Temporal Knowledge: Understanding Time Management through Knowledge Management Lenses

Dezhi Wu  
Southern Utah University

Katia Passerini  
New Jersey Institute of Technology

Abstract

Understanding which strategies today’s knowledge workers utilize to manage their time empowers organizations to gain productivity and even competitive advantages. Research on time management generally focuses on applications (the “how-to”) with the objective of uncovering best practices. In this paper, time management is linked to knowledge management, and traditional knowledge management frameworks are used to interpret implicit and explicit temporal organization strategies used by individual knowledge workers. Interview and field observations were used to uncover implicit
motivational drivers for time management adopted by busy knowledge workers. The data analysis results present an individualistic and explicit approach to time-management from a knowledge management point of view.

Keywords: Time, time management, knowledge management, temporal knowledge, tacit knowledge, explicit knowledge, knowledge workers.

Introduction

Today’s knowledge workers are taxed with increasingly pressing project deadlines: they need to work more efficiently to get their tasks completed while managing dynamic requirement changes throughout the workday. Understanding the strategies these professionals utilize to manage time will empower organizations to gain more productivity and competitive advantages. Knowledge workers are both information and knowledge users and producers (Wolff 2005). Prior research (Wu et al. 2008, Wu 2009) finds that professionals’ time management practices become part of the knowledge that organizations need to manage. However, because of the complexity of time phenomena, time management has been an under-researched area (Ancona et al. 2001) and research on exploring how knowledge workers process their time management knowledge (we refer to it as “temporal knowledge”) is still scant. In practice, knowledge workers use both explicit and implicit time management strategies for organizing their time. For example, they may use explicit deadlines to prioritize tasks or they may have implicit motivations (task difficulty level, authority of the recipient) for being productive.

This research aims to investigate what types of temporal knowledge are being utilized in knowledge workers’ time management practices, which are personal and mostly stored in the individuals’ mind. We look at this issue from a knowledge management perspective because implicit (or tacit) knowledge is hard to codify, yet it carries rich information and contextual successful strategies that could be replicated. Understanding how temporal knowledge is organized and stored can ultimately demonstrate whether new strategies for individual temporal knowledge extraction should be put in place, and can lead to an investigation of how to effectively implement these new strategies. Taking a knowledge management perspective enables classifying mechanisms for creation, storage, transfer and application of temporal knowledge. Starting from this classification, future research can be further extended into programmatic actions.

The manuscript first introduces what knowledge is and the relationships between time management and knowledge management. Following a description of the research approach and procedures used to collect the data, the preliminary study results are reported. Lastly, ongoing activities and future research directions are discussed.
Theoretical Background

Knowledge

Knowledge is one of the most important assets that organizations own. The more contextual and unique it is to an organization (i.e., difficult to replicate), the higher its value is. Knowledge is often embedded in organizational routines, policies, culture, norms and documents. Organizations focus on knowledge to increase effective actions and influence future actions (Alavi and Leidner 2001). Knowledge in organizations is classified as explicit and tacit (Nonaka 1994). Explicit knowledge is often codified and communicated in symbolic and natural language. Tacit knowledge is rooted in action, experience, context, and embodies cognitive and technical elements. As such, tacit knowledge is difficult to imitate and capture (Spender 1996), since it is often stored in individuals' minds. As Alavi and Leidner (2001, p. 110) state, “because knowledge is personalized, in order for an individual's or a group's knowledge to be useful for others, it must be expressed in such a manner as to be interpretable by the receivers.” At the individual level, knowledge is more dynamic, since individuals' knowledge is invisible to the external world and individuals have flexibility and control to apply their knowledge into their own unique contexts. Individuals increase their organizational knowledge through learning by doing (Argote 1999). Within the time management context, it is unclear what types of temporal knowledge are being utilized by individuals to undertake their tasks, such as to set up their priorities for achieving productivity. This is the goal of this research.

Nonaka (1994) proposes a classic paradigm for managing the dynamic aspects of organizational knowledge. The role of the individuals was emphasized during the knowledge conversion (KC) process, which is regarded as a process whereby an individual is affected by the experiences of others. For example, he mentions that “the prime mover in the process of organizational knowledge creation is the individual. Individuals accumulate tacit knowledge through direct 'hands-on' experience” (p. 21). Furthermore, Nonaka proposes four modes of knowledge conversion through interactions between explicit knowledge and tacit knowledge: (1) from tacit knowledge to tacit knowledge through interaction between individuals - referred to as “socialization”; (2) from explicit knowledge to explicit knowledge through the exchange and combination of explicit knowledge held by individuals - referred to as “combination”; (3) from tacit knowledge to explicit knowledge through a process of mutual interaction - referred to as “externalization”; (4) from explicit knowledge to tacit knowledge through traditional node of learning - referred to as “internalization.”
Individuals are regarded as the main drivers of informal knowledge transfer (Gupta and Govindarajan 2000; Pfeffer and Sutton 2000), especially when tacit knowledge is concerned because tacit knowledge resides in individuals’ minds. A study of a group of senior knowledge managers from a variety of industries in the United States and Canada who participated in a day-long focus group study reveals some successful tacit knowledge transfer initiatives within organizations. This study concludes that the best knowledge practices need a fit between different types of knowledge and its specific organizational contexts (Smith et al. 2007).

Anderson’s ACT model (Anderson 1983) divides knowledge into "declarative knowledge" (i.e., explicit knowledge) and "procedural knowledge" (i.e., tacit knowledge). In this model, it hypothesizes that explicit knowledge has to be transformed to tacit knowledge in order to develop cognitive skills. This is a knowledge interaction process consistent with the "internalization" mode that Nonaka (1994) proposed. The ACT model was then further expanded. Zack (1998) distinguishes knowledge as declarative (know about), procedural (know how), causal (know why), conditional (know when), and relational (know with).

Dixon (2000) indicates that knowledge makes a meaningful link between information and its application in a specific setting. Gladwell (2000) identifies three approaches to promote knowledge transfer: (1) to have an effective facilitator, who has the ability to persuade others to promote knowledge transfer; (2) to have high-quality memorable content; (3) to create an open environment for people to be more engaged with learning and knowledge transfer. In terms of the relationship between time and knowledge, Massey and Montoya-Weiss (2006) propose a useful model to understand the temporal fabric of knowledge conversation (KC) in the media selection and use context. This process involves exchange of exiting knowledge and potential creation of new knowledge. The researchers consider the KC as a dynamic, time-dependent and experience-dependent process, and they especially propose that the temporal behavior engages in the KC process. They also explain that the KC process occurs through a series of interactions over time and take two fundamental forms: (1) indirect KC, characterized as solitary work by individuals interacting with a knowledge artifact, such as documents, diagrams and procedures, and (2) direct KC, characterized as communicative activity between participants (human-to-human). It can also be complemented by using knowledge artifacts, which consist of documents, diagrams and procedures etc. Knowledge repository systems facilitate the access to knowledge artifacts, which make structured and explicit knowledge available to an organization and its members.

Knowledge Management and Time Management

This research relates time management to knowledge management because most organizational knowledge artifacts often carry a time
dimension. Time affects the relevance, reliability, and usefulness of information and knowledge assets. It can either enrich information with a contextual component or it may render older information obsolete. Alavi and Leidner (1999) define knowledge management as a systematic and organizational process for acquiring, organizing, and communicating both tacit and explicit knowledge to make employees more effective and productive in their work (by reducing duplication and facilitating timely access to information). This overlaps and is consistent with the objectives of time management. Therefore, we suggest that time management is part of knowledge management, and that the strategies to manage time (temporal knowledge) should be captured, utilized and transferred.

The theoretical foundation of this research primarily relies on the definitions and taxonomies of knowledge reviewed by Alavi and Leidner (2001), which classified knowledge in various categories: (1) tacit and explicit; (2) individual and social; (3) creation, retrieval, transfer and application; and (4) procedural, conditional, relational and pragmatic knowledge. Most of these classifications are elaborated from the literature discussed in the earlier part of the theoretical review. We adopted and added specific time dimensions into these taxonomies to define the coding scheme and framework to interpret our findings.

In our research, explicit temporal knowledge is defined as articulated, generalized and codified understanding of time structures and deadlines, such as project deadlines, and tacit temporal knowledge is rooted in actions, experience, and dependent on a specific context; not necessarily articulated even in the mind of the user. Mapping Alavi and Leidner’s taxonomy (2001), we classify temporal knowledge into individual, group, organization and inter-organizational knowledge, which is determined by who created the knowledge. For example, individual temporal knowledge is described as a definition of time and deadlines created by and inherent to the individuals. When we relate temporal knowledge to knowledge management processes or activities, temporal knowledge process is split into creation, storage/retrieval, transfer and application processes. Lastly, when we consider the purpose of time use, we divide temporal knowledge to procedural, conditional, relational and pragmatic types. One example of pragmatic temporal knowledge is whether the knowledge is useful and practical for time management practices.

The problem that we are investigating relates to the distribution of daily activities and tasks across the above mentioned categories of knowledge. If one finds that most time management knowledge is tacit, individually-based, and pragmatic, then socialization strategies should be put in place to transfer know-how. By classifying temporal structures by types, relatedness, processes and purpose, issues and limitations can be elicited and opportunities can be shaped. More details of these temporal knowledge taxonomies are discussed in the data analysis and study findings section.
Research Methodology And Procedure

In this study, a group of twenty knowledge workers including full-time faculty members, administrators and staff were observed and interviewed in a US East Coast academic institution. Through sharing their personal time management stories, the interviewees disclosed their perceptions of organizational temporal structures, and their personal strategies for responding to a variety of different temporal demands (i.e., to balance work and family life). All personal stories shared in the interviews were audio-taped and transcribed.

Professionals work on different tasks in their unique contexts. To gain rich time management information, we asked each professional to describe their long-term, time-management strategies. Individual knowledge workers shared their stories on how they managed their time at the workplace and, sometimes, in their personal lives. The first author also conducted field observations in each individual's office to see how a "typical" day looked like and to capture the flow of interruptions.

To identify individual characteristics of time management, it is important to understand their psychological time perception. Waller et al. (2001)'s work provides a good indication to learn individual time management behavior, especially in terms of individuals' time perspective, which refers to how people do their time planning and execution in terms of past, present, or future (Kluckhohn and Strodtbeck 1961; Zimbardo et. al 1999). Individuals who have more future time perspective are seen to be highly goal-oriented individuals (Bird 1988; Das 1987), and are more likely to be effective time managers (Wu 2009). Therefore, it is useful to learn how individuals handle their short-term tasks, and whether they also have a long-time plan to better manage their time.

Through reviewing a few popular time management articles and handbooks (Richards 1987; Hall 1983; Morgenstern 2000), we integrated and customized some general questions to measure individuals' short-term and long-term time management strategies as follows:

The following long-term strategy questions guided the interviews:

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?

Following a first visit to ascertain long-term time management strategies, we met with individual knowledge workers again to capture their daily, weekly and monthly scheduling techniques (short-term planning). Because each individual had different stories to tell us, we used different questions to elicit individual short-term strategies. The following questions directed our meetings:

1. What are the most frequent time wasters in your daily work?
2. Does this daily work mirror most of your ordinary life?
3. Can you describe how you get rid of these time wasters?
4. When do you feel you are losing control of your time? Present an example.
5. After reviewing your planned and completed tasks, do you ever change your time management strategies? How?

Data Analysis And Study Findings

Based upon Alavi and Leidner (2001)’s knowledge taxonomy, we created a customized coding scheme to explain the types of individual knowledge in a time management context. We then performed a content analysis to further classify individual knowledge according to "nature of time," "actors/users," "related processes/activities" and "related to the purpose/use of time." The interviews were audio-taped and transcribed and resulted in over 350-page transcripts. Within the text transcripts, a total of 348 instances/comments on time perceptions and applications were identified and captured.

First, we ran a basic frequency analysis on all types of temporal knowledge instances. The following figures (Figures 1-4) demonstrate the percentage distributions of each temporal knowledge classification that we discovered in this study.
Figure 1. Instance Frequency (%) on “Nature of Time”

Nature of Time

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tacit</td>
<td>7.2</td>
</tr>
<tr>
<td>Explicit</td>
<td>92.8</td>
</tr>
</tbody>
</table>

Figure 2. Instance Frequency (%) on “Temporal Knowledge Actors/Users”

Temporal Knowledge Actors/Users

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inter-organization</td>
<td>5.7</td>
</tr>
<tr>
<td>Organization</td>
<td>48.9</td>
</tr>
<tr>
<td>Group</td>
<td>6</td>
</tr>
<tr>
<td>Individual</td>
<td>39.4</td>
</tr>
</tbody>
</table>
In terms of “nature of time,” 92.8% of individual knowledge in personal time management context is explicit, meaning that the majority of temporal knowledge is explicitly captured and recorded in either individuals’ minds or their calendar tools (see Figure 1). A few typical explicit individual knowledge examples in personal time management context were captured from our participants as follows:

• “I set the priority based on the type of the task and due date. Even if it is an administrative non-value-added task, it is due today…”
• “I try to limit the number of meetings that will occupy a lot of my time.”
• “People expect an immediate response from email. And if they don’t get it right away, you will get another email to ask if you got the previous email thirty minutes later.”
• “I would say this task takes about a good third or a half of my day.”

Tacit temporal knowledge can be demonstrated through the following examples:

• “Or if something is need based, so…it is not…I don’t think we call it as a strategy.”
• “Because you know research, is not something you can do from 10 o’clock to 12 o’clock. It is idea generation…Sometimes, I got ideas from casual chats with other people. So I think it is also important.”
• “If I was physically unable to sleep, I could work every hour everyday…and I still would not get done all the papers.”
• “I set up my own rewarding system and give myself little breaks. I also set up a day for if I have to do something difficult…if I have to write something…”

Regarding the temporal knowledge actors/users involved in personal time management practices, individuals and organizations are the two dominant actors, which count for 39.4% and 48.9% of the coding units respectively (see Figure 2). Actors identified as “individuals” can be found in the following examples captured from the transcripts:

• “If I have a meeting at one o’clock…I just allocated time based on the schedule…”
• “We could have this conversation…we could set aside an hour, or an hour and a half for it.”
• “And some family demands absolutely critical. If I have to step in…for example, my wife is out of country until next week, and this means that certain things in our house have to be done…”
• “I am pretty good about not double booking myself.”

“Organizations” as actors can be seen in the time management instances below:
• “That is what happens. I didn’t have time...I had too many meetings, so I went home and I spent a couple of hours answering emails last night.”
• “I don’t get stuck with too many meetings.”
• “So I tell my students I am going to have your grades done on Tuesday, then I feel I have to...”
• “Obviously, the more is work related to important meetings with the dean or things that I have to deliver, then that is my priority A.”

Four knowledge processes are involved in personal time management practices: (1) knowledge application process (42.2%); (2) knowledge transfer process (30.2%); (3) knowledge storage/retrieval process (18.1%); and (4) knowledge creation process (9.5%) (see Figure 3). The following quotes from the interview transcripts provide examples for each category.

“Knowledge application” processes focus on actions and strategies being utilized to meet deadlines or time management goals, which can be inferred from the following time management instances:

• “A lot of work that you don’t do in the meetings.”
• “Sometimes what I will do is that I will look at my schedule and I will realize, for example, that on Friday my schedule is empty, and I will make that a catch up day.”
• “And that is one thing that people in time management say ‘just answer your email once a day’...but the problem is that I don’t finish it...in the time I feel I can allocate to it.”
• “And that is particularly frustrating when I have scheduled time to do some work, and then I cannot focus...”

“Knowledge transfer” process is defined as using time to transfer (information and knowledge) between individuals, from individuals to groups, between groups, across groups, and from the group to the organization. A few instances are captured to show the knowledge transfer process in the personal time management practices:

• “I have office hours when students can meet me.”
• “So if it means that a meeting being held at the Provost or Vice President level obviously has more importance than a departmental meeting.”
• “But all the university level events, I try to participate and enjoy them very much.”
• “If you have something coming up like a meeting and you know you are working on some other projects, but you have to drop and put to the side what you are working on, and focus on meetings.”
"Knowledge storage/retrieval" processes involve using scheduling tools to codify and retrieve deadlines and are articulated through written documentation, structured information in databases etc. Examples are as follows:

- "And roughly rank order, like what I have to accomplish before Monday."
- "I like this October 1st, I had to do slides for coming Monday for that."
- "So if I can put my teaching on one day."
- "Well, I will use my Palm, but...I don't really...I mean it is kind of like I put down meetings there I don't really...and I put down tasks that I have to make sure that I don't forget them"

"Knowledge creation" processes are regarded as scheduling to develop new content or enhance existing content.

- "I try to move through my mundane or repetitive tasks quickly. I try to delegate some of that to help..."
- "One thing about teaching is you do get that summer break, so the other part of scheduling we haven't talked about is annual scheduling."
- "I don't get real research done...so I just do it in summer."
- "When I was working on my dissertation, I had my younger kids at home...then my dissertation had to be put off."

In addition, in terms of the purpose of time use, the frequency analysis results indicate that 38.8% is used for pragmatic purposes, 15.5% is relational, 31.9% is conditional, and 13.8% is procedural (see Figure 4).

"Pragmatic knowledge" refers to useful and practical time management strategies as follows.

- "I set deadlines for everything, and I prioritize them."
- "Every day, my responsibilities are to get them (daughters) both out of bed, get them dressed, get their teeth brushed, and get them ready for school...that is my responsibilities..."
- "You ask for extensions, and sometimes you get them and sometimes you don’t..."
- "Well, this semester, as I said, I am only at school for three days, so I don't need to schedule off-time."
“Relational knowledge” is defined as “know-with” which shows an in-depth understanding of the relationships between time events and an intention to effectively allocate time resources to meet time management goals.

- “So far, my meetings are mostly research-related, and department or administrated types of meetings are limited…”
- “There are times when I will back out of social events.
- “My boss could call me, and I need to respond to him, which will set you back in your schedule.”
- “Wednesday I schedule meetings, so Wednesday is my meeting day…”

“Conditional knowledge” is also called “know-when” which refers to as the knowledge of explicit meeting times, task deadlines and so on.

- “If there are too many meetings, I have to attend those meetings.”
- “I generally call the people who are expecting they are done, that I am not going to get them done…”
- “You will have to spend time outside of meetings, at night or during the weekend, doing the work.”
- “Say, there is a paper revision due…”

“Procedural knowledge” refers to “know-how” meaning practical knowledge in sequence to get things done.

- “I won’t get an article published if I missed my editor’s deadline.”
- “Answering people, who the content of the substance of the response don’t demand that immediately, but if I get it out of the way, then I open up a new vista of time.”
- “Every week, I do a new list at the beginning of the weekend whenever it is.”
- “I schedule my routine work like this on two days, Mondays and Wednesdays.”

Based on the individual interview statements, we performed a content analysis by organizing the interview transcripts into separate temporal knowledge instances (i.e. each statement representing one instance). We coded each statement based on the classification scheme presented in
legend in Table 1, where we determined the categories of temporal knowledge represented in each instance.

Two independent researchers coded the 348 temporal knowledge instances respectively. To examine inter-coder reliability, a Cohen’s Kappa Coefficient analysis was performed. We reached a significant agreement between two coders (Cohen’s Kappa > 0.61), thus reaching a satisfying level in the coding analysis (Kraemer 1982).

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explicit- Tacit</td>
<td>User s</td>
<td>Type of Knowle dge</td>
<td>Types of Use</td>
</tr>
<tr>
<td>Judge X</td>
<td>Judge X</td>
<td>Judge X</td>
<td>Original transcript unit</td>
</tr>
<tr>
<td>e</td>
<td>i</td>
<td>pg</td>
<td>ap</td>
</tr>
<tr>
<td>e</td>
<td>o</td>
<td>cs</td>
<td>ap</td>
</tr>
<tr>
<td>e</td>
<td>g</td>
<td>cd</td>
<td>tr</td>
</tr>
<tr>
<td>e</td>
<td>g</td>
<td>cd</td>
<td>tr</td>
</tr>
</tbody>
</table>

Table 1: Long-term interview transcripts Coding Illustration

Legend:

- Explicit-Tacit: e=explicit; t=tacit
- Users: i=individual; g=group; o=organizational; io=inter-organizational
- Types of Knowledge: d=declarative; pr=procedural; cs=causal; cd=conditional; r=relational; pg=pragmatic
- Types of Use: cr=creation; sr=storage; tr=transfer; ap=application
Conclusions And Future Research Directions

This research categorizes individual knowledge workers’ time management strategies into different types of knowledge. It also recognizes that temporal knowledge, as part of significant organization resources, should be better captured, utilized and managed for achieving and improving both individual and organizational productivity.

At the current stage, we only analyzed the knowledge workers’ long-term strategies, and the analyses of short-term strategies are still ongoing. After these analyses, we plan to further explore whether role differences impact temporal knowledge management processes through incorporating each individual knowledge worker’s profile. How do temporal management strategies differ across organizational hierarchies? What can be learned at the different levels? What are the most effective practices? What are the most recurring concerns? How are knowledge workers dealing with the “always-on” and “always-connected” nature of today’s work environments? These are just some of the questions that we hope to uncover through further qualitative data analysis.

In the meantime, we have extended this study with fifteen staff members in an information technology department at another US West Public University. We expect to find different temporal patterns between faculty’s data from the US East Coast Research University and the IT staff data at the US West Public University. Also, because two sets of participants work for two different academic institutions in the US, there may be organizational cultural differences impacting the perceptions of their time, individual time management strategies and how temporal knowledge is processed. We also plan to find out how and why different organizational time phenomena impact individual productivity and organizational temporal knowledge creation, retrieval, transfer and use.

References


Author Biographies

Dezhi Wu is Associate Professor of Information Systems in the Department of Computer Science and Information Systems at Southern Utah University, USA. She is also a certified project management professional (PMP®). She received her Ph.D. in information systems from the New Jersey Institute of Technology, USA. Her research interests include human-computer interaction, asynchronous learning networks, knowledge management, project management, and healthcare systems. Her work has been published in the IEEE Internet Computing, Communications of the Association for Information Systems, Journal of Asynchronous Learning Networks, Journal of Knowledge Management, Journal of Information Systems Education, Computers & Education, International Journal of Web-based Learning and Teaching Technologies, and a number of conference proceedings. She also published a book entitled Temporal Structures in Individual Time Management: Practices to Enhance Calendar Tool Design in August 2009. She served as the Chair for the Association for Information Systems Special Interest Group on Human-Computer Interactions (SIGHCI) from 2010-2011. Her homepage is at http://www.suu.edu/faculty/wu.
Katia Passerini is Associate Professor and Hurlburt Chair of Management Information Systems (2006-2012) at NJIT. She has published in refereed journals and proceedings (Communications of the ACM, IEEE IT Professional, Communications of AIS, Journal of Knowledge Management, Computers & Education, Journal of Educational Hypermedia and Multimedia, IEEE Internet Computing) and professional journals (Project Management Network, Cutter IT Journal, Cutter Benchmark Review) in the area of computer-mediated learning and knowledge management. Katia's professional background includes multi-industry projects at Booz Allen Hamilton and the World Bank. She is a certified project management professional (PMP®), with MBA and Ph.D. degrees from the George Washington University.