2008

# By When Do You Need This Done? Discovering Knowledge Workers' Time Management Practices

Dezhi Wu
*Southern Utah University*, wu@suu.edu

Katia Passerini
*New Jersey Institute of Technology*, pkatia@njit.edu

Michael R. Bartolacci
*Penn State University - Berks*, mbartolacci@aol.com

Follow this and additional works at: http://aisel.aisnet.org/amcis2008

# By When Do You Need This Done? Discovering Knowledge Workers' Time Management Practices

**Dezhi Wu**

Computer Science & Information Systems
Department
Southern Utah University
Cedar City, UT 84720
Email: wu@suu.edu
Homepage: http://www.suu.edu/faculty/wu/

**Katia Passerini**

School of Management & College of Computing
Sciences
New Jersey Institute of Technology
University Heights, Newark, NJ 07102
Email: pkatia@njit.edu
Homepage: http://web.njit.edu/~pkatia

**Michael R. Bartolacci**

Information Sciences and Technology
Penn State University – Berks
P.O. Box 7009
Reading, PA 19610
mbartolacc@aol.com

## ABSTRACT

This research investigates knowledge workers' individual time management practices. At an academic institution in the United States, a set of in-depth semi-structured interviews was conducted to explore how individual knowledge workers manage their time demands and respond to the temporal norms and boundaries designed by their organizations. This research extends and applies taxonomies used for knowledge management to time management. Based on the qualitative analysis, a variety of approaches to managing time were identified. Personal time management practices mainly involve individual and organizational constraints that guide the perception of time and the allocation of resources around deadlines, distinguishing between work and family contexts. Moreover, the research shows that knowledge workers focus on conditional knowledge of time (i.e., understanding when the deadlines are), and pragmatic knowledge (i.e., finding out appropriate strategies for achieving time management goals). Study limitations and future research opportunities are also discussed.

### Keywords

Time management, knowledge management, time, time management systems, knowledge, knowledge management systems

## INTRODUCTION

Time dominates the rhythm, pace and productivity of people and organizations. The objective of this paper is to understand how time is perceived and managed by knowledge workers in organizations. Our focus is on individuals in organizations that are both producers and users of information and knowledge (Wolff**,** 2005). To obtain a more holistic picture, we also differentiate between individual's time management strategies when dealing with work and institutional tasks as opposed to those for personal and family endeavors.

We relate this quest to knowledge management for multiple reasons discussed throughout the paper. First, our units of analysis are knowledge workers (as defined above), who have both implicit and explicit strategies for managing time. Understanding these strategies empowers organizations to achieve productivity gains from their human capital. It is important for organizations to better comprehend how people experience and react to time constraints and prioritize actions when they have conflicting demands. These prioritization and management mechanisms are often tacit and making

them explicit may inform the design of new time management tools (such as shared calendar tools) that currently facilitate meeting management in organizations. The elicitation of tacit time management knowledge is indeed a knowledge management process.

Moreover, information and knowledge in organizations often carry a time-dimension. Time affects the relevance, reliability and usefulness of information and knowledge assets and can either enrich information with a contextual component or may render older information obsolete. Consistent with the definition of knowledge, which increases effective actions and influences future actions (Huber, 1991; Nonaka, 1994; Alavi and Leidner, 2001), a successful time management experience can be described as one that effectively assigns priorities to actions thereby enabling the achievement of future goals (Richards, 1987). Despite the importance of this temporal dimension, research on exploring how individual perceptions of time affect organizational knowledge creation, storage, retrieval and application is still scant in the literature. In particular, at the individual level, it is unclear how knowledge workers (who play a key role in generating and applying knowledge) deal with temporal constraints. It is also unclear how they define and apply time management knowledge into meaningful contexts and further generate new knowledge.

We intend to explore how individual knowledge workers manage their time demands and respond to the temporal boundaries designed by their organization. This entails the exploration of how time management knowledge is created, retrieved, stored and applied in work and life contexts. This research extends and applies taxonomies used for knowledge management to time management. The manuscript first introduces relevant theoretical foundations including a literature review on time management and key knowledge management concepts. Relevant theories are reviewed and synthesized into a framework that adapts knowledge management taxonomies to map different perceptions of time. We then introduce the analysis of time management experiences based on interviews with selected knowledge workers in a U.S. academic institution. A preliminary coding analysis of the interviews is presented to review time management experiences of individual knowledge workers as well as their time management knowledge creation, storage/retrieval, transfer and application process. Finally, the study limitations are discussed together with an overview on future work on the design of information technology solutions to enable the improved time management knowledge.

## THEORETICAL BACKGROUND

In this section we review the relevant literature on time management and knowledge management that serves as a theoretical framework for interpretation of the interview data collected in this study.

### Time Management

Organizations are experiencing difficulties in efficiently managing their temporal resources. As a result, people are overwhelmed with multiple pressures to get their work completed on time. Increasingly complex time demands and constraints have been placed on executives and organizations. Therefore, time management is now viewed as a necessary endeavor for companies that wish to remain competitive (Richards, 1987). Organizations need to help their employees pay more attention to key priorities, scheduling and delegation. For the vast majority of organizations, time is "not just an immutable constant…but a cluster of concepts, events, and rhythms covering an extremely wide range of phenomena" (Hall, 1983, p. 13) that need to be managed.

Prior research shows that organizational temporal boundaries impact individual productivity. For example, individual knowledge workers' temporal experiences demonstrate how individual workers perceive time in organizations via juggling through temporal norms and routines around time created by organizations and their personal time constraints to achieve their best personal temporal cycles (Wu et al., 2006).

### Time Management Systems (TMS)

Various software tools have been developed to support scheduling. A common information technology aid for individuals is an electronic calendar or time management tool. Based upon an analysis of surgery scheduling conflict issues, a software decision making tool called "Operation Book" (Egger and Wagner, 1992) was built to strengthen information sharing, resource allocation as well as decision making. A study of the implementation of this tool concluded that scheduling through a computer system fostered a better collaboration. A study with a group of knowledge workers (Wu and Tremaine, 2004) indicated that a few professionals used personal digital assistants to manage their mobility. It concluded that the majority of knowledge worker professionals kept multiple electronic calendars mixed with traditional paper-based tools.

Limited research has been conducted to date investigating the relationship between individual and organizational temporal structures, and specifically how software tools can support more effective time management strategies (Wu, 2005; Wu et

al., 2005). This paucity opens up opportunities for future human computer interaction (HCI) research that addresses the issues of usability and effectiveness of TMS. We will discuss these aspects later in this work.

**Knowledge Management, Knowledge Management Systems and Time Management**

Knowledge is generally categorized into two dimensions: tacit and explicit (Polany, 1967; Nonaka and Takeuchi, 1995). This duality (tacit - explicit) is mirrored in the perceptions of time. Explicit notions of time and deadlines are often clear and articulated. However, individuals and groups within organizations interpret this notion based on special contexts, remarks and situations. For example, a deadline of April 1 for project A may have a different relevance and weight when compared with the same deadline for project B (a higher priority project) or when compared with deadlines determined by authorities. People deal with competing demands in different ways, often making judgments based on past experiences, values and interpretations that are difficult to articulate. Yet, each individual knows exactly how he/she will react in front of a new deadline without the need to codify the implicit time management strategy.

The relevance of the time management and knowledge management is its impact on organizational performances (Berman, et al., 2002). Eliciting, aligning and consolidating individual strategies for managing times may be as important as eliciting and consolidating individual know-how, at least for what concerns task execution efficiency. Alavi and Leidner (1999, p. 6) define knowledge management as "a systemic and organizationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees so that other employees may make use of it to be more effective and productive in their work." Knowledge management is focused on "organizing and making available important knowledge, wherever and whenever it is needed" (Sabherwal and Becerra-Fernandez, 2003, p. 228). The notion of productivity implies time (units produced in a unit of time) and the concept of "wherever and whenever needed" also interlaces with time. Because the value of knowledge is dependent on the context of its use - and time is a critical component of context - knowledge and time management seem also intrinsically related, with time being an attribute of the value of knowledge. For this reason, we piloted the use of knowledge-management related frameworks to investigate explicit and implicit time management strategies of various knowledge workers, following the framework later described in Table 1.

In addition, knowledge management systems are catalogued as a class of information systems designed to manage organizational knowledge. These systems can be organized through taxonomies, yet many of these taxonomies are time-dependent. For example, in the "repository model" of knowledge management (Alavi and Leidner, 2001), the essence of the knowledge repository organization is its update, relevance and timeliness of information resources. Similarly, the "network model" of KM is used to indicate the exchange of knowledge in the online forums and communities, where people can easily find the needed expertise directory and interact with knowledge-holders (Brown and Duguid, 1991) at different times. In the network model, on-line collaboration and learning are also tied to temporal attributes; for example they are organized by synchronous and asynchronous interactions. Time management systems could be embedded in knowledge management systems to help knowledge workers organize their recurrent practices (e.g., work routines) in organizations. In the next section, we present our semi-structured interview procedures for discovering time management knowledge in practice.

**RESEARCH APPROACH**

In-depth semi-structured interviews were conducted with "busy" knowledge workers (professionals who worked over forty hours a week in a U.S. public research university) leading to a total of 348 instances/comments on time perceptions and application. A total of twenty knowledge workers were asked to articulate their time management experiences in the organization. The workers interviewed ranged from the university president, college deans, department chairs, to faculty and administrative staff. All of the interviewees used (or were aware of) the calendar module of Microsoft Outlook, which was the standard application available at the selected academic institution. Some of the respondents also kept additional electronic or paper-based calendar tools to manage different time demands for work, family and kids. The interviews focused on eliciting long-term time management strategies, which included questions on weekly, monthly and yearly scheduling. We asked the interviewees to explain why and how they allocated time for specific meetings, events or other activities scheduled for their work and family in their calendars. The objective of the interview was to identify long-term strategies for managing deadlines in order to extrapolate clusters representing some generic time management frameworks. Sample questions on time management included but were not limited to the following:

1. *When you have too many things to do, what kind of time management strategy do you use to get your work done on time?*

2. *When you have important deadlines, how do you usually handle your family demands?*

3. *When you have too many meetings, how do you deal with more important work?*

4. *Do you feel you lose control of your time? If yes, why? If not, why not?*

5. *Do you usually participate in any social events? If yes, why? If not, why not?*

Another set of follow-up interviews (not included in this analysis) was also conducted about six weeks after the first set of interviews in order to elicit strategies related to the management of short-term demands (daily tasks and interruptions; day-to-day calendars, etc.). The interview transcripts were coded independently by two coders, and an inter-coder reliability analysis was later run to verify the validity of the coding approach.

**Coding Analysis Scheme**

Our interviews were audio-taped and transcribed. The entire transcript has over 350 pages, which were later transferred into a spreadsheet broken down by lines with separate and self-contained statements. Because of the earlier discussed alignment with knowledge management, we adopted selected knowledge taxonomies to identify various time categorizations. We built the taxonomy in Table 1 with specific examples based on Alavi and Leidner (2001)'s review of knowledge definitions. In particular, we looked at four different main coding categories, with each category adding more specificity. The first category (1) deals with the epistemological nature of time (explicit versus tacit) perceptions. The second category (2) classifies the actors (individual, groups, organizations or inter-organizations) which are involved in determining the temporal norms and boundaries. The third category (3) refers to the related processes / activities (creation; storage/retrieval; transfer or application). Finally, the fourth category (4) defines the specific notion / purpose of the scheduled activity (procedural; conditional; relational; pragmatic).

The complexity of the coding scheme enabled looking at each time management statement separately (as described in the next section) as well as together, with different combinations taken jointly (as will be investigated in future research). Each level enabled gaining a holistic view, starting from perception of time (tacit or explicit), with the possibility of identifying if time and deadlines are intrinsically determined by individuals or extrinsically by groups and the organization. In addition, the subsequent levels (three and four) show the key processes used by individuals to manage scheduling, and within those processes, they show the most frequent types of time management strategies (knowing how to manage a schedule; when to complete a task; managing in relation to other people as well as implementing practical and useful time control steps). We describe the results of the analysis of each category in the following paragraphs.

**DATA ANALYSIS AND DISCUSSION**

The coding analysis was based on the four level coding scheme in Table 1. An analysis of general coding frequencies as well as average frequencies for all coding categories was run. To verify the inter-coder coding reliability of the coders, a Cohen's Kappa coefficient (Kraemer, 1982) was calculated using SPSS. We found each of the four main coding categories have reached "substantial" (0.61 < Kappa value < 0.81) and "almost perfect" (Kappa value > 0.81) agreement between two coders (Landis et al., 1977). Cohen's Kappa value for the coding category "related to the purpose/user of time" is 0.833, which is the highest coding agreement. The Kappa values of the other three main coding categories fall between 0.688 and 0.738, meaning "substantial" level of agreement. These Kappa values are shown in Table 2.

We found that in knowledge worker's personal time management practices, the majority of time management knowledge used is explicit (92.8%). The determinants of the temporal norms and boundaries mainly involved individual and organizational actors. Transfer (in this case mostly associated with interactions with groups in the context of meetings) and application processes play a key role in personal time management activities with 105 and 147 out of 348 counts respectively. The primary purpose / use of time was conditional (know-when to complete a task) and pragmatic (useful knowledge for an organization, application of a useful model). Table 3 presents the detailed results of the frequency analysis.

The title of this paper states a common question that people often ask when completing any type of task: *By when do you need this done*? Our results show that even in a context where scheduling self-determination is rather high, organizations are still highly driven by explicit deadlines which are codified and clear to the actors. In fact they seem to be determined by institutional players (bosses or organizational structures) at least 50 percent of the time. However, and this may be unique of an academic institution, respondents were also able to determine when things needed to be done by at least 40 percent of the time, showing a balance between internally and externally driven time demands and the subsequent reactions to these demands.

| 1) Nature (epistemology) of time | |
|---|---|
| *Explicit* | Articulated, generalized and codified understanding of time structures and deadlines. <br> <u>Example</u>: *"I need to grade assignments today." "I always said that I have to return students work in one week."* |
| *Tacit* | Rooted in actions, experience, and dependent on a specific context; not necessarily articulated even in the mind of the user. <br> <u>Example</u>: *"Because - you know - research is not something that you can do from 10 o'clock to 12 o'clock. It's idea generation… Sometimes, I got ideas from casual chats with other people. So I think that's also important." "Or something like that…it is need based, so I don't think we can call it a strategy."* |
| **2) Actors / Users (ontological dimension)** | |
| *Individual* | The definition of time and deadlines is created by and inherent to the individuals. <br> <u>Example</u>: *"I schedule time in the morning to get things done."* |
| *Group* | The temporal norm and boundaries are created by and inherent to the collective actions of a group. <br> <u>Example</u>**:** *"Because you upset other people by not getting things done on time because they have to wait, you upset a whole mechanism."* |
| *Organization* | The definition of time and deadlines are created by and inherent to the organization. <br> <u>Example</u>: *"Well certain priorities are set up by deadlines. There are things that have to be turned in, and done at the university."* |
| *Inter-organization* | The definition of time and deadlines are created and reside outside the organization. <br> <u>Example</u>: *"Some deadlines you just don't meet. For example, there is a deadline for a paper for a specific journal, Sept. 30th and two days before the deadline…"* |
| **3) Related processes / activities** | |
| *Creation* | Involves scheduling to develop new content or enhance existing content. <br> <u>Example</u>: *"Well for the year of my sabbatical my short term goal is to write some papers and get the first draft done of the book."* |
| *Storage/ Retrieval* | Involves using scheduling tools to codify and retrieve deadlines and is articulated through written documentation, structured information in databases etc. <br> <u>Example</u>: *"Well. I use my Palm. But, I don't really…I mean it's kind of like I put down meetings there I don't really…and I put down tasks that I have and make sure that I don't forget them."* |
| *Transfer* | Refers to using time to transfer (information and knowledge) between individuals, from individuals to groups, between groups, across groups, and from the group to the organization. <br> <u>Example</u>: *"But I really enjoyed time I spend time with my students, one on one. That is one of my favorite times during the week. So I enjoy it and I enjoy what comes out of it because students really respond to that individual attention and it's very rewarding for me to do that."* |
| *Application* | Involves focusing on actions and application. <br> <u>Example</u>: *"And it was managing your email traffic. They told us to create folder, where you have folders A, B, C, and D, like your priorities. But the folder D is where you put the e-mails that maybe are your friends' emails. They don't need to be responded immediately, and can be responded later."* |
| **4) Related to the purpose / use of time** | |
| *Procedural* | Know-how <br> <u>Example</u>: *"Inside of my calendar, there are clips. I have like file folder labels; then I have little post-it notes. And I use colors to show the different classes."* |
| *Conditional* | Know-when <br> <u>Example</u>: *"I don't have to come to school on Thursday, Friday, Saturday or Sunday."* |
| *Relational* | Know-with <br> <u>Example</u>: *"If there are parties held for the department, I usually hold the parties, or I attend the parties, and I do that simple because really nice if I go…other people notice, and people appreciate that."* |
| *Pragmatic* | Useful and practical time management <br> <u>Example</u>: *"I try to put due dates that are earlier than the real due dates." "Well not newspapers, usually during the meeting, I am doing grading and skimming articles, reading articles."* |

**Table 1. Taxonomy of Time Management Instances**

Coherently with the nature of an academic institution, the majority of the schedule related to knowledge transfer and application processes, where transfer processes appeared mostly related to the results of group exchanges and meetings. Surprisingly, less than ten percent of the time appeared tied to "creation" activities, which was a disappointing result compared to business organizations, such as 3M and Google, that have learned to provide employees with quiet time for reflection, in the perception that such a practice fosters innovations and creation. Lastly, coding category 4 (use of time) results show that respondents spent most of their time with a clear awareness of "when things are due" (conditional knowledge or know-when) and focused on pragmatic approaches to time management.

| Main Categories | Subcategories | Cohen's Kappa |
|---|---|---|
| 1) Nature of Time | Explicit / Tacit | 0.700 |
| 2) Actors/Users | Individual / Group / Organization / Inter-organization | 0.738 |
| 3) Related Processes / Activities | Creation / Storage/Retrieval / Transfer / Application | 0.688 |
| 4) Related to the Purpose / Use of Time | Procedural / Conditional/ Rational / Pragmatic | 0.833 |

**Table 2. Coding Categories Reliability for Two Coders**

| Main Coding Categories | Coding Subcategories | Frequency | | | | | |
|---|---|---|---|---|---|---|---|
| | | Coder 1 | | Coder 2 | | Mean | |
| | | Count | Percentage | Count | Percentage | Count | Percentage |
| 1) Nature of Time | Explicit | 329 | 94.5 | 317 | 91.1 | 323 | *92.8* |
| | Tacit | 19 | 5.5 | 31 | 8.9 | 25 | 7.2 |
| 2) Actors / Users | Individual | 123 | 35.3 | 150 | 43.1 | 137 | *39.4* |
| | Group | 16 | 4.6 | 26 | 7.5 | 21 | 6.0 |
| | Organization | 188 | 54.0 | 153 | 44.0 | 170 | *48.9* |
| | Inter-organization | 21 | 6.0 | 19 | 5.5 | 20 | 5.7 |
| 3) Related Processes / Activities | Creation | 31 | 8.9 | 35 | 10.1 | 33 | 9.5 |
| | Storage/Retrieval | 69 | 19.8 | 57 | 16.4 | 63 | 18.1 |
| | Transfer | 98 | 28.2 | 111 | 31.9 | 105 | *30.2* |
| | Application | 150 | 43.1 | 145 | 41.7 | 147 | *42.2* |
| 4) Related to the Purpose / Use of Time | Procedural | 33 | 9.5 | 63 | 18.1 | 48 | 13.8 |
| | Conditional | 132 | 37.9 | 91 | 26.2 | 111 | *31.9* |
| | Relational | 38 | 10.9 | 69 | 19.8 | 54 | 15.5 |
| | Pragmatic | 145 | 41.7 | 125 | 35.9 | 135 | *38.8* |

**Table 3. Coding Categories Frequency Analysis**

## LIMITATIONS AND FUTURE RESEARCH

This research is exploratory in nature and as such it tested an approach and analysis framework within a very specific context. The data was solely collected from an academic institution, and thus the results might not be generalizable to other type of business organizations. Being aware of limitation, we plan to conduct this study with more diverse business organizations in the future, and to explore time management knowledge uses in multiple organizations.

Another limitation lays in the need to differentiate categories of time management beyond the four main knowledge categories presented in this manuscript. Preliminary review of clusters of users shows that individual profiles can be enriched with examples and scenarios. We intend to use these clusters to guide the refinement of current TMS that are systems that are yet to show significant interface and functionality improvements (just ask yourself if you are using more than one digital calendars, and if you are – by any means – still maintaining your original manual calendar?). Future studies will identify more accurate TMS system requirements after consolidating and organizing users' profiles. We anticipate the additional clustering analysis and the extension of this research to other organizations will offer significant input to the design of evolving time management systems (TMS) that are emerging to respond to the new challenges of the broadband (and "always on") economy.

**ACKNOWLEDGEMENTS**

**REFERENCES**

1. Alavi, M., and Leidner, D. E. (1999) Knowledge management systems: Issues, challenges and benefits, *Communications of the Association for Information Systems (CAIS),* 1, 1-37.

2. Alavi, M. and Leidner, D. E. (2001) Knowledge management and knowledge management systems: Conceptual foundations and research issues, *MIS Quarterly*, 25, 1, 107-136.

3. Berman, S. L., Down, J., and Hill, C. W. L. (2002) Tacit knowledge as a source of competitive advantage in the national basketball association, *Academy of Management Journal*, 45,1,13-31.

4. Brown, J. S. and Duguid, P. (1991) Organizational learning and communities of practice, *Organization Science*, 2, 1, 40-57.

5. Egger, E. and Wagner, I. (1992) Time-management: A case for CSCW, *Proceedings of the ACM Conference on Computer-Supported Cooperative Work*, 249-256.

6. Hall, E. T. (1983) The dance of life: The other dimension of time, Anchor Press, Garden City, NY.

7. Kraemer, H. C. (1982) Kappa coefficient. In S. Kotz and N. L. Johnson (Eds.) *Encyclopedia of Statistical Sciences*, New York: John Wiley and Sons, 352-354.

8. Huber, G. (1991) Organization learning: The contributing processes and the literatures, *Organization Science*, 2, 1, 88-115.

9. Landis, J. and Koch, G. G. (1977) The measurement of observer agreement for categorical data, *Biometrics*, 33, 159-174.

10. Nonaka, I. (1994) A dynamic theory of organizational knowledge creation, *Organization Science*, 5, 1, 14-37.

11. Nonaka, I. and Takeuchi, H. (1995) The knowledge-creating company, Oxford University Press, New York.

12. Polanyi, M. (1967) The tacit dimension, Anchor Books, New York.

13. Richards, J. H. (1987) Time management: A review, *Work & Stress,* 1, 1, 73-78.

14. Sabherwal, R. and Becerra-Fernandez, I. (2003) An empirical study of the effect of knowledge management processes at individual, group, and organizational levels, *Decision Sciences*, 34, 2, 225-260.

15. Wolff, E. N. (2005) The growth of information workers in the U.S. economy, *Communications of the ACM*, 48, 10, 37-42.

16. Wu, D. and Tremaine, M. (2004) Knowledge worker adoption of time management tools: Satisfaction and perceived effectiveness, *Proceedings of the Tenth Americas Conference on Information Systems*, New York City, NY, USA, 3444-3453.

17. Wu, D., Tremaine, M. and Hiltz, S. R. (2005) Time experience within an organization: How do individuals manage temporal demands and what technology can we build to support them? *Proceedings of the Eleventh Americas Conference on Information Systems*, Omaha, NE, USA, 3445-3454.

18. Wu, D., Tremaine, M. and Ngugi, B. (2006) Personal use of temporal structures involving electronic time management systems, *Proceedings of ISOneWorld,* Las Vegas, NV, USA.

19. Wu, D. (2005) Supporting individual time management through the capture and display of temporal structures, PhD Dissertation, New Jersey Institute of Technology, USA.