes, such as the maintenance and monitoring of networks and computer equipment, the optimization of work processes, and the elaboration of status reports. The essential characteristic of this type of working sphere is that a very similar purpose is achieved periodically. The actual duration of the involvement can be between fractions of an hour to a few hours. Recurrent-type working spheres are very common among individuals who are in charge of equipment, like engineers or developers who are in charge of software applications, as illustrated by the comments of Mike, from Venture:

*“Once a week we do what’s called re-indexing, which basically optimizes the lookup values so that tables can get accessed faster. Once a month we actually physically go to the data center, run emergency service pack fixes, anything that we would call critical fixes, and reboot every server in the data center. So those are the two main ones. Every night we do a full database backup. Every four*

*hours there's what's called a log backup. There's other proprietary stuff that we do hourly, weekly, monthly, but [it] just maintains the Venture code."*

Recurrent working spheres were assigned to individuals by their bosses or through agreements with their co-workers; thus, some level of formality exists in the sense that they are the ones who have to be executing that working sphere regularly. Although periodicity was aimed for, in practice, flexibility existed in the execution. This was due to most actions relating to working spheres being executed by individuals working alone. They were able to decide whether or not to execute them within a week or within a day, as long as they completed them by a certain time or date. The following two examples can help to illustrate the nature of this kind of sphere:

#### Charles's Daily Status Report.

Charles is an analyst at IT-Services, and, as part of his responsibilities, he had to produce a daily report on the status of the systems (servers and databases). The details of how that working sphere was enacted were described by him during an interview:

*"To prepare that report, the first thing I do: the report comes out with a layout, so what I do [is,] I go back to yesterday's report that I sent out, copy the layout, and paste it in a new e-mail. Now, the next step I do is define which environment I am going to check right now. So, I have three major environments: the Alpha, Beta and PROD, right? The first thing I check is where the night cycle status is in every environment, Alpha, Beta and PROD. If Alpha is done good, [then] Beta is*

*done, good. If PROD is done, good. So I write that. Now, the next step is to go and take the information from the database to see how much of that information has been properly processed. So, I go, check, I run a query that goes and checks tables in different databases in that environment, comes back and gives me report. Now, the report gives a lot [of] information, but I only need one line. So I copy that line and paste it in the e-mail. The next step: go to the beta one, do the same thing, copy that line, and paste it in the Beta status. And PROD, the same, exactly. After that it's done. So I send it to all the guys in the [Production] team, and that's it. Before I go home, I just send the update to everybody. So if there is a problem, then one of those guys can follow up it.”*

As explained by Charles, the elaboration of the report involves a set of actions that include the consultation of databases from different systems, and the identification of information that then is integrated into an e-mail that he sends every day to his manager and to the team before he goes home. As Charles worked the nightshift, this report was elaborated two or three hours before he finished his shift at 8:00 a.m.

#### David's Forecasting Revenue Report

As explained in Section 3.2, David, a manager from Venture, had to detail a monthly revenue report and send it to his boss for discussion. During an interview he explained the details of what this working sphere involved:



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Víctor Manuel González y González

Dissertation Committee:  
Professor Gloria Mark, Chair  
Professor Bonnie Nardi  
Professor Alladi Venkatesh

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*“For the forecasting revenue we use a combination of different programs, one being our internal MACTS, which you’ve probably seen now, the Venture Customer Tracking System. Then, we have an Access database that we run some reports against in. Part of what I have to do is I have to look at all the revenue that we recognize year-to-date, and then I have to forecast out with everyone. So, we have a backlog report and the backlog report gives us every customer, and every piece of revenue bit that has been recognized, and it’s broken up into categories. What I have to do on a monthly basis is I have to forecast when that revenue is going to be recognized, what month it’s going to happen in, and then I also have to report on how accurate was I the last month, what changed, and what does it mean for our cash flow, so to speak. So, that’s a significant amount of time because one of the things that I’ve learned is I just can’t fill out the reports; I actually have to go in and look at it, the data, and I have to see our people keeping the dates up. So I’ll look at the dates and look at the comments and say: Does it make sense? Does the information that’s in here correlate with the dates that the trainer or the installation person says is actually going to happen? In total, that’s eight to ten hours a month probably.”*

The revenue report that David prepares results from the execution of varied actions including the consultation of different systems and people. He commented that although he has to do it every month, there is no specific date for it to be completed. As with other working spheres of this type, at the beginning, David had to be sure he remembered to

complete this report. But as time passed and it became a common practice, he no longer needed external reminders (e.g., notes).

#### **4.4. Urgent Problems**

This type of working sphere refers to special kinds of problems that become critical, as they affect infrastructure making it impossible for their clients or co-workers to continue their work normally. Outages, then, are directed at problems that the informants had to support and solve for others, being as they were, responsible for them. Given the importance of those working spheres, they took precedence over other work that the individual might have been doing at the moment when a problem arose. This reprioritization was mentioned by Mike from Venture during an interview:

*“Yeah, my main, pure and simple, if anything [in] real time breaks, everything gets put to the side. End quotes, be damned; database splits be damned; investigating why live practices are slow be damned. If something’s broken, I will work on that until it’s fixed, because that is my primary responsibility: keeping every single customer up and running.”*

“End Quotes,” “Database splits” and “Investigating why live practices are slow” were projects that Mike was working on, and he used them as examples of those other working spheres that he had to put aside, if he had to attend an urgent problem. Ben, a manager, made a similar comment when he spoke about the urgent problems experienced at IT-Services:

*“Unless it is a serious problem... If it is a serious problem, then we follow it through until it is done. I mean, if it is something like, for example, prices did not get loaded and [I] got a major problem because of that, then we work as long as we have to work to get that thing resolved. You know, this is not an eight-to-five job, there is a lot of times you can work three hours, but a lot of times you work ten or twelve hours.”*

People then became fully immersed in this type of working sphere until a solution was found, which, in general, took only a few hours. Once the problem was solved, or the systems were stabilized, generally people did not perform further actions related to this type of working sphere. However, if a problem was solved only temporarily, or if there were suspicions that it would arise in the future, problems became project-based working spheres, and, as observed during the course of this study, were assigned to someone as a project. The following example shows a narrative of one outage experienced by Tom, a manager from IT-Services and referred to during one interview:

*“We have not had a big one in a while, but there was one day that really stands out where we had an issue with some of the data that we needed to support that day. It wasn't promoted. So, we are in the middle of a pool day, I don't know if anybody talked to you about pool days, but they are big days around here for us, because we deal with a mortgage product, and during four days out of the month when we get information about those products and there is a high cut-off at twelve noon, that if you don't get everything down before that cut [off,] then you start*

*generating costs and fines for the company. But, because this data hadn't been loaded, we weren't able to accept the information in the system, and it was really getting close to the cut-off. And then, we were trying to think about how to get this information in there. It was a process that took a long time to load, so we couldn't roll [it] back in the same way that we always did, so we have to think in a new way to get the data in there. So, we had to go through a lot of data, do a lot of queries, pull a lot of information, look at different aspects, and all that time the clock was ticking down towards noon. And once we passed noon it was too late.*

*So, you know if we got past that time, Atlantic Investments has to pay one and a half percent for the overall sell cost. So, that's happened in the past, and it is not a good thing. So, when we go into big days, we expected it to fail. We told them it was going to fail. In fact, we gave them a threshold. If you pass this threshold we are going to fail... The whole thing must have lasted... the real intense part of it must have been at least three hours, and we had at least four people involved. We had people on the business side involved in tracking things. So, we probably... probably the whole team was involved in that one. So, ten people there, plus, when you get an issue like this, you tend to get executives [who] fool around; they come to say: "We have to get this done!" That time, we had at least three members of upper management putting their nose in here, trying to make sure that everything was done."*

As explained by Tom, this urgent problem was important not just because it represented a major issue for the clients, as they could not complete the pool day operations, but because they had a deadline, that if it was not reached, would involve costs for the company. In general, urgent problems tend to be characterized by periods of great tension, as people aim to resolve them quickly, but at the same time, avoiding mistakes that could make things worse. As with other urgent problems, the one described by Tom involved an investigative process to find a solution; one for which a pre-established procedure did not exist, but was enacted in more an ad-hoc fashion until a solution was reached.

#### **4.5. Requests**

Another common type of working sphere is created when requests come from bosses, co-workers, or clients who demand assistance or support. In this type of working sphere, individuals are asked to provide reports, clarify results obtained from systems, repair or check a device (e.g., a computer,) or to assist in the installation of software or hardware. Requests come to a particular individual because he has the experience or the abilities needed. Therefore, this type of working sphere tends to be handled by the individual with little participation from others. As Ronald, a manager at Venture, commented, requests often emerged as the requesters know that the individual can “make things happen”: *“I do a lot of the customer support. Some people try to go through other channels if they are frustrated for the delay, or the way we handle it, and then they will call me and I will try to intervene, to do something to make it happen.”*

Consequently, requests can be more informal in nature rather than being connected with work processes. As Ronald indicates, in some cases people made requests that aim to “*go through other channels*” and shortcut the formal work processes. In other cases, there is no formal process associated with a request. For instance, the request from Steve to Alfred for a cell phone mentioned in Section 2.3.3 was not part of a work process, but something that emerged out of the need for being in communication during a server update. For Alfred, that was a request that he had to deal with in an ad-hoc fashion to define how he would be able to get the resources for Steve.

Most requests observed were enacted in a matter of a few hours, but were not necessarily handled as they arose. Because the requests were informal, and the commitment was not rigid, people accommodated those working spheres based on other priorities and the time available. For example, Alfred did not start working on Steven’s request right away, but opted for creating a reminder in his Microsoft Outlook software so that he could keep the request in mind. Necessarily, some of those requests were expected to be fulfilled within a particular time frame, however, they were not promised by any specific deadline.

I noticed that for many of the individuals, their jobs were highly characterized by the predominance of requests, which was the case for support engineers and analysts. Some support engineers described this situation and pointed out that they needed to be constantly attending to unexpected things and juggling them along with other working spheres, such as, project-based ones. Analysts were more likely to engage in requests because they were in closer contact with customers.

## 4.6. Other Working Spheres

Although I tried to characterize and codify all the central working spheres for the individuals observed, a few of them did not fit any the five categories explained above. For example, there was a pattern that people called “Cases” that seemed common among three of the informants at Venture, but not to any other informants. At Venture, those informants were involved with supporting customers, and they kept track of, and followed up on, calls asking for advice, modifications or clarifications about their software. They called this kind of work effort “Cases.” I found that these “Cases” could not be considered Request-type working spheres, as they were treated in a formal way. There was a well-defined work process that specified the procedures for handling a case, and escalating it, if necessary. At the same time, they could not be considered Project-type working spheres, as they lacked a rigid schedule for delivering results. In fact, “Cases” were often treated in the way that the company offered to do their best to attend a “Case,” but without implicit guarantees to the clients about when it could be done. Consequently, and in spite of the fact that these “Cases” were common among a few informants at Venture, other informants there, and in IT-Services, I did not encounter working spheres with those characteristics, and I was not able to define this pattern of working sphere with more precision.

Another pattern that couldn't be clearly identified was for spheres that were closely connected with the individual's personal needs. In some cases, people engaged in working spheres that had a personal nature, such as getting rid of viruses in their computers, or obtaining a driver's license at the Department of Motor Vehicles. Those working spheres were useful for setting up the conditions so they could get their job done

by having a computer machine working well, or being able to arrive on time by car, but it is arguable whether those working spheres just served work-related purposes.

Another working sphere not easy to classify were those cases when individuals engaged in working spheres related to human resource management processes such as annual self-evaluation, or compensation and retirement schemes. Those working spheres, in general, had an administrative nature. Although those working spheres could be considered projects, they were not directly oriented to satisfy the needs of clients. Consequently, the five patterns discussed above were the ones that more frequently arose within the data and were more clearly identified. All other working spheres were classified in the “Other” category.

## **5. Developmental Dynamics of Working Spheres Over Time**

Besides the natural development that working spheres experienced due to the execution of chains of thematically connected actions, it was possible to identify particular characteristics of the developmental dynamics that working spheres experienced over time. In this section, I concluded the conceptual analysis of the nature of working spheres by describing four main aspects of the development of spheres.

### **5.1. The Genesis of Working Spheres**

Depending on their type, working spheres were initiated by different formal and informal mechanisms. Many of the project-based working spheres were defined in a formal way, during meetings and with the agreement of the parties involved. For instance, as

explained in Chapter Five, every month, right at the start of the monthly release cycle, people from IT-Services had a meeting with people from Atlantic Investments to define what was to be included in each release. Then, they would meet again within IT-Services to discuss what was promised to the client and define the items to be developed and tested by each person. Many of their working spheres had such genesis.

In contrast, many other working spheres were initiated as part of independent requests emerging from clients whenever they deemed it necessary. Such was the case for many internal requests from the Back Office to the Operations team at IT-Services. Paul, a developer in this team, mentioned the general dynamics of that process that initiates new working spheres for them:

*“The design of our requirements is initially created by an end user. Basically, the user will create the Project Request Form [which] will be a very general outline, as to what they need to have done to whatever application it needs to be done to; and what the priority it is; that kind of thing. Ok? So, there is basically a very simple Web page that they enter in the PRF.<sup>17</sup> And then they submit that; they get the signatures they need from their manager, which approves that project; which essentially is approving the work that that project will require to be done.”*

In contrast with formal mechanisms, many other working spheres were initiated in a more informal manner which was the case for problems (or requests) that don't follow a formal assignment mechanism and that were attended in a more ad-hoc fashion. The origin of those spheres, in spite being informal, did not result in less care or attention. As was

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<sup>17</sup> PRF – Project Request Form

explained before, urgent problems were treated on a prompt basis and took priority over other working spheres.

## **5.2. The Gradual Definition of Working Spheres**

Once a working sphere was initiated and as people became more involved in what it required, they gradually defined how its purposes would be achieved, including what kind of resources were necessary, and what people they should obtain support from. For working spheres that involve something new, such as the implementation of new procedures, or programs, such definitions have to be worked out from scratch, as prior reference of a similar effort is not available. The need to define those aspects at the initial stages is pointed out by Bob, the manager from IT-Services:

*“For the enterprise [project], it is in a very initial stage. It is in a kind of a project creation mode, or project definition mode, and I am ready to push and drive in that project. I have had a number of conference calls on it. I have identified action items, but I have not yet assembled a kind of like, overall approach, and work plans. That’s what I am working on at this time.”*

As indicated by Bob, as people define the details of a project, they also set the scope of it and the plans that it will follow. Although it is clear that not all working spheres required such elaboration, to some extent they did require at least some in order for its objectives to be achieved. It was clear that as people gained experience with working spheres that require repeating procedures encountered in previous working spheres, they exerted less

time and effort on them. Such is the case for the working sphere that Charles, an analyst at IT-Services, engaged in to create a “Status Report,” or the working sphere that David engaged in, related to the creation of a “Revenue Report.” In similar way, project-based working spheres related to software developments were generally well defined early on.

### **5.3. Connections in the Creation Among Working Spheres**

As mentioned in a previous section, some working spheres can produce, or create, a new working sphere as when projects are divided into a number of project-based working spheres, sequentially connecting one depending on the previous one for achieving its purposes. In other cases, such connections exist, but in the sense of one working sphere originating from another type of working sphere. That was the case for some problem-type working spheres, resulting in new project-based working spheres, or even formalized requests that became projects. An example of this was a working sphere in the form of request that Alfred encountered during the observation. A co-worker from another department came to Alfred’s office and asked him to help them locate information about who the users were for certain applications, as they were trying to build an inventory for the entire company. He helped her identify documents in the company’s network archive that contained useful information. During an interview with Alfred, I talked about this request. He mentioned that a few days later it became a project for his team. He had additional conversations with the employee about the inventory, and they realized that the request would require some programming. Alfred decided to make the request a formal project, and assigned it to one of his developers.

#### 5.4. Active, On-hold or Dead Working Spheres

Informants pointed out different operational statuses for their working spheres with respect to the possibilities of moving them forward to achieve their purposes. There were three common statuses mentioned: active, on-hold or dead. Some of the working spheres were referred to as being “active” or “ongoing.” For those working spheres, individuals were able to work on engage in them, by their own volition, whenever other priorities allowed them to do so. In contrast, other working spheres were referred to as being “stagnant,” “stalled” or “dormant.” For different reasons, informants were impeded from continuing work on them. Many times the individuals were just waiting for responses from other people in order to continue the work. This was illustrated by a comment from Leonard, a sales executive at Venture, while referring to the status of one of his working spheres regarding Hal Spine, a medical practice they were trying to sell the Service Model to:

*“Hal Spine, we haven’t had a response since they [had] told us they didn’t want to give us the financial data for the preliminary assessment. I wrote them back and told them what we were doing and said the ball is in your court; we haven’t heard back.”*

Finally, other working spheres were considered to be “cut-off” or “dead,” as individuals could not achieve the purposes of the spheres, but had to abandon them instead. As pointed out by Danielle, from Venture, “[many of] these projects are cut-off because of resources, money or personnel.” Informants could not continue working on them because

companies were not interested anymore in those work efforts, and individuals had to archive the working sphere. During the interviews, some informants referred to many of their abandoned working spheres as having been abandoned for those reasons.

### **5.5. Obsolescence and Post-work in Working Spheres.**

Whenever informants were successful in achieving the purposes of their working spheres, they were not in need of working in that sphere anymore. Once the purpose was achieved, people moved on to something else. For instance, the working spheres of the Project leaders at Venture aimed to achieve the installation and the setting up of the MASYS system at a practice. But once it was completed and the personnel there were trained, they did not deal with that client anymore, as stated by Dean:

*“Right now, pretty much after the project is over, that is, after three months, we pretty much hand them over to Customer Support. And so, we’re sort of done with that project, and we just move on to the next practice.”*

Thus, informants mentioned that as they concluded their work in a sphere, and achieved its purposes, as mentioned by Jennifer from Venture, they “*get out of the picture.*” If they continue working with the same client or new purposes are defined for the same project, they then have to work on them. In addition, because some problems or requests result from the use of products that they had delivered, this was a source of new working spheres. That was typical for the people at IT-Services. Because each developer or analyst did not only create and implement software, but actually supported it as well,

many of the requests could be related to the systems they had delivered from a project-based working sphere. Although the connections among those working spheres are through a specific product, the purposes of the spheres are different, and people treat them in that way. Consequently, the more products that are delivered on time, and supported, the more likely that individuals ended up being involved in working spheres in the form of requests or, in some cases, urgent problems.

## **6. Summary**

This chapter introduces the notion of a working sphere to refer to the conceptualization of practical units of work as was understood by my informants. Each working sphere has a particular temporal framework, a collaborative structure, and requires the use of particular resources to achieve its purpose. Although I identified different types of working spheres, there are five characteristic patterns that have more relevance for understanding the practices of my informants. These working sphere patterns differ with respect to their formality, the level of involvement required, their time frames, and their typical durations. As will be analyzed in the next chapter, different types of working spheres have more relevance for particular types of jobs. Similarly, each type demands a particular way to be managed, and particular informational needs. Those aspects will be discussed in detail in subsequent chapters.

# Chapter Seven: Dynamics of Carrying Out Activities in the Workplace

## 1. Introduction

As part of consolidating an understanding about how information workers manage multiple activities, this chapter focuses on analyzing the dynamics involved while carrying out activities. Building upon the previous chapter, the analysis presented here is based on the notion of the working sphere.<sup>18</sup> The understanding of the dynamics of carrying out working spheres is approached by looking at three main aspects: (1) the execution of actions contributing to a working sphere, (2) the handling and continuous engagement in a working sphere, and (3) the interruption and fragmentation of working spheres. The analysis is guided around three groups of hypotheses, focusing on each particular aspect listed above. The analyses involve both Single-Factor Analysis of Variance (also called One-way ANOVA), and Multi-Factor Analysis of Variance (in specific Two-way ANOVA) (Williams and Monge 2001). This latter kind of analysis permits investigation of interaction effects between factors.

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<sup>18</sup> The analysis presented in this chapter is based on a total of 921 observation hours of informants. This does not include additional time spent at the sites doing general observations, preliminary observations of informants and interviews. Of the 36, only 35 informants were included in this analysis as one of them was an outlier. The outlier informant worked as a support engineer and her main function was to forward calls and e-mails to other members of her team. Because of that, the outlier informant managed an extremely large number of working spheres but her involvement with them was minimal. Each informant was observed for an average of 26 hours and 20 minutes (s.d. 2 minutes and 9 seconds). The average duration of an observation day was 8 hours and 46 minutes (s.d. 43 minutes and 15 seconds).

Presented in Chapter Five, and illustrated in Figure 7.1, three main factors are used for the analysis: (1) the function of informants, (2) the work team they belong to, and (3) the level of collocation with respect to their teammates. The first factor, function of informants, has three levels: technical, business-oriented, and managerial. The second factor, the work team, has three levels: IT-Services Trading team, IT-Services Operations team, and Venture team. The third factor, the collocation, has three levels: adjacent, semi-adjacent, and separate.

In regards to the function factor, it is derived from the roles of information workers identified in previous chapters. The relationships are as follows: software developers and support engineers have a primarily technical function; analysts and project leaders have jobs that are primarily related to a business function; managers play a managerial-supervisory function. It is important to highlight that although the function of informants is derived from their roles, this way of grouping informants facilitates greater consistency across groups, as the three functions are present in each work team.<sup>19</sup>

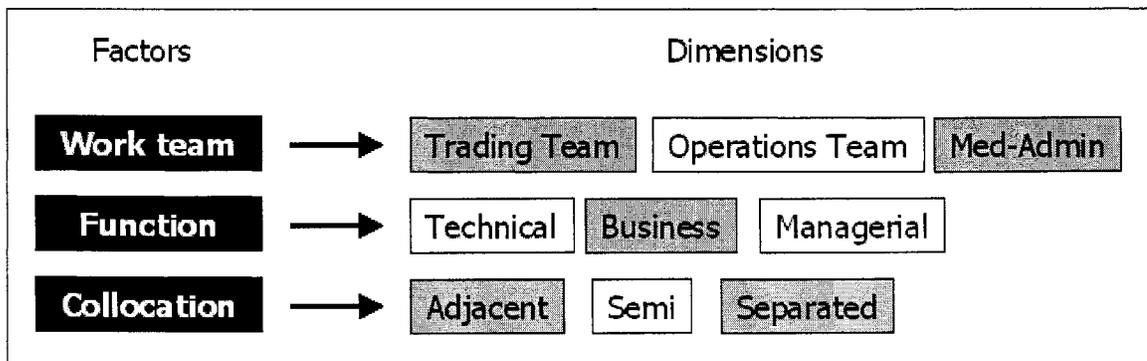


Figure 7.1. The main factors used for the analysis of the dynamics of carrying out activities.

<sup>19</sup> From the perspective of roles, software developers were only observed in the IT-Services Trading and Operations teams, but not in Venture. Support engineers were only observed in the Venture team.

Thus, the chapter presents the analysis including descriptive statistics, testing of hypotheses and a discussion of their implications to understand the practices of informants in regard to the management of multiple activities.

## **2. Execution of Actions Contributing to Working Spheres**

The investigation showed that in order to do their job, all informants have to interact with different people and different kinds of digital and physical artifacts. Informants had to constantly consult with each other, talk to each other face-to-face, or through e-mail or phone. At the same time, they had to use different technologies and devices, ranging from pieces of paper to computer applications. As they conducted their work, people moved back and forth among all kinds of devices and tools. These interactions with people and artifacts constitute a first level of analysis in order to understand the dynamics of carrying out multiple activities. Within this context, actions are considered to be the minimum components of the working spheres that people engage in. Consequently, the first effort to analyze the data collected in the observation notes was to identify the different types of actions that individuals executed involving interactions with other people and artifacts.

### **2.1. Theoretical Discussion and Hypotheses Development**

#### Longer Informal Interactions Due to Proximity and Content of Interaction

As explained in detail in Chapter Five, people at the Operations work team worked very close to the client who is located in the same physical space. As some studies have indicated, physical proximity supports opportunistic conversations (Kraut et al. 1993, and Whittaker et al. 1994). The workplace study revealed that this physical proximity of the

main actors (i.e., company and client) make their operations more intertwined and this might have caused more interactions. People from the Back Office (their client in practice) often visited the informants working for the Operations team and those visits were reciprocal. In contrast, the Trading team has their client (Atlantic Investments) a mile or two away. Venture has clients all over the U.S. In addition to that, it was observed that interactions among team members in the Operations team were also frequent and more common than those happening in the other two work teams. Meanwhile, I noticed the content of those interactions makes it likely to affect their duration. Informants from the Operations team, while informally interacting with people from the Back Office, explained procedures or gave instructions about how to use applications, and this kind of interaction took a longer time. Thus, the Hypothesis 1 is as follows:

*H1: Informants from the Operation work team will experience longer informal interactions than those informants from the Trading and Venture work teams.*

#### Phone-Mediated Nature of Work

Informants at the Venture team have to engage in more complex phone conversations due the nature of the topics they discuss (e.g., long explanations of procedures, walking clients through the solutions to problems with systems, interviewing potential clients to gather information). The relationships they establish with clients and providers are primarily mediated by phone. In contrast, the Trading and Operations teams, in general,

do not have to discuss those kinds of topics over the phone and their relationship with the client is also mediated by e-mail and face-to-face interactions. Thus, the Hypothesis 2 is:

*H2: Informants from the Venture work team will experience telephone interactions of longer duration than those informants from the Trading and Operations work teams.*

### Constant Awareness of the Work of Others

As a result of being collocated, informants obtain more awareness in regard to the working spheres that their teammates are involved with. During the workplace study, it was observed that informants working adjacent to their teammates updated each other about things they were doing, or just they became aware accidentally as they listened to their teammates while talking to clients or to other co-workers. As indicated by Heath and Luff (2000), such awareness is required to coordinate work. The lack of such awareness is likely to affect the time required to interact in formal meetings if that is the main form of interaction among teammates. For the case of informants in a separate level of collocation, formal meetings were a main mechanism to interact with their teammates. They don't have the ability to accidentally listen to what their teammates were doing as they were physically separated. Thus, the Hypothesis 3 is as follows:

*H3: Informants with an adjacent level of collocation will experience longer formal meetings than those informants with a separate level of collocation.*

### Job Primarily Based on Interacting with People

Informants with managerial functions have to interact more with others face-to-face, either in informal or formal meetings. This is because as indicated by Panko (1992), whenever possible, there is a preference for managers toward face-to-face forms of interaction. This preference is likely to be reflected in the total time per day spent by informants in informal and formal meetings and differ according to their function. During the workplace studies it was observed that managers relied on face-to-face forms of interactions as a central aspect of their work. This reliance was not observed to have the same importance for informants with other function (technical and business). Therefore the Hypothesis 4 is:

*H4: Informants with managerial function will spend more total time per day on informal and formal interactions than informants with technical and business-oriented functions.*

### Job Primarily Based on Interacting with Computer Devices

For those informants covering technical functions, it is clear that their computer devices have a primary role to support their work. Previous research by Kidd (1994) suggests that computer devices can be more or less relevant for different types of information workers. The workplace study allowed me to observe that for informants with a technical function (i.e., software developers and support engineers), the computer had a key role, as their work was primarily based on developing and testing software or interacting with computer systems. Therefore, the Hypothesis 5 is:

*H5: Informants with a technical function will spend more time per day using computer devices than informants with business-oriented or managerial functions.*

In terms of the interaction effects, the hypotheses are as follows:

#### Informal Interactions

As was mentioned, the informants from the Operations work team seemed to rely more on informal interactions to conduct their work than those informants from the Trading and the Venture work teams. Meanwhile, informants with a managerial function were observed to rely more on face-to-face forms of interaction. It is important to clarify whether or not there are interaction effects between the work team and the function that the informants have. Based on the observations, it is possible to intuit that managers from the Operations team might be required to engage in more informal interactions in their cubicle or offices due to their physical proximity with their client. Therefore, the Hypothesis 6 is:

*H6: There will be effects in total time spent per day on informal interactions for informants with a managerial function due to their belonging to the Operations work team.*

#### Use of Computer Devices

As was mentioned, the informants with technical roles were observed to rely more on the computer as it played a key role for their jobs. Given that for this study I had access to different types of workers in each company, informants with a technical function in IT-

Services were all software developers. In contrast, informants with a technical function in Venture were all support engineers. That means that in spite of both informants depending on the computer for their work, there were qualitative differences in its usage: Software developers used computers mainly for programming and testing purposes. Meanwhile, support engineers used computers mainly for making modifications in databases, monitoring systems and running tests. Similarly, there were some observed differences among those informants having a managerial function. In particular, managers from the Operations work team were particularly likely to use more their computers in contrast to managers from the other work teams. That is because all three of those managers from the Operations team used to be software developers and they were still involved in the maintenance or modification of software modules. Although that was not a central part of their work, that previous experience as software developers and their involvement with projects of that nature make them different from other managers. Therefore, the Hypothesis 7 is as follows:

*H7: There will be effects in total time spent per day using computer devices for those informants with a technical function due to their belonging to the Venture work team and for those informants with a managerial function due to their belonging to the Operations work team.*

## **2.2. Descriptive Statistics**

Based on a qualitative characterization to contrast the actions of the informants, a list was developed as shown in Table 7.1. This list contains a characterization of actions that is

both useful in understanding the nature of the work of the information workers studied and the implications for the management of multiple activities, as well as to be able to compare my results with previous studies. Based on the list of typical actions, the data in the observations notes were coded in order to quantify the time spent on each action by the different informants.

<b>Actions</b>	<b>% entire day</b>	<b>Avg. Time/Day (sd)<sup>(4)</sup></b>	<b>Avg. Time/ Action (sd)</b>
Using phone <sup>(1)</sup>	7.6	0:39:48 (0:29:10)	0:03:02 (0:01:28)
Using e-mail	8.3	0:43:31 (0:20:27)	0:02:04 (0:00:42)
Using PCs <sup>(2)</sup> <sup>20</sup>	27.8	2:26:21 (1:08:23)	0:02:30 (0:00:45)
Using paper documents	6.6	0:34:51 (0:25:10)	0:01:50 (0:00:52)
Using other tools <sup>(3)</sup>	0.8	0:04:02 (0:03:55)	0:01:15 (0:00:43)
Talking through the walls	1.7	0:08:46 (0:10:29)	0:01:06 (0:01:14)
Talking to others in own cubicle	8.3	0:43:45 (0:29:37)	0:04:29 (0:02:49)
Formal meetings	14.3	1:15:21 (1:00:12)	0:42:56 (0:19:11)
Talking to others in other cubicles	12.4	1:05:24 (0:37:40)	0:08:21 (0:03:27)
Personal	11.2	0:59:11 (0:26:13)	0:33:32 (0:27:40)
Unknown	1.0	0:05:15 (0:08:59)	0:05:09 (0:09:05)
All actions except “Formal meetings”, “Personal” and “Unknown”	73.5	0:48:19 (0:53:05)	0:03:05 (0:02:51)
All actions total	100%	0:47:51 (0:51:48)	0:09:40 (0:17:19)

Table 7.1. Average continuous time spent on actions before switching.

- Notes: (1) includes time spent on cell phones  
 (2) includes both PCs and financial terminals, but does not include e-mail.  
 (3) ‘Other tools’ include: handheld calculator, planners, and address books  
 (4) the time is presented in the format: hour : minute : second.

As Table 7.1 shows, on average, informants spent most of their time interacting with personal computers (27.8%). This action accounts for the greater percentage of all the types

<sup>20</sup> Continuous time on PC without considering switching among applications: mean 3 minutes and 31 seconds (s.d. 1 minute and 17 seconds).

of actions coded. The results can be understood considering that most informants have at least one computer on their desks, and the fact that, being information workers, their work was predominantly computer-based. This percentage of time can be even higher if we include the time spent using e-mail adding to just above 36%. However, because using e-mail is a communicative action, it was coded as distinct from using the computer. As shown in Table 7.1, the total time spent on e-mail is 8.3%, which, interestingly, accounts for more than the time spent on the phone (7.6%). It is important to notice that in spite of the high degree of computerization, Table 7.1 shows that paper documents and other non-automated tools are still commonly used by informants. The information presented in Table 7.1 also accounts for the relevance of both formal and informal interactions in the work practices of individuals. On the one hand, formal meetings are an important component of the work of informants (14.3%). Additionally, informal interactions are as important as meetings as informants spent about 22% of their day in these forms of interactions.

Table 7.1 also shows the brief duration of actions. For instance, using the phone lasted an average of just above 3 minutes, interacting with an e-mail tool just about 2 minutes, and using the personal computer for other functions averages 2 and a half minutes. Excluding meetings, personal and unknown categories, all other actions have an average duration of above 3 minutes. Personal actions refer to things such as going to the restroom, preparing a snack, or making a cup of coffee. All actions which were not personal or whose nature was not well described by one of the types of actions listed in Table 7.1 were coded as unknown. Those unknown actions included situations when the

individuals left the cubicle or office, but it was not possible to follow them, and consequently it was not possible to identify what the individuals did when they were out.

## **2.3. Hypotheses Testing**

### **2.3.1. Hypothesis 1: Longer Informal Interactions due to Proximity and Content**

An analysis of variance was conducted to identify significant differences in the average duration of informal interactions (“Talking to others in own cubicle” and “Talking to others in other cubicles”) among the different work teams. A one-way ANOVA revealed that the duration of informal interaction in cubicles differed significantly as a function of the work team ( $F(2,32) = 4.055, p < 0.05$ ). For means, standard deviations, and specific contrasts between means that were significant,<sup>21</sup> see Table 7.2. A Tukey HSD post-hoc test revealed that informants from the Operations work team took significantly longer in their informal interactions than informants from the Trading work team,  $p < 0.05$ . No other specific post-hoc contrasts were significant.

Similarly, a one-way ANOVA revealed that the length of informal interaction in the cubicle of other co-workers, differed significantly as a function of the work team ( $F(2,32) = 5.263, p < 0.05$ ). A Tukey HSD post-hoc test revealed that informants from the Operations work team took significantly longer in their informal interactions than informants from both the Trading and the Venture work teams,  $p < 0.05$ .

Therefore, based on these results, Hypothesis 1 cannot be rejected. Informants from the Operations work team spent longer in informal interaction in their own cubicle when compared to informants from the Trading work team, and spent longer in informal

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<sup>21</sup> Contrast between means that were significant are indicated with an (\*).

interaction in other cubicles when compared to informants from both the Trading and Venture work teams.

Work team	Average time per action (sd)	
	Talk/others in own cubicle	Talk/others in other cubicles
Trading	<b>0:03:12 *</b> (0:01:18)	<b>0:07:34 *</b> (0:03:27)
Operations	<b>0:06:15 *</b> (0:03:27)	<b>0:10:59 *</b> (0:03:16)
Venture	<b>0:04:30</b> (0:02:57)	<b>0:06:57 *</b> (0:02:17)
All	<b>0:04:29</b> (0:02:49)	<b>0:08:21</b> (0:03:27)

Table 7.2. Average time spent on informal interactions by the different work teams.

### 2.3.2. Hypothesis 2: Phone-Mediated Nature of Work

An analysis of variance was conducted to identify significant differences in the average duration of phone-based interactions among the different work teams. A one-way ANOVA revealed that the duration of phone conversation differed significantly as a function of the work team ( $F(2,32) = 4.723, p < 0.05$ ). For means, standard deviations, and specific contrasts between means that were significant, see Table 7.3. A Tukey HSD post-hoc test revealed that informants from the Venture work team took significantly longer in their phone interactions than informants from the Trading work team,  $p < 0.05$ . No other specific post-hoc contrasts were significant.

Work team	Average time per action (sd) - Phone
Trading	0:02:22 * (0:00:46)
Operations	0:02:55 (0:01:19)
Venture	0:04:01 * (0:01:50)
All	0:03:02 (0:01:28)

Table 7.3. Average time spent on phone interactions by the different work teams.

Therefore, based on these results, Hypothesis 2 cannot be completely rejected. Informants from the Venture work team spent longer in phone interaction compared to the Trading work team. Although there are differences with respect to the Operations work team, these are not significant.

### 2.3.3. Hypothesis 3: Constant Awareness of the Work of Others

An analysis of variance was conducted to identify significant differences on the average duration of formal meetings among the different levels of collocation. A one-way ANOVA revealed that the duration of formal meetings differed significantly as a function of the level of collocation ( $F(2,32) = 3.433, p < 0.05$ ). For means, standard deviations, and specific contrasts between means that were significant, see Table 7.4. A Tukey HSD post-hoc test revealed that informants with a 'Separate' level of collocation took significantly longer in their formal meetings than informants from the 'Adjacent' level of collocation,  $p < 0.05$ . No other specific post-hoc contrasts were significant. Therefore, based on these results, Hypothesis 3 cannot be rejected.

Collocation	Average time per action (sd)
	Formal meetings
Adjacent	<b>0:37:03 *</b> (0:19:20)
Semi	<b>0:45:37</b> (0:12:45)
Separate	<b>0:56:21 *</b> (0:17:01)
All	<b>0:42:56</b> (0:19:11)

Table 7.4. Average time spent on formal meeting by the different level of collocation.

#### 2.3.4. Hypothesis 4: Job is Primarily Based on Interacting with People

An analysis of variance was conducted to identify significant differences in the time spent per day on informal interactions with other people (“Talking to others in own cubicle” and “Talking to others in other cubicles”) among the different functions of informants. A one-way ANOVA revealed that the time spent per day on informal interactions in cubicles (“Talking to others in own cubicle”) differed significantly as a result of the function of informants ( $F(2,32) = 6.140, p < 0.01$ ). For means, standard deviations, and specific contrasts between means that were significant, see Table 7.5. A Tukey HSD post-hoc test revealed that informants with a managerial function spent significantly more time per day on informal interactions in cubicles than informants with either technical or business functions,  $p < 0.05$ .

In contrast, a one-way ANOVA revealed that the time spent on informal interaction in the cubicle of other co-worker (“Talking to others in other cubicles”) did not differ significantly as a result of the function of informants ( $F(2,32) = 0.557, p > 0.5$ ).

Finally, a one-way ANOVA revealed that the total time spent per day in formal meetings differed significantly as a result of the function of informants

( $F(2,32) = 7.646, p < 0.005$ ). For means, standard deviations, and specific contrasts between means that were significant, see Table 7.5. A Tamhane<sup>22</sup> post-hoc test revealed that informants with a managerial function spent significantly more time per day in formal meetings than informants with a Technical function,  $p < 0.05$ . No other specific post-hoc contrasts were significant. Therefore, based on these results, Hypothesis 4 cannot be rejected. Informants with managerial functions spent more time in informal interactions in their cubicles when compared to business and technical function, and more time in formal meetings when compared to technical functions.

Function	Average time per day (sd)	
	Talk/others in own cubicle	Formal meetings
Technical	0:28:03* (0:16:29)	0:32:27* (0:20:20)
Business	0:37:45* (0:24:31)	1:11:30 (0:51:09)
Manager	1:05:42* (0:33:35)	1:59:17* (1:07:34)
All	0:43:45 (0:29:37)	1:15:21 (1:00:12)

Table 7.5. Average time spent per day on informal and formal meetings grouped by function.

### 2.3.5. Hypothesis 5: Job is Primarily Based on Interacting with Computer Devices

An analysis of variance was conducted to identify significant differences in the time spent per day interacting with the computer among the different functions of informants. The one-way ANOVA revealed that the time spent per day using the computer differed significantly as a result of the function of informants ( $F(2,32) = 12.509, p < 0.001$ ). For means, standard deviations, and specific contrasts between means that were significant, see Table 7.6. A Tukey HSD post-hoc test revealed that informants with a Technical function spent significantly more time per day using the computer than informants with either

<sup>22</sup> The Tamhane test was used in this case because a Levene test showed that it was not possible to assume homogeneity of variances for the means.

Managerial or Business functions,  $p < 0.05$ . Therefore, based on these results, Hypothesis 5 cannot be rejected.

Function	Average total time per day per action (sd)
	Using personal computers (PCs)
Manager	1:35:33* (0:56:35)
Technical	3:30:19* (0:54:27)
Business	2:20:34* (0:48:28)
All	2:26:21 (1:08:23)

Table 7.6. Average time spent per day in using computer grouped by function.

### 2.3.6. Hypothesis 6: Informal Interactions

A multi-factor analysis of variance was conducted to identify the main effects and significant interactions on the time spent per day on informal interactions (“Talking to others in own cubicle” and “Talking to others in other cubicles”) as a result of informants belonging to one of the work teams or having a particular function. A two-way ANOVA for the average time spent per day interacting in their own cubicle revealed the following results: there is not significant main effect for work team ( $F(2,26) = 0.316$ ,  $p > 0.5$ ); there is a significant main effect for function ( $F(2,26) = 6.043$ ,  $p < 0.01$ ); there is no significant work team by function interaction effect ( $F(4,26) = 1.635$ ,  $p > 0.1$ ). For means and standard deviations see Table 7.7.

Similarly, a two-way ANOVA for the average time spent per day interacting in the cubicles of co-workers revealed the following results: there is not significant main effect for work team ( $F(2,26) = 2.584$ ,  $p > 0.08$ ); there is not significant main effect for function ( $F(2,26) = 0.803$ ,  $p > 0.4$ ); there is no significant work team by function interaction effect ( $F(4,26) = 0.474$ ,  $p > 0.5$ ). Therefore, based on these results, we can reject Hypothesis 6.

Work team	Function	Talk/others in own cubicle	Talk/others in other cubicles
Trading	Manager	0:50:39 (0:30:07)	0:51:41 (0:17:44)
	Technical	0:22:11 (0:08:24)	0:44:44 (0:13:23)
	Business	0:48:23 (0:27:19)	0:46:42 (0:21:18)
	Total	0:41:32 (0:25:59)	0:47:34 (0:17:13)
Operation	Manager	1:05:27 (0:27:57)	0:54:57 (0:27:59)
	Technical	0:34:34 (0:25:18)	1:29:12 (0:28:36)
	Business	0:46:17 (0:25:12)	1:12:46 (0:35:47)
	Total	0:47:21 (0:26:39)	1:14:00 (0:30:55)
Venture	Manager	1:20:55 (0:41:30)	1:00:06 (0:36:23)
	Technical	0:26:45 (0:01:42)	1:32:53 (0:25:24)
	Business	0:19:51 (0:08:57)	1:31:27 (1:12:21)
	Total	0:43:19 (0:38:01)	1:20:19 (0:53:02)
Total	Manager	1:05:42 (0:33:35)	0:55:38 (0:25:44)
	Technical	0:28:03 (0:16:29)	1:12:09 (0:31:02)
	Business	0:37:44 (0:24:31)	1:08:16 (0:49:05)
	Total	0:43:45 (0:29:37)	1:05:24 (0:37:40)

Table 7.7. Average time spent per day in informal interactions: work team by function

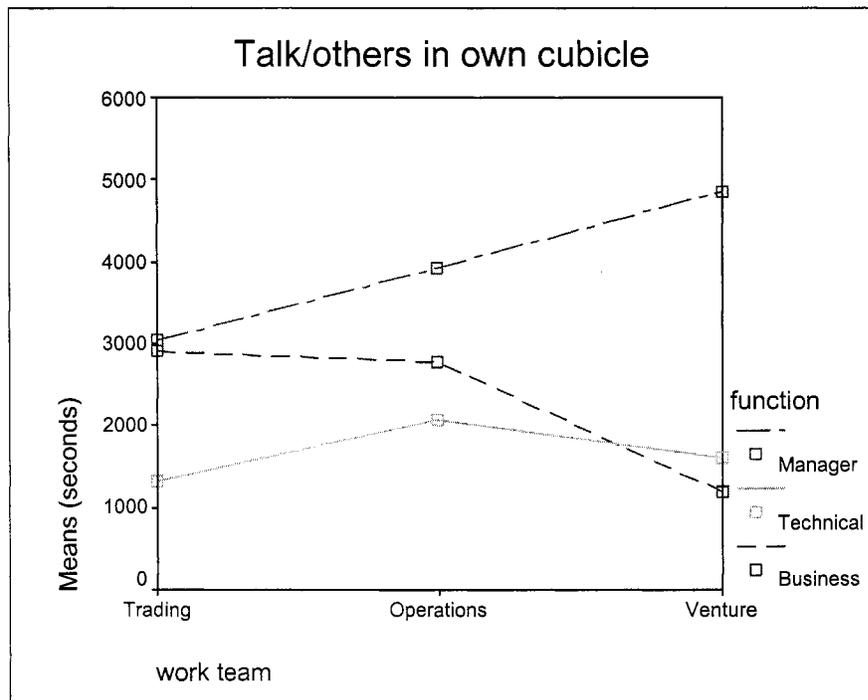


Figure 7.2. Plot of time spent per day in interactions in own cubicle: work team by function.

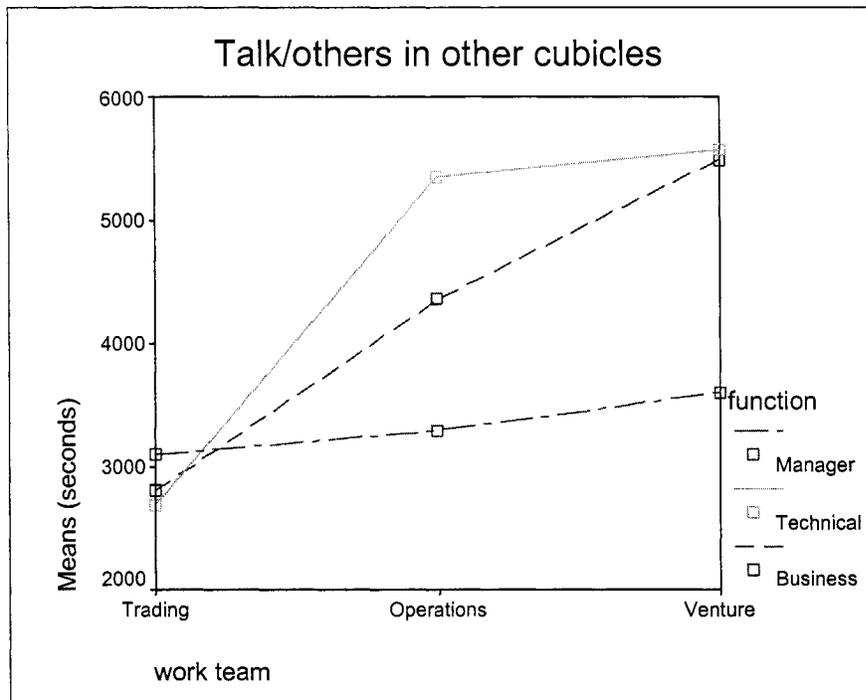


Figure 7.3. Plot of time spent per day in interactions in other cubicle: work team by function.

### 2.3.7. Hypothesis 7: Use of Computer Devices

A multi-factor analysis of variance was conducted to identify the main effects and significant interactions on the time spent per day using a computer as a result of informants belonging to one of the work teams or having a particular function. A two-way ANOVA for the average time spent per day interacting in their own cubicle revealed the following results: there is not significant main effect for work team ( $F(2,26) = 0.296, p > 0.5$ ); there is a significant main effect for function ( $F(2,26) = 10.444, p < 0.001$ ); there is no significant work team by function interaction effect ( $F(4,26) = 0.808, p > 0.5$ ). For means, and standard deviations see Table 7.8. Therefore, based on these results, we can reject Hypothesis 7.

Work team	Function	Using personal computers (PCs)
Trading	Manager	1:11:18 (0:46:00)
	Technical	3:31:14 (0:28:47)
	Business	2:31:15 (0:40:22)
	Total	2:25:33 (1:05:55)
Production	Manager	2:23:25 (1:06:40)
	Technical	3:25:37 (1:25:28)
	Business	2:11:18 (0:27:13)
	Total	2:44:39 (1:09:40)
Venture	Manager	1:23:54 (0:48:20)
	Technical	3:37:54 (0:45:33)
	Business	2:13:20 (1:10:12)
	Total	2:10:44 (1:12:40)
Total	Manager	1:35:33 (0:56:35)
	Technical	3:30:19 (0:54:27)
	Business	2:20:34 (0:48:28)
	Total	2:26:21 (1:08:23)

Table 7.8. Average time spent per day using computer: work team by function.

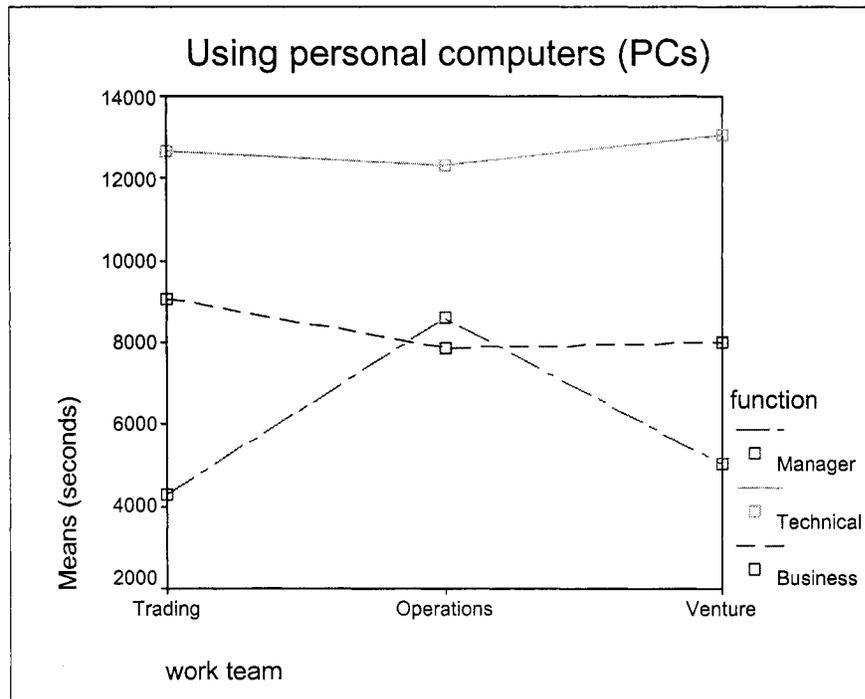


Figure 7.4. Plot of time spent per day using the computer: work team by function.

## 2.4. Discussion of Results

Many aspects can be highlighted from the analysis of the execution of actions presented above. First, it is clear that work at the level of actions is composed of interactions of a very short nature. The results show that brevity is a characteristic of most type of actions because if we exclude meetings, personal and unknown time, the average duration for the rest is just above three minutes (mean: 3 minutes and 5 seconds, s.d. 2 minutes and 51 seconds). This points to the need to understand the interaction of individuals with their environment as one resulting from brief engagements with people, devices and systems. People did not sustain prolonged interactions with devices but switched among them very frequently.

Also it is important to highlight that the computer has a very clear central role in the activities of informants, as they spent about 27% of their days using computer applications or digital documents. Interestingly, computers are not the only resources people used as they were complemented in considerable proportion (7.4%) by non-automated tools and paper artifacts. As will be described in the next chapter, physical tools are very relevant to support particular strategies to manage multiple activities; and their relevance for those strategies can be seen in part by looking at the percentage of time individuals spend using them.

The set of seven hypotheses presented and tested for this section highlight some relevant aspects of the nature of managing multiple activities. The first hypothesis stated that informants from the Operations work team would experience longer informal interactions. This hypothesis was corroborated by the statistical tests. It was found that the Operations team at IT-Services spent significantly more time per action in

interactions in cubicles than the Trading team and informants from Venture. As was mentioned before, an interpretation of this finding is that people in the Operations team had a closer relationship with the people from the Back Office who technically were their main “client” and with whom they shared the building. This translated into having more frequent and informal interaction with them. People from the Back Office could easily reach them; and my perception is that there was frequent interaction between them as their operations were intertwined. In contrast, the Trading team dealt directly with the client Atlantic Investments and their interactions with them were less frequent and more formal. Similarly, informants at Venture were physically separated from their clients. However, also common among the informants from the Operations work team was a more intertwined form of operations with their teammates.

The second hypothesis stated that informants from Venture would experience longer phone-based interactions. This hypothesis was corroborated by the statistical tests. People at Venture took significantly longer in this kind of interaction compared with informants from the Trading team at IT-Services. The latter result can be due to the diversity imposed by the number of clients managed by Venture, and the fact that much of the communication with the medical practices is generally established by phone and usually it is to explain a problem or a request and this can require more time.

The third hypothesis stated that informants with an adjacent level of collocation would have longer meetings. This hypothesis was corroborated by the statistical tests. The analysis showed that “separate” informants spent longer in each meeting compared with “adjacent” informants. This can be explained in part by noticing that by the fact of being adjacent to their teammates, people required less time in meetings, as they had

more frequent communication with them. The same does not apply for “separate” informants for whom meetings might have played a more central role in the way they interacted with their co-workers. This is an interesting result as it points to the value of having people physically collocated, especially in the light of meetings requiring more coordinated efforts to take place. Planned meetings are a convenient way to make sure that everybody required for the discussions will attend them but the wide diversity of personal schedules makes them difficult to coordinate. Therefore, it is possible to argue that by having people together, the need for meetings is reduced, at least for the meetings that they have with their teammates.

The fourth hypothesis stated that informants with managerial function would spend more time per day in face-to-face interactions. The time per day spent on “Talking to others in own cubicle,” “Talking to others in other cubicles,” and “Formal meetings” was used for this analysis. The hypothesis was partially corroborated by the statistical tests. The analysis shows that managers spent significantly more time per day in interactions in their own cubicle compared with informants with both technical or business functions. Similarly, managers spent significantly more time per day in formal meetings compared with informants with technical function. In contrast, the analysis did not indicate significant differences in the time spent in interaction in the cubicle of other co-workers. Based on my field notes and observations of the managers, I interpret these findings as being due to the fact that they required more interactions with their co-workers and had to devote more time to them for different sorts of reasons. For instance, I noticed that managers had to spend more time interacting with their subordinates to discuss their work, reassigning priorities to people and even solving issues of a personal nature. That

accounts for the fact that they sustained longer interactions in their offices or cubicles. Furthermore, managers have to rely more on formal, scheduled meetings to interact with people other than their co-workers. Because managers were the interfaces of their teams to the rest of the organization, they were more likely to spend more time per day in meetings. Compared with managers, informants with technical functions such as developers spent less time per day in meetings, which can be explained by the fact that developers tend to have just a few meetings and those usually take place at the beginning of each release cycle.<sup>23</sup>

The fifth hypothesis stated that informants with a technical function would spend more total time per day using their computers. This hypothesis was corroborated by the statistical tests. The analysis showed that given the nature of their work, technical informants spent significantly more total time per day working on their personal computers than the time spent in the same action by informants with a managerial or business-oriented function. As was mentioned before, the main function of software developers is to code and test computer applications; this explains why they spent significantly more time in this action. Similarly, the main responsibilities of support engineers is the demand to monitor systems, run updates, and configure computer servers and databases. All these jobs are performed through their computers.

The sixth hypothesis explored the interaction effects on the time spent per day on informal interactions as a result of informants belonging to one of the work teams or having a particular function. This hypothesis was refuted by the statistical tests as no significant work team by function interaction effects were found. In spite of those results,

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<sup>23</sup> As explained in detail in Chapter Five, all developers worked under a monthly release cycle which had a meeting at the beginning of the month for planning purposes.

the data show that informants with a business function at Venture spent less time in interactions in their own cubicle, but also more time than other business informants in interactions in other cubicles. This might be due to the fact that they were relatively new in the company, Venture, and they were more likely to leave the cubicles to talk to others to find out about work processes, administrative procedures and other things that they needed to learn.

Finally, Hypothesis 7 explored the interaction effects on the time spent using the computer as a result of informants belonging to one of the work teams and having a particular function. This hypothesis was refuted by the statistical tests as no significant work team by function interaction effects were found. Although the effects are not significant, looking at Figure 7.4 allows us to observe how managers in the Operations team spent more time per day using their computers than informants with a business function. That was due to the fact that those managers in the Operations team used to be software developers and, as mentioned before, they still did some projects involving the maintenance or development of software components.

## **2.5. Contrasting this Study with Studies in Managerial Research**

Table 7.9 compares the results of the study presented in this dissertation with previous studies whose characteristics were described with more detail in Chapter Two. From the data in Table 7.9, it can be derived that for studies conducted prior to 2002, the time spent by informants in desk work averages 23.75%. This can be in part due to the nature of the work of the informants observed in previous studies that primarily focused on managers. If the time spent on e-mail is added to desk work, my informants averaged 42.9% of their

time at their desks which is very close to the more recent finding of 42% from Hudson et al. (2002). The similarity with Hudson's results can be due to the fact that people observed in that study were project managers who might have similar job characteristics as the individuals observed in my study. Furthermore, it might be also due to those individuals from Hudson's study having access to modern technologies as my informants did. Unfortunately, the results from Hudson et al. (2002) were not detailed enough to include time spent on e-mail, which would make a more precise comparison.

In terms of interactions with people, Table 7.9 shows that my informants spent a lower percentage of their working days engaged in scheduled, formal meetings (14.3%), compared with an average of 35.6% across the other studies. In contrast, individuals observed in my study spent more time in informal unscheduled interactions (22.3%). With respect to this, previous studies are not very conclusive as the average is 26.4%, but there is more variability among them. With respect to the average duration of actions, as indicated in Chapter Two, Mintzberg (1973) reported average duration of 6 minutes for phone conversations, while I found those lasting an average of 3 minutes; unscheduled meetings reported by Mintzberg lasted an average of 15 minutes, while my informants took an average about 4 and a half minutes while interacting with co-workers in their cubicles and about 8 and a half minutes when going to other cubicles or offices. Similarly, Sproull (1984) reported phone calls of about 5 minutes on average.<sup>24</sup> Given the lack of detail on the data from other studies, and the different conditions experienced by my informants, it is not possible to make a more precise comparison of results with respect to the average duration

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<sup>24</sup> Focusing only on the informants with a managerial function, my study found that their phone calls lasted an average of 3 minutes and 20 seconds (s.d. 2 minutes), their informal interaction in their own cubicles took an average 5 minutes and 28 seconds (s.d. 2 minutes and 46 seconds) and their informal interaction in co-workers cubicles lasted an average of 8 minutes and 31 seconds (s.d. 3 minutes and 10 seconds).

of actions such as use of paper documents, other tools, e-mail and computer usage. At the time that studies like Sproull's, and those previous to her, were conducted, computing tools were not as common as they are now.

	% time	Avg. time/day (s.d.)	Horne 1965	Mintzberg 1970	Sproull 1984	Stephens 1995	Hudson 2002
Desk work	34.6	3:02:18 (1:14:57)	26%	22%	19%	28%	42%
Phone <sup>(1)</sup>	7.6	0:39:48 (0:29:10)	9	6	13	9	
E-mail	8.3	0:43:31 (0:20:27)					
Scheduled meetings	14.3	1:15:21 (1:00:12)	10	59	34	48	27
Unscheduled meetings	22.3	1:57:55 (0:43:45)	55	10	34	14	19
Other	12.9	1:07:35 (0:24:22)		3		2	
Total	100%	8:46:29 (0:43:15)	100%	100%	100%	100%	88% <sup>(2)</sup>

Table 7.9. Comparing average time of typical action with previous studies.

Notes: (1) Includes time spent on cell phones

(2) 12% of the time subjects were "too busy to respond" and data were not collected.

### 3. Engagement in Working Spheres

A second element to understand the dynamics of work experienced by the informants is to look at and analyze the time they spent engaged in their working spheres. As explained before, a working sphere thematically connects the individual goals of a set of actions as all are oriented to achieve a particular purpose. The analysis presented here looks at the time that informants spent in continuous engagement with a working sphere, the total time per day devoted to it, and the number of working spheres they managed per day.

The analysis and identification of working spheres followed the methodology explained in Chapter Four. Using the observation reports, interview transcripts and other

documents collected in the field, the time spent on each working sphere was computed. Because working spheres were not executed without interruption, the analysis focused on the segments of continuous engagement in the sphere before switching to some other working sphere. Working spheres were enacted as chains of segments until their purposes were achieved or were left in a holding state until resources or conditions were available.

The coding process resulted in identifying that individuals were involved in some working spheres but those were not essentially part of their job. Those working spheres resulted from them providing brief advice to others. Therefore, those spheres that were directly connected with the individual and for which he or she was responsible for, were called *central* working spheres. In contrast, other spheres for which the individual just was briefly involved due to his or her expertise or knowledge and for which somebody else was responsible were called *peripheral* working spheres. Other kinds of work that people engaged in can be referred to as being general and not related to any particular working sphere. This kind of general or meta-work corresponded to things such as cleaning the desk and organizing documents, preparing agendas or to-do lists, or cleaning up computer folders or e-mail in-boxes. Because this kind of work did not apply to any working sphere in particular it was coded as meta-work. All other work for which the purpose was not clearly identified was coded as unknown.

### **3.1. Theoretical Discussion and Hypotheses Development**

#### Job Diversity of each Work Team Due to the Number of Clients

A major difference between informants from Venture and informants from the other two work teams is the larger number of clients. Previous research indicates that diversity of

the jobs of information workers (in particular managers) is influenced by the number of external contacts they have (Mintzberg 1973 and Panko 1992). Clients constitute external contacts around which working spheres can be defined. Thus, the Hypothesis 8 is:

*H8: Informants from the Venture work team will handle more working spheres per day than those informants from the Trading and Operations work teams.*

#### Demands for Prolonged Engagement in Working Spheres

In general, managers experience brief engagements in their working spheres. This is because brevity is a characteristic that has been related to the nature of managerial work (Horne 1965 and Mintzberg 1973). In contrast, one can expect that other functions of information workers will result in longer periods of engagement in working spheres. The relevant hypothesis is:

*H9: Informants with a managerial function will spend less time per day in a working sphere than informants with a business-oriented or technical function.*

#### Supervision and Coordination of the Work of Subordinates

Managerial research indicates that managers play key roles as supervisors of subordinates and have to be involved in guiding their work (Mintzberg 1973 and Sproull 1984).

Therefore, managers have to engage in more peripheral working spheres due to their expertise and their involvement in supervising and coordinating the work of others. Thus, the Hypothesis 10 is as follows:

*H10: Informants with a managerial function will handle a larger number of peripheral working spheres per day than informants with a business-oriented or technical function.*

In terms of the interaction effects the hypothesis is as follows:

Number of Working Spheres per Day

Informants from the Venture work team had a large number of clients and this might affect the number of working spheres they handled per day. From the field observations it was noticed that the number of working spheres might be affected also depending on the function of informants in each work team. As was mentioned, informants with a technical function were software developers at IT-Services or support engineers at Venture. Given that software engineers were generally involved in working spheres of shorter duration (e.g., a software upgrade, checking for computer viruses, installing a new keyboard), it is likely that they managed more working spheres as opposed to software engineers. Similarly, it is likely that informants with a business-oriented function at Venture managed more working spheres, as they had more clients, when compared with informants with the same function at IT-Services. Therefore, the hypothesis is as follows:

*H11: There will be effects in the number of working spheres handled per day for those informants with a technical or business-oriented function due to their belonging to the Venture work team.*

### 3.2. Descriptive Statistics

Table 7.10 shows the average number, time per segment and total time spent per day for the central and peripheral working spheres. People averaged about twelve different working spheres per day, nine of them being central and three of them peripheral. On the average, individuals spent about forty-five minutes in each central sphere per day, but the engagement in them was rather fragmented as they averaged just above 12 minutes per segment of continuous engagement with the sphere before switching to another.

Type of working sphere	Avg. # W.S. per day (sd)	Avg. Time/W.S. per segment (sd)	Avg. Total Time/W.S. per day (sd)
Central	9.31 (4.99)	0:12:16 (0:03:56)	0:45:21 (0:19:38)
Peripheral	2.90 (1.63)	0:05:34 (0:03:43)	0:08:18 (0:06:06)
All	12.22 (5.30)	0:10:29 (0:02:51)	0:33:58 (0:12:04)

Table 7.10. Average number, total and segment times for central and peripheral working spheres.

### 3.3. Hypotheses Testing

#### 3.3.1. Hypothesis 8: Job Diversity of each Work Team Due to the Number of Clients

An analysis of variance was conducted to identify significant differences in the number of working spheres handled per day among the different work teams. A one-way ANOVA revealed that the number of working spheres handled per day differed significantly as a result of the work team of informants ( $F(2,32) = 9.107, p < 0.001$ ). For means, standard deviations, and specific contrasts between means that were significant, see Table 7.11. A Tukey HSD post-hoc test revealed that informants from the Venture work team handled

significantly more working spheres than informants from either the Trading or the Operations work team,  $p < 0.05$ . Therefore, based on these results, Hypothesis 8 cannot be rejected.

<b>Work team</b>	<b>Avg. # W.S. per day (sd)</b>
Trading	<b>9.79*</b> (2.61)
Operations	<b>10.53*</b> (2.72)
Venture	<b>16.85*</b> (6.74)
All	<b>12.22</b> (5.30)

Table 7.11. Average number of working spheres per day by work team.

### 3.3.2. Hypothesis 9: Demands for Prolonged Engagement in Working Spheres

An analysis of variance was conducted to identify significant differences in the time spent per day in a working sphere among the different functions of informants. A one-way ANOVA revealed that the time spent per day in a working sphere differed significantly as a result of the function of informants ( $F(2,32) = 4.784$ ,  $p < 0.05$ ). For means, standard deviations, and specific contrasts between means that were significant, see Table 7.12. A Tukey HSD post-hoc test revealed that informants with managerial functions spent significantly less time per day in working spheres than informants with either technical or business-oriented functions,  $p < 0.05$ . Therefore, based on these results, Hypothesis 9 cannot be rejected.

<b>Function</b>	<b>Avg. Total Time/W.S. per day (sd)</b>
Managerial	<b>0:25:38*</b> (0:05:24)
Technical	<b>0:39:00*</b> (0:13:39)
Business	<b>0:36:56*</b> (0:11:55)
All	<b>0:33:58</b> (0:12:04)

Table 7.12. Average time per day in a working sphere by function.

### 3.3.3. Hypothesis 10: Supervision and Coordination of the Work of Subordinates

An analysis of variance was conducted to identify significant differences in the number of peripheral working spheres handled per day among the different functions of informants. A one-way ANOVA revealed that the number of peripheral working spheres differed significantly as a result of the function of informants ( $F(2,32) = 7.794$ ,  $p < 0.03$ ). For means, standard deviations, and specific contrasts between means that were significant, see Table 7.13. A Tukey HSD post-hoc test revealed that informants with managerial functions managed significantly more peripheral working spheres than those informants with business-oriented functions,  $p < 0.05$ . No other specific post-hoc contrasts were significant. Therefore, based on these results, Hypothesis 10 cannot be rejected, although it is only confirmed for the case of managerial versus business-oriented functions.

Function	Avg. # of peripheral W.S. per day (sd)
Managerial	4.09* (1.47)
Technical	3.00 (1.69)
Business	1.90* (1.01)
All	2.90 (1.63)

Table 7.13. Average number of working spheres per day by work team.

### 3.3.4. Hypothesis 11: Number of Working Spheres per Day

A multi-factor analysis of variance was conducted to identify the main effects and significant interactions on the number of working spheres handled per day as a result of informants belonging to one of the work teams or having a particular function. A two-way ANOVA for the number of working spheres handled per day revealed the following results: there is a significant main effect for work team ( $F(2,26) = 10.696$ ,  $p < 0.001$ );

however there is not a significant main effect for function ( $F(2,26) = 1.686, p > 0.2$ ); there is no significant work team by function interaction effect ( $F(4,26) = 1.020, p > 0.4$ ). For means, and standard deviations see Table 7.14. Therefore, based on these results, we can reject Hypothesis 11.

<b>Work team</b>	<b>Function</b>	<b>Avg. # W.S. per day</b>
Trading	Manager	<b>11.25 (2.63)</b>
	Technical	<b>9.33 (3.21)</b>
	Business	<b>9.11 (2.23)</b>
	Total	<b>9.79 (2.61)</b>
Operations	Manager	<b>2.67 (1.34)</b>
	Technical	<b>8.75 (2.17)</b>
	Business	<b>10.78 (3.34)</b>
	Total	<b>10.53 (2.72)</b>
Venture	Manager	<b>19.08 (7.63)</b>
	Technical	<b>20.67 (3.30)</b>
	Business	<b>13.53 (6.41)</b>
	Total	<b>16.85 (6.74)</b>
Total	Manager	<b>14.48 (5.79)</b>
	Technical	<b>11.37 (5.50)</b>
	Business	<b>11.05 (4.52)</b>
	Total	<b>12.22 (5.30)</b>

Table 7.14. Average number of working spheres handled per day: work team by function.

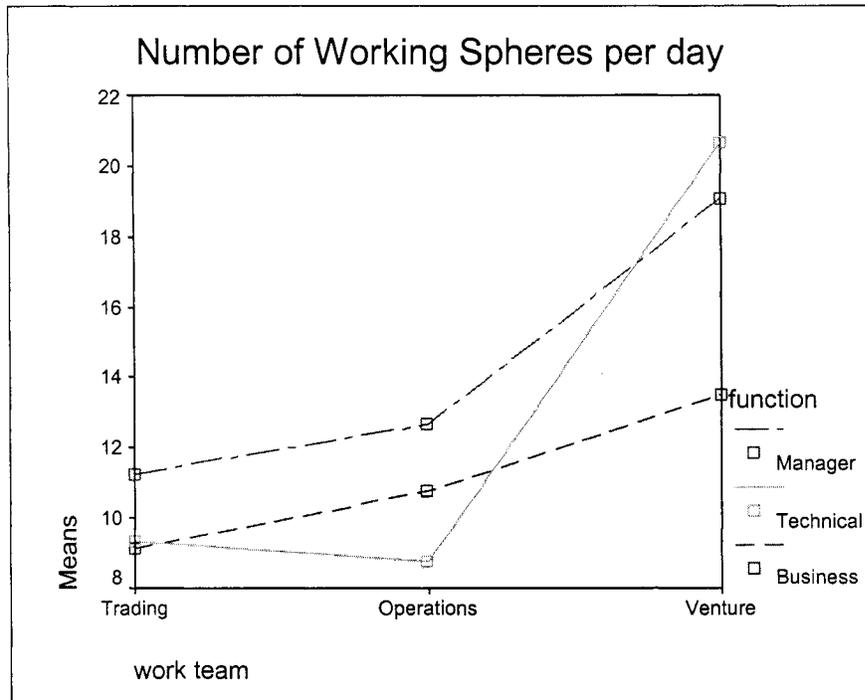


Figure 7.5. Plot of average number of working spheres handled per day: work team by function.

### 3.4. Discussion of Results

A number of findings can be highlighted from the analysis presented in this section. We can see that work is varied not just in terms of the different interactions informants had with others and with artifacts, but also in terms of the different working spheres they had to manage per day. People averaged about twelve different working spheres per day, nine of them being central and three of them peripheral. That demanded a constant reorientation around different topics, time frames, and collaborative structures as each of the working spheres was oriented towards a different purpose. These conditions were commonly experienced by the informants, such as Adam, a business analyst at IT-Services, who, during an interview, made a vivid comment about this constant switching and multi-tasking:

*“Today? Today there were so many different issues going on.... I mean today, I was sitting, and I had a Test script in one hand, I had a document that I was reading for a meeting in the other hand; and then at the same time I have issues on my Berg Trading monitor that I was leading with; so I’m running test trades; I’m reading on some subject; I am helping someone over the phone with something else. And then I am also trying to do this training coordination thing! So it is like constant, constant, just, multitasking, craziness, I mean it is, it is amazing! [laughs]...”*

As it was presented, on average, individuals spent about 45 minutes in each central sphere per day, but the engagement in them was rather fragmented as they averaged just above 12 minutes per segment of continuous engagement with the sphere before switching to another.

The set of four hypotheses presented and tested for this section highlight some relevant aspects of the nature of managing multiple activities. Hypothesis 8 stated that informants from the Venture work team will handle more working spheres per day. This hypothesis was corroborated by the statistical tests. The analysis revealed that informants from Venture managed significantly more working spheres than the informants from both teams of the IT-Services company. As was mentioned, this can be in part explained by the fact that people in Venture were involved with more clients and this resulted in a larger number of working spheres handled per day. Interestingly, the number of peripheral working spheres is similar to those of informants from IT-Services.

The ninth hypothesis stated that informants with a managerial function will spend less time per day in working spheres. This hypothesis was corroborated by the statistical tests. Informants with managerial functions spent significantly less time per day in working spheres than informants with technical or business functions. Managers have more diverse work and were involved in more projects and devoted less time to each one. Consequently, their encounters with their working spheres were brief.

The tenth hypothesis stated that informants with a managerial function would handle a larger number of peripheral working spheres. This hypothesis was corroborated by the statistical tests. This can be explained as managers in general became involved in things that are not central for them as they interacted with many of their subordinates and many individuals outside their teams. Managers are often consulted due to their experience and wider perspectives both in terms of skills and temporal scope. As a result, they just become peripherally involved in those working spheres. Alfred, a manager from IT-Services is a good example of how he, due to his experience and seniority, was often called to help others with their requests. As he explains, part of this was due to the fact that he had worked with Atlantic Investments even before IT-Services took over the technical arm:

*“Now one of the reasons why I get called on by network administration, tech support, and those areas quite often is because, well starting at [Atlantic Investments] when I started there we were a very small group and every developer was tech support, help desk, ...you know network administrator, almost [every function]. We did a lot of different things: analyses, development, and so forth. And every one of us developers did all that stuff so I was involved early on in a lot of the network administration or a lot of the areas that network*

*administration currently takes care of. Alright...so they know I've got a lot of knowledge there and they'll come to me to ask me, you know, find solutions. Things like that."*

The eleventh hypothesis explored the interaction effects on the number of working spheres per day as a result of informants belonging to one of the work teams or having a particular function. This hypothesis was refuted by the statistical tests as no significant work team by function interaction effects were found. In spite of the result, looking at Figure 7.5 allows us to observe how for informants with a technical function in the Venture company, their number of working spheres managed per day increases and exceeds that of other functions. That can be explained by the fact that those informants have a role as support engineers.

#### **4. Interruption and Fragmentation of Working Spheres.**

A third element involved in the dynamics of the work of those individuals observed is the fragmented nature of their work. The enactment of a working sphere was commonly fragmented as can be seen by the short duration of segments of continuous engagement that, for instance, averaged just above 12 minutes for central working spheres. This fragmentation resulted from two main reasons. On the one hand, work is fragmented as people switched to other working spheres because an action was concluded (e.g., a phone conversation ended and the person moved to another working sphere). On the other hand, work was fragmented as a result of an interruption of an action (e.g., the person is interrupted by a phone call that has to do with a working sphere different to the one he is

working on). This latter kind of fragmentation delays the execution of the interrupted action until later. This section presents an analysis of the extent working spheres are interrupted, the kind of interruptions fragmenting them, the type of working spheres triggering interruptions, as well as the likeliness of resuming work in a working sphere after it was interrupted.

Analysis was done focusing on the segments of working spheres. Each segment was coded to identify whether or not at the end of the segment the informant switched to another working sphere because the previous one was concluded, or because it was interrupted. It is important to clarify that a working sphere can be concluded for a moment but it does not mean that its purposes are achieved. Consequently, concluding a working sphere means that the action at hand was completed as its goal was achieved, but the working sphere itself is left in a state so that it can be resumed later on. One might ask why informants did not continue with their working spheres until its purposes were achieved. In some cases they did continue to the end, but in many others, they needed to wait for resources, people or inspiration to continue with those working spheres. As pointed out by Bryan, a developer from IT-Services, people cannot spend more time on something than they can:

*“In from what I have seen you can’t really force yourself to spend more time on something than you can spend on it. And even though you are not really spending time on it, you are still sort of thinking about it in the background and understanding the relationships between different pieces of data or different business processes.”*

As with Bryan, many developers worked on a project for some part of the day until they got bored, so they closed that project and left it aside for the day, and then turned to some other working sphere. The next day or whenever they recovered the inspiration they returned to that working sphere. As many working spheres lasted for many days, the data collected do not allow us to know with certainty whether a working sphere ended and achieved its purposes. Therefore the analysis focused on the conclusion of working spheres.

#### **4.1. Theoretical Discussion and Hypotheses Development**

##### Working Conditions Leading to a More Hectic Environment

One can expect the working conditions experienced at the Trading team to be in general more hectic. This is because they are closer to the financial brokers at Atlantic Investments and are more likely to experience unexpected switching from the working sphere at hand due to requests from them. Thus, the Hypothesis 12 will be as follows:

*H12: Informants from the Trading work team will experience a larger number of interruptions than those informants from the Operations or Venture work teams.*

##### The Externally-Driven Nature of the Job

It is expected that due to the nature of their job, informants with a technical function, such as support engineers, are more likely to experience external interruptions of working spheres. As such, people may come frequently to their cubicles with requests. Previous research studying interruptions at the workplace has indicated that similar types of

information workers, such as front-desk people, are also likely to experience external interruptions due to requests (Rouncefield et al. 1994). Consequently, the Hypothesis 13 is as follows:

*H13: Informants with a technical function will experience a larger number of external interruptions than those informants with business-oriented or managerial functions.*

In terms of the interaction effects, the hypothesis is as follows:

Number of Interruptions Per Day

In contrast with the more fast-pace environment experienced by the Trading work team, the other two work teams experienced a quieter environment. However, there are some reasons to believe that the number of interruptions was experienced differently by the informants depending on their function. In particular, the informants with a business-oriented function from Venture were sales executives or business analysts that, at the time of the study, were becoming involved with the work processes and exploring leads for potential clients. The fact of being new and somehow independent might have affected the relationships with others, and therefore the fragmentation of their work due to interruptions. Therefore, the Hypothesis 14 is as follows:

*H14: There will be effects in the number of interruptions for those informants with a business function due to their belonging to the Venture work team.*

## 4.2. Descriptive Statistics

The exploration of the data revealed that just above half of all working sphere segments were not interrupted (55.8%), but others suffered interruption (44.20%). These figures reflect the level of interruptions of work resulting in informants having to resume it later on.

Following Miyata and Norman (1986), the interruptions experienced by the informants can be categorized into two main groups: external and internal. An external interruption is one that emerges as a result of a condition in the environment that drives away the attention and engagement in the working sphere at hand. In contrast, an internal interruption is one that results as the individual, in his own volition, decides to abruptly stop his engagement in the working sphere and move to another one. The exploration of the data revealed that of all interrupted segments, most of them (56.40%) were interrupted by an external interruption whereas the rest (43.60%) by an internal interruption.

The data were explored to examine the actual triggers and results of internal and external interruptions. As Table 7.15 shows, most internal interruptions resulted in the individual leaving his cubicle or office (14.70%), which was followed by checking a document in his computer (12.29%). In contrast, the type of mechanisms more commonly resulting in external interruptions was a person arriving to the cubicle or office of the informant (25.77%), followed by the notification of a new e-mail message (14.47%). E-mail was just above the phone as a type of triggering mechanism for external interruptions (10.25%).

Type of interruption	Trigger/result of interruption	Average Interruptions per day (s.d.)	% within type of int.	% all types
<b>Internal</b>	Check/Use Paper Docs	0.33 (0.49)	3.48	1.52
	Check/Use Computer	2.70 (2.36)	28.19	12.29
	Talking t/wall	0.82 (0.95)	8.03	3.50
	Phone call	1.28 (1.45)	13.29	5.80
	E-mail use	1.28 (1.47)	13.29	5.80
	Leaves workspace	3.24 (2.29)	33.72	14.70
		<b>9.60 (6.13)</b>	<b>100%</b>	<b>43.60%</b>
<b>External</b>	New e-mail notification.	3.17 (2.26)	25.65	14.47
	Person arrives	5.65 (2.78)	45.69	25.77
	Status on terminals	0.81 (0.54)	1.31	0.74
	Phone ringing	2.25 (1.18)	18.17	10.25
	Voice message light	0.11 (0.31)	0.62	0.35
	Call through wall	0.96 (1.16)	7.32	4.13
	Reminder notification	0.15 (0.22)	1.23	0.69
	<b>12.36 (4.00)</b>	<b>100%</b>	<b>56.40 %</b>	
<b>Total</b>		<b>21.96 (8.24)</b>		<b>100%</b>

Table 7.15. Types of external and internal interruptions.

Focusing on the type of working sphere that causes the interruption resulted in the following: Most external interruptions are due to central working spheres (48.10%), whereas more internal interruptions are due to other working spheres, such as personal, meta-work or unknown work (62.50%). Table 7.16 shows the distributions.

Type of Interruption		Interruption Source			Total
		Central	Peripheral	Others	
External	% within Type Int.	48.10%	22.80%	29.00%	100.00%
	% within Int. Source	65.90%	84.90%	37.60%	56.40%
	% of Total	27.20%	12.90%	16.40%	56.40%
Internal	% within Type Int.	32.30%	5.20%	62.50%	100.00%
	% within Int. Source	34.10%	15.10%	62.40%	43.60%
	% of Total	14.10%	2.30%	27.20%	43.60%
<b>Total</b>	<b>% of Total</b>	<b>41.20%</b>	<b>15.20%</b>	<b>43.60%</b>	<b>100.00%</b>

Table 7.16. Distribution of external and internal interruptions by source of interruption.

### 4.3. Hypotheses Testing

#### 4.3.1. Hypothesis 12: Working Conditions Leading to a More Hectic Environment

An analysis of variance was conducted to identify significant differences in the number of interruptions among the different work teams. A one-way ANOVA revealed that the number of interruptions differed significantly as a result of the work team ( $F(2,32) = 16.303, p < 0.001$ ). For means, standard deviations, and specific contrasts between means that were significant, see Table 7.17. A Tukey HSD post-hoc test revealed that informants from the Trading work team experienced significantly more interruptions than those informants from either the Operations or the Venture work teams,  $p < 0.05$ . Therefore, based on these results, Hypothesis 12 cannot be rejected.

Work team	Avg. # of Interruptions per day (sd)
Trading	28.43* (5.37)
Operations	20.80* (6.47)
Venture	14.79* (6.25)
All	21.96 (8.24)

Table 7.17. Average number of interruptions per day by work team.

#### 4.3.2. Hypothesis 13: The Externally Driven Nature of the Job

An analysis of variance was conducted to identify significant differences in the number of external interruptions among the different functions of informants. A one-way ANOVA revealed that the number of external interruptions did not differ significantly as a function of the work team ( $F(2,32) = 0.631, p > 0.5$ ). It is possible that this lack of significant effects is due to the fact that informants with a technical function have two main different roles: software development and support engineering. Thus, an additional analysis of variance was conducted to identify any significant difference in the number of

external interruptions based on the role of informants as it is defined in Chapter Five. The one-way ANOVA revealed that the number of external interruptions differed significantly as a function of the role of informants ( $F(4,30) = 3.806, p < 0.02$ ). For means and standard deviations, see Table 7.18. A Tukey HSD post-hoc test revealed that informants with the role of engineer experienced significantly more interruptions than those informants with roles as leaders,  $p < 0.05$ . No other specific post-hoc contrasts were significant. Therefore, based on these results, Hypothesis 13 cannot be rejected.

Role	Avg. # of External Interruptions per Day
Analyst	13.22 (3.37)
Developer	11.25 (4.23)
Engineer	18.50* (1.17)
Leader	8.27* (2.84)
Manager	13.21 (3.34)
Total	12.36 (4.00)

Table 7.18. Average number of external interruptions per day by role.

#### 4.3.3. Hypothesis 14: Number of Interruptions per Day

A multi-factor analysis of variance was conducted to identify the main effects and significant interactions on the number of interruptions experienced per day as a result of informants belonging to one of the work teams or having a particular function. A two-way ANOVA for the number interruptions experienced per day revealed the following results: there is a significant main effect for work team ( $F(2,26) = 13.022, p < 0.001$ ); there is not a significant main effect for function ( $F(2,26) = 1.067, p > 0.4$ ); however there is an approaching significance work team by function interaction effect ( $F(4,26) = 2.595, p < 0.07$ ).

Focusing only on the external interruptions, such significant interaction effects become more evident. A two-way ANOVA for the number external interruptions experienced per day revealed the following results: there is an approaching significance main effect for work team ( $F(2,26) = 2.913, p < 0.08$ ); there is an approaching significance main effect for function ( $F(2,26) = 2.746, p = < 0.09$ ); however, there is significant work team by function interaction effect ( $F(4,26) = 5.898, p < 0.002$ ). For means, and standard deviations see Table 7.19. Therefore, based on these results and for the case of external interruptions, Hypothesis 14 cannot be rejected.

<b>Work team</b>	<b>Function</b>	<b>Avg. # of external interruptions p/day</b>
Trading	Manager	<b>14.17</b> (2.12)
	Technical	<b>13.83</b> (3.83)
	Business	<b>14.78</b> (2.53)
	Total	<b>14.33</b> (2.66)
Operations	Manager	<b>15.22</b> (3.69)
	Technical	<b>8.67</b> (3.07)
	Business	<b>10.11</b> (3.56)
	Total	<b>11.07</b> (4.20)
Venture	Manager	<b>10.75</b> (3.22)
	Technical	<b>18.50</b> (1.17)
	Business	<b>8.27</b> (2.36)
	Total	<b>11.03</b> (4.53)
Total	Manager	<b>13.21</b> (3.34)
	Technical	<b>12.70</b> (4.84)
	Business	<b>11.45</b> (3.95)
	Total	<b>12.36</b> (4.00)

Table 7.19. Average number of external interruptions per day: work team by function.

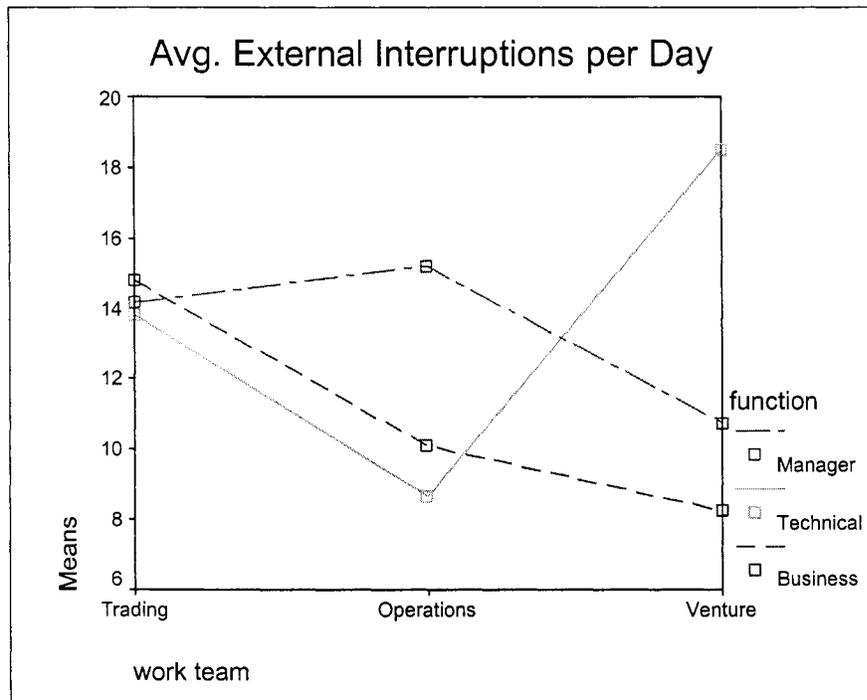


Figure 7.6. Plot of average number of external interruptions per day: work team by function.

#### 4.4. Resumption of Interrupted Work

Once interrupted, individuals had to find opportunities to resume their working spheres. The analysis presented here explores how likely it was for informants to resume an interrupted working sphere. Each of the interrupted segments was coded to determine if the working sphere was resumed later on and the time it took to resume it. Given the characteristics of the data collected, resumptions were considered just within the same day. Many informants were observed in non-consecutive days, and therefore it was not possible to know if the next day they resumed a working sphere that was interrupted a few hours before leaving the office. The exploration of the data revealed that most segments interrupted were resumed (81.90%), whereas the rest were not (18.10%). The average time to resume a working sphere was 23 minutes and 15 seconds (s.d. 53 minutes

and 47 seconds). During the time elapsing from the interruption until the moment it was resumed, informants worked in an average of 1.92 (s.d. 1.79) other spheres. Table 7.20 shows the breakdown by type of working spheres. Most of the spheres touched before resuming work corresponded to the other category which includes personal, meta-work and unknown working spheres.

<b>Working spheres touched before resuming work</b>	<b>Mean (s.d.)</b>
<b>All types of working spheres</b>	<b>1.92 (1.79)</b>
Central	0.78 (1.11)
Peripheral	0.28 (0.63)
Others	0.86 (0.82)

Table 7.20. Distribution of resumed and no resumed working sphere segments.

The type of interruption causing the fragmentation also had effects on whether or not a working sphere was resumed. No resumed working spheres were as likely to have experienced an external interruption (51.30%) than an internal one (48.70%). In contrast, it was more likely that resumed working spheres were externally interrupted (57.60%) than internally (42.40%).

The exploration of the data allowed me to identify that in most cases interrupted working spheres were self-resumed by the individual, but in the rest of the cases it was an external factor that made the individual resume an interrupted working sphere. Thus, an interrupted working sphere could have been brought to the attention of the individual without the individual intending it. Scenarios of externally initiated resumption were due to the interdependencies of work. For instance, other co-workers were involved in that working sphere and they either mentioned the sphere to the informants, or asked them to resume working on it for some reason (e.g., they needed the results sooner). Most of the

working spheres were self-resumed by the individuals (89.3%) whereas a few of them were externally resumed (10.7%).

#### **4.5. Discussion of Results**

The analysis shows that the informants' work is fragmented. People constantly switched to other working spheres because the action in hand was concluded and no further action on that working sphere was required, or because they experienced an abrupt interruption of actions which forced them to leave the working sphere and turned to another one. As it was presented, just above half of the segments were non-interrupted (55.80%), whereas the rest experienced abrupt interruption (44.20%). Due to the limits imposed by the way data were collected, it is not possible to assure that for those segments not interrupted, the individuals achieved the purposes of the working sphere. However, it is possible to say that those working spheres were left on a status where no more work could be done by the informant until actions of others were achieved. This status of partial completion of a working sphere is very common in the workplace due to the interdependence that some working spheres require in order to achieve their purposes. This was commented on during an interview with one of the informants:

*“Most of the time I start working on a task until I finish it. The only time I would leave it hanging is if we were waiting on some requirement, and we have to hear from the Business team, they have to talk with the users and then they get back to us. In that case I would switch to another task.”*

In contrast, those working spheres experiencing abrupt transitions were more difficult to handle as they produced different levels of disruption for the individual. Disruptions can be minimal when interruptions are brief or the informant does not have to reconfigure his computer or physical environment (e.g., closing the application that he was using before the interruption). Meanwhile, other interruptions can be more disruptive as when the person being interrupted needs to be fully immersed in a totally different working sphere. This can cause him to forget ideas and lose concentration. As expressed by George, a developer, interruptions that involve solving problems can cause more disruption:

*“I mean, you have got your mind on something else and then you have to shift completely. It is disruptive in the sense that if we are going to leave it unattended for a period of time and by the time you come back to it your frame of mind is completely different. Then it is really hard to go back and say what was my train of thought? What was I going to do here?”*

Thus, fragmentation due to interruptions can lead people to enact explicit efforts and strategies to resume their work, as they have to remember not just what they were doing, but what they were thinking at the time of the interruption. Many people pointed to different strategies they use to facilitate the resumption. Those strategies will be discussed in detail in the next chapter.

The set of three hypotheses presented and tested for this section highlights some relevant aspects of the nature of managing multiple activities. Hypothesis 12 stated that informants from the Trading work team would experience a larger number of interruptions. This hypothesis was corroborated by the statistical testing. Informants from Trading

experienced a significantly larger number of interruptions than informants from the Operations or Venture work teams. The greater number of interruptions by the Trading team of IT-Services can be in part due to the nature of their work. My perception from the field study is that people of IT-Services worked in a more hectic environment, more unpredictable, and more likely to have financial implications if issues were not attended to promptly. Furthermore, many of the informants in an open-office environment were likely to overhear conversations and were being called, which then resulted in more interruptions to their work, especially when those issues calling their attention were related to production support issues.

The Hypothesis 13 stated that informants with technical functions would experience a larger number of external interruptions. This hypothesis was refuted by the statistical tests. No significant differences in the number of external interruptions were found among the different functions. However, when conducting the analysis by roles it was found that informants having the role of engineer experienced significantly more interruptions than managers. This can be explained by the fact that the nature of the engineers' job is very likely to be characterized by constant requests from others, which forced them to switch working spheres constantly.

Finally, Hypothesis 14 explored the number of interruptions per day as a result of informants belonging to one of the work teams or having a particular function. This hypothesis was refuted by the statistical tests as no significant work team by function interaction effects were found. However, focusing only on the external interruptions, an interaction effect was found. As it was explained, people with a technical function in the Venture work team experienced a larger number of external interruptions, but they are the

ones with less interruptions than the other two work teams. In contrast, the managers experienced a different number of external interruptions as compared with other functions depending on the work team. The Trading work team had similar interruptions; however, the Operations work team were the ones with the larger number of external interruptions. This might be due to their proximity to the client and their being liaisons for their team, they experienced more external interruptions.

The results also indicate the relevance of interactions with other people as the main cause for both external and internal interruptions. It is important to note that in both companies, informants worked in teams and with operational styles that encouraged them to interact with each other whenever it was necessary; and, consequently, this led to external interruptions. Furthermore, the physical characteristics of the workplace also contributed to external interruptions because many people worked in open-office cubicle environments and it was easy for co-workers to have access to them. Interestingly, even those working in offices were easily approachable because most of the time they kept the office door open and there were not secretaries or assistants deciding who entered or talked to the office's occupant. All this favored an environment where people unintentionally were likely to interrupt the work of their co-workers by arriving at their cubicle or office to discuss something. Meanwhile, those same conditions favored more participation among individuals to solve problems even when they were not directly requested for advice. I noticed that many of the informants were in a state of "constant monitoring" as they aimed to help others with their expertise to solve problems or deal with certain issues. This was explained by one of the informants in the following terms:

*“I think my ears are always prompt up to listening to something because I find that my exposure, because of the applications that I work on and because that as long as I being here, you know, almost in every case I can lend to something that some of the other people are not exposed to. They know their knowledge base, but once it gets, passes that boundary they are kind of fuzzy on that. So, sometimes my ears are prompt up to listening to conversations that are going on [around], and then I can offer [help] or go ahead and kind of say: ‘Oh, this is what’s happening.’”*

It is also important to highlight the fact that more external interruptions were due to central working spheres. As I said before, central working spheres were the ones that the individual was responsible for. Consequently, an interruption caused by a central working sphere, although disruptive as it affected the one at hand, was to some extent necessary as those types of spheres were important for the individual. In contrast, an interruption due to a peripheral working sphere was both disruptive and not directly relevant to the individual. However, beyond the natural disruption caused by interruptions, they are absolutely necessary to allow the flow of operations in the workplace. Interruptions are necessary, not just because they allow people to help others, as would be the case of peripheral working spheres, but because in most cases they help them to direct their attention towards central working spheres that they should engage in. These results connect with previous investigations that point to the different ways that interruptions can be beneficial. As it was mentioned before, O’Conaill and Frohlich found that when their informants experienced interruptions, the benefit was for the person being interrupted in about 64% of the time; whereas, in 32.8% of the cases the benefit was obtained by the person interrupting. In contrast with those results, in my data 22.8% of the interruptions were caused by peripheral

working spheres and therefore, by definition, it can be said that the benefit falls only in the person interrupting. Assuming that the person being interrupted benefited from interruptions due to unknown work, personal and meta-work, that would account for 77.1%. Those figures are not completely similar to those found by O’Conaill and Frohlich, but it is interesting to see that the percentages are relatively close.

The analysis of the data also points to important aspects of the resumption of interrupted work. In most cases working spheres are resumed, but it took some time for informants to do so. Individuals took an average of 23 minutes to resume interrupted work and the analysis found that in this time people managed about two working spheres. This indicates that immediate re-engagement is not always possible and that people had to take measures to handle other spheres before finally returning to the interrupted working sphere. It was interesting to note that there was almost no relationship between whether the sphere was internally or externally interrupted for those segments that were not resumed. However, for those segments that were resumed, the type of interruption did matter. More resumed segments were resumed due to external interruptions. Interestingly, most segments were self-resumed.

Finally, it is important to note that segments that were interrupted lasted for about 11 minutes and that the total engagement per day in a central working sphere averages about 45 minutes. That would indicate that if people stay focused and avoid interruptions they might finish their engagement with a working sphere by devoting uninterrupted periods of about three quarters of an hour. This is particularly relevant when one considers that half of the interruptions are self-initiated by the person. Consequently, if the person holds the interruptions, and refrains himself from interrupting a working sphere, he would

reduce the fragmentation of his work. As I will discuss in the next chapter, one of the strategies to manage multiple activities is based on such mechanisms of managing interruptions and reserving “*working sessions*” of uninterrupted work.

## **5. Summary**

This chapter presented an analysis of the way that working spheres are carried out by the informants studied. Working spheres are composed of chains of actions of very short duration involving the interaction with people and physical and digital artifacts. Although most interactions with artifacts were computer-based, they were also with non-automated tools and paper artifacts. Meanwhile, interactions with co-workers were based on formal, and more importantly, informal interactions. Similarly, work is very brief at the level of working spheres as continuous engagement lasted for about 12 minutes and the total time spent on each sphere per day averages about 45 minutes. People managed an average of nine central working spheres per day. Work then suffers from fragmentation, as it is interrupted by external factors or by the individual of his own volition. After interruption, people have to resume work, and the informants studied averaged about 23 minutes to resume it; but during this time they also engaged in an average of about two other spheres before the resumption.

The previous results, although particular to the informants studied, might have some level of generalization when considering the characteristics of their companies, teams, and functions. My research was conducted in Information Technology (IT) companies which provide services such as software development, database administration and maintenance of networking infrastructure. At different levels, both companies outsource

IT services for their clients. Such outsourcing schemes are becoming more popular as they permit companies to optimize their efforts into core functions (Malone 2004). Consequently, companies providing services through outsourcing can experience similar context as those described here. Furthermore, the team-based form of organization and flat organizational hierarchies are also very common for many modern companies (DiMaggio 2001). Consequently, these characteristics might be present in other contexts. Finally, the roles of the informants being managers, business analysts, software developers, or support engineers are also common in the IT industry (Stephens 1995). Therefore, some characteristics such as interruptions or types of working spheres might be common for people in other IT companies. In spite of those aspects being common in other contexts and might let, to some extent, generalize the results, it is important to highlight that the financial context of the work teams from IT-Services might be rather unique. The financial value of the transactions they supported might not be present in other contexts.

All the previous factors characterizing the fragmented and varied nature of the work of individuals make it necessary to understand what the strategies are that individuals use to cope. Although it is possible to perceive that much of the fragmentation can not be avoided because it results in part of the nature of the work, it was clear that in most cases individuals did not just wait “for whatever came to their plate.” They also actively plan, strategize and decide which working spheres they will attend and when they will do them. That will be discussed in the next chapter.

# Chapter Eight: Strategies to Manage Multiple Activities

## 1. Introduction

This chapter presents an analysis of the different processes and strategies that individuals use to manage multiple activities, and to multi-task among them. Although the informants for this study, in general, liked the thematic variety that characterizes their jobs as they constantly moved back and forth between different issues, the brief involvement with the various multiple working spheres and their fragmentation was perceived as something that imposes clear challenges for them. Individuals have to make explicit efforts to manage the working spheres for which they already had commitments, as well as being able to accommodate new working spheres as they arise unexpectedly throughout the day. Clearly, individuals face a constant stream of work. But at the same time, individuals shape this stream, as they are able to make decisions about their starting, delaying or abandoning work efforts. Consequently, the processes and strategies for managing multiple activities presented in this chapter consider individuals not to be just passively coping with streams of work, but also to be actively involved by planning, prioritizing, and, sometimes even, self-modifying courses of work on their own volition.

Organized into four main sections, this chapter starts with a discussion of the findings that point out the way that the informants talked and reflected on the need for and the preferences towards multi-tasking. Then this chapter will focus on presenting three grounded processes identified as fundamental for understanding the phenomenon of multi-tasking in the workplace, as well as the strategies used in each one. That is

followed by a discussion of the influences of the collective perspectives on personal activity management. Finally, this chapter presents an analysis of core capabilities that tools should provide for managing multiple activities.

## **2. The Challenge of Multi-tasking**

Although people expressed different opinions concerning their preferences with respect to being involved in a variety of projects and initiatives, all of the informants recognized that their jobs, to some extent, demand that they move back and forth between different working spheres. Susan, a software developer on the Trading team at IT-Services, recognized the multi-tasking that her job demands, as she supported the daily operations of the software applications used by the client (e.g., Trade Manager), but at the same time, they juggle this task with the monthly releases of enhancements for those applications, with the development of new projects:

*“We definitely have to be multitasking because I would be working on this task, and then we [receive] an announcement that we have to do a [modification] or a bug that we have to fix. Or, ‘Oh we have to deploy Trade Manager in the Finance Department.’ So, you know, we have to stop this, and do that. So it’s a lot of going back and forth.”*

As informants recognized that multi-tasking was an intrinsic aspect of their jobs, it was important to find out how much they liked to engage in this kind of behavior. When

talking about that, my informants generally expressed positive feelings about having to multi-task. One informant mentioned, *“I like to multi-task; I like to do ten different things at once, which is a little chaotic for some people, but for me it works”* and others expressed, *“I’m used to the multi-tasking, I enjoy that part of the job.”*

Through the analysis of why some individuals found multi-tasking appealing, I found that individuals identified two particular benefits: (1) It seems that multi-tasking reduces their boredom, as it resulted in having more varied work, and (2) multi-tasking among different working spheres, to some extent, makes them focus more on the working sphere they’re handling at any particular moment. Those two benefits are pointed out in a comment by Deana, a business analyst at IT-Services:

*“I like to multi-task. I like diversity. I think that having to work on different projects helps me concentrate on the thing that I am looking at that time. Because if I would have only one thing, then finally, I’d get bored, versus, if I have multiple things going on, then I’d have to focus on what I am doing at that time, and then move to the next thing. Because the more diversity for me, the more variety; much variety, that’s what captures my attention or my interest.”*

In contrast with those who enjoy multi-tasking, others liked it only within certain limits, as when the tasks were of a short duration. For many, multi-tasking is a behavior that brings with it some benefits, but also imposes some challenges, as indicated by Donald:

*“I enjoy [multi-tasking]. But it’s a double-edged sword. I thoroughly enjoy the diversity, and the ability that I can do different things at different times. If I did*

*only one thing always, I know I would get bored to tears. The fact that one day, I'm writing SQL code, the next day I'm doing some VB code, the next day I'm doing statistical analysis on disk I/O systems to find a performance problem. Those sorts of abilities, to have different projects in different areas, definitely I like that. The downside is, there's so much going on so many times, that you get the, 'Hey, I got a quick question' way too often, where it's not that I don't have the answer quickly, but then all of a sudden now, all that train of thought that I had going into a steam-rolling toward a project, the bubble burst."*

As indicated by Donald, informants recognized that they must engage in a concerted effort to keep focused on what they need to get done. And in case of fragmentation, they have to be able to recover and maintain the continuity of the working sphere. There is a struggle to keep focused. This was well described by one of our informants, Adam, a financial analyst at IT-Services, who commented about the characteristics of this effort, and compared it to navigating through a river:

*"Sometimes you just get going on something, and they [call] you, and you have to drop everything and go and do [that] something else for a while. But, I generally just have a pretty good idea of what is needed to be done, what my major tasks are. And just knowing that, I mean, it is like, it's almost like you are weaving through, it is like, you know, a river, and you are just kind of like: 'Oh these things just keep getting in your way' and you are just like, 'get out of my way,' and then, you finally get through some of the other tasks and then you kind of get back, get*

*back along the stream, your tasks, that's a weird analogy [laughs], but there are always currents that kind of take you, or tend to take you in another direction, and you just have to know if you should be following that."*

The analyst's river analogy reflects that information workers have to make a concerted effort to keep going "*along the stream*" of their working spheres in spite of "*currents*," or obstacles, that can divert their attention. Moreover, the analogy also reflects that individuals need to maintain a level of awareness about all their major working spheres in order to be able to assess whether they should switch or remain focused on the current working sphere at any particular moment. In the next section, I describe how, in practice, the informants enact those efforts to efficiently switch among their working spheres as necessary.

### **3. Fundamental Processes and Strategies Involved in Multi-tasking**

Through the comparative analysis of the informants' experiences, I discovered that individuals use three fundamental processes to manage multi-tasking as work moves along its temporal course. These processes involve a *consolidation, and continual renewal of overviews* of the working spheres for which one is engaged, the adequate maintenance of a *flexible window of focus* on those working spheres demanding attention, and the *management of transitions* for the switching among working spheres. These three processes are enacted and combined as individuals move through their day, and as they

influence, and are influenced by, the collaborations established with others. In the following sections, I draw from the data to illustrate these processes and these strategies.

### **3.1. Overview of Working Spheres**

A fundamental process through which individuals are able to respond to the demands of multiple working spheres is based on the consolidation, representation and continuous renewal of the overviews of those working spheres that they are engaged in. I argue that to effectively multi-task, people must gain an *overview* of the working spheres in which they are currently engaged. An overview contains the knowledge about the scope and purposes for a set of working spheres, their temporal constraints, degree of development, and the next actions to be conducted for each one. With such an overview, information workers can maintain a state of preparedness; they can make better judgments with respect to their priorities, and can move in and out of working spheres as circumstances change, or as opportunities arise.

The consolidation of an overview is a strategy that, as illustrated in Figure 8.1, consists of a number of steps for gathering information about the working sphere that the individual must attend to. The need for an overview becomes essential after a period of absence from work, as when the individual begins his day, or returns from a weekend. At that time, the individual needs to re-engage in his work and consolidate an overview that integrates his preconception of what he knew that he ought to be doing, plus the consideration of the current conditions and demands. Once the overview is consolidated, the individual is able to establish a prioritization scheme, and decide on which working sphere his attention should be devoted to.

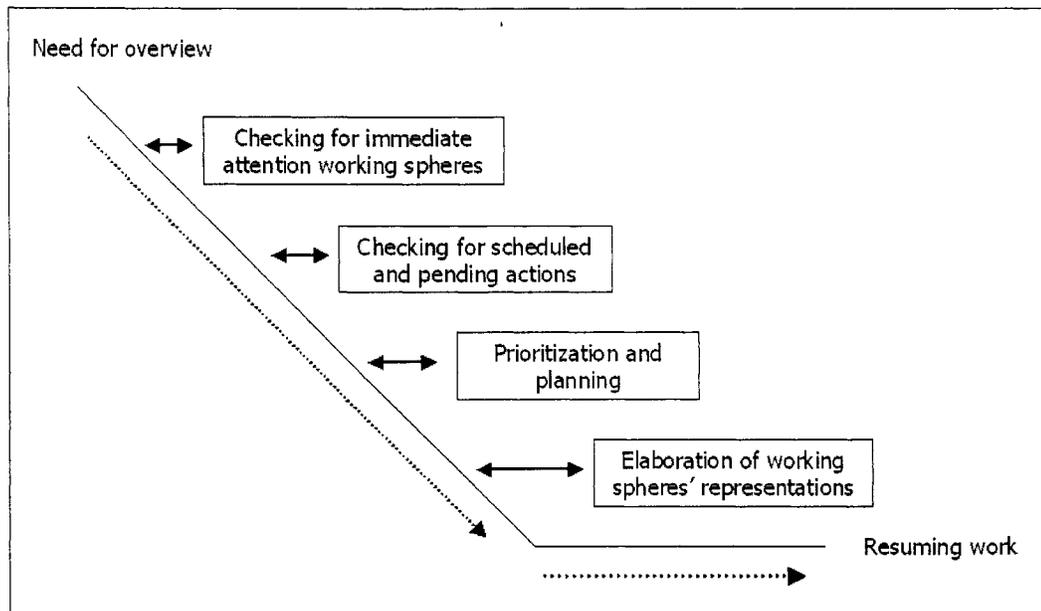


Figure 8.1. Typical steps used to consolidate overviews.

As represented in Figure 8.1, the analysis of the practices of informants resulted in the identification of five steps that are used as part of the consolidation of overviews. It is important to notice that not all of those steps are always followed by all informants or executed in any particular order. Depending on their needs, styles, or resources, individuals opt for all, or a sub-set of those steps in order to consolidate overviews. In the following sections, I discuss each one of them.

### 3.1.1. Checking for Immediate Attention Working Spheres

Informants usually performed this step by checking channels that can convey messages related to the working spheres that were demanding immediate attention. It typically involves the consultation of new messages from both e-mail and voicemail in-boxes. However, for many informants, it also included things such as consulting computer applications or other systems through which messages or information could be explicitly

or implicitly obtained. By checking those channels, the individual becomes aware of important things that occurred while being away from the office, and information pertaining to those working spheres demanding immediate attention. For instance, Bob, the manager at IT-Services, pointed out that this was a daily practice, which centered on his e-mail and voicemail tools:

*“OK. I think that the first thing that I [will] do when I get in is I look at my e-mail, to see if there are any particular issues that came up, if there are any important items that I need to address immediately. That’s with my e-mail. Then, I check my voicemail, if there is, you know, anything, if there is any indicator that there is voicemail; and sometimes I don’t read all of my e-mail, I can identify based on the subject line, that something should be addressed or I need to read right away.”*

When checking channels, many informants like Bob quickly browsed the messages listed in their e-mail in-boxes to find out if there were important things to attend to. However, individuals did not always start working on those messages right away. What was more common was that during this step, people were basically trying to become aware of anything important that they must be attending to, before they started working on other regular projects. Once they became aware of a working sphere that required their immediate attention, they proceeded to work on it. Consequently, the effort here is centered around obtaining summaries of the messages received, and based on those summaries, the importance of the working sphere is evaluated. As commented by Bob, he

felt that for him, the subject line of a message was enough to discern the importance of the contents of the message. Similarly for Bob, many other informants had set up their e-mail tools so that they could quickly read not just the subject line, but the three first lines of the message as well. With this partial information, they evaluated the importance of the messages and consolidated their overviews.

I noticed that the reason people checked some channels was because they knew that it would be through those particular channels that they would have access to those working spheres which were demanding immediate attention. As indicated by Paul, a developer at IT-Services, he knows that it will be by e-mail or voice-messages that others will communicate important things to him:

*“Beginning of my day, well, typically [at] the beginning of my day, the first thing I do is to check my e-mail and my voice messages. I mean, if somebody has something very important, that is how they reach me. That is the tool that they have to get a hold of me and to let me know something important is broken. So everyday, the first thing I do is e-mail and voice messages.”*

Although both e-mail and voicemail tools are the most common tools mentioned by informants for obtaining items in need of immediate attention, depending on the nature of their work, other tools were also used. Many informants in charge of supporting particular applications, after first checking their e-mails and voicemails, would proceed to generate status reports in order to verify that those applications were running correctly, and to confirm that there were no indications of potential problems. Because many

problems could arise without the users being aware, informants had to do this check-up in order to prevent problems and to evaluate their implications. This practice was mentioned and observed in many people including Ben, a manager whose team was in charge of the financial systems used in the Back Office:

*“My day, typically when I come in here, I get my cup of coffee, then I go to my e-mails, or phone messages, if I have them. Then, I pretty much scan through [the systems] and see if we have any major problems [from] the past night. If there is any problem, then I would look at it, and determine whether it is a serious problem, or whether it is not a serious problem, it is something that we have to look at.”*

In a similar fashion, other informants, in charge of the maintenance of equipment, also ran checks to verify their status and identify any problems or unusual conditions (e.g., hard drives without space, low speeds in computer networks, and so forth). For many informants, this became a recurrent working sphere that they had to do almost every day.

The analysis showed that informants did not follow any particular order when checking different channels for immediate attention items. Largely, the order depended on their expectations for getting important information through particular channels. In summary, by this step of checking the channels for working spheres requiring immediate attention, informants began the consolidation of their overviews.

### 3.1.2. Checking for Scheduled and Pending Actions

A second step that people usually take in order to consolidate an overview consists of checking tools containing pending actions, or information about scheduled commitments that individuals have to carry out during that day. Many of the informants used Microsoft Outlook Tasks for keeping lists of pending actions to annotate abbreviated or short descriptions of things to do. Similarly, many of the informants used MS Outlook Calendar, or a personal paper calendar, that listed the meetings that people would have to attend for that particular day or week. Checking for pending and scheduled actions was a step usually followed by checking for immediate attention items, as explained by Bob, a manager at IT-Services:

*“And once I checked [e-mail], what I do is, that I look for tasks [MS Outlook Tasks] that I need to address, if they are priority, or look my meeting schedule, [MS Outlook Calendar] that I typically print out from the day before. And, if there are items that I need to prepare for, get things together for, I will do that as well.”*

Figure 8.2 shows a partial view of one of those printouts that Bob used. The printout provides information about scheduled meetings, as well as a list of actions to be completed (Task pad). Brief annotations were used for both. Like Bob, many informants also maintained lists of To-dos in MS Outlook Tasks. However, some used paper planners as their primary means for listing pending actions, or used paper planners in combination with MS Outlook Tasks.

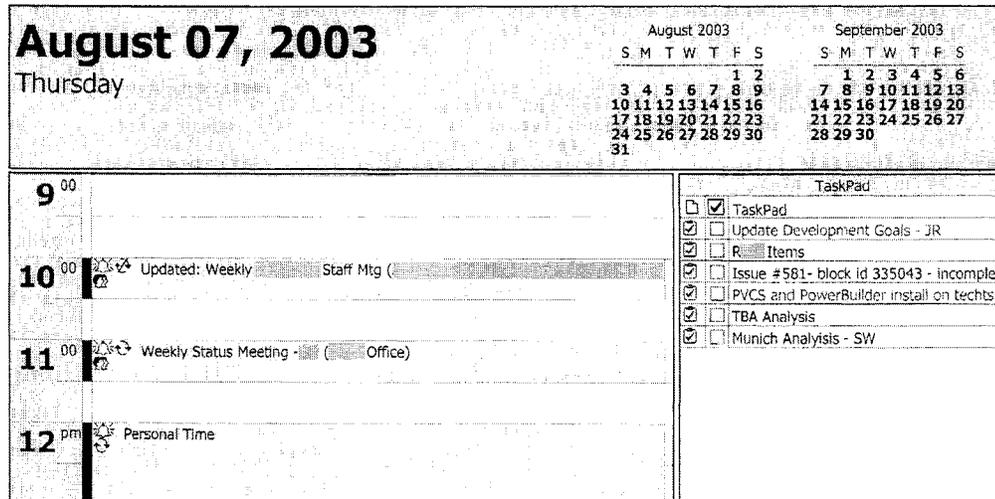


Figure 8.2. A Microsoft Outlook printout with the pending and scheduled actions.

Similar to what other researchers have found (Belloti et al., 2004; Whittaker 1996), my informants used their e-mail tools to create lists of pending actions. These informants created and maintained special mailboxes where they stored messages for which they would have to take some action. Many of them stored messages in those mailboxes whenever they were not able to respond to them right away. During the step of checking pending actions, they referred back to those mailboxes.

This practice of creating e-mail mailboxes was often complemented with individuals sending e-mail messages to themselves, so that they could be reminded about the pending action when they arrived at the office the next day. Thomas pointed out that by sending a message to himself, it will reappear in the inbox as a new message, and therefore it will be more visible and easy to notice the next day:

*“Yes, if I send it to myself, and I put them in my personal folders if I know they are important, so I can go back to them. Definitely, if let's say that it is nighttime, and I need to do something in the morning, I will e-mail myself: ‘Hey talk with*

*this person in the morning,' go and cc: me and it goes to my folder and stays there. It is the first thing I see in the morning, because it won't be open yet."*

In contrast with scheduled actions, most pending actions were handled with certain flexibility, and were executed as time was available, and if not completed, just forwarded to the next day. Meanwhile, scheduled actions such as meetings are negotiated to take place at a particular time, and, consequently, they are generally not easy to postpone. This imposes particular restrictions on the daily plans of individuals and, therefore, their overviews ultimately have to be consolidated based on that information. Individuals have to make sure they know which meetings they should attend during the day, so that their engagements in other activities can be adjusted to these temporal constraints. By keeping in mind their scheduled actions, people gained a sense of the fragmentation of their day, and could plan in advance on how to organize their efforts.

### **3.1.3. Prioritization and Planning**

Another step taken by individuals, while consolidating their overviews, consisted of the prioritization and planning of actions for those working spheres in which they were engaged. It has to be said that this step is not a prerequisite for individuals taking action on a particular working sphere. For instance, when an individual realized that a working sphere demanded immediate attention, such as in the case of an urgent problem (e.g., a "production issue" at IT-Services), he immediately proceeded to work on that sphere until the problem was resolved. Obviously, facing those scenarios, individuals did not wait to create a planning scheme, as it was clear that the main priority was to attend to,

and resolve, the urgent problem. In many other cases, I noticed that it wasn't until individuals had checked their immediate attention working spheres, and their lists of scheduled and pending actions, that they engaged in some form of prioritization and planning. For instance, Joe, a manager from Venture, mentioned that he followed a prioritization and planning step after checking for immediate attention working spheres, and scheduled and pending actions:

*“On typical days, in the mornings, I go through e-mails, work through what's come up, follow-up with people, review my task list for the week that I have and [then] I prepare mentally. 'Okay, what am I going to do?' and just try to prioritize what things that I absolutely and positively have to get done.”*

Prioritization and planning helped individuals to consolidate an overview by establishing a general idea of what they should devote attention to, and in what order. It also helped them organize their efforts and envision how much could be accomplished, and how to divide up their time in order to complete them. David a manager at Venture, referred to this step as part of what happened at the beginning of the week:

*“I would say, I usually start out by reviewing voicemails and e-mails, for the most part, and see what I can get done in there, and then I'll look at my Tasks list. Then, I'll say: what - if it's a Monday, it's what do I want to get done this week. What am I going to try to accomplish? I usually try to group those, and then I'll*

*go to my calendar, and I'll actually block out time on my calendar for when I'm going to accomplish those tasks. "*

Jose, a manager at IT-Services, also emphasized the relevance of prioritization and planning. In Jose's case, he bases it on his knowledge concerning the availability of other people and the way that things were done in the office. For instance, Jose pointed out that most meetings and other interactions took place early on in the day or after lunch, so he could plan accordingly for things that required more *solo* work, and put them "lower in the day."

It was interesting to notice that although most people carried out this step of prioritization and planning at the beginning of the day, some of the informants mentioned that they did this at the end of the day, in preparation for the next day. In this way, they acted proactively to reserve "working sessions" of uninterrupted work, as explained by David, from Venture, during an interview:

*"At the end of the day, it is to look at what meetings and appointments I have for the following day, to give myself an idea of how much time I think I'm going to have. And what I may do is, at the end of the day, if I look at my Calendar and I say, wow, it's starting to fill up; I will actually then refer to my Tasks and I will block out time in my Calendar to make sure that I have working sessions, and I'll actually put in there what that working session is going to be for and the actual task that I want to accomplish. Otherwise, what happens is my calendar gets filled up completely, so in which case, then, I have no time to do tasks at all."*

Although prioritization and planning were useful to organize efforts, I notice that informants never considered such schemes to be rigid and unchangeable, as they were aware that those were always likely to be adjusted to the conditions as they unfolded. For instance, Chris, a manager at IT-Services, pointed out that in spite of the fact that he always has working spheres that have to be attended to, he had to reprioritize them when facing unexpected requests, or urgent problems:

*“I think that in any one moment, I probably have five to ten things that I am working on, and I just try to balance the ones that are highest priority, to work on them. Now, often what happens is that I am working on one of those five priority items, and then a production call comes in from [Atlantic Investments] or someone else, and that becomes the highest priority. So after I get through the highest priority, then I go back to the top five again and finish whatever I was working on before.”*

#### **3.1.4. Elaboration of External Representations**

Another step that the informants took as part of the consolidation of their overviews for their working spheres, and actions related to them, was to represent them on physical or digital artifacts. By representing, I mean the exercise of crafting lists of annotations containing information pertaining to the working spheres that they had, or wanted to attend to, as well as other details that were essential for achieving their respective purposes (e.g., a phone number, a name of an application, a postal address, and so forth). It is important to notice that the effort of representing working spheres sometimes came

as a direct result of the prioritization and planning of activities. Once elaborated, the external representations were regularly consulted during the day to help the individual decide what to do next when in doubt. The following scenario illustrates the experience of Louis, a project leader at IT-Services, and describes the use of external representations to guide his work.

It is 9:02 a.m., Louis is arriving at the office, and he is checking the reminders on his computer calendar for the meetings he has today. He then opens his e-mail in-box to check for messages. "Nothing new, nothing new," he mumbles as he scrolls down a list with a three-line summary of each message. Suddenly, he stops at one of them "Oops! This one!" He looks at the message content briefly. "OK, let's see, what else?" he says, as he continues checking the list of messages. Finishing that, he turns to a small notebook on the left side of his desk. "My notebook with the day-to-day stuff," he says, as he starts making annotations on it, and turning over previous pages, "removing some items," he says. As he annotates on his notebook with a list of items to complete today, he turns to a whiteboard hanging on one of the walls. On the whiteboard, he also has a list: "Those are like my bigger projects and the things I *have* to do". At 9:12 a.m., he turns to his computer, picks up the phone, and starts on one of the items listed in his notebook. During the next two hours, he works on various items, leaves the cubicle a couple of times, and makes a few phone calls. At 11:14 a.m., returning from a meeting with George, his boss, and while looking at his notebook, he says: "OK I took care of one thing, but for this one, George has other plans; let's hold that one." He leaves the cubicle again to talk to other people, and defines the details for another project. Louis continues his day attending meetings, preparing a report for people in Munich, and covering other items listed in his notebook. At the end of the day, and just before leaving, he checks his

annotations in his notebook, and then makes some changes on the whiteboard. He mumbles: “Things are cooking.”

Louis’s scenario highlights that in order to manage one’s activities, individuals represent information about their working spheres with different levels of aggregation. Those representations can provide *local* or *global* perspectives of the working sphere, depending on the level of aggregation. A local perspective refers to the day-to-day things that one must do. Louis used a notebook to maintain a list of particular actions to be done during the day (e.g., making phone calls, preparing reports, asking someone a question, etc.), as he explained: “[This is] *my notebook with the day-to-day stuff... Just to keep me straight and make sure I don’t forget anything.*” The artifact helped Louis remember things, not just while being at his desk, but also when he took the notebook with him whenever he moved around the office to interact with others. In parallel, some people also maintained a *global* perspective of their working spheres. As one informant indicated, this provides them with “*the big picture of things that I am suppose to be working on.*” In Louis’s case, this global perspective was maintained on his whiteboard, which he referred to as “*...my bigger projects and the things I have to do.*” This artifact helped Louis attain a more general perspective of the different projects that he was involved in, and was particularly useful for looking at an overview of his working spheres at a glance. Often, while observing Louis, I noticed he turned to his whiteboard and looked at it, passively, just thinking. Other times, while talking on the phone, Louis turned to his whiteboard and used the information there to support his conversation.

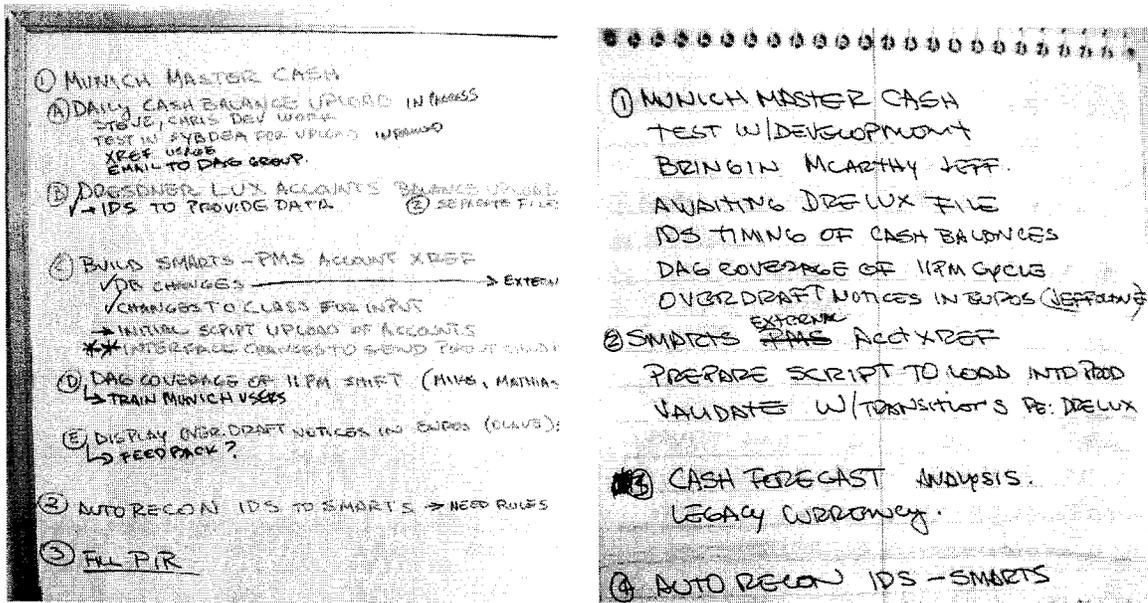


Figure 8.3. Artifacts used to represent global and local perspectives of engagements.

Figure 8.3 shows a section of Louis’s whiteboard and of a typical sheet from his notebook. We can see that although the main use of the whiteboard was to represent his working spheres, some particular actions, such as “e-mail to DAG group,” were also represented there, but always framed within an engagement, e.g., “Daily Cash Balance Upload.”

Like Louis, other informants crafted and used representations of working spheres that provided both global and local perspectives. Such was the case for developers, or analysts, who commonly used systems to keep track of software items to be developed, or tested for a particular release. Reports from those systems helped to keep people informed about what they were supposed to do for the releases, which provided a global perspective of their working spheres. For instance, as mentioned before, John was a developer who made use of a printout that he referred to as “The STP list” containing the items to be developed for each monthly release. At least once a month, but usually more

often than that, John printed a report from the STP system and kept it on his desk. Figure 8.4 shows a detail of one of those printouts.

**STP List**

Ref No.	Type	Proj	Short Desc.	Spec	Date Spec Recv.
99E	Enhancement	ACE Batch Reports	PSR must accurately reflect close of business data	118A	11/7/2002
99E	Enhancement	ACE	PSR must accurately reflect close of business data	118A	11/7/2002
303E	Enhancement	ACE	Debug Editor: make available for no naked rules		
284E	Enhancement	ACE	Seg Asset: maturity as additional criterion for options coverage	151	6/17/2003
283E	Enhancement	ACE	Seg Asset: TBAs sb netted then absolved by ultimate parent, maturity, coupon	151	6/17/2003

Figure 8.4. Detail of a printout of a STP list – with a list of enhancements for the ACE project.

It is important to notice that the individuals usually annotated the printout. For example, John generally made annotations on it, either by including details of more specific things that he had to do for a particular working sphere, or by adding additional working spheres that were not included in the system. As Figure 8.5 shows, John included additional “to do’s” that had to be completed that day, or week, with things relating to the systems that he supported. For instance, the “Cash items” annotations, refers to the Cash system used in the Back Office that he supported. Such annotations provided a local perspective of his working spheres.



*“I use Tasks from Outlook, but to be honest, also, what I do every morning, like before I come in, I have in my head, like, okay, what are... - I know my tasks are there, but then some things, like can fall onto my lap that were not there yesterday, so I make a list of things [on paper] that I want to accomplish that day, and then I just scratch them. I do have my Tasks in Outlook of things I need to accomplish and they have a certain time period but then I also have other tasks that come in-between and for that I have a little notebook that I write: ‘This is what I need to accomplish today.’”*

It was clear that for many people, the principle advantage of having external representations of their working spheres was that they provided a way to be visually reminded of those things that need to get done. The list of things was always visible and provided a way to keep focused on advancing the purposes of those working spheres. In Bryan’s case, a software developer, he kept his planner on the right side of his desk, and often referred to it, as he conducted his work. When talking about the usefulness of his planner he pointed out that it was convenient for keeping things straight in his head: *“I think that the highest part is just keeping everything kind of straight in your head, which is what the planner helps me out with, a lot.”*

Because this step of representing working spheres requires some effort, I noticed that there was some degree of variation in how often informants engaged in this step. For many, the strategy was done regularly as part of the routines that they did at the start of each day. However, in many other cases, informants were less “religious” and they recurred to this practice whenever they felt that it was necessary. That was mentioned by

Vincent, the sales executive at Venture, when I asked him if he did his “To-do” list “every single day”:

*“Not religiously, but when I know that there’s a lot of stuff that needs to be done, that day, I’ll make that list. I try to make it at least once a week for review; just keep recreating that list. And then, if I’m done with most of them I’ll just leave the file and start over, and so there’s no master list that I have, just sort of a daily/weekly list...very generic.”*

In summary, informants, as part of the process of consolidating their overviews, crafted global and local external representations of their working spheres, which served to organize their efforts, to visually remind them of things to do, and to keep things straight in their heads with respect to what they were supposed to do.

### **3.1.5 Continual Renewal of Overviews Along the Day**

As illustrated in Louis’s scenario, people start the first hours of the day by gaining an overview, using artifacts or checking communication channels with pending messages. However, given the changing nature of their work, the informants continually renewed overviews of their working spheres, in order to make sure that the current working sphere is the one that must be attended to at that particular moment. Consequently, the need for an overview was more prominent at the start of the day, as people were re-engaging in their activities. Similar situations were experienced when people returned to the office after lunch, or after a series of consecutive meetings. In an effort to consolidate an

overview, people engaged in one or more of the steps described in Figure 8.1. There was no particular order that people used when following those steps, but generally people checked their e-mail in-boxes, and their voicemails. After that, they would look at their calendar to check for scheduled actions, and then, if they got new information about their working spheres while being away, they modified their overview representations.

By renewing overviews, people were accomplishing two main purposes: (1) to make sure they were not missing something, and (2) to regain their concentration, in cases where they felt distracted. People regularly checked their e-mail in-boxes, because they wanted to find out if there were new things coming that they have to take care of. As one informant pointed out: *“Obviously, you have your Outlook, which you have to check every once in a while just to make sure that you are not missing something that has happened during the day, so the Outlook is always open.”* And another informant said: *“I’m primarily working on this, but I’ll have Outlook open in here, and I’m continually looking over to see what’s going on.”* In addition, people also renewed their overviews when they were trying to regain concentration on the work before them. The need to regain concentration was very common when individuals experienced sequential interruptions; and for this reason, they would forget what they were doing, as pointed out by one of the informants: *“If I get overwhelmed with the immediate tasks, in which case, then I will have to go: ‘OK, what I was doing now’ and then I do a check in the planner.”* Thus, by checking their external representations people reminded themselves about their priorities.

## **3.2. Maintaining a Flexible Window of Focus**

A flexible window of focus refers to the ability of individuals to be immersed in, and attending to, a particular working sphere, but at the same time, being flexible and able to focus on things around them that can affect their other working spheres. As other authors have observed (e.g., Heath and Luff 1991), the informants, while conducting their work, *monitor* the actions of their co-workers, checking their progress and status, as this helps them to adjust their own actions. However, it was observed that while monitoring, individuals focused their attention flexibly to filter and seek information relevant to their working spheres.

### **3.2.1 Active vs. Potential Working Spheres**

The analysis showed that the window of focus expands to cover both their *active* and *potential* working spheres. Based on their overviews, the individuals have a number of active working spheres that can draw their attention. Consequently, while conducting work on one of them, their focus is also partially oriented towards other working spheres. We noticed that, as part of the process of creating their overviews, people can develop a set of expectations regarding the particular events or conditions that they should monitor relating to those spheres (e.g., a person with whom they must talk, a device that has to be available, a paper format that has to be received, etc.). Those events act as triggers, which guide the multi-tasking among their active working spheres. On the other hand, we observed that because working spheres can arise unexpectedly, individuals attend to events that can have a direct impact on their areas of responsibility, and that can potentially become a working sphere for them (e.g., problems on systems they supervise

or requests from clients). By keeping a flexible window of focus over their areas of responsibility, they are able to cope with the unexpected ways in which some of their working spheres originate, and are assigned. Thus, as individuals conduct their work, both active and potential working spheres are focused on, and distractions are filtered out that have no relationship to their work.

### **3.2.2 Keeping Balance: An Illustrative Scenario**

The following scenario shows how the process of maintaining a flexible window of focus is experienced by John, a developer at IT-Services:

Today John is working against the clock. It is 11:18 a.m. and he is busy writing the documentation for the software code for the “Upload” process. He has been involved with this working sphere for the last two weeks, but, as he has been occupied with other urgent working spheres as well, he is delayed. Yesterday he attempted to negotiate an extension of the deadline with his boss Leo, but he was not successful. The report of the “Upload” process has to be on Leo’s desk at 9:00 a.m. tomorrow morning. As he works, he wears his headphones and plays some music, “Music helps me to focus,” he mentions. After some time working, he turns the volume down as he notices that Leo, who sits in an adjacent cubicle, is on the phone with the client. He stops working, and listens to the conversation. However, as it seems that Leo’s conversation is not really relevant for him, he continues preparing the report. At 11:55 a.m., Chris shows up and asks if John has plans for lunch. “I will order something; I have to get done with this report,” John says, and continues working. One hour later, while still working on the report, he listens to a conversation in James’s cubicle, as he talks to Eric about one of the software systems that John is supporting. He stops typing, takes out his earphones, and walks over to James’s cubicle: “No, James, you need a patch for that software.” After discussing the patch that

James has to install in the system, he returns to his cubicle and continues his work on the report.

In this scenario we can see how John listened for, and attended to, matters that were related to his working spheres. He had to balance his focus on his current working sphere (i.e., the “Upload” process) with conversations happening around him. Similarly, John reacted to things that had no relation to his active working spheres, but that did have a direct impact on his areas of responsibility. For instance, while listening to James talking about a system that John was responsible for, John decided to focus on that conversation, and clarified to James that he had to install a software patch for the system. This issue was unexpected and was not part of John’s overview, yet it became a working sphere that he attended to that day, as it concerned his responsibility.

### **3.2.3 Opening and Closing Monitoring Channels**

Maintaining a flexible window of focus requires that individuals be connected to the collective environment, as was observed in John’s scenario. Although he wore headphones and played music, he kept listening to the things going on around him, and remained aware of the larger environment outside of his office. Beyond the events that occur nearby, other channels help individuals connect to more distant events (e.g., e-mails, instant messaging, the phone or voice messages). I observed that the channels which individuals decide to leave open are determined by the communication requirements of both their active and potential working spheres. Based on the overviews of their active working spheres, the informants can expect that some communication channels will convey information about particular spheres, and, therefore, this will affect

their decision on whether or not to leave them open. For example, informants at Venture were careful to keep their cell phones handy if they were expecting to get a call from a client about the approval of a contract. Also, based on their responsibilities, individuals relied on particular communication channels, through which potential working spheres could emerge. For example, many of the informants played a role in supporting users, and they always had to take phone calls from customers, as those could be related to problems in the systems that they support. I also noticed that under certain conditions, such as an approaching deadline, people would opt for closing most channels, and may even leave the office for a day or two to work from home. When co-workers were aware that an individual was working on a deadline, they helped him by limiting their interactions. The need to adjust or close channels can also be necessary for certain tasks requiring concentration, as pointed out by Kim:

*“It can be frustrating. I only find it really bothersome if I have to write documentation. Because if I am writing documentation, I am usually really in [to it] and thinking about it, and I don’t want to be interrupted...But typically, if I really feel that I have to get something done, and I need to be able to concentrate uninterrupted, I would close my door. So I do have the luxury, or if it is more than I really need, to think about something and do analysis--and it is--and it involves a lot of different issues, a broad scope, I would even sometimes work from home.”*

In summary, people opted for different combinations leaving different monitoring channels open, or closed, depending on their communication tools, characteristics of their work settings, responsibilities and kind of working spheres that they were engaged in.

### **3.3. Management of Transitions**

The management of transitions refers to the strategies used by information workers to facilitate their reorientation and engagement toward a working sphere, when moving from one working sphere to another. I observed that the informants experienced different types of transitions, which vary according to the way working spheres intersect in time. Intersections can often result in challenges for resuming activity on a working sphere, and therefore managing those transitions is important.

#### **3.3.1 Natural Transitions**

It was found that the informants experienced *natural transitions* when an action was concluded (e.g., a phone conversation or the composition of an e-mail message) and when no further action was required for that particular working sphere at that moment (e.g., the individual waiting for a response from another person). I noticed that in those cases, individuals generally try to reach a point of *closure* for their working sphere: making sure that nothing else has to be done, annotating details on documents, or putting away folders or documents associated with it. I observed that often, after a natural transition, individuals switched to another working sphere without interacting with any artifacts or persons to give them an overview. Other times they renewed their overviews by checking their e-mail for new or pending messages, went through their lists (e.g., to-

do lists, agendas, etc.), or even sought updates from co-workers. Once the overview was gained, the individual moved to the next working sphere.

### **3.3.2 Forced Transitions**

Many times the informants experienced *forced transitions*, as a result of interruptions of their current working sphere. In those situations, the person has to leave the current working sphere, and turn to another. I observed that a common mechanism for managing this transition is based on extending work in the current working sphere until a natural breaking point has been reached. In this case, when individuals were interrupted by others, they asked them to wait so they could conclude the current action (e.g., finishing composing an e-mail message or typing a line of software code) and then give them their full attention. This strategy aims to minimize the level of disruption in the current working sphere by guaranteeing that it is left at a natural breaking point so that it can be easily resumed. Many of the informants pointed out that reaching a natural breaking point was necessary in order to avoid losing track of the flow of ideas, so that they could give full attention to the interrupting working sphere.

There were two main ways by which our informants managed abrupt transitions with respect to the immediate involvement in the interrupting working sphere. In many cases, the individual accepted the interrupting work, and became fully involved in it until the request was done. This kind of involvement is typical when a working sphere representing an urgent problem served as the basis for the interruption. As was explained in previous chapters, these urgent spheres can have strong implications; for example, when requests referred to problems with financial transactions, or legal operations.

However, I also noticed that the immediate involvement with a working sphere could increase the tendency of the individual to respond quickly to things, as pointed out by David from Venture:

*“So that, by nature of that, takes you off task all the time, because you’re always just looking there. And I think part of that is that I’ve been conditioned to respond to things quickly. Just by nature of - to me the faster you get on top of something, the easier it is to resolve as opposed to it sitting out there.”*

In contrast, there were many situations in which individuals opted for another strategy: they responded quickly to an interruption, by taking the necessary information and details about the request, and then followed it up later when they could easily turn away from other working spheres. This initial partial involvement enabled them to be responsive, and organize their work in a better way, but at the same time, allowed them to continue with the interrupted working sphere after a brief period.

### **3.3.3 Sequential Transitions**

I found that during interactions with another co-worker, the informants experienced *sequential* transitions among many working spheres, as they discussed issues related to each one. I noticed this occurring during conversations, prior to the start of a formal meeting, and in other kinds of informal interactions. Individuals took advantage of interruptions by purposely engaging in sequential transitions with people for whom they shared different working spheres. After talking about the interrupting working spheres,

people tried to discuss other pending working spheres before the interaction finished. The following scenario illustrates that situation:

While working on an analysis, Jennifer is interrupted by the phone ringing: “Hello?... Hi, Pam!” Pam, a trainer in Texas, is calling to give details about the training program at GTE, a new medical practice, as Jennifer called her earlier this week. However, Jennifer already has the information: “Don’t worry, Pam. I actually ended up figuring out that one,” says Jennifer. They talk about that, but then Jennifer switches the subject to another working sphere, “What about East Bay Orthopedics? Are they signing the contract?” After discussing East Bay, she ends the phone call, and resumes work on her analysis.

In a similar way, other informants mentioned that sometimes they used this practice of engaging in sequential transitions to maximize their time while interacting with others. They discussed as many pending actions on shared working spheres as possible. In this way, they focused on the whole collaboration with the individuals that many times involved a number of shared working spheres.

### **3.3.4 Reorientation and Resumptions**

In general, informants did not express any major problems for resuming work after an interruption if the interruption did not last for a long time, or they did not experience sequential interruptions. For short interruptions, people can easily recover because it is easy to remember what they were doing, as exemplified by Gian’s experience:

*“And then I will turn to the screen and say ‘what’s up?’ But, in my mind is made that bookmark, so to speak. And that is how I program. I make a mental bookmark and I will come back and I look at the screen and I know where I was and I continue. Unless I am going off to meeting, or lunch, when I am going to have a significant interruption, I usually just try to finish up with whatever I am on. But, you know, for quicker interruptions, no I basically have that clue in my head saying what I was doing before, and just continue.”*

In contrast, another manager at IT-Services, Chris, noticed that when interruptions were sequential, people found it more challenging to remember what they were doing:

*“I am working on a task and I get a phone call which disrupts me, I get an e-mail which disrupts me, or both, and then somebody comes in my cube and I get disrupted, and I have to get back to what I was doing. You forget what you are working on, so you kind of do something else for a while, and then you remember what you were working on. Yeah, this is very, very common.”*

As indicated by Chris, many informants just did something else for a while, or tried to recreate the last actions they had done before the interruption. They went through each of the open applications in their computers, or looked at the different documents on their desk, trying to regain their train of thought. Sometimes recovering this train of thought was challenging as it involved identifying not just *what* they had been doing, but *why* they were doing it. Remembering the reason why they were doing something was the

more challenging aspect of it, especially when the interrupted action involved complex operations, such as with databases or systems. In order to facilitate re-engagement, many people annotated their actions as they executed them. Others, time permitting, used sticky notes to annotate details before switching. Those were useful for resuming the working sphere later on. This all indicates that people were preparing for interruptions so that when they happened, they could figure out where the work had been stopped, in order to easily resume the activity in that working sphere.

#### **4. Influences of the Collective on Personal Activity Management**

Because individuals participated in collective efforts, it was important to consider the effects of that participation on the strategies that were used for the management of multiple activities. In this section, I discuss two effects found by my analysis. I discuss how, on the one hand, there is a connection between the individual's overviews and the articulation of work that is done at the collective level, and how on the other hand, there are challenges imposed by the different perspectives, with respect to what is involved in achieving the purposes of a working sphere.

##### **4.1. Collective Specification of Overviews**

To some extent, gaining an overview of a working sphere is based on a person's effort to articulate his own work (i.e., defining what should be done, with what resources, the timeline, and so forth). However, it is also clear that an individual's overview originates as a product of articulating the work collectively (Strauss 1985). Consequently, when an

individual obtains an overview, identifying the working spheres and setting priorities, he or she does so by aligning the overview to the primary goals that the collective effort aims to achieve. We observed that this alignment of overviews for working spheres is achieved in practice, mainly through formal interactions with collaborating partners (cf Strauss 1985).

Through formal meetings, individuals can acquire information on the status of others' working spheres, which helps them consolidate their own overview. Meetings with the specific purpose of keeping people "*on the same page*" were very common at IT-Services and Venture, as they helped people establish a common ground, refresh their collaborations, define dependencies, articulate their work, and discuss and validate their priorities with others. In the case of IT-Services, their monthly releases included a meeting at the beginning of the month, which served to set the scope and define the items to be included in the release, and from where individuals could be informed about their own working spheres:

*"You know, in that meeting that I said that we do before the release, you know, at that point, we sit down and figure out, okay, how many days of work effort it is going to take to beat each item, and based on that, then we count how many days we have total for the release, and figure it out what things can be done, [and what can] get done for the release. Because there is always going to be more items than you can possibly get done in one release, so you have to make the best decision from there."*

As indicated in the previous quote from Jose, the meeting serves to define the scope of the release, and this information was later on included into the STP system (Figure 8.4). Once the STP system was updated, team members were able to consult it in order to remember what items were agreed upon, to be included in the release. Some of the team members, like John, even made printouts of their items. In general, no more meetings were necessary, as major modifications were seldom done after the meeting. In this way, the result of the articulation, what Strauss calls “*the scheme*” (Strauss 1993), remained stable for the whole month. This stability highly contrasted with the different situations experienced by other informants. For instance, the support engineers at Venture, due to the high variability of their work, have weekly sessions where they discuss their priorities, as pointed out by Donald from Venture:

*“Once a week we meet and say: ‘What are you working on? What are your top five? Are my top five really appropriate top five? Can I get some help from you, because your four are less important probably than mine?’ So we sit down and do that once a week just to figure out where everyone is.”*

Due to the ever-changing environment in which the support engineering team at Venture works, members of the team were more likely to have these kinds of meetings more often. New demands for work, such as requests or projects, were more likely to arise during the week, and they have to be accommodated by a re-prioritization of the working spheres. Interestingly, from Donald’s experience, it is possible to see that this re-prioritization was done by incorporating the perspectives of all members of the team,

judging the relative importance of each of their working spheres, and then negotiating on what each individual should be focusing on, in order for them to be working on the items of major importance for the whole team.

#### **4.2. Differences on Levels of Specification of Working Spheres**

A working sphere refers to a unit of work conceptualized from the perspective of the individual. The labels that people use for referring to their working spheres enables them to communicate with others, and to help to establish a shared context. When the informants used labels such as “the R6 project” or “Jim’s production issue” they indeed communicated something more than the simple characterization of their work. Because others understood what “the R6 project” was about, who “Jim” was, or what a “production issue” was, those labels carried implicit information for those who could interpret it. For instance, people might be aware that “R6” referred to a forthcoming release that would include a financial instrument called “commercial paper”. They knew that “Jim” was an important person working at Atlantic Investments, and they knew about his style of always “*bombarding*” them with constant requests. Similarly, the reference to “a production issue” immediately brought to mind that what he was trying to solve could have strong financial implications if not attended to promptly.

Because working spheres have those shared meanings, they are useful for coordinating and communicating. However, the specific meaning, characteristics, and scope of a working sphere are defined by the individual. In practice, working spheres are articulated by individuals, in order to achieve its purposes. I noticed that most of this articulation was not necessarily shared by others. People might share what the purpose

was (e.g., to produce a specification for a new software release) without requiring knowledge of the details of how that purpose would be achieved. Such was a common case for the working spheres that developers carried out. Managers, or analysts, were aware of what developers were trying to achieve, but they did not necessarily need to know all the steps that developers took to complete those working spheres. This articulation of a working sphere, and the different perspectives that people have about the details involved, were pointed out by many informants. One of them, Susan, the developer for IT-Services, commented about the “Future Fund” working sphere that she was engaged in:

*“For this release, we have to implement a future fund. For example: A future fund is a type of financial instrument that people here use. [Kim] and [Alfred] will sign off on the [specification]. For them, it’s just a project. High level...they usually come up with a list of things to do. I’ll take that list, and then I’ll divide it into smaller tasks. So whenever I get a big task that has too many steps to get it accomplished, so I divide it into smaller tasks, and then we also try to specify if it is something that needs to be done in a time frame, or a certain time. And then we try to find developers to work on it. And then, we set priorities. And then, we’ll find, we’ll say, ‘Ok we’ll get this done,’ and then we work for two weeks...”*

Such disparity between the “high level” view of a working sphere and a detailed specification of it has some important implications for the management of collective versus personal activities, and the judgment that others make about the workload of other

individuals. For instance, at IT-Services, some developers expressed that their managers did not understand what it really meant to produce the software. Managers usually saw just a brief description of an item to be developed, but they were not aware of the technical aspects and difficulties which developers might encounter. Similarly, in Venture, the sales executives sometimes complained to one another about the lack of understanding that their managers and other individuals had about the details of their jobs, and how they achieved their goals. At Venture, co-workers just saw that sales executives had to do “a revenue cycle analysis” but they were not aware that it involved calling the medical practice many times to get reports, run computer macros for obtaining metrics, produce reports, and presentations.

The point of highlighting such disparities is not whether or not it is possible to achieve fair judgments about the workload of others, but to argue that these discrepancies have a direct effect in the way that both collective and personal activity management are connected. Because an individual needs to have a more detailed perspective of his working spheres, and because such details are ultimately unnecessary for others, the computer systems used to manage the collective effort do not necessarily help him manage the specific activities that correspond to him.

As described in Chapter Five, many systems were used by the informants to manage the activities at the collective level. A simple system with the STP list was used by the Production team; meanwhile people in the Trading team used the Case Tracker. Likewise, the customer support personnel at Venture used the ACTS system, and the sales executives used the Sales-Support system. Although these systems helped people consolidate their overviews, they were not designed to, and did not completely, support

the needs of the individuals. Those systems were designed to support coordination of efforts at a level of detail that was appropriate for the collective, but limited for individuals. Consequently, informants had to maintain parallel artifacts for managing their activities. Because of that, in many cases, the tools used for managing activities at the collective level were perceived by individuals as just reporting tools, where no benefit could be expected in terms of personal activity management.

## **5. Core Capabilities of Tools Supporting the Management of Activities**

This section presents a consolidated description of the core capabilities required of the tools designed for supporting the processes and strategies used by informants for managing multiple activities. I argue that these capabilities are based on the ability of tools to provide succinct views, single-point integration, monitoring, timed notification, flexible listing, visual representation, and mobility. In the following lines, I explain how each capability is provided by the tools that were used by the informants.

### **5.1. Succinct View Capability**

The consolidation of overviews is based on the consultation of many different tools, which varies from person to person depending on their roles, styles, or types of working spheres that they manage. Looking at what the tools offered for the consolidation of activities, it was clear that they provided a succinct view that summarized the essential information that people needed in order to judge, and become aware of, the general status of their working spheres. This was the case for the e-mail in-box, which provided a

succinct view by presenting a list of the messages with limited, but essential, information, such as the name of the sender, a subject line, date, and so forth. For many informants, this limited information was enough to gauge the relative importance of the message and from this to consolidate their overviews. As indicated before, many, while resuming their work and checking e-mail, just looked at the in-box with the list of messages, often not opening the messages until they had more time to do so. In many cases, as indicated in Louis's scenario, people set up their e-mail in-boxes so that they could see, not only the subject of the message, but the first three lines of it, which was useful to better judge its contents.

Another example of a tool which provides such a succinct view was observed in the experience of Cecile, a customer support engineer at Venture. Because her work was mainly based on the resolving of requests (e.g., phone calls) from customers, she heavily used the ACTS system. This system provided a way to filter cases that she was assigned to resolve ("My Cases"). The system provided a "sum up" of her work as she explains:

*"[The ACTS system] pretty well sums up what I need to do, and what I need to look at. Going into the details requires opening up a case to see [exactly] what is needed. But as far as, like, priority, and what time it was created, and what's the next action, the screen shot tells me. It's like: okay, zero in on this case; this is a high priority; this was created on this date; it's a couple of days old now; you need to contact them."*

Because the requests, which were called “cases,” are originated by clients reporting problems by telephone during the day, the list of cases is modified on a moment-by-moment basis. Given this particular way to assign cases, having a succinct view with a list of the cases was useful for Cecile, as she was able to build a robust overview, and had more control over her time and efforts. Figure 8.6 shows a detail of the “My Cases” view.

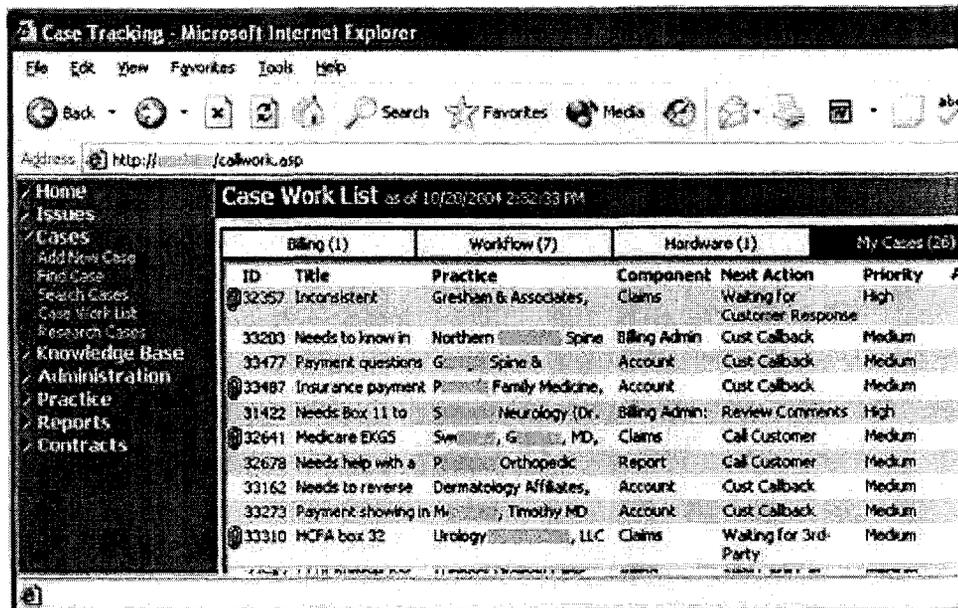


Figure 8.6. The ACTS system: My Cases view for Cecile.

I noticed that beyond the benefits of having a consolidated overview with respect to a working sphere being attended to during a particular period, individuals also pointed out the need for a retrospective view of their past overviews. Such information is essential for people when they need to report what they have accomplished (e.g., during annual evaluation of performance). Bryan from IT-Services referred to the capability of getting overviews for those purposes through his planner:

*“The other part of why I use the planner is that it gives me a really succinct view of what I have done for the year. A lot of times I refer back to when I did things. There is not a good way to do that in Outlook, find it quickly, because all the searches there, you know. When I write it down here, I can look at it, and even without reading the words, just the general shape of how I wrote it down, or how it looks like. People, I think, have better memories for that.”*

## **5.2. Single-Point Integration Capability**

As can be seen from the example of Cecile and her use of the “My Cases” view in ACTS, she has the benefit of having a single-point of reference that integrates most of the information she needs to consolidate her overviews. The “My Case” view provides a complete local perspective. Because her work is so centrally based around using ACTS, she can consolidate her overviews mainly from what she sees in the system. However, other informants did not have that level of integration for the information they needed for managing their working spheres, and for consolidating their local perspectives. The information about local perspectives was distributed among many artifacts, including e-mails, systems such as ACTS, personal agendas, or Microsoft Outlook Tasks, and even simple pieces of paper such as printouts. This, of course, brought challenges when people tried to consolidate their overviews, as a vast set of tools had to be checked which, in many cases, was not always possible to do in an exhaustive way. Consequently, many individuals complained about this, and expressed their desire for a single tool to manage their perspectives. For instance, Vincent gives an interesting case: For many years, he used a daily paper planner for managing his activities. When he started working at

Venture, he had to start using Microsoft Outlook, and in particular, the Calendar feature, as many times, meetings were assigned through this tool. Being a shared calendar, he had to consult it from time to time, to see where his co-workers were or what they were doing. During one of the interviews, he expressed his desire for being able to use Outlook as his primary tool, but he was convinced that it would not work, as Outlook did not provide what he needed:

*“I would like to get to the point where I could use Outlook for everything; just use the Outlook Calendar for everything. Outlook, from my perspective anyway, it doesn’t give me the details that I need to see, for organizing my time...I don’t like it, I really can’t see a whole week or a whole day at one time. Right now I’m using about four or five different things, which is driving me nuts, but eventually we’ll get there.”*

Comparing Microsoft Outlook with his paper planner, Vincent felt that it provided more natural and quicker ways to get the information that he needed:

*You know, so many guys waste so much time going to their PDA and their PC and all that kind of stuff, putting stuff in, and then click four or five times to get to it and check it off and that type of thing. I just make notations here [paper planner]; I flip to it; I got a notation, bam, you know. If somebody asks me, you know, what are you doing on Thursday because I go in everyday, instead of opening up my PDA or opening up my PC and going to the [MS Outlook*

*Calendar] and scrolling through the calendar to the right day, I go to this and say 'Oh, tomorrow morning at 7:45, I'm talking Richard, you know.' Whereas, I can do that in two seconds; whereas if I were looking in my PDA or looking in my PC it would take me 20 seconds. You know."*

Like Vincent, other people pointed to the need to have single-point integration for their local representations. *"I'd rather have everything in one place. Where right now I have many different sources,"* said Danielle, a support engineer at Venture.

### **5.3. Monitoring Capability**

Some of the systems used by individuals provided the capability of monitoring the status of actions related to their working spheres. Primarily, people were made aware of things through e-mails and, therefore, were constantly monitoring their in-boxes to make sure that they were not missing anything important. In many cases, this monitoring was facilitated by individuals setting up their e-mail tools to filter out messages that responded to certain characteristics. For instance, Jose uses a "Rule Wizard" that comes with Microsoft Outlook, for automatically redirecting messages from his in-box to specific folders. He created folders for each of the clients' applications, and this was useful for monitoring potential problems such as production issues:

*"Basically, when e-mails, when they come in, I use the [Microsoft Outlook] Rule Wizard to, once they hit the Inbox, send them all into slots depending on where they are coming from...That helps a lot, specially in the applications, because if I*

*send e-mail to one of these application folders then it could be a potential production issue, so I look at it right away. It helps keep it organized so I can get to the most important stuff faster.”*

Beyond e-mail, other systems also provided some capabilities to monitor working spheres. For instance, the Berg terminal used by the financial analysts at IT-Services served as a “window” into the clients’ premises, by which they were able to monitor the actions of the financial brokers when they posted trades. Similarly, other systems used to support the collaboration among individuals such as the ACTS system at Venture provided information to keep track of the actions of others and consequently to organize one’s work. Other than those tools, individuals did not have much support for monitoring. The main tool was the ability to hear things around them and act based on that.

#### **5.4. Timed Notification Capability**

Microsoft Outlook Calendar was the electronic calendaring tool that was used by all of my informants. Not surprisingly, the tool was mainly used for coordinating meetings. Many of those meetings were set up with specific notifications (“meeting notices”) for reminding individuals about the events. I observed that individuals, in general, relied on those meeting notices as the primary mechanism by which to be on time, and to not forget about a meeting, as indicated by Louis:

*“Meeting notices are very important because they remind me that, ‘Oh! I have to be somewhere.’ There has been a few times that I get so involved in an issue,*

*trying to solve it, that I totally forget about the meetings. Oh my God! If that pop-up [meeting notice] ... if that did not pop up, I would have just lost it!"*

Although primarily used for meetings, timed notifications were also used for other time-sensitive actions. For instance, Tom used them to create notices in order to remind himself about a forthcoming deadline for a project, or an engagement. He pointed out that, in spite of the fact that the reminder will not always be visible, he trusts that the notice will pop up on the screen, at the right time, and remind him:

*"Things that are very important, that I know that I have a hard deadline, I put reminders on, and leave it there. So, even if it goes down, it will pop up and: hey you need to deal with this."*

It is important to highlight the fact that the reminder capability was provided primarily by Microsoft Outlook. This capability was not provided by any of the others tools that the informants used. Interestingly, despite the fact that people had other tools, such as Personal Digital Assistants (PDA's) or a time watcher, which also have timed notifications, I never saw any of the informants using this function from them.

## **5.5. Flexible Listing Capability**

The way in which individuals wrote information for their working spheres on tools, such as Microsoft Outlook Tasks, or on their paper planners, was rather brief, and in many cases, abbreviated. Figure 8.7 shows details of such annotations by two different

informants. This, in part, is due to the fact that people can remember what a working sphere involves with just a few key words. Consequently, many informants found it cumbersome to have to detail “too much” of a task in order to be able to use a system.

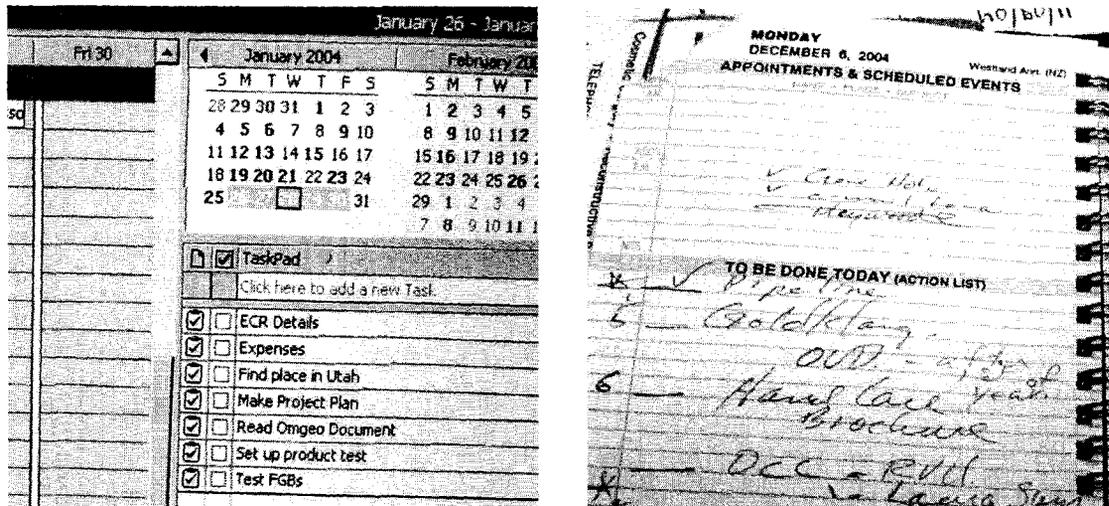


Figure 8.7. Examples of actions on MS Outlook Task Pad and paper planner.

For instance, Adam, the financial analyst at IT-Services pointed to this as the reason why he preferred to keep his to-do's in an e-mail message that he keeps open, and updates from time to time, rather than use the functionality provided by Microsoft Outlook Tasks: The brevity of the annotations does not imply simplicity of the working spheres.

*“Well I used to use [MS Outlook Tasks] but I don't really use those anymore. It is just, it is too much to manage, I don't like the way it works in Outlook. It is too much roll pen, I just think, it is too much information, they ask you for too much information, it is like, it is just a lot easier to me just to keep an e-mail.”*

Analyzing a couple of examples, from Figure 8.7 we can see how some of those annotations referred to a complex chain of actions. For instance, the left image of Figure 8.7 shows an example of the MS Task Pad used by James, the financial analyst at IT-Services. While observing him, I was able to watch how he enacted one of the working spheres listed in that Task pad. The “*Expenses*” label refers to his having to organize a number of receipts from several trips he had taken in the last few weeks. He had to fill out a form and attach the receipts so that he could get reimbursed. While doing so, he called the accounting department to resolve a question about one of those expenses. Then he walked over to the accounting office to submit the documents. Meanwhile, the “*Read Omgeo Document*” referred to a project called Omgeo for which he had to produce a specification. At that time, he was just becoming familiar with the project, and he spent time reading and checking documents both in his computer and on printouts. Similarly, the right side of Figure 8.7 shows the detail of a paper planner, listing the actions to be done by Vincent, the sales executive at Venture. The first item, “*Pipeline*,” listed in the “*TO BE DONE TODAY*” section, referred to a meeting that he had to attend, where they discussed the status of different medical practices to whom they were trying to sell the service model. The “*H... Care brochure*” referred to his having to send a brochure, together with an information package, to a medical practice called “*H... Care*.”

The previous examples and the experiences of the other informants show that individuals tend to be very flexible in the way they represent a working sphere, and they can refer to different sets of actions. Therefore, it is important to realize that tools which provide the capability for flexible annotation with respect to the listing of activities are effective, because they do not impose demands that constrain the description of a work

effort. In this case, the tools provide the ability to list things to do, and have those items together so they can be consulted whenever the person needs to consolidate an overview or be reminded of something.

## **5.6. Visual Representation Capability**

A critical capability provided for many of the tools used by individuals to manage their work was the ability to visualize representations of their working spheres and the actions to be done. As discussed before, the local and global perspectives of a working sphere are mainly based on the ability to *see* things. Seeing in order to remember seems to be the requirement that those tools are covering. As expressed by one informant: *“I have always believed that if you don’t have the issue in front of you, you will not necessarily remember what needs to be done.”* This is clear in the case of Louis’s whiteboard, but also clear in the experience of many other informants who used printout documents and had them handy so that they could *see* their commitments.

The need for visual representations seemed to be also required for consolidating the temporal descriptions of a working sphere, or to observe the interdependences among them. However, such ability is null in most of the tools managed by the informants observed. There was no possible way to see how their working spheres developed across time, and visually project their future work efforts. That kind of capability is missed, but not ignored, by some informants. Some of them used tools such as Microsoft Project to produce Gantt diagrams that let them see how their different working spheres intersected and to be able to track their progress. Such capability was essential for some informants

such as Alfred, the manager at IT-Services. Alfred mentioned that from time to time he uses Microsoft Project to have a visual representation of the workload:

*“I still fire up Microsoft Project once in a while to try and visually organize it for myself. I think at one point, while you were here, I was taking cases and entering them into Project. And it had to do with, I was getting something together for George, and I forget what it was. And I needed was to kind of show him, in a better way, other than a Case Tracker listing, what the extent of work was across a few different applications just to show the backlog. Okay? You saw that it took a lot of work...”*

## **5.7. Mobility Capability**

Despite the fact that my informants spent most of their time at their desk, the management of activities was not circumscribed to the time they spent there. Individuals usually carry with them notepads, or other artifacts, to make annotations during meetings, to carry information to discuss with others, and to remind themselves about things they have to do, or places they have to go. Consequently, tools that support the management of multiple activities have to account for this mobility of individuals and support it. Clearly, many of the tools used for individuals did support it. For instance, as it was explained before, Louis’s notepad was a fundamental resource not just because it provided a local perspective of his working spheres, but because it was easy to transport wherever he needed to go. Similarly, the printouts from Microsoft Outlook made by Bob or Alfred listing their calendar and tasks (Figure 8.1) were particularly useful when working away from their desks:

*“I print this out [Microsoft Outlook printout] ...I need to know, at any point in time, what meetings I’ve got to get to, alright? Things pop up daily so one day, you know, I might only see two meetings on Thursday but by the end of today I might have five. Okay? So everyday I make sure, just so I know...because I get involved in going out and solving problems, or talking to various people in both buildings, you know, I need to have this [Microsoft Outlook printout] with me to know where I’ve got to go, and at what time.”*

Five of my informants carried with them Blackberry cell phones. This type of cell phone has the ability to receive e-mail messages, as well as open documents, and other functions similar to personal digital assistants (PDA). Although only five of my informants had this kind of cell phone, I noticed that they were very useful to remain connected to the office, as they were able to receive e-mail messages and respond to those messages if necessary. Leonard, a sales executive, whom I observed for a couple of days while he has away from the office, pointed out the value of his Blackberry:

*“I check my e-mails all the time, and don’t have any now, thank goodness. Primarily, for me, it’s basically, you know, to find out who wants what, anywhere I’m at, at any given time. Because if I’m out of the office, that’s what gives me the e-mails I need to follow up on, and I know what I need to accomplish if there’s anything critical right then and there.”*

## 6. Summary

This chapter presented an analysis of the fundamental processes and strategies that individuals follow for managing their multiple activities, and multi-task among them. The three fundamental processes highlighted here present some optimal ways by which multi-tasking is achieved. As one informant described it, those processes allowed him to not let anything “*fall through the cracks.*” It should be clear that although each process is relevant for all informants, I observed that the specific use of one over another strategy is based on personal preferences, job characteristics, or the availability of resources. For example, to represent an overview, some informants were more inclined towards annotating their working spheres in “to-do” lists, whereas, others just used their e-mail in-boxes to list pending messages related to working spheres. Similarly, some types of job roles (e.g., project leaders) demanded more interdependence, and required more interaction with others, whereas the work of others tended to be more solo. In other cases, individuals had access to particular tools such as instant messaging that facilitated awareness to the presence of co-workers beyond what can be captured by just listening to events in the hallway or in other cubicles.

Central to the consolidation of overviews are the strategies for checking for any immediate attention items, the verification of pending and scheduled actions, the prioritization and planning and the representation of working spheres through local and global perspectives. Such steps are performed more closely when individuals have a stronger need for consolidating an overview, as could be the case when arriving to the office in the morning, or after a prolonged time away from the desk. During the day, individuals renewed their overviews by doing one or a few of those identified strategies.

Because the work of individuals is based on their participation in collective efforts, the consolidation of their overviews primarily emerges as a result of the articulation of work at the collective level, and then it is defined at the personal level. However, the different perspectives that people have about what is involved in a personal work effort not only results in a problem when assessing the work of others, but is also problematic for achieving an integration of both collective and personal activity management. It is also important to consider that the processes and strategies used by individuals to manage their multiple activities are influenced and shaped by the collaboration that they have with others. When people share multiple working spheres, they have to be able to manage not just a working sphere in particular but the whole collaboration. This affects the way in which an individual manages the transitions, because sequential switching is more likely to occur when collaboration is based on multiple working spheres. Similarly, this also affects the way that individuals maintain a flexible window of focus, as it has to include, and be based on, collaboration with others.

Finally, this chapter presented an analysis of the core capabilities of the tools used by my informants to manage their multiple activities. Those capabilities are based on the ability of the tools to provide succinct views, single-point integration, monitoring, timed notification, flexible listing, visual representation and mobility. Not a single tool provided all of those capabilities. It was through the assembling of different tools that individuals were able to cope with their multi-tasking. It is important to notice that the capabilities that those tools address cannot be feasibly implemented in a single tool or automated technology. Rather, it is a combination of tools that have to be designed to work together to better support the management of multiple activities. Therefore, the core capabilities

that I am pointing out can serve as a point of reference which designers of information technology can use to build new tools supporting personal activity management.

# **Chapter Nine: Conclusions**

## **1. Introduction**

This chapter concludes the dissertation by presenting a summary of the results of the study, as well as discussing a set of theoretical and design implications. I start by briefly restating the characteristics of the phenomenon that my investigation has aimed to understand, and by reviewing the characteristics of my methodological approach. Later, I describe the contributions of this investigation to the understanding of how individuals conceptualize their activities, the dynamics observed in carrying them out, the fragmentation of work, and the role of the strategies employed to keep track of activities, and cope with their fragmentation. This chapter then discusses some theoretical implications that my research has with respect to the nature of information work, and the refinement of theoretical notions provided by Activity Theory, and the Interactionist Theory of Action. Organized around three main themes, this chapter also discusses the implications of my results for the design of new forms of information technology aiming to support personal activity management. Finally, the chapter presents some of the areas into which research in this area can focus on in the future.

## **2. Phenomenon Under Investigation and Review of the Methodology**

The purpose of this dissertation was to consolidate a conceptual understanding of the phenomenon of information workers managing multiple activities in the workplace.

Guided by methods proposed by Grounded Theory, I derived a framework of grounded concepts aiming to provide a characterization of the nature and kinds of activities that information workers engage in, the dynamics involved in the execution of those activities, the strategies adopted to manage and track them, as well as the role of the tools used to support those strategies. My investigation aimed to study a variety of information-worker roles, operating in modern working environments and with access to a variety of information technologies.

The methodology used in this investigation involved the use of a shadowing technique where informants were observed for a minimum of three working days while their activities were recorded in detail. The informants were also extensively interviewed to discuss their perspectives in regard to the management of multiple activities, as well as to learn more details concerning some of the observed activities, and keep track of their changes. Other data collected included pictures taken of their desks and other artifacts, as well as photocopies of documents, and printouts of screen shots showing their e-mail mailboxes lists, file folders and calendaring tools. A total of 36 informants from two different companies were studied, which included managers, software developers, financial analysts, project leaders, sales executives, and support engineers.

The data collected were analyzed by integrating qualitative with quantitative methods. Following grounded theory methods, the main analytical process involved the comparative analysis of pieces of data (fragments of interview transcripts, photocopies, observation notes and so forth). The data were coded to point to particular aspects of the phenomenon. Then a piece of coded data of one informant was compared to that of another informant, so that a more concrete understanding of that aspect of the

phenomenon could be consolidated. By comparing data, and merging the experiences of many informants, eventually, I derived solid conceptual categories describing particular aspects of the phenomenon. That process was followed to derive all the conceptual categories presented in this dissertation, such as the concept of a working sphere, typical types and patterns of working spheres, the concept of overviews, the processes and strategies used to manage multiple activities, and so forth. Given the nature of the phenomenon, it was necessary to complement the traditional methods of grounded theory with quantitative characterizations of some parts of the data, in order to understand the dynamics involved in carrying out activities: time duration of actions and activities, the number of interruptions, and so forth. This quantitative characterization provided new perspectives of the data in ways that qualitative characterizations alone would not be able to.

It is important to mention that my investigation has aimed to make an effective use of either qualitative or quantitative methods on the basis of the requirements for understanding particular aspects of the phenomenon. In those cases, the boundaries between what could be considered pure qualitative and pure quantitative gradually disappeared. This merging of methods was particularly useful for the derivation of the grounded concept of working spheres. First, the analysis was mainly qualitative, as I aimed to discover how people talked, how they reflected on their work, and how they carried out their activities. Using observations, notes, interviews, and transcripts, I conducted an analysis that aimed to start by clearly identifying the distinct units of work that people worked on. Then, once the units of work were identified, I continued by comparing them across different lines: how people handled them, their temporal aspects,

the resources required, and the way in which they collaborated with others to achieve their objectives. Comparing the activities of different informants made it possible to understand that they conceptualized their activities as a thematically-based association of individual actions, serving to communicate to others their work efforts, and to set the scope of their workloads. That gave rise to the notion of a working sphere and its properties. However, that did not conclude the analysis. In order to understand how people engage in activities and carry them out on a daily basis, it was necessary to analyze how much time people spent, per day, on a given working sphere, how fragmented they were, and how many working spheres they handled. Consequently, the analysis at that stage became quantitative. The analysis of the quantitative results indicated differences with respect to the time that people spent on different working spheres. That served to guide the qualitative analysis further, and derive a more precise understanding of the different types of working spheres. The five typical patterns identified in Chapter Five (Event, Project, Recurrent, Request, and Problems) were a result of such analysis. Consequently, the end result of that analysis is one where I better understood the nature of working spheres, through qualitative and quantitative characterizations.

Clearly, many other results presented in this dissertation emerged as part of a more typical qualitative analytic process. In those cases, the use of that approach was in response to the nature of the aspects that needed to be understood. Such was the case with respect to the processes and strategies employed for managing multiple activities, where the analysis and understanding of the phenomenon followed a qualitative approach.

### **3. Summary and Discussion of Results**

This section summarizes the main results of this investigation, and discusses them with respect to previous research.

#### **3.1. On the Conceptualization of Practical Activities**

My investigation builds upon other previous efforts that assumed or pointed to the fact that information workers tend to frame the goals of single actions within units of work of a higher order (MacIntyre et al., 2001; Kaptelinin 2003; Belloti et al. 2003; Czerwinski et al. 2004). By engaging in a direct study of the way in which information workers talked, described, and engaged in those units of work, my investigation was able to identify some of their properties, and propose the notion of a *working sphere* as an analytical concept in order to talk about them. A working sphere was defined as a unit of work that, from the perspective of the individual, thematically connects a number of actions and their goals towards the achievement of a specific purpose, has a unique time frame, demands the use of particular resources and tools, and involves a particular collaborative structure. To be carried out, a working sphere demands the achievement of specific actions distributed across hours, days or weeks, depending on the nature of the purpose to be achieved.

Many times, these actions require that people build particular sets of tools, and resources that are associated with a working sphere. For instance, informants often kept paper documents related to a working sphere in folders, or organized electronic documents in computer directories or mailboxes. Similarly, some working spheres demand interaction between a particular sub-set of co-workers who collaborate, or exchange information, required to achieve the purposes of the working sphere. Thus, the constitutive elements of

a working sphere, which include: purpose, a time frame, resources, and a collaborative structure, serve to provide a more robust understanding of those units of work that information workers engage in, in everyday practice.

The analysis revealed that the conceptualization of work as working spheres is important for individuals, as it provides at least three clear benefits for the enactment of work. First, I found that working spheres make actions meaningful beyond the scope of short-term goals. Working spheres help individuals in that way by providing a way to frame individual actions within a purpose, which orients, and gives form, to all of them. By being aware of the purpose, such as “*organizing a party to celebrate this month’s achievement,*” or “*creating a new image for the company’s Web site,*” people know that their completion demands a number of varied actions, including conversations, sending e-mail messages, making phone calls, or preparing documents. But they know that these actions are directed towards the same purpose. Second, I found that working spheres helped the individual envision and define his workload. Often, individuals represent overviews of their work that point to the working sphere, rather than to the specific actions that achieve it. For many informants, keeping lists of their working spheres helped them to plan their days, and reminded of their commitments. As it was explained in the previous chapter, although people are sometimes explicit with respect to actual actions to complete for a working sphere, many times those actions are left unstated, either because it is assumed to be understood as that which is required, and they do not need to specify those details because during the actual enactment of the action, people would know what actions they have to do. Finally, I found that working spheres can be useful to set the boundaries of collaborative efforts with others, by functioning as points

of reference which relate to a collective of individual efforts facilitating communication between co-workers. This collaborative value of working spheres is important to highlight because, although working spheres were a personal conceptualization of work, they often pointed to collective efforts, and consequently, by referring to a label, such as “the Rational project” people were able to share with others the purpose of the actions for which they were involved in at a particular moment, or for which they were planning to do.

The results indicate that not all working spheres involve the same level of involvement for individuals, nor are they all of the same type. In particular, the data showed that some working spheres were more central for the individual, as he was responsible for the achievement of their purposes. Other working spheres were considered to be peripheral, as they just demanded brief engagement and only with the purpose of providing information to others. For those central working spheres, I found a number of typical patterns among these sets of informants: central working spheres could have a project-oriented nature, be based on one-time events, demand a solution for urgent problems, involve the recurrent enactment of certain sets of actions, or be based on informal requests by other co-workers. Depending on their type, working spheres imposed different requirements with respect to the way people handled them. Those types varied as to the degree in which they demanded an immediate involvement and attention until their purposes were achieved, they had different levels of flexibility in regard to their temporal frames, and had different degrees of formality with respect to their assignment and the accountability that individuals had for them.

### **3.2. On the Dynamics of Carrying Out Activities**

The results indicate that working spheres are composed of chains of brief actions, with an average duration of less than three minutes. Thus, the informants experienced a constant reorientation interacting with information artifacts and with co-workers. Interestingly, although computers were the main tool used by people to do their work, paper-based artifacts are still prevalent and relevant within modern office environments. The latter confirms other studies such as the work of Sellen and Harper (2002), but also indicates that people interact within information environments relying on a combination of digital and physical resources. This combination of resources is particularly clear within the processes and strategies employed by people in order to manage their multiple activities.

Some differences in time, for which people spent on actions, were due to the roles that informants had. In particular, my results indicate that managers spent more time per day in formal and informal interactions. This confirms what previous managerial research has pointed out in regard to the preference of managers for verbal communication (Mintzberg, 1973; Panko, 1992), but it also indicates that in spite of the existence of new forms of communication, such as e-mail, today managers still rely on face-to-face interactions to do their work. In general, formal and informal interactions with co-workers account for about 37% of the day. Thus, an important component of an individual's work is not circumscribed, nor contained, within a frame imposed by computer applications. Only in the case of software developers or support engineers, my study found that people spent significantly more time per day at their computers.

The results indicate that informants worked on an average of twelve working spheres per day, nine of them demanding central involvement, and the other three being

peripheral. These spheres were enacted through brief segments, averaging about 12 minutes of continuous engagement, before switching to some other sphere. On average, people spent about 45 minutes per working sphere per day. This brief involvement, in a varied number of working spheres, was experienced by all informants. As indicated in Chapter Seven, some differences existed for those informants working at Venture, having more central working spheres, or managers engaging in more peripheral working spheres. Although those differences are important and have to be considered, what is even more relevant is the fact that engagement in a working sphere is not continuous until a purpose is achieved. Work is achieved through brief moments of continuous engagement that span across time.

### **3.3. On the Fragmentation of Work**

My results point to different aspects describing the fragmented nature of work. First, they indicate that work is fragmented in mainly two ways: On one hand, a working sphere can be left aside for a moment when no more work is possible, as a person is waiting for the resources or for conditions to occur before resuming work on it. On the other hand, a working sphere can be abruptly stopped in its execution, due to internal or external interruptions. The analysis shows that a little less than half of the working spheres' segments were interrupted (44.20%). To some extent, we can say that work was as likely to be interrupted by external interruptions (56.4%) as by internal interruptions (43.6%). Interestingly, the main factor triggering those interruptions was face-to-face interactions with other co-workers, rather than automated tools such as e-mail notification of new messages. Except for engineers, the role of informant did not affect the number of

interruptions. Furthermore, external interruptions were related to central working spheres. Finally, a working sphere, when interrupted, was, on average, resumed in about 23 minutes. And during that time, people worked on about two other intervening working spheres.

Comparing these results with previous studies, exploring the interruptions experienced by information workers, some points can be highlighted. On her study, Lee Sproull made the remark that the managers she studied “*spontaneously interrupted themselves as often as they are interrupted by others*” (Sproull, 1984, p. 20). Building upon Sproull’s finding, the results of my study proved that this was the fact not just for managers, but for the other roles as well. Similarly, in their workplace study, O’Conaill and Frohlich found that 63% of the interruptions occurred as face-to-face interactions (O’Conaill and Frohlich 1995). In contrast, my study found that face-to-face interactions account for about 40% of the interruptions. The differences might be due to the fact that their informants operated mostly away from their cubicles. Comparing O’Conaill and Frohlich’s results with mine is interesting when considering that I found that more external interruptions were due to central working spheres. O’Conaill and Frohlich found that the person being interrupted benefits in about 64% of the times, whereas in 32.8% of the cases the benefit falls only on the person interrupting. In contrast with those results, in my data, 22.8% of the interruptions were caused by peripheral working spheres and, therefore, it can be assumed that the benefit was for the person doing the interrupting. Assuming that the person being interrupted benefited from the interruptions resulting from other working spheres (unknown work, personal and meta-work), that will mean that people benefited from 77.1% of the interruptions. Those figures are not completely similar

to those found by O’Conaill and Frohlich, but it is interesting to see that the percentages are relatively close.

### **3.4. On the General Life Cycle of Working Spheres**

The study allowed me to observe some of the typical states in the life cycle of a working sphere. Although the study was not designed to observe those changes over the long term, for some informants, and for some of their working spheres, it was possible to identify a set of typical stages. These stages refer to the origin of a working sphere, its gradual definition, its operational status, and the obsolescence that it suffers once its purpose is achieved. People indicated that many of their working spheres are assigned in a formal manner, generally during meetings with co-workers or bosses. In contrast, other working spheres resulted from requests made by clients or co-workers, and were assigned in an informal way. In general, the assignment of a working sphere did not convey a clear definition of how its purposes would be achieved. It was through the enactment of the working sphere that people gradually revealed what the resources were, as well as the temporal frame and collaborative structure required by the sphere. This, of course, affected the way people handled the working sphere, for the less mature it was, the more challenging it was to use tools to represent it, and keep track of it.

Informants also pointed to the differences in operational status of their working spheres. They referred to their working spheres as being active, on-hold, or dead. In the first category were those spheres for which they were able to work whenever other priorities allowed them to do so. Other working spheres were on hold, as individuals were waiting for others to continue work on them. Finally, other working spheres were

identified as being dead when the purpose was not achieved, but it was not possible to continue working on that sphere as the purpose itself had lost value.

Many of the informants also talked about the things that happened after they had achieved the purposes of a working sphere. In many cases, working spheres gave place to other working spheres, as it was the case when people were involved in long-term efforts that were divided into monthly deliverables, or when a problem demanded permanent solutions and people created a project to resolve it.

### **3.5 On the Strategies Used to Manage Multiple Activities**

The results of this investigation have shown that, in general, the informants had a favorable preference towards multi-tasking. People identified two main benefits of this behavior. First, multi-tasking among different projects and activities brought a higher degree of variety to their work, and reduced their boredom, as compared to having just one major project to deal with. Second, multi-tasking led individuals to be more focused and concentrated on the task at hand, as they knew they would have to optimize their efforts in order to be able to focus on the other things they had to attend. As indicated by Kaufman et al. (1991), this preference of my informants towards multi-tasking might be due to the fact that all were well-educated individuals. Confirming remarks made by Bluedorn (2002), I noticed that many informants developed their ability to multi-task through past experiences, both educational and job-related. In other words, it seems that the job in itself demanded multi-tasking and because individuals already had the skills to cope with it, they were able to perform well in their jobs.

Interestingly, after the observation was concluded, and as a result of my reporting on some preliminary findings, awareness towards the need for multi-tasking within their jobs was gradually developing among the people at IT-Services. During follow-up interviews, some people mentioned that they were discussing more often their need for multi-tasking, and in particular, they were incorporating that skill, the ability of handling multiple projects, within the job descriptions for new employees for their groups.

The study identified that, although informants liked to multi-task, they recognized that it involved challenges. People had to be able to maintain their train of thought in order to resume pending activities, while facing constant interruptions. The analysis of the practices of the individuals resulted in the identification of a set of fundamental processes and strategies used for multi-tasking. These processes involve a consolidation and continuous renewal of overviews of the working spheres in which one is engaged, the adequate maintenance of a flexible window of focus over those working spheres demanding attention, and the management of transitions leading to switching among working spheres. The processes are enacted, and combined, as individuals move throughout their days.

Central to the management of multi-tasking is the consolidation of an overview. The overview is a notion that is used here to refer to the knowledge of what the working spheres are that an individual is engaged in, and what are the actions required so that those working spheres can be advanced towards achieving their purposes. The overview then is part of the knowledge that individual has in his head, but many times it becomes externalized into physical or digital representations. I observed that the informants used two main forms of representation, which varied according to the level of aggregation that

they had for the working spheres, and the actions involved in them. Global representations were used to represent working spheres, listing labels for them, without specifying details about the actions to be completed. Local representations were more oriented to the specific actions that individuals would have to complete in a day, functioning more as to-do lists.

The notion of overview, and the processes involved in creating and renewing them, can be contrasted with previous efforts in managerial research that were highlighted in Chapter Two. In particular, the process of “agendizing” as described by Barry and his colleagues (1997), pointed out that managers needed to build mechanisms for mediating between long-term organizational goals and plans, and the changing circumstances experienced moment by moment in the process of managing. They talked about what it takes for an individual to be able to create an agenda, its characteristics and the way it becomes implemented. My results indicate that this need for agendizing is required, not just for managers, but in general for individuals that have to juggle many activities. In contrast to agendas that generally are conceptualized to reflect a long-term vision that the individual has for his company, or team, the overviews are clearly more practical and oriented towards the short and medium-term objects of the individual. I noticed that just a few managers created representations of overviews that would closely match the agendas described as long-term visions. My work also builds upon previous studies of agendas and complements them by providing a more detailed understanding of what the actual steps are that people use for consolidating their overviews, which include the checking of immediate attention channels, checking for scheduled actions, process of prioritization and planning, and the elaboration of representations.

A second fundamental process required to manage multiple activities involves the maintenance of a flexible window of focus. This refers to the ability of an individual to be immersed in, and attend to a particular working sphere, and at the same time, be flexible and able to focus on other things around him that could affect other working spheres. My study revealed that the window of focus expands to cover both *active* and *potential* working spheres. Active spheres are those for which the individual is aware of the fact that he has to maintain engagement in, as they are “on his plate.” In contrast, potential working spheres are those which result from an individual attending to events that have a direct impact on his areas of responsibility, and can potentially become a working sphere for him (e.g., problems on systems they supervise or requests from clients). Those findings confirm the observations of other researchers (Heath and Luff 1991), because it was observed that the informants, while conducting their work, *monitor* the actions of their co-workers, checking their progress and status, as this helps them to adjust their own actions. However, my results extend those previous results within the context of managing multiple activities, and emphasize that while monitoring, individuals focus their attention flexibly to filter and seek information relevant for their working spheres. Similarly, in order to maintain a flexible window of focus, individuals use strategies that involve the selective opening of communication channels, through which they can become aware of changes affecting their potential or active spheres. This coincides with the results reported by Hudson et al. (2002), who observed that the managers of their study opted for different techniques to separate themselves from the sources of interruption (e.g., e-mail, phone and co-workers). My results indicate that people not only remove themselves from those distractions, but that the specific level of

isolation is determined based on the expectations for active working spheres and responsibilities. Based on what individuals know concerning what is coming (e.g., a call from their client), or what might come (e.g., an e-mail from the monitoring systems alerting for major problems), they opted for leaving open certain communication channels.

A third fundamental process in the management of multiple activities refers to the ability of individuals to manage transitions among working spheres. When facing natural transitions, the individual is able to reach a point of closure for his working spheres, such that actions can be resumed seamlessly. In those cases, individuals either achieved the purpose of the working sphere, or could no longer work on it as they would have to wait for resources or the right time to resume it. In contrast, when facing forced transitions due to the interruptions, individuals handled them in mainly two ways. They could start working on the interrupting working sphere right away, and then resume the interrupted working sphere when they completed the latter. In many situations, they took enough information about the interrupting working sphere, annotated it or set a reminder for it, and immediately returned to the interrupted working sphere. I noticed that the decision to take one or the other strategy was based on factors such as: who the person was that was doing the requesting, the interrupting working sphere, and the working sphere type. For instance, when bosses requested things, I observed that people were limited to postpone the execution of a working sphere. Similarly, when the working sphere referred to an urgent problem, people immediately focused their attention on it.

The study also highlights the fact that working spheres are framed within the collective efforts that an individual takes part in as part of his job. Some working spheres

might demand different degrees of collaboration with other co-workers, but their purposes get coined, and are directed within those lines of work which the companies pursue in order to serve the needs of their clients. My study found that, framed by collective efforts, working spheres can emerge on a both formal and informal basis. Often, individuals get assigned to their working spheres during formal meetings; but many times, it is a result of a more spontaneous process, emerging as the need arises. In both cases, it is the collective perspective that impacts the prioritization of the efforts at the individual level. Consequently, when individuals gain an overview, identifying working spheres and setting priorities, they do so by aligning the overview to the overall goals, which the collective efforts aim to achieve.

#### **4. Theoretical Implications**

A set of theoretical implications can be derived from the analysis I have conducted on the phenomenon of managing multiple activities in the workplace. In this section, I highlight those aspects where my results seem to contribute to the development of analytical frameworks, or to point to the opportunities that exist for their further development on the basis of my results.

##### **4.1. Fresh and Updated Perspective on the Nature of Information Work**

The results presented in this dissertation make it possible to consolidate a wider perspective of the nature of modern information work. To the best of my knowledge, my study, and the level of analysis performed on the data collected, only parallels those

seminal studies conducted by Mintzberg (1973) and Sproull (1984). In my case, the scope of the informants studied transcends those of previous studies by including a wider variety of roles. Furthermore, although other studies have provided some accounts regarding the practices of modern information workers (e.g., Kidd 1994; or Hudson et al. 2002), those studies were limited as to the level of detail in their findings, due to their data collection techniques. Consequently, the data collected in this study provides a fresh and updated perspective to information work as it is experienced today.

Based on this study, there are particular aspects that I consider relevant for further development of the understanding of the nature information work. Much has been said about information workers demanding intellectual skills, rather than manual abilities (Kidd 1994; Schultze 2000). Many refer to information work as “knowledge work” to emphasize the intellectual aspects of it. The individuals observed in my study evidently fall within this characterization of primarily creating, interpreting, and sharing knowledge. That is a commonality among all of them. However, where they differ is in the way that information is delivered, transformed, and shared. These differences can be based on the roles they had, and the fundamental *functions* they played for their companies. Mintzberg, in his dissertation on the nature of managerial work, talked about managers as playing functions, such as being monitors, disseminators, spokesmen, entrepreneurs, disturbance handlers, resource allocators, negotiators, and so forth (Mintzberg 1973).

Among my informants, those with managerial positions could be identified as playing some of the functions identified by Mintzberg (1973), but those functions identified by him might be not enough to describe the work of other roles. For example, many times

analysts and project leaders have acted as *mediators* between stakeholders. Developers, especially senior ones, have helped others by using their expertise, and functioned as human *knowledge bases*. Sales executives, and support engineers, were in constant contact with clients, becoming the main *interfaces* and public relations point for the client. Those functions affected, in practice, the nature of their work. Recognizing and identifying those functions, played by different roles of information workers, is an important component for understanding the nature of information work. In the case of Mintzberg and other managerial scholars, what they did with their studies was to reveal the essential skills and competencies that managers ought to have in order to perform their jobs well. Similarly, identifying those functions, can serve to identify the skills and competencies required for other roles of information workers. Furthermore, it can result on revealing essential information for determining the functions required within a work group, in order to achieve a balanced structure, and to operate more efficiently among people. What my results do by pointing to the existence of functions, such as mediator, knowledge base or interface, is to open the door for further investigations oriented in that direction.

#### **4.2. Activity Theory: On the Need for an Intermediate Unit of Work**

The analysis of how people conceptualize their activities has important implications for the multi-level perspective with which Activity Theory proposes to model human work. As it was discussed in Chapter Three, my initial understanding of the phenomenon was guided by the notions proposed by Activity Theory scholars. Insights in regard to the relationships between individual and collective efforts were useful to illuminate an

understanding of the nature of working spheres, and the strategies used to manage them. However, my notion of a working sphere, as a personal conceptualization of work, faces problems when it is compared with the hierarchical model of activities, actions, and operations that is proposed by Activity Theory.

Working spheres were units of work, used by informants to thematically connect chains of actions, which together make it possible for individuals to achieve a purpose. When people used phrases such as “the Rational Plan,” “the project for Piedmont Pediatrics,” or “Jim’s production issue,” they suggested thematic labels that framed related sets of actions. The purposes achieved transcended the limited scope of each action. In that sense, it was clear that the notion of a working sphere was more complex than the notion of action proposed by Activity Theory. It went beyond a simple interaction with an artifact, or another individual. Consequently, trying to match the working spheres within the Activity Theory hierarchical framework will force us to place them beyond the level of simple actions. However, at the same time, it became obvious that those thematic references were not in themselves activities. Thinking of working spheres as activities presents difficulties when we analyze, with care, what this notion means for the proponents of Activity Theory.

As discussed in Chapter Three, the notion of *activity* refers to the “ultimate reason” or the “true motive” behind people’s behaviors (Leontiev 1978; Kaptelinin 2005). Activities are said to extend over the long term, and serve to guide and define the “horizon of possible actions” (Engeström 1995; Kuutti 1998). We can argue that objects, and the motives fueling them, work as mechanisms which guide human work, rather than projecting concrete and articulated purposes. The differences between what would be a

*motive*, and that which would be considered a more concrete *purpose*, was clear in some of the observed experiences. To illustrate this, I refer to the IT-Services' beach party, mentioned in Chapter Five. As mentioned, Bob, the manager, threw a party for all the members of his team and their families. They gathered at a nearby beach, had a barbeque, played volleyball, and socialized. In the invitation e-mail that Bob sent out, he mentioned that the purpose of the event was “*to celebrate the outstanding effort of [the] team this year.*”<sup>25</sup> While talking to Bob before the party took place, he mentioned to me that he saw the party as a way to motivate his people, and increase the communication among them. Later on, during a follow-up interview, and while reflecting about this working sphere, he mentioned that, as a manager, one of his responsibilities was to keep the team motivated and working together. By organizing the party, he was fulfilling and materializing such responsibility. Thus, the *motive* of the event, as understood by Activity Theory, was primarily to enhance the well being of the team through the specific *purpose* of celebrating the team's efforts for that particular year. In other cases, informants also pointed to the motives, identifying them, and distinguishing them from the concrete purposes of their working spheres. In other words, people conceptualized those units of work as distinct from what Activity Theory identifies as an activity, but neither is equivalent to what would be considered an action.

Consequently, the need for an intermediate notion, placed between what we classify as activities and actions, emerges as an important empirical result of this study. From the perspective of information work, the work of the informants can be better described by a hierarchical model that incorporates the notion of a working sphere, and its purposes

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<sup>25</sup> This information can be seen in Figure 5.6.

within the classical model of Activity Theory. Such resulting model is illustrated in Figure 9.1.

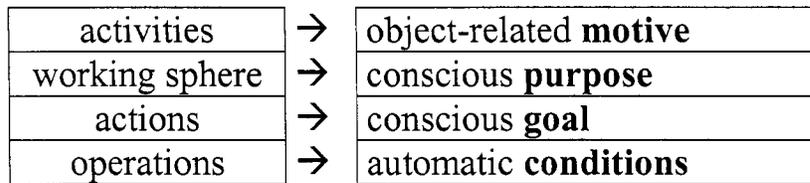


Figure 9.1. Suggested modified multi-level perspective for information workers.

It is important to say that the notion of a working sphere in itself would be appropriate for explaining the data collected, but I believe that the need for an intermediate level can be justified, not only by my results, but also by many of the results reported by others in the previous literature. As indicated in Chapter Two, many researchers in the area of human-computer interaction and computer-supported cooperative work have implicitly, or explicitly, pointed to this intermediate notion by referring to “working contexts” (MacIntyre et al. 2001), “higher-level tasks” (Kaptelinin 2003), or “thrasks” (Belloti, Ducheneaut et al. 2003). The way that those authors described such units of work has many similarities with the notion of a working sphere that I am proposing here. Consequently, although it would require more investigation and analysis which could result in a more precise characterization of the intermediate level, it is possible that at least for the domain of information work, a modified multi-level perspective of the hierarchical framework of classical Activity Theory would make sense.

Finally, I would argue that the incorporation of an intermediate notion would ease some of the problems that many researchers within the human-computer interaction and the computer-supported cooperative work communities have encountered while attempting to apply the notions of Activity Theory, and, in particular, the hierarchical

framework as analytical tool. Researchers from these disciplines have found it challenging to establish adequate borders for the notions of action and activity, as proposed by the hierarchical framework. Consequently, some analyses guided by Activity Theory have tended to lose the emphasis on the ultimate motives, and object-orientation of activity, and instead use the idea of activity to describe work efforts closer to, but not necessarily equivalent to, goal-oriented actions. For instance, while analyzing the practices of hospital workers, Bardram (1997) referred to efforts such as “diagnosing a patient” and “preparing a patient for surgery” as *activities*. The level of actions was used to describe things such as “checking blood sugar level” or “requesting x-rays” (Bardram 1997). But what Bardram had called *activities* appears to correspond to lower-level processes when we contrast them with a more fundamental activity, such as “providing health care for the patient.” This problem of assigning lower level efforts to the activity level, comes not from a lack of understanding of the concepts proposed by Activity Theory by those trying to apply them, but from an attempt to work without an intermediate notion, which is currently missing within the hierarchical framework, one that would reduce the need to overextend the concepts of activity and action. The further development of this intermediate level and its generalization over other domains of work is a future direction for the theoretical aspects derived from this dissertation.<sup>26</sup>

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<sup>26</sup> Work on the development of this notion is currently done with both Professor Bonnie Nardi and Professor Gloria Mark. Derived from the empirical results of this dissertation, and a comparative analysis of theoretical work within the Activity Theory literature, we are proposing the notion of engagement as an intermediate notion.

### **4.3. Articulation of Work at the Individual Level**

As indicated before, Strauss's Interactionist Theory of Action emphasizes two important aspects of human work: its temporality and the articulation required to achieve it. Strauss conceived human work as constituted by acts that add up in courses of actions of varied duration (Strauss 1985). For him, the involvement of individuals is characterized by its intermittence, as it depends on the ability of the individual to contribute to different parts of a project at certain points of time. Strauss's observations of the nature of the practical enactment of work were clearly confirmed by the results of my investigation. The informants that I observed engaged and disengaged in their working spheres, depending on their ability to make progress, based on the interdependencies they had with others, or the availability of resources, or inspiration. The results also indicate that the intermittence can result from forced fragmentations of work, due to external and internal interruptions. Thus, over time, information workers enter and leave a working sphere's trajectory, as Strauss would refer to it, in order to achieve the goals of particular actions, and, through time, they accumulate a set of actions that all together allow them to achieve the working sphere's particular purpose. Because of their value to suggest that human work is enacted in this way, Strauss's ideas were useful for my study, for guiding the analysis over those aspects, and by the manner in which they apply for the specific case of working spheres.

In regard to the articulation of work, the results of this study confirm some of Strauss's propositions, but in addition to that, they illuminate other aspects that, I argue, can be fundamental for further development of the Interactionist Theory of Action. As indicated before, Strauss understood articulation work as being enacted at two different levels. The first level refers to the articulation of what Strauss called an "arc of work" or

“trajectory” (Strauss 1993). This is the articulation required in order to define the clusters of tasks required for a particular arc of work. It involves the definition for the types of tasks required, how many of them, the costs, deadlines, and the persons to conduct them. The second level referred to by Strauss is the articulation required to define the efforts among a bundle of arcs of work, which he called a “line of work” (Strauss 1985). In this case, the articulation defines the priorities among the arcs of work and the people leading each one, among other things. The fundamental difference between those two levels of articulation is that one points to the details of work definition *within* an arc of work (e.g., a project), whereas the other points to the details of defining work *across* arcs of work (e.g., a set of projects with each one addressing different clients).

As I pointed out in Chapter Three, the concept of articulation has been fruitful, and applied, mainly, to understand work processes at the collective level; however, Strauss’s ideas can apply at the individual level as well. In particular, when referring to the articulation of an arc of work, Strauss emphasizes that the articulation is demanded for all workers who, depending on their accountability, have to be involved in the articulation of a task, or a cluster of them. This study provides evidence that such articulation is common for information workers. The informants had to engage in the articulation of their working spheres so they could define the specific actions to be enacted on them. As indicated, working spheres experienced a gradual maturation that let people identify the temporal frames, collaborative structures, and the resources required to achieve the purposes of the sphere. The process of maturation was driven by the individual, as he discovered those aspects of the working sphere. Furthermore, this process of articulation is done at an individual level, as often it is unnecessary to make this articulation apparent

to others. As discussed in Chapter Seven, the details of what is involved in order to achieve the purposes of a working sphere can be conceived in different ways, depending on the needs of the individual. For example, when Susan, a developer at IT-Services, commented about the “Future Fund” working sphere that she was engaged in, she emphasized that she had to move the working sphere from a “*high-level*” perspective to the specific “*steps, to get it accomplished.*” That high-level perspective was useful for communicating with her manager, but in order to carry out the working sphere, she had to articulate it on a lower level. Consequently, viewing working spheres as arcs of work from the individual’s perspective, my study reveals that articulation is required at different functional levels, and these details are not apparent to all individuals, in the same way. From this study, I can argue that hiding details of articulation is not due to the fact that individuals do not wish others to know about their work, but due to the fact that they do not need to share those details in order for them to collaborate. This investigation, then, suggests further development of the notion of articulation in regards to the details of aggregation required by individuals in order to enact work versus those required for collaborating with others.

A second important aspect that the results from this investigation illuminate is in regard to the articulation performed for a line of work. When discussing the notion of line of work, Strauss conceived that the effort to articulate among arcs of work is a challenge at the organizational level, and experienced by the organization as a whole. When referring to the way that people create overviews, and how those overviews serve to consolidate knowledge about the working spheres that they attend to, it is possible to see that the processes for creating and updating an overview can be understood as a process

of articulating a line of work. A line of work would be composed of the individual's working spheres. As mentioned before, they will engage in articulating each working sphere, but the process of creating an overview goes beyond that. The informants, through checking immediate attentions, channels, scheduled actions, planning, prioritizing, and creating representations, performed a type of articulation that had to take into consideration all their arcs of work (working spheres), so that they could organize themselves and optimize their efforts. Consequently, I argue that my research illuminates, from the perspective of an individual, how a line of work is articulated. Given the objectives of this study, I did not focus on the articulation of work at the collective level, however, the evidence collected indicates that articulation of a line of work was done by teams, and it was very important for defining the work of the team members. For instance, as discussed in Chapter Seven, Donald mentioned how his team engaged in a weekly meeting, where they discussed and prioritized together their working spheres: *“What are your top five? Are my top five really the appropriate top five? Can I get some help from you, because your four are less important probably than mine [are]?”* Those negotiations were performed at the working sphere level, not at the level of the individual actions, thereby, pointing to the articulation of lines of work. More research is required to understand the processes involved in the articulation of lines of work at the collective level, and how they connect with the perspectives of individuals.

## **5. Implications for the Design of Tools Supporting Activity Management**

The results of this investigation highlight a set of implications for the design of tools for supporting the ways that information workers manage their activities. In this section, I discuss those implications by grouping them within three major themes that, in my opinion, ought to be considered by designers when thinking about those prospective tools. The purpose of the discussion presented here is not to show a set of explicit requirements, as I do not believe that an effort like that is possible without considering the specific context and conditions where a system will be applied. On the contrary, my purpose here, is to emphasize the three major considerations that, based on the results of my study, should shape the design of new tools.

### **5.1. On the Mixed Use of Physical–Digital Tools**

As observed in Chapter Seven, informants make use of both physical and digital tools in order to support the representation of the overviews used for managing multiple activities. Whiteboards, paper notepads, post-it notes, and other pieces of paper were used in combination with the different tools provided by Microsoft Outlook: tasks, e-mail and calendar. Physical artifacts were never excluded from the collection of tools that people used for representing the local, or global, perspectives of their working spheres. This dependency on physical representations not only confirms arguments of other authors in regard to the prevalence of paper in modern office environments (e.g., Sellen and Harper 2002), it also serves to highlight a more fundamental aspect: the need for understanding the physical-digital nature of activity management support. Activity management is then a form of physical-virtual activity as proposed by Pederson (2003).

Based on the results of this study, I would argue that it would not be enough to envision supporting tools that are exclusively based on electronic devices, such as computers, personal digital assistants, or mobile devices. Physical representations are required, as the affordances that they provide cannot be achieved with any other current computer device. Low-weight, malleability, permanency, and ability to be annotated are affordances that cannot be currently obtained from current electronic devices today.

The question is then: How can a designer who is limited by the current characteristics of technology deal with a situation that clearly demands the use of integrated physical representations of information? I argue that the answer will be based on being able to look beyond the confines of the computer, and thinking about tools that would integrate information from both domains. By integration, I mean not just the ability to transfer information from one domain to the other, but the fact that a tool should, by design, use a combination of digital and physical components that complement and support each other. What those tools would look like; what form would they take? Given the purpose of this document, this is not the place to suggest specific solutions, but from the observed practices, it is possible to see some examples of how this currently occurs in the workplace. Those examples, although not fully refined, could provide insights into the actual forms that novel tools would take. Here, I will draw from one of those practices for illustrative purposes.

As I indicated in Chapter Seven, Bob and Alfred, both managers at IT-Services, used to produce a printout of their “Outlook for the day.” This document, presented in Figure 7.2, was a standard report produced by their Microsoft Outlook software. The printout included a schedule of meetings for the day, a list of to-do’s (as stored in the Microsoft

Outlook TaskPad), a monthly calendar for the current and the forthcoming month, as well as space for notes. Interestingly, as they were likely to attend many meetings, every morning, they printed their “Outlook for the day,” and used it to orient their decisions about what to do and where to go. While observing Alfred, after returning to his office from a meeting, I watched him making modifications and new entries to his Microsoft TaskPad based on annotations that he had made on the printout while being away. Thus, it was the combination of the physical artifact (the printout) and the digital artifact (Microsoft Outlook) that made it a good and optimal tool to assist Bob and Alfred in their management of their activities. However, it is important to understand that any other piece of paper would not be enough to support this practice. It was the design and the layout of the information on the paper artifact, matching with the functionality provided by the digital artifact, which made the combination so useful. Interestingly, both informants discovered the value of that printout by accident. Alfred mentioned that one day he decided it was a good idea to bring a list of his meetings when he was away, so that we could make annotations. He decided to use a printout of the “Outlook for the day” from the tool. Once he saw the value, he adopted it, and continued to use it.

The “Outlook for the day” printout is one example that illustrates the potential power of merging physical and digital components to create hybrid tools. More design and evaluation efforts are required in order to understand what specific forms hybrid tools should have, but I argue that by removing the emphasis on the *automation* of the practice, and placing it on the *enactment* of the practice, it would place designers in a better position to propose tools that would be functional and useful for information workers with the management of multiple activities.

## 5.2. On the Materialization of Core Capabilities

As described in Chapter Seven, the analysis of the properties of the tools for supporting the representation of overviews, and the management of multiple activities, resulted in the identification of a set of core capabilities. Those capabilities included the ability of the tools to provide succinct views, a single-point of integration, monitoring, timed notifications, flexible listing, visual representation, and mobility. Those capabilities together constitute a list of high-level requirements for tools supporting the management of activities.

Some of these capabilities have been also identified in previous studies of task management. For instance, the work by Bellotti et al. (2004) pointed out to “Vistas” as a special kind of to-do list that reflected the desire of their informants to see all their to-do’s together. That resembles the “single-point of integration” capability that my study found. Similarly, other authors have indicated the need for mobility in task-management resources (e.g., Blanford and Green 2001). In contrast with those previous efforts, my investigation provides a more integrated and consolidated set of capabilities for the specific purposes of personal activity management. The kind of capabilities that I am proposing are not equal, but similar, with respect to their level of abstraction, to those proposed by Robison within the context of common artifacts supporting collaborative work (Robinson 1993).

It is important to emphasize that analysis of the practices of individuals clearly shows that not a single tool contained all of those core capabilities. For instance, people needed e-mail tools because they provide succinct views and monitoring capabilities; calendars, because they provided timed notifications; whiteboards because they provided

visualization; and notepads, as they could be carried and they supported mobility. In other words, the capabilities are materialized as an ensemble; and by combining the capabilities of different tools, they produce all that is required to manage multiple activities. Consequently, designers of tools aiming to support the management of multiple activities ought to approach to those high-level requirements with an understanding that they were identified from the ensembles that individuals had, and that each ensemble could be different, although there were many that were similar. The data shows that the ensembles themselves varied, depending on the role of the individual, his preferences, and the types of working spheres being handled. It is still an open issue to define what the ensembles ought to be, as new technologies develop. The construction of those ensembles, then, is a critical aspect that designers of technologies should pursue.

### **5.3. On the Tools and Methods of Use**

From the analysis of the informants' practices, it becomes clear that managing multiple activities, and multitasking effectively among them, requires people to pay a price: one has to spend time and effort for those strategies to work. Although the informants had various ways by which they enacted those strategies, it was clear that they were conscious of the fact, that they, and nobody else, were responsible for the management of their work.<sup>27</sup> People, then, make explicit efforts for keeping track of their commitments, remembering meetings, and managing their time, in order to complete assignments before their respective deadlines. Such work was necessary if they wanted to perform well as

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<sup>27</sup> In just one case a manager received direct support from his assistant to manage his activities, but even he had to make activity management work while using his notepad to remember actions or his electronic calendar to schedule some appointments.

employees, and it was expected from others, including their bosses, clients and co-workers.

Consequently, when people look for tools to support the management of their activities, they are conscious that the use of those tools requires some effort, not only with respect to learning the use of the tools, but with for their maintenance as well. I draw from Leonard's comments, to highlight the importance of considering the effort associated with making a tool work:

*“But, anytime you have a tool, you still have to spend time making sure that tool is effectively managed, utilized, and updated. So, if you don't have the right information when [you're] entering it, or you don't have the time to do it, it's not going to do you any good.”*

Those comments made by Leonard indicate that, when using a tool, it is not just important that the tool does what it is supposed to do, but that people develop a method for using the tool. Consequently, given the challenges involved in the management of multiple activities, a tool aiming to support it must be augmented with a suggested method to use it. The purpose of such a method should not be to be prescriptive on what an individual must do to manage his work, but to suggest the manner of use for which the tool could be optimal. Here, work is necessary for designing the tools and their methods. The results reported in this investigation can be used to guide both the design of tools and the methods associated with them.

Methods to manage time and activities abound in the popular press. During the investigation several informants mentioned various ones, to advocate particular methods. One example is the Frankly Covey methodology of time-management. Looking at these methods, one would understand that perhaps the major value of these approaches are that they suggest to the individual ways and best practices to behave, and organize time and efforts. Unfortunately, some of those methods tend to be unrealistic with respect to the realities of the workplace, or too detailed to be feasible. Furthermore, for most of those methods, no specific computer tools have been designed to support them.

## **6. Future Research Directions**

The research effort presented here can be further developed in at least three particular areas: mobile information workers, distributed work environments, connecting collective and personal activity management tools.

### **6.1. Mobile Information Workers**

My investigation focused primarily on information workers who, for the most part, operated within offices or cubicles. Local mobility was common within and around offices or buildings, but it was certainly limited. In Venture's case, although two of the informants were sales executives and I had observed them while working outside the office, my study did not focus on the challenges for mobile information workers. Future research can be conducted exploring the dynamics involved for carrying out activities, and the strategies for managing them while being mobile.

## **6.2. Distributed Work Environments**

Although the companies studied had interactions with providers and clients in remote locations, the work within the company was conducted primarily at a single location. No teams were integrated with individuals working in different cities or countries. Such conditions might affect the way work is done as substantial efforts are necessary for the coordination among distributed efforts. Future research can be conducted exploring the particular challenges imposed for the management of multiple activities in a distributed work environment, when the collaborative structures of the working spheres are integrated across a number of people in different locations.

## **6.3. Connecting Collective and Personal Activity Management Tools**

This study revealed that the strategies used by individuals to manage multiple activities cannot be understood without considering that the individual participates in collective efforts. Consequently, the working spheres that individuals engage in are the result of collective efforts directed toward the purposes that their organizations aim to achieve. These results indicate that there is a relationship between two levels of management: one in the individual's domain for managing his own working spheres, and another that the organization utilizes for the management of a whole set of projects. Future research could be directed toward understanding the effects of linking tools for personal activity management with those used at the collective level. Commercial products such as Microsoft Project, used for supporting the management of projects with many individuals participating, provides some level of connectivity with personal tools, such as Microsoft

Outlook. However, no empirical research has been done that explores how connecting those two perspectives can affect the management of activities.

## **7. Concluding Remarks**

The work, and results, of this dissertation provides an updated perspective on the nature of information work, with an emphasis on the management of multiple activities. It is clear that major empirical efforts such as the one reported in this dissertation often become points of reference that serve to nurture studies in the years to come. However, it is clear to me that periodic investigation is necessary, given the dynamic nature of this phenomenon. That aspect can be seen clearly in previous managerial research conducted during the 70's and 80's, which was often cited as a point of reference by human-computer interaction researchers. At the time those managerial studies were conducted, it was hard to imagine the impact that computer networks would have on transforming the practices of information work and the changes in operational schemes, bringing more team-based forms of organizations, more flexibility, and variety of jobs. By saying that, I point out the fact that human-computer interaction research cannot be static, and that only by periodically conducting empirical investigations that renew our understanding of information work, and that looking at the transformations that are taking place, can we advance the way in which we design and think about supportive technology.

Similarly, the never-ending cycle of investigation is extended when considering that tools and practices influence each other, as people co-evolve with the tools, and they

shape them to serve their needs. Thus, as new information technologies are envisioned for specifically supporting the management of multiple activities, more research will be required to understand how those new tools are shaping the practices and strategies used by individuals. Such mutual shaping is particularly intriguing, in this case, given the lack of information technologies, which seriously and frontally support the management of multiple activities. Once we have reoriented the design effort toward creating computer tools that support the fundamental aspects of personal activity management, we, as computer scientists and designers, will be in a position to make a sensible contribution to that which is the motive fueling the existence of computers in the workplace: the productivity of the information worker.

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# Appendix A

## Protocol and Interview Guide for General Interview

**Note:** the following is the guide for the general interview as it was designed for study. Every time an interview was conducted the protocol was slightly modified to suit the specifics of each informant and incorporate questions related with the observations. The protocol presented corresponds to the one used to interview Adam, a financial analyst at IT-Services. This protocol was designed based on previous studies (e.g. Gruen, 1996)

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### Interview Protocol - Field Study at ITS

Company: IT- Services, Southern, California.

Interviewer: Víctor M. González

Subject: Adam

Date of Interview: Wednesday June 5, 2003

### PROTOCOL

#### Format

We will conduct 60-90 minutes semi-structured interviews where we will ask people about the nature of their job, the ways they organize their information, ways to interact with other individuals, communication devices used and current strategies to manage and coordinate multiple projects.

#### Structure

- 1) Introduction to the study and the aims of the interview (1 min)
- 2) Subject reads and signs the consent forms (4 min).
- 3) Interview (53-83 min)
- 4) Closing up the interview (2 minutes)

### TOPICS

#### 1. JOB SPECIFICS

##### Issues to be covered

- *Official name of the job position*
- *Years in the position*
- *Current main responsibilities and main processes he/she is involved with.*
- *Current projects working on.*
- *Natural rhythm of work and Working hours*
- *Training received to perform the job*

##### Questions:

- What is the official name of the job position you have? In your own words how would you describe your job? What do you do?
- For how long have you worked here? Have you worked in other areas of the organization?
- What is your formal education? Did you received any training to perform this job when you came here?
- Now let's talk about more recent aspects of your work, what are some of the projects on which you have been working on this past month?
- Does your work have a natural rhythm to it (seasonal, monthly, weekly, daily)?

## 2. INTERACTIONS AND MEETINGS

### Issues to be covered

- *Interaction with other people.*
- *People reporting to the subject /People to whom the informant has to report.*
- *Periodicity of meetings.*
- *Strategies used to coordinate the arrangement of meetings*

### Questions:

- What people in IT-Services have to report to you and what people you have to report to?
- Who are the team members with who you communicate more and less frequently? And to what extent your work depends on the interactions with those team members?
- Tell me about the interactions that you have to have with people outside the Trading team, but part of IT-Services and for what sort of reasons do you have to interact with them? Who are they, what role do they have? What kinds of things make you to interact with them? How much your work depend on interacting with those persons? Tell me about the interactions that you have with people outside IT-Services and for what sort of reasons do you have to interact with them?
- Meetings: I have seen that many times you meet people here in your cubicle, sometimes two or three but other times you go to a meeting room or conference room and have more formal meetings. What kinds of meeting you have in each situation?
  - Let's talk a little about information that you use for and get from meetings:
    - What kind of information you take from the meetings? Do you take notes?
    - What kind of things do you bring back from meetings and what you do with them (documents, fliers, etc)?

## 3. PLANNING OF ACTIVITIES

### Issues to be covered

- *Goals and tasks for the current day (day of the interview)*

### Questions:

- How do you go into deciding what things you should do each day and how do you decide on what order do you do them?
- Do you think about the things you have to do before coming to work, on your way to work or once you arrive here? How often that kind of things happen to you?
- Do you have a kind of routine that you follow everyday?
- For instance, what goals (if any?) do you have for today? Do you expect to complete all of them?
- How often do you get diverted from your plans?

During the time I observed you I saw that you used to have an e-mail with a list of things you have to do. In that email you annotate what to do, and general details of your tasks. I saw that you send that email to yourself. Are you still using this strategy? Could you describe to me how you do it? Please show me the email that you use today.

## 4. MANAGEMENT OF PROJECTS

### Issues to be covered

- *Strategies used to coordinate multiple projects.*

During the time I was observing you I notice that you use the ACE STP spreadsheet quite often.

- Is that the way you keep track of your projects? How many projects are you now working on? Is there another way?
- How it relates with the email you send yourself and keep updated?

- How can you know when a project is not moving as expected?
- Could you explain the ACE-STP list for me:
  - How do you use it?
  - What's the difference between an enhancement and an issue?
- What is your opinion about the ATRACK (the Activity Tracking System from Boston head quarters)? Are you managing to fill your activities daily? How do you remember what you did? Has ATRACK changed the way that you look at your work, I mean, are you thinking now about your work as being a set of projects? Do you think about your work as a set of projects? How do you define your work?

## **5. MULTITASKING & INTERRUPTIONS**

### **Issues to be covered**

- *Own perception of multitasking and challenges to manage multiple activities*
- *Challenges to handle interruptions*

### **Questions**

Many times people are able to do two or more activities at the same time, this is what we might call multitasking.

- Do you like to multi-task? What kind of things would you say that you can do simultaneously?
- Now, in terms of activities would you say that you multi-task activities or prefer more to finish one and then to start a new one? Do you usually achieve that?
- About Interruptions: I would like to understand how do you go into resuming pending activities after you experience an interruption. Let's say somebody shows up or calls you, or you had a break for lunch or you just have to leave to go home? How do you go into recovering and reassuming what you were doing before the interruption?
- What kind of interruptions are more disruptive for you? Why

## **6. WORK AT HOME**

### **Issues to be covered**

- *Telecommuting*
- *Balance between work and family*

### **Questions:**

- Do you check your email (work email) after your leave work or over the weekends?
- Do you receive calls from work at your home?
- Do you have to come on weekends to attend things here in the office?
- How often do you take work to home? What is your experience so far?
- What do you like about working from home? What do you miss when you work from home?
- Do you have an office room at home?
- How do you access the company network? Have you had any problems accessing the network or resources?

## **7. TIME MANAGEMENT AND CONTACT MANAGEMENT**

### **Issues to be covered**

- *Use of calendar (both electronic and paper).*
- *Use of meeting management software.*

### Questions:

Let's start the interview today talking about your time management strategies. Just tell me in general what kind of things you do to manage your time?

- Do you use the Calendar provided by Outlook regularly?
- Do you use any other calendar or agenda? Do you keep a personal agenda?
- Are you satisfied with your current time-management strategies?
- Do you forget appointments?
- When you need to get the phone number or address of a person in what do you use (Outlook, agenda, Phone, or what)?

I have seen that you programmed some reminders in Outlook, what are the main uses or things you have to remember?

I noticed that sometimes when looking for a phone number you created a new message, press the To: button and then got from the address book the data you needed. Could you explain to me how this it work?

## 8. PAPER and COMPUTER SETTINGS

### Questions:

Paper: I have notice that in spite that you have the computer, you still need paper to conduct some parts of your work. Could you describe to me what do you feel is the role of paper to conduct your work?

- What information do you print out and keep both in electronic and paper format?
- Do you print out emails? Why?
- Do you print out other documents? Why?
- Do you delete the documents in your computer once you print out them?

Computer Settings:

- Is there any set of typical applications that you open and use each day?
- Is there any set of typical applications that you open and use for certain things?
- Do you switch off your computer everyday? Why? Why not you keep it just locked?

## 9. WORKING WITH MULTIPLE DISPLAYS

You are one of the persons that uses Berg terminals. So you have to be working with more than one display. Usually people only work with a single screen in a PC. Here you have three screens and sometimes I have seen you using the three at the same time.

- From your own perspective how is like to be working, everyday with more than one screen?, What are some of the advantages and disadvantages of having multiples screens? About working with Berg terminals:
- I have noticed that many times you are working switching from the PC to the Berg terminals: Would you prefer to integrate both systems in your PC such as JXT has in his setting? What are the main advantages or disadvantages of having these two systems/displays?
- What is the typical use that you give to the left screen? And the right screen?

## 10. USE OF PHYSICAL SPACES AND ARTIFACTS

### Issues to be covered

- *Organization of desktops, file cabinets, walls.*
- *Main artifacts used to perform their job*
- *Reference material.*

- *Artifacts used to coordinate tasks with colleagues: Shared boards, Post-it notes, group calendars.*

**Grand Tour Question:**

Let's suppose that you will be away for a long time and I will be here, and I have to be aware of how everything is organized here in case you need something during the time you will be away. So, please explain to me why information, documents or things are in each location, how you use them, where they came from, etc.

**11. MANAGEMENT OF INFO & COMM TECHNOLOGY**

**Issues to be covered**

- *Use of notepads*
- *Use of email, instant messaging*
- *Use of cell phone, phone, etc.*
- *Web usage*
- *Contact management*

**Questions**

I noticed that you own an notepad that you use some times while conducting your work.

- Can you explain what are the main purposes and uses of that notepad?
- How often do you recheck or consult the information you wrote down there?
- For what purposes do you use each account?
- Do you have to transfer information (email messages) from different accounts?

About Email:

- I noticed that you have set a sound in Outlook so you get it whenever a new message arrives, Do you find this more convenient for you instead of having window popping up in the screen or just small icon in the task bar near the windows clock?
- How do you organize your email messages? What folders do you use to organize your email? Do you apply filters to your email?

**12. COMPUTER ENVIRONMENT**

**Issues to be covered**

- *Ways to organize information in the computer*
- *Integration of information from sources other than the computer*
- *Information in the computer vs. information that exist in paper documents.*
- *Email organization*
- *Searching for information in the computer*

**Grand Tour Question:** Let's suppose again that you will go to away for a long time, please describe to me the way on which you organize your files and documents in your computer,...., How do you organize your mailboxes in your email client,...., How do you organize your contacts in your computer,...., How do you organize your web bookmarks? How do you organize the email attachments?

## Appendix B

### Example of a General Guide for Follow Up Interviews

**Note:** Follow-up interviews were conducted with the purpose of checking the changes and evolution of some activities and emphasize my understanding of some specific aspects. They were conducted in a less structured way than the general interviews and were shaped to suit the specifics of each informant. The themes and questions discussed in each interview varied as each informant experienced different salient aspects of the phenomenon. The guide presented here was used for the first follow up interview with Ronald a manager at Venture.

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#### Follow up Interview Guide

**Informant:** Ronald **Role:** Manager **Date of Interview:** August 5, 2004

**Researcher:** Victor M. González **Follow up interview #:** 1

#### GENERAL TOPICS TO DISCUSS

##### Interruptions

“An important part of the study I am conducting is to understand the sources of fragmentation of activities. One of those sources are interruptions. For instance when you get a phone call in the middle of doing something, or when somebody comes to your office without a previous appointment. I observed a few situations like those when I was with you. Along those lines...”

- How much interruption do you experience in a daily basis? And for what kind of reasons you usually get your work interrupted?
- What are you feelings about interruptions? Do you like them or you minimize them?
- Now how often do you think that you interrupt yourself? What I mean is that for example, you are working on a document and then you decide to do something else which is not related with the stuff you are doing.

##### Top priorities

“During our first interview, we were talking about your top priorities. You mention three of them as your top ones: raising money, getting physicians sign up, and the training efforts. Along those lines...”

- How all those three main priorities have evolved in the last two weeks? What kind of things you have been doing related with each of them?
- Are you changing priorities at this point? Are you having more or different priorities?
- He also mentioned an investment banker: What is his name?

“Related with top priorities, during my observation I saw that you are concerned with other projects outside Venture. I remember you mentioned that you have some issues related with the previous company you where with. Along those lines...”

- What are your top priorities outside Venture? What are the main projects you are working on?

##### Use of Technologies

“I have some specific questions about the use of some technologies. For this part, if possible, I would like to take pictures. Along those lines, let’s start with..”

- I would like to know how you use your Notebook. What kind of things do you keep there? Can you give me examples?
- For what communications do you prefer to use his SBC Yahoo email account.
- Ask him about for what kind o things he prefer to use his easel pad. Take pictures about some of the sheets and ask him for what purposes he use those.

**Mobility**

“In regards the mobility, I would like to know what are you experiences as a mobile worker. I mean, you have this office here, but you also have one in DDDD. What kind of challenges does impose to you the fact that you have to interact from there some day of the week?

- Is there any chance to observe NOG working at his office in DDDD?
- How fundamental is for a manager to have social contact with executive staff, how does he compensate for it when working from DDDD?

Important: Get copies of his Calendar for the days he was observed July 22, 27 and 29.

# Appendix C

## End of the Day – Format

### End of the Day Session Sheet

Informant Code: \_\_\_\_\_

Date: \_\_\_\_\_

Issues or things that I worked on today	Rankings (Higher/Normal/Lower)	
	Level of Importance	Level of Urgency
1. _____	<input type="text"/>	<input type="text"/>
2. _____	<input type="text"/>	<input type="text"/>
3. _____	<input type="text"/>	<input type="text"/>
4. _____	<input type="text"/>	<input type="text"/>
5. _____	<input type="text"/>	<input type="text"/>
6. _____	<input type="text"/>	<input type="text"/>
7. _____	<input type="text"/>	<input type="text"/>

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## Report of Observation

Code: OR 02 KIM 03312004

Date: Wednesday 03/31/2004

Time observed: 9 hours and 7 minutes

From: 8:25AM to 5:32PM

Subject: KIM

Researcher: Víctor González

Time	What was he doing...:	Tools used	Persons	Notes
8:25:27	She is in – Logs in	PC	KIM	
8:25:59	Around 20-30 new emails – She starts deleting some	Email client	KIM	
8:26:26	Reads email from Tony Trade Manager – Original message sent by Terry Randall to BB, AUG, ROSS, GEOR Those messages were sent to her by Tony. They were sending messages about what Yang wants (PIMCO). This is a list of the expectations of Yang with comments from BB	Email client	KIM	
8:29:52	She continues checking email – deletes some of them	Email client	KIM	
8:30:31	Reads a message from client Leaves it open	Email client	KIM	
8:31:01	Replies a message to Yang. This is the same message that she sent to Lydia yesterday, it was then sent to Yang	Email client	KIM	
8:32:09	Continues deleting some messages – Berry, JRJR about ATRACK usage	Email client	KIM	
8:33:41	She continues – Checking reply message she sent yesterday (Gentlemen – the CTS – Collateral) Reply of JOE	Email	KIM	
8:34:42	Dials Tony - Now, concerned... - Terry why he thinks we are behind? - He misunderstood what I said - Did I missed*the boat here, I thought it was clear - I do not want him telling AUG why he...	Phone	KIM, Tony	
8:36:00	- Ok bye!	Phone	KIM, Tony	
8:36:15	She starts composing a message for Terry. "Just want to clarify that MS is	Email client	KIM	

## Appendix E

### Example of Coding

**Note:** The following two extracts show examples of the ways that data were codified using open coding as well as using axial coding to define properties and dimensions. These extracts are presented here just as illustrations. The coding presented here correspond to a category titled: “Overview Consolidation – work resumption” which refers to the behaviors of the informants to cope with the fragmentation of activities.

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#### Interview Transcript (Bryan - Developer) - CODED

Victor: The first topic that I have is about planning of activities, basically what I want to talk about here is about how you go into planning the things you do everyday, so let's talk a little bit about how you go into deciding what to do in a day and in which order you would do the things.

BRYAN: OK. Let's see, I suppose chronology, I start, like if I come in [**landing**] one of the first things I do is a check my email [**message container**] to see if anything important [**"while I was away" events**] has happened during the time I have been away [**period away**]. Most of the time there is one or two things that demand attention early in the day [**expected workload**], and I usually make a decision [**"what to do next" definition**] about how important those are [**importance evaluation**], take a look on my calendar [**appointment container**] to see what it is, meetings [**time critical action**] that I have for the day, so also take a look on my calendar [**activity list**], on Monday I have to probably read it [**memory refresh**] but most of the rest of the week, coming to work I know what I am working on right now [**setting up "what's going on"**], but you know, over the weekend [**period away**] I usually forget so I have to read [**memory refresh**] what I am doing on Monday again.

---

#### CODING

**High order Category:** Overview consolidation – work resumption

**Category:** Landing

**Definition:** This category refers to the occasions when people resume work after some period away from the office. It could be after a weekend, after a vacation or once they start the working day. This category covers the actions done by individuals during "landing".

**Subcategories (properties) [dimensions]:**

Period away	[one night... some weeks]
"While I was away" events	[unimportant ... important]
Messaging repository	[voice, email, artifacts, or notes]

**Category:** "What to do next" definition

**Definition:** This category refers to the time spent by the individual on defining the next action to be performed.

**Subcategories (properties) [dimensions]:**

Expected workload	[high... low]
Importance evaluation	[unimportant ... important]
Time critical events evaluation [approaching within hours ... far away - same day]	
Hierarchical status of co-workers evaluation	[lower t. me.... higher t. me]
Prioritization	[non detailed ... detailed]

**Category:** Retaking "what I was on"

**Definition:** This category refers to what is involved on resuming work after some interruption due to execution of other actions. The work is resumed within the same day.

**Subcategories (properties) [dimensions]:**

Period unfocused	[minutes ... hours]
Activity repository consultation	[email, paper list, planner, Outlook]
Origin [Overwhelmed by immediate activities]	

**Category:** Setting up "what I am working on"

**Definition:** This category refers to effort that people make to become aware of the things more relevant for them at the moment. This effort consists on an internalization process that involves the consultation of activity lists from where relevant items are pulled out.

**Subcategories (properties) [dimensions]:**

Memory refresh	[daily ... weekly]
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# Appendix F

## Coding Scheme and Data on MAXQDA

**Note:** The MAXQDA system was used to facilitate the coding of data. The following figures show the coding scheme (Code System) used to facilitate the analysis of the way people create and consolidate their overviews. The figure presents a general screen shot where both the coding scheme and some retrieved segments are shown. It is important to understand that as the analysis was consolidated, the categories and the coding schemes were adjusted.

