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Personal Temporal Structure Usage in Electronic Temporal Coordination Systems: A Qualitative Study

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ABSTRACT

Temporal structures have been argued to be an important element of business affecting both the processes that are undertaken within an organization and the overall productivity of the organization. As such, it might be considered appropriate for an organization to engage in what can be called temporal coordination in order to ensure that previously ad hoc temporal structures are now used to enhance and integrate business processes. Two in-depth interview studies with management were conducted to explore what types of temporal structures were used by professionals in their temporal coordination processes. The preliminary study results indicate that the majority of temporal structures being used are explicit clock-based temporal structures. This study therefore suggests that system design modifications are needed for enhancing the current electronic temporal coordination systems through incorporating new functions of manipulating more diverse temporal structures (e.g., implicit temporal structures) to achieve more efficient temporal coordination.

Keywords

Time, temporal structures, temporal coordination, electronic calendar systems.

INTRODUCTION

Time is becoming an increasingly important element in today's business world. Information technologies have integrated and advanced business processes, dramatically reducing cycle time. Globalization has increased this temporal intensity so that people today live in a world where a variety of tasks take place in a dynamic temporal context with cyclical and phasic patterns throughout (McGrath, 1990). Research in management has begun to focus on how the organization and structure of time affects corporate performance. The concept of temporal structures has been developed, that is, inherent time structures that control the flow of activities within an organization. Studies have begun to classify these temporal structures and to demonstrate that they can have both negative and positive effects on an organization's performance.

However, the discipline of information systems has only begun to take an interest in this temporal structure area (Boland et al., 2004). In this research, we refer to the management of temporal structures as temporal coordination. This study is part of our preliminary investigation on the current temporal structures and how they impact business processes. The goal is to demonstrate what temporal structures are being used in the temporal coordination systems by professionals with qualitative evidence. Such an approach is nontrivial because temporal structures are often generated externally or at low levels within individual organizational units. Further, they are also embedded in local cultures, and have ambiguous boundaries. Furthermore, globalization connects units of work that have decidedly different temporal structures bringing about further coordination clashes including those of time zone differences. These issues suggest that information systems can be used as coordinating mechanisms, both in terms of capturing unknown but important temporal information and also in providing decision making support for setting appropriate temporal guidelines to improve the fluidity of processes.

This paper proceeds in four sections. The first introduction section above presents the motivation for investigating personal temporal structures usage in electronic temporal coordination systems. The second section briefly presents theoretical background by reviewing the existing temporal structures literature. This is followed by the research design, results and discussion. This paper ends with study limitations and future research discussions.

THEORETICAL BACKGROUND

Temporal structures are a primary concept in organizational behavior and organizational change, which provides a foundation for constructing the regularity of our society (Bluedorn et al., 1988; Clark, 1985; Orlikowski and Yates, 2002). Temporal structures can be defined as patterned organization of time used by humans to help them manage, comprehend or coordinate their use of time (Wu, 2005).

Two key temporal structure categorizations in prior research provide a theory foundation for us to further investigate how users capture and utilize their internal and external temporal information and construct their own time management practices, which inherently involve many temporal coordination activities. One such categorization proposes that temporal structures are composed of three components: (1) explicit schedules, sequencing patterns, and deadlines, which are typically encoded in personal calendars; (2) implicit rhythms and cycles of behavior, which are understood time patterns that are never explicitly stated or written but which are learned and understood by a population of individuals; and (3) socio-temporal, i.e., organizational cultural norms about time (Blount and Janicik, 2001). Orlikowski and Yates (2002) categorize temporal structures into clock-based (e.g., meeting schedules), event-based (e.g., wedding event) and practice-based time (e.g., summer family vacation schedule while kids are free of school). Because some classifications are overlapped in the above two studies and each study proposed somewhat different perspectives of temporal structures, we integrated and re-structured these two existing classifications to form a more consistent and logic classification as our coding scheme to analyze our interview data presented in later sections.

RESEARCH DESIGN, PROCEDURES AND FINDINGS

Two sets of in-depth semi-structured interviews were conducted with twenty busy professionals in a US public research University. All of the study participants used electronic coordination systems at work, such as Outlook. The university setting was chosen because of convenient sampling, and reasonable accessibility of large collections of conflicting time patterns in this setting.

Data was collected on each individual's time management strategies and the types of temporal structures they experienced and used in their temporal coordination. The interviews were then analyzed for evidence of the different types of temporal structures that were in use, e.g., explicit clock-based. The interviewees' roles ranged from busy department receptionist to university president and spanned a diverse set of occupations in between. The interviews lasted between thirty minutes and two hours.

The first set of interviews focused on short-term time management strategies (those involving the current day's scheduling and temporal coordination activities) and the second set of interviews focused on long-term time management strategies (those involving weekly, monthly and yearly scheduling and long-term temporal coordination plans).

The interviews were audio-taped and transcribed, and the transcription accuracy was checked by three researchers. A coding schema (see Table 1) was established to categorize the individual temporal structures mentioned in the interviews into either explicit or implicit temporal

structures. The explicit temporal structures were further broken down into clock-based and event-based, and the implicit temporal structures included practice-based and socio-temporal norms respectively. Using this coding schema, two coders coded the transcripts of the interviews separately. Cohen's Kappa analysis was performed to compute the intercoder reliability for our two interview coding analyses, which were deemed satisfactory (>0.85).

Table 1 shows the detailed coding analysis results. The large majority of the 475 temporal structures that we found in use were explicit clock-based (total = 272) and implicit practice-based (total = 141). After this, explicit event-based (total = 40) temporal structures were used the next most frequently followed by implicit socio-temporal norms (total = 22) temporal structures. The explicit clock-based result is not surprising since most of our respondents were using some form of electronic temporal coordination system (i.e., calendar) to maintain their schedules and these systems only support explicit clock-based temporal structures.

Table 1: Coding Results of Personal Use of Temporal Structures

Type Temporal Structure	No. of Incidences in Short Term Time Management	No. of Incidences in Long Term Time Management	No. of Total Incidences	Mean No. of Incidences	Std. Dev in No. of Incidences
Explicit					
Clock-based	88	184	272	136	67.88
Event-based	13	27	40	20	9.90
Implicit					
Practice-based	36	105	141	70.5	48.79
Socio-Temporal Norm	2	20	22	11	12.73

The use of explicit event-based temporal structures was not as common but still prevalent. Implicit socio-temporal norms were the next temporal structure that was used to a certain extent by our respondents.

The implicit practice-based results were more surprising. Implicit structures and practices were used to guide the allocation of time in the schedule but were typically maintained in the time manager's head or in a note. If they had been encoded in a paper or electronic temporal coordination systems, they would have become explicit practice-based structures, but they often did not have exact start and end times and therefore could not be placed in personal calendars. Evidently, from the coding analysis, implicit practice-based temporal structures are difficult to manage for two reasons: First, implicit temporal structures, in nature, have the most ambiguous temporal boundaries, which make coordination hard to manage. Second, although almost one fourth temporal structure usage belongs to implicit practice-based

temporal structures, the current temporal coordination systems are lack of such functions to support this practice.

Many of the complaints came from the implicit temporal structures category, in particular, because individuals were unaware of the requirements of the implicit structures since this information was not widely disseminated. This made it difficult to perform temporal coordination activities. Another source of difficulty came from temporal structures that could not readily be tied to a clock-based system. This occurred, in part, because current temporal coordination systems do not have mechanisms to support these structures, but also because additional coordinating infrastructure was not in place. Finally, even well structured time units created problems because they were not treated as multi-propertied data items that could be sorted, copied, searched and updated by their properties.

DISCUSSIONS, LIMITATIONS AND FUTURE RESEARCH

Overall, the analysis of the interviews indicated that managers are well aware of the temporal structures that were identified and that they manually encode these structures in their temporal coordination systems when possible.

This research demonstrates that people are mainly constrained by explicit clock-based temporal structures, e.g. meetings, project deadlines, classes etc., which can be easily recorded in the current temporal coordination systems. This may be due partially to the fact that the current systems only support this type of temporal structure.

The ability to create implicit practice-based temporal structures also plays an important role in temporal coordination suggesting that electronic temporal coordination tools might employ techniques for representing these structures and their associated ambiguity. In addition, temporal coordination systems could define events with a detailed structure of tasks to be performed around the event creating support for explicit event-based temporal structures. In this way an event type could be placed without the associated work of entering the sub events.

This study has two obvious limitations. First, it was conducted in an academic institution, so the study results do not necessarily represent an accurate distribution of the temporal structures in use. Second, our study sample was small and the interview captured data at a point in time. In the future, we aim to expand our research to different types of business organizations with more participants. In addition, further in-depth data analyses are required for capturing more useful interface recommendations and systems requirements for building better electronic coordination systems.

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