A CLOCKWORK ORgANisation:

Proposing a new theory of organisational temporality

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Abstract

Time is an inherent quality of human life, yet it remains a hidden dimension in Information Systems (IS) research. In our 'real time' world, time has become a fundamentally important business performance indicator but the hidden costs associated with increased speed in firms are frequently overlooked. In research, there has been a lack of synthesis and coherence on the topic of time, largely because a reliance on myopic measures of time has resulted in a shortage of research on temporal construct associations. To address the conceptual weaknesses in studies of time, the aim of this research is to provide a rich definition and conceptualisation of time in an organisational context. Our framework of organisational temporal performance is based on a multidisciplinary literature review, where variants and sub-components of the concept have originated, matured, and have been applied and tested thoroughly over time. The paper concludes with a discussion of the implications of the study and possible avenues for future research.

Keywords

Organisational temporality; temporal planning; temporal execution; temporal schemata; temporal exactitude; temporal flexibility; time allocation; improvisatory style; monochronicity; polychronicity; tempo rubato*; absolute temporal position; relative temporal position; pace; timeliness; temporal awareness; temporal signification; temporal preference; time pressure; time compression*

1 Introduction

> 'Can an *instantaneous* cube exist?'… 'Can a cube that does not last for any time at all, have a real existence?'... 'Clearly,' the Time Traveller proceeded, 'any real body must have extension in four directions: it must have Length, Breadth, Thickness, and Duration. But through a natural infirmity of the flesh… [we] overlook this fact… [We] draw an unreal distinction between the former three dimensions and the latter, because… our consciousness moves intermittently in one direction along the latter from the beginning to the end of our lives'.
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> H.G. Wells. The Time Machine (p. 6)

Though Time is an inherent quality of human life (Hassard, 1999), our understanding of it is limited because "consciousness moves along it" (Wells, 1995, p. 6). In much the same way, our understanding of time in organisations has been limited (Orlikowski and Yates, 2002). Yet there are many reasons why temporal factors should be of primary concern in managing or analysing an organisation (Lee and Liebenau, 2000b).

1.1 On the importance of time

Firstly, time is a *fundamental business performance indicator* (Ciborra, 1999). For more than fifty years, project completion time has been used to evaluate project success (Atkinson, 1999; cf. Olsen, 1971). Such is the importance of time in organisations that in many cases, time delays are considered synonymous with project failure (Toxvaerd, 2006; Sarkar and Sahay, 2004).

In addition, it is more important than ever to be able to work at speed in today's increasingly high velocity business environment (O Riordan *et al*., 2012b; Eisenhardt, 1989). Indeed, the idea of "real time" suggests that in today's increasingly Internet-dominated world, activities must happen instantly (El Sawy and Majchrzak, 2004; Orlikowski and Yates, 2002). In an age of temporary strategic advantage (D'Aveni *et al.,* 2010), reduced time-to-market has become a strategic objective in many firms (Cohen *et al.*, 1996) and the competitive survival of many organizations depends on delivering projects on time (Staats *et al.,* forthcoming).

Finally, organisations have become so heavily focused on time savings that they overlook the hidden costs associated with increased speed (Rämö, 2002; Merle Crawford, 1992), often failing to recognise that 'faster' is not always 'better' (Kessler and Bierly, 2002). It is well established that time measures and the resulting time pressures, have a significant impact on organisational, group, and individual behaviour. For example, time pressure impairs decision-making (Marsden *et al.,* 2002; Failla and Bagnara, 1992), alters risk evaluation (Kahneman, 2011; Das and Teng, 2001), causes stress (Maule and Svenson, 1993), inhibits creativity and motivation (Amabile *et al.,* 2002; Baer and Oldham, 2006; O Riordan *et al.,* 2011), reduces software quality (Austin, 2001) and negatively affects business negotiations (De Dreu, 2003). Indeed, a growing literature on time highlights conflict between organisational temporal structures – socially enacted temporal patterns of work – and individuals' temporal preferences (Perlow, 1999).

1.1 On the theoretical shortcomings of existing research

Despite the importance and prevalent use of time as an indicator, we argue that the concept of time suffers from a number of significant theoretical shortcomings that hinder temporal studies. Fundamentally, the reliance on myopic measures of time in literature has led to a lack of research on temporal construct associations, and has prevented the creation of cumulative tradition. As a result, researchers have failed to resolve the abstract nature of time.

Myopic measures of time: In studying time in organisations, researchers have rarely gone beyond measuring time-on-task or elapsed time (Kavanagh and Araujo, 1995). Instead, time has been narrowly conceived as a linear continuum of infinitely divisible, quantifiable units that are homogeneous, uniform, regular, precise, deterministic, and measurable (Ancona, *et al.,* 2001a). Fundamentally, these measures "fail to capture the complexity of industrial temporality" (Hassard, 1999, p. 585). It is only by adopting a richer conceptual lens that researchers may begin to think about processes and practices in terms of how fast they are moving, their trajectories over time, the cycles they align with, and the historical positions they take on the continuum of time (Ancona *et al.*, 2001b). In the context of IS research, researchers rarely goes beyond measuring time-on-task or elapsed time (Saunders and Kim, 2007). This myopic use of narrow measures has cost IS researchers the opportunity to fully evaluate the temporal effects of new technologies in organisations and to use that information to design and manage IS/IT in firms (Lee and Liebenau, 2000a; Sahay, 1997; Failla and Bagnara, 1992).

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Lack of research on temporal construct associations: As a construct or variable, time is fundamental to a variety of theories of organizational change and strategic planning, as well as numerous mid-range models such as the product life cycle (Kavanagh and Araujo, 1995). Yet because of the reliance on myopic measures of time, researchers do not generally delve into the temporal dynamics of associations between constructs (Mitchell and James, 2001). More specifically, researchers do not generally report their results in terms of the duration of effects, the time lag between causes and effects, or differences in rates of change in their research (George and Jones, 2000, p. 670). Similarly, decisions about when to measure and how frequently to measure variables are left to intuition, chance, convenience, or tradition (Mitchell and James, 2001). In effect, researchers disregard the temporal complexities of theory and fail to adequately represent the temporal dynamics of theoretical relationships. As a result, researchers are forced to overlook the rhythms or patterns of relationships over time and must rely on "impoverished theory about issues such as when events occur, when they change, or how quickly they change" (Mitchell and James, 2001, p. 533).

Lack of cumulative tradition: A good concept or theory should cumulatively build on existing research (Dubin, 1978), but there is a lack of coherence in research on organisational temporality (Nandhakumar, 2002). As a result,

> we are in a wonderful age of discovery about temporal issues in organisations but with, unfortunately, little comparison and integration across studies. We are lost in a "Temporal Tower of Babel", where we do not understand what others who are building this structure with us are talking about (Ancona *et al.*, 2001b, p. 527).

This lack of synthesis and coherence has resulted in a *failure to resolve the abstract nature of time:* The temporal nature of our being in this world has fundamentally shaped our knowledge and understanding of it: the concept of time pervades everyday language: "time is of the essence": "timing is everything": something can be "just in time" and "a stitch in time saves nine". Yet despite its pervasiveness, the concept of time remains abstract (Jacques, 1982); it is a "hidden dimension" (Das, 2001; Hall, 1966), and remains one of the most elusive concepts related to work (Saunders and Kim, 2007; Sarkar and Sahay, 2004; Massey *et al.,* 2003; Cooper and Rouseau, 2000).

To address these conceptual weaknesses in studies of time, the main aim of this research is to provide a rich definition and conceptualisation of time that can be used to meaningfully evaluate temporality in an organisational context. This paper presents a new conceptual framework of Organisational Temporal Performance that is based on a literature review concentrating on research in Organisation Science and the humanities (including anthropology, economics, sociology, psychology and music), where variants and sub-components of the concept have originated, matured, and have been applied and tested thoroughly over time. The next sections of the paper summarize the pertinent literature and describe the theoretical basis and research approach adopted in this study. The over-arching conceptual framework of time and its sub-components are presented and discussed. The paper concludes with a discussion of the implications of the study and possible avenues for future research.

2 Research Approach

2.1 Approach to Literature Review

A methodological review of past literature is crucial for any academic research (Webster and Watson, 2002) and must be done rigorously and comprehensively (Walsham 2006). Yet authors rarely give much attention to the literature analysis strategy in describing their research (Conboy, 2009). Because this study is based on a review of existing literature, we begin by discussing our approach in detail.

Multidisciplinary review: The concept of time transcends all research boundaries. It is as salient in physics as it is in psychology. Thus, the literature on time in organisations owes as much to research in philosophy and music as it does to research on project management and engineering. Indeed, one of the core motivations for this research was to celebrate the diversity of ideas surrounding the notion of time that are all too often eliminated in research.

Algorithmic search approach: Owing to the broad spectrum of potentially relevant literature, we systematically searched for articles on time, technology and organisations in two journal databases (EBSCO and JSTOR). We then conducted two separate analyses to ensure saturation: a traditional citation analysis and a usage-based analysis. The citation analysis was carried out in accordance with Webster and Watson (2002). More specifically, we looked for references to books and articles on time in organisations mentioned in the bibliographies of the work we had already identified and also examined the research that had since been published

and had cited that work. The usage-based analysis was carried out using the bX^{TM} Usage-Based Services. This service generates a list of related articles based on other users' search behaviours. There was significant redundancy across the results of both analyses. However, the results of the usage-based analysis were not as closely bound to disciplinary borders as the results of the citation analysis. Indeed, the usage-based analysis identified a number of important articles about time in organisations that were outside the bounds of our original search parameters. We were satisfied that the review had reached a stage of completion when our search activities failed to yield any additional articles.

Iterative Classification: Our review reveals that the core literature on organisational temporality is concentrated in three disciplines (organisation science, management and information systems), which are heavily influenced by one another. This work is informed by research in a variety of other disciplines, most notably sociology, anthropology, economics, decision sciences, psychology, project management, software engineering and music. Given the volume of literature under review, it was necessary to iteratively classify temporal concepts into a set of high level "intellectual bins" (Miles and Huberman, 1999).

2.1 Approach to Theory Building

Taken together, conceptualisation and construct measurement have the power to provide a better understanding and explanation of interesting and important phenomena (Barki, 2008). Thus, the aim of this study is to provide a rich definition

and conceptualisation of time that can be used to meaningfully evaluate temporality in an organisational context. Our approach for developing a new conceptualisation of time in organisations is informed by Dubin (1978). As such, we followed a four-phase process, with activities in each phase overlapping to some degree and the overall approach being iterative in nature.

The first phase was to identify temporal attributes, variables or dimensions that have already been identified in research. As part of this process, several concepts that appeared to be identical or almost identical were grouped together. Perlow's (1999) concept of temporal preference, for example, is not dissimilar to the concept to temporal style (cf. Bluedorn *et al.,* 1999).

The second phase was to systematically classify and arrange each concept: it is only when units of theory are put together into models of the perceived world that theories emerge (Dubin, 1978, p. 28). This classification was carried out with reference to the significance of individual concepts. That is to say, the design of the classification was informed by the relative importance of particular concepts in explaining organisational phenomena. For example, the classification places less emphasis on individual impulsiveness, for example, because this concept has been less frequently used to explain organisational phenomena.

There was significant overlap between the third and fourth phases, which were concerned with bounding the conceptualisation and with visualising different system

states. Having initially based the framework on the pervasive distinction between what Lee and Liebenau (2002b) describe as the structural and interpretive aspects of time, the issue of effectively bounding the theory necessitated the development of an alternative approach. This was the most difficult part of the process and remains the most difficult to document: though each individual element of the framework is explicitly and clearly inherited from existing research, the organising principle upon which the framework is based effectively 'emerged' as a synthesis of the literature as a whole, aggregating a plurality of ideas that had been purposefully and iteratively applied to the task of richly measuring organisational temporality.

3 Organisational Temporality: a new departure

3.1 Problematising traditional perspectives

Temporality researchers typically distinguish between 'objective' (mind-independent) and 'subjective' (mind-dependent) time (e.g. Kavanagh and Araujo, 1995; Bluedorn *et al.,* 1999; Orlikowski and Yates 2002). This dichotomy has elsewhere been described as the 'structural' and 'interpretive' aspects of time (e.g. Lee and Liebenau, 2000b; Sahay, 1998). The mind-independent view is that time in organisations is an objective, chronological (Sarkar and Sarkar, 2004) and material commodity that is scarce, valuable, homogenous, linear and divisible (Sahay, 1997). This view was brought about with the rise of the modern industrial organisation, which transformed time into capital (Ballard and Seibold, 2004), but has become a distinguishing characteristic of contemporary Western culture (Ciborra, 1999). It reflects a pervasive desire to maximise the temporal ordering and synchronisation of

activities that dates back to Taylor's famous Time and Motion studies (Orlikowski and Yates, 2002; Ciborra, 1999). Conversely, the mind-dependent view is neither objective nor chronological. Instead, time units are considered "heterogeneous, discontinuous, and unequivalent" (Starkey, 1989, p.42; cf. Lee, 1999). Research in this tradition emphasises the mental representations of time – the knowledge schemata – of individuals in organisations (cf. Labianca *et al.,* 2005). That is to say, it focuses on the multiple ways in which time is experienced in organisations and on the co-existence of multiple temporalities in the workplace (e.g. Nandhakumar, 2002, p. 257). As such, it emphasis 'pluritemporalism' in the workplace (Nowotny, 1992) and highlights the simultaneous existence of multiple "temporal zones" within the firm (Kavanagh and Araujo, 1995).

This distinction is intuitively appealing but does not reflect any inherent property of time (Orlikowski and Yates, 2002) and its pervasiveness has had a detrimental effect on research investigating organisational temporality. Researchers who have focused on one side or the other have overlooked the manner in which the two are mutually constituted (Orlikowski and Yates, 2002). For example, research on temporal performance in firms has emphasised objective time, failing to explore the *(mis)alignment of objective and subjective time* in organisations. That is to say, very little research has looked at the tensions that exist between temporal structures in organisations and the temporal preferences and temporal styles of individuals. In addition, this dichotomy does little to advance *temporality research at multiple levels of analysis*. This is because the dichotomy is often reduced in literature to a simple

opposition of individual versus institutional temporality (this perhaps explains why there is such a gaping hole in existing literature on intersubjective temporality[1]). As a result, there has been a pervasive failure in literature to systematically distinguish between temporality within individual events, across groups of events and between events.

3.2 Proposing an event-based view of Organisational Temporality

A good classification functions "in much the same way that a theory does, connecting concepts in a useful structure. If successful, it is, like a theory, descriptive, explanatory, heuristic, fruitful, and perhaps also elegant, parsimonious, and robust" (Kwasnik, 1999, p. 24). Our approach therefore takes these shortcomings into account. The initial aim is to develop a rich syntax that can be used to describe the temporality of organisational events. Where the literature on 'objective' time is preoccupied with the narrow concept of temporal location, our framework proposes *a new syntax for describing* a richer temporal profile.

Where existing research has rarely gone beyond the challenge of identifying dimensions of time in organisations[2], our approach is based on evaluating the *temporal profiles of organisational events*. This emphasis on organisational events is based on the recognition that organisational temporality is an enacted and practice-based phenomenon (Orlikowski and Yates, 2002). The appeal of this approach is

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[1] Ballard and Seibold (2003)'s framework is a notable exception

[2] There are some exceptions. See Scriber and Gutek, 1987; Lee and Liebenau, 2000; Ancona et al., 2001; Ballard and Seibold, 2003

that it facilitates a meaningful evaluation of whether temporal structures in the firm can be said to 'fit' the temporal preferences and perceptions of organisational actors. By focusing on events rather than individual units of work (an event may encompass multiple units of work), this approach provides a starting point for making clear distinctions between the temporal profiles of individual events, groups of events and the space between events[3]. For example, researchers may define events as aggregations of tasks that are related in some way (executed by a particular individual, occurring in a particular place, occurring simultaneously etc). Finally, the specification of a particular event for a particular study also determines the level of abstraction at which the model operates, helping to resolve ambiguities about multiple levels and units of analysis.

These temporal profiles can be used to e*valuate the temporal performance in the firm* by measuring the distance between the actual temporal profile of an event and its (hypothetically) ideal temporal position. This affords researchers the opportunity to clearly distinguish between fixed attributes of organisational temporality and temporal variables in organisations in their research. In effect, it becomes easier to identify the factors governing actual temporality in the firm and therefore to probe the reasons why (temporal) things are as they are.

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[3] This distinction is inherited from the division of Social Network Analysis research into ego network research and whole network research, where the former visualises (tabulates or graphically represents) social networks from the perspective of an individual in the network and the latter visualises the network at the level of the whole network.

Finally, this approach facilitates the numerical evaluation of the temporal performance of an event (or events) in a qualitatively rich way. It becomes possible to derive the optimal temporal performance of an organisation by minimising differences between the actual temporal profiles of events and the ideal temporal profiles of events. This technique can also be used to systematically evaluate the impact of interventions on temporal performance (by looking for a reduction in the distance between the actual temporal profile of an event and the ideal temporal profile of an event). In short, the strength of this approach is that it will stimulate further research and theory building on organisational temporality.

4 An event-based framework of Organisational Temporality

4.1 Overview and guiding principle of the framework

This section introduces a new framework of organisational temporality, derived from existing literature on organisational temporality. The framework is centered on the concept of Organisational Temporal Performance (OTP). If organisational temporality refers to *the way time* is *in organisations* (cf. Perlow, 1999), then the OTP is *an evaluation of the way time* is *in organisations*. This broad definition is appropriate for the purpose of this framework, which is to evaluate time in organisations in as rich and broad a manner as possible.

The central argument of the framework is as follows:

$$OTP = \Sigma \quad \left| \, ^{(a)}TP_{(e)} \; - \; ^{(i)}TP_{(e)} \, \right|$$

OTP: Organisational temporal performance
aTPe: Actual Temporal Profile of an event
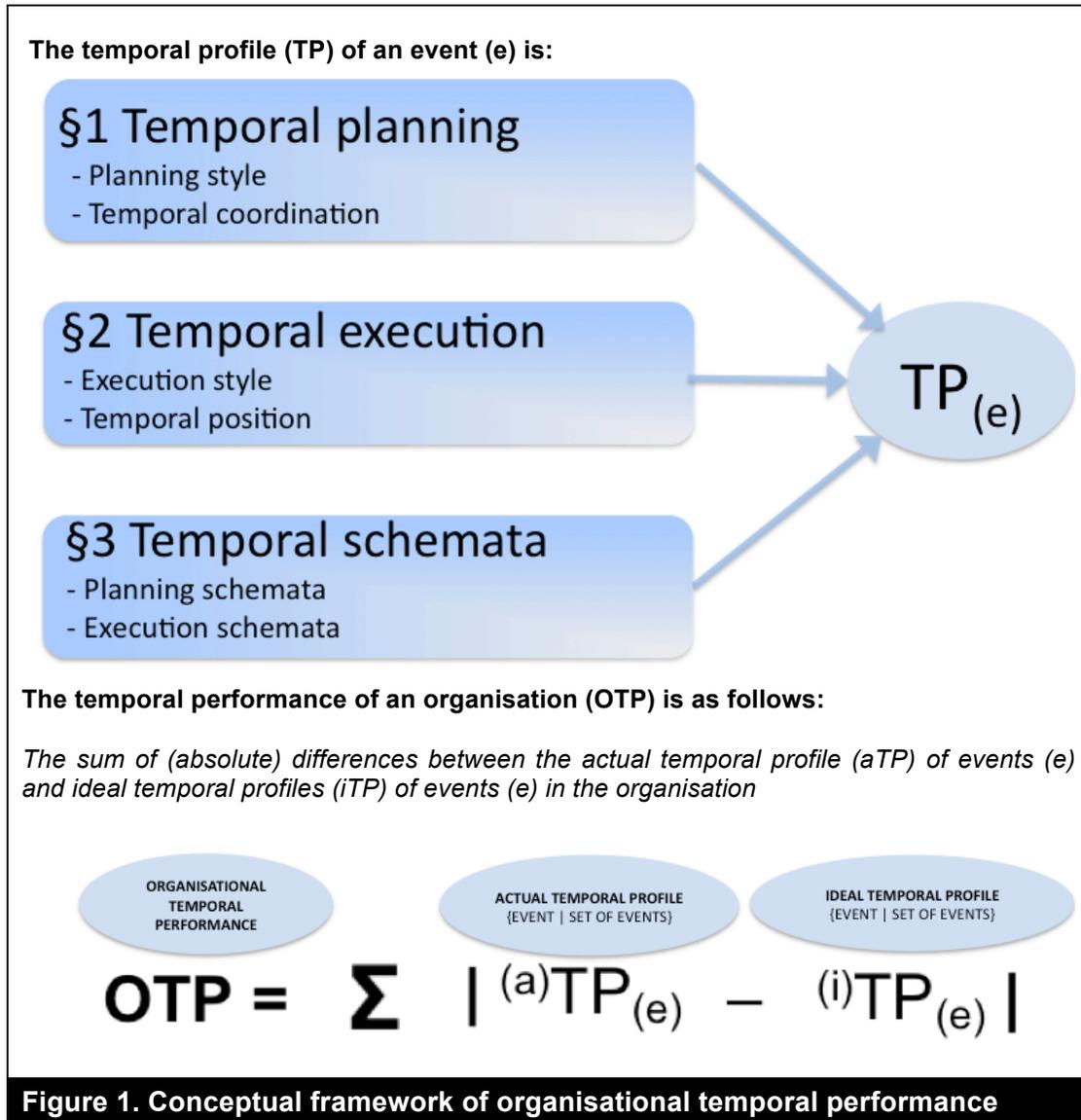*iTPe: Ideal Temporal Profile of an event*

In other words, Organisational Temporal Performance is given by the sum of the (absolute) differences between the actual temporal profile of events and the optimal temporal profile of events. In short, if one begins by evaluating the actual temporal performance of an event and then identifies some imagined ideal temporal performance for that event (based on hindsight and what-if analysis), it becomes possible to measure the difference between the two figures and to quantify the extent to which that event performed well from a temporal perspective. If one were to calculate these differences for all events in an organisation and then add those differences together, one would arrive at some measure of the actual temporal performance of an organisation versus some hypothetical optimal performance.

Based on this initial argument, the key challenge is to develop a framework that facilitates a rich evaluation of the temporal character or profile of organisational events. More specifically, the intention is that it be used to derive a measure of the distance (difference) between the actual temporal profile of an event and the ideal temporal profile of an event. In this way, the framework becomes a diagnostic tool

that can potentially be used to evaluate the success of interventions designed to improve temporal performance in firms.
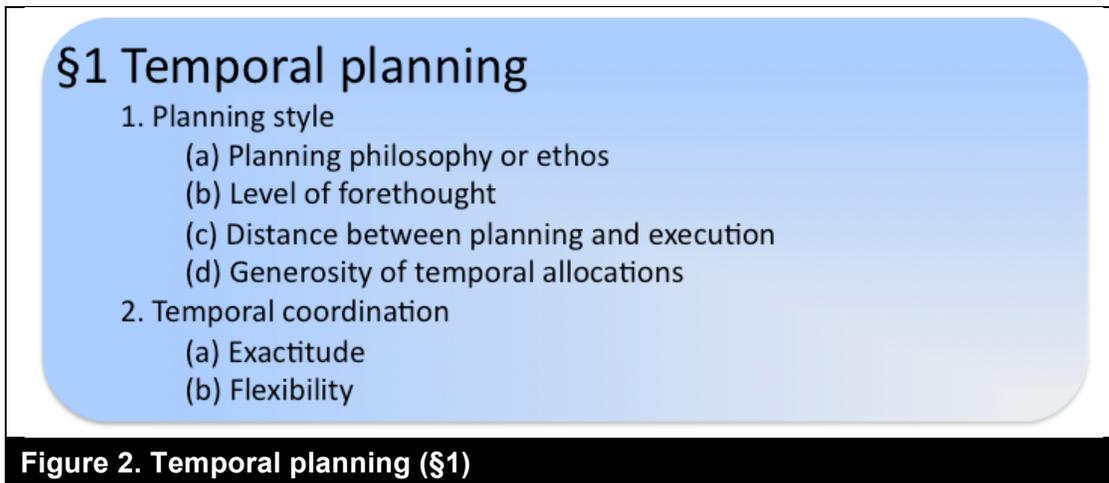
4.2 The framework in detail

Temporality, in the final analysis, is neither an abstract entity nor a neutral medium; it is a "result of human engagement with the world" (Hörning *et al.,* 1999). In organisational contexts, planning plays an important part in structuring that engagement and is influenced by cognitive perceptions and preferences regarding time. At the same time, behavioural intentions are guided by cognitive perceptions and differ from actual behaviours because of unforeseen constraints that only come into play as life unfolds. We therefore suggest that these three elements construct and reconstruct one another and time itself in a kind of perpetual motion in the firm. Our framework, informed by Sherman's (2001) delineation between using time, thinking about time and relating to time, therefore suggests that the temporal profile of a given event can be described by considering the planning of the event, the execution of an event, and the temporal schemata that surround the event (see Figure 1). This framework represents a significant departure from existing research, which has not yet gone beyond analysing patterns of deviation between temporal planning and temporal execution in seeking to improve organisational performance.

The temporal profile (TP) of an event (e) is:

§1 Temporal planning
- Planning style
- Temporal coordination

§2 Temporal execution
- Execution style
- Temporal position

§3 Temporal schemata
- Planning schemata
- Execution schemata

$TP_{(e)}$

The temporal performance of an organisation (OTP) is as follows:

The sum of (absolute) differences between the actual temporal profile (aTP) of events (e) and ideal temporal profiles (iTP) of events (e) in the organisation

ORGANISATIONAL
TEMPORAL
PERFORMANCE

ACTUAL TEMPORAL PROFILE
{EVENT | SET OF EVENTS}

IDEAL TEMPORAL PROFILE
{EVENT | SET OF EVENTS}

$$OTP = \sum \left| {}^{(a)}TP_{(e)} - {}^{(i)}TP_{(e)} \right|$$

Figure 1. Conceptual framework of organisational temporal performance

4.2.1 Temporal Planning (§1)

In organisations, planning is a fundamental process. It is a process of optimising the

allocation of resources in pursuit of value. Temporal planning concerns those

activities within the firm that pertain to the allocation of the firm's resources. As indicated in Figure 2, the framework proposes that temporal planning is composed of two elements.

§1 Temporal planning
1. Planning style
        (a) Planning philosophy or ethos
        (b) Level of forethought
        (c) Distance between planning and execution
        (d) Generosity of temporal allocations
2. Temporal coordination
        (a) Exactitude
        (b) Flexibility

Figure 2. Temporal planning (§1)

Planning style refers to the approach taken to planning a particular event. The significance of planning style is that it inevitably shapes subsequent evaluations of time use. We propose that planning style be evaluated using four indicators. The ethos or *philosophical underpinning* the approach to time and planning in the firm ultimately governs the amount of temporal freedom or autonomy that organisational actors may have (or not have). The need to consider the *amount of forethought* preceding an event is suggested by Scriber and Gutek (1987) who describe the salience of future orientation as an important characteristic of organisational temporal cultures. The *temporal distance* between the planning of an event and its execution gives an indication of the extent to which temporal planners are proactively or reactively in control of time within a firm. It also speaks to the overall flexibility of the organisation in terms of rapidly responding to uncertainty and can be used to

evaluate the impulsiveness of the firm. Finally, the need to consider the generosity of time allocated to events is suggested by existing literature on time boxing (cf. Martin, 1991) and other practices that decompose work into units of time. More so than investigating deadlines in their own right, it provides an indication of time scarcity in the firm (Scriber and Gutek, 1987) and sheds light on the creation of time pressure.

Temporal Coordination refers to the extent to which events are synchronised in the firm from a planning perspective. According to Malone *et al.,* (1987), the primacy of organisations over markets comes down to the question of coordinating activity. Traditionally, coordination has been achieved through scheduling. Coordination can be scrutinised by considering the level of exactitude with which time use is planned and the level of flexibility that is incorporated into planned time use. *Exactitude* refers to the level of precision with which a particular event is planned in terms of time. The concept is based on the work of Raybeck (1992), who suggests that the level of temporal exactitude about previously planned deadlines decreases as the need for temporal flexibility increases. The significance of exactitude is that it speaks to the cultural attitudes within a particular firm with regard to time. For example, the rigidity with which deadlines are planned and subsequently adhered to within an organisation represents an important insight into the temporal character of that firm. Research has shown that attention to time is a catalyst that motivates groups to pace work under deadlines (Waller *et al.,* 2001). *Flexibility* refers to the extent to which the planning of a particular event can be adapted in response to changing needs. The concept of flexibility can be evaluated by considering the degree of change required

and the timeframe within which that change must be realised (Conboy, 2009). The main challenge for organisations today is to balance the need for coordination with the need for flexibility, taking into account that the optimal level of flexibility is likely to differ across industries and across different levels of the organisations. The level of contingency planning built into software development projects would be inappropriate for manufacturing contexts, for example, where higher levels of planning rigidity are better tolerated. Similarly, the techniques used to ensure flexibility have evolved over time. The idea of using temporal buffers so that plans could be respecified 'on-the-fly' was written about in literature in the 1980s but was not observed in practice until much later (cf. Scriber and Gutek, 1987). In many cases, the increased use of Information and Communication technologies (ICTs) has facilitated more on-the-fly coordination. Thus, contemporary practices achieve temporal flexibility through temporal elasticity, rather than temporal exactitude.

4.2.2 Temporal Execution (§2)

Just as Ballard and Seibold (2003) consider temporal enactments, our framework suggests that the temporal profile of a given event can be described by considering the execution of an event as well as its planning. Temporal execution therefore refers to the manner in which time is enacted or performed within the organisation. As illustrated in Figure 3, the framework suggests that temporal execution consists of two main elements.

§2 Temporal execution
1. Execution style
   (a) Improvisatory style
   (b) Monochronicity
   (c) Polychronicity
   (d) Pace
2. Temporal position
   (a) Absolute temporal position
   (b) Relative temporal position
   (c) Timeliness
   (d) Temporal deviation

Figure 3. Temporal execution (§2)

Execution style refers to the approach taken to actually executing an event. The concept is derived from existing literature on temporal structures (Orlikowski and Yates, 2002), temporal patterning (McGrath and Kelly, 1992), and temporal ordering (Zerubavel, 1979). This literature explicitly argues that temporal structures are enacted recurrently in everyday organisational practices (Orlikowski and Yates, 2002, p. 686). Execution style is a behavioural construct, intended to capture the lived experience of organisational temporality. Four aspects of execution style are identified. *Improvisatory style* refers to the extent to which activities are spontaneous or impromptu (cf. Crossan *et al.,* 2005; Weick, 1998). As argued by Ciborra (1999), improvisation in an organisational context has its own unique temporal character that differs from standard or routine modes of activity. *Monochronicity* describes the extent to which activities are executed serially (Hall, 1966). *Polychronicity* refers to the extent to which activities are executed simultaneously (Hall, 1966). Though few studies have investigated organisational polychronicity, its significance is suggested

by the work of Souitaris and Maestro (2010), who demonstrate that polychronicity improves performance at senior management level at least. Finally, *Pace,* measured quantitatively, describes both the ratio between the amount of work to be completed and the time taken to complete it (cf. Wally and Baum, 1994). In this sense, pace gives an indication of the productivity of organisational actors from a temporal perspective and the amount of time compression that has already been brought about in a particular organisation. This is important in terms of determining whether the firm is already at or near optimal temporal performance for a particular event type. However, most research on organisational temporality concentrates on measures of speed at the detriment of acceleration[4]. The concept of pace can also be extended to take into account the amount of change in pace within a particular event. Its pace may be steady and consistent or erratic and changeable; it may be accelerating or decelerating. Changes in pace can be accidental but are sometimes deliberate. To take a musical analogy, composers often pre-specify tempo markings that change according to the texture of a given musical passage (Albert and Bell, 2002). Indeed, composers will sometimes specify *tempo rubato*. The indication affords the performer(s) the discretion to modify the tempo of a piece in an expressive way. The term literally means "stolen time". To take an example from software development, the concept of entrainment describes the process whereby teams either pace their change internally to coincide with the midpoint, deadline, or

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[4] One exception is Gersick's (1994) powerful analysis of midpoint-transitions in group tasks, where it was found that the rate of acceleration increased as deadlines approached

task phases, or externally by entraining to exogenous pacers (Ancona and Chong, 1996). But even when pace changes are deliberate, they are achieved at a cost. This point is well illustrated in extant research on lean manufacturing, which identifies temporal unevenness as an important – but overlooked - source of waste in organisations.

Temporal position is the second component of temporal execution. It describes the location of a particular event in time. Traditionally, this position has been narrowly conceptualised in terms of calendars, timelines and Gantt charts. Our framework attempts a much broader conceptualisation of temporal position. Specifically, it identifies four aspects of temporal position for individual events. *Absolute temporal position* is specified using traditional measures of temporal position: start time, end time and duration. Note that multiple start and end times may be recorded against a particular event if that event is interrupted, delayed or postponed. *Relative temporal position* describes the temporal position of an event in relation to other events. The practice of defining events' temporal positions relatively is pervasive. In project management, for example, the practice of recouping lost time on a project by moving individual tasks from a serial temporal configuration to a parallel arrangement is well established. We propose that relative temporal position is given by considering whether a given event fundamentally occurs (i) serially or in parallel with other events, and (ii) whether the event is iterative or novel. It is also here that one may evaluate the extent to which pace or tempo changes are occurring within the firm (either within events that repeat or across groups of events, depending on the

individual study). *Timeliness* measures extent to which an event occurs at the 'right moment' – *kairos* – and the extent to which it was given the right amount of time). When events occur in a timely fashion, delays and interruptions will be less common. In short, the firm will "run like clockwork". Existing literature on timing in organisations is primarily focused on aspects of poor timing including sequence problems (Lieberman and Montgomery, 1988), synchrony problems (Perlow, 1999), rate problems (Eisenhardt, 1989), deadlines (Waller *et al.,* 2001) and duration problems (Ancona *et al.,* 2001). Finally, *temporal deviation* describes the difference between the planned temporal position of an event and the executed temporal position of an event. Where an event begins later than planned it is late. When its duration is less than planned, it is truncated, and so on.

4.2.3 Temporal schemata (§3)

Temporal Schemata refer to individuals' understanding and experience of time and deadlines (Labianca *et al.,* 2005). Temporal schemata are an important aspect of temporality in organisations because it is through the interaction of organisational temporal structures and organisational agents' perceptions of, and reactions to, time that temporality in organisations manifests. In addition, temporal schemata govern individuals' perceptions of time and the passing of time as well as responses to time framing, time horizons and time pressure. In other words, temporal schemata exist for temporal planning and for temporal execution. Temporal schemata appear in many studies of time in organisations and are also referred to as construals (Ballard and Seibold, 2003), perceptions (Ancona *et al.,* 2001), perspectives (Conte *et al.,*

1995) and visions (Saunders *et al.,* 2004) of time. As illustrated in Figure 4, temporal schemata consist of two key dimensions.
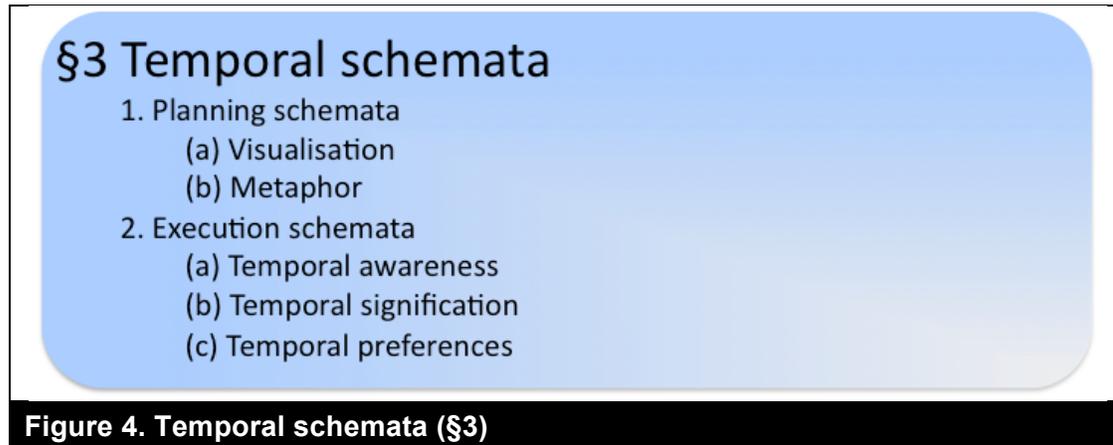
§3 Temporal schemata
1. Planning schemata
    (a) Visualisation
    (b) Metaphor
2. Execution schemata
    (a) Temporal awareness
    (b) Temporal signification
    (c) Temporal preferences

Figure 4. Temporal schemata (§3)

Planning schemata refer to the conceptualisations of time that are held by individuals in terms of planning time. From the perspective of this study, it is as important to have an understanding of how time is conceptualised during planning, as it is to have an understanding of how time is conceptualised from an experiential perspective. The rationale for this is that planning schemata are a key mechanism that can be used to optimise temporal performance in organisations (Yakura, 2002). To take an example from project management, the practice of specifying three-point estimates for tasks (best-case, worst-case and most likely) can be traced back to 1754 when Priestley suggested indicating date accuracy using spans rather than points in order to solve the problem of graphically representing temporal uncertainty. In Western societies, time has been primarily viewed in a *linear* manner (cf. Sarkar and Sahay, 2004). Indeed, the proposition that time could be visualised in a linear fashion with a uniform scale (i.e. all time intervals are considered equal) was first

proposed by Barbeu-Dubourg in 1753 (Boyd Davis *et al.,* 2010). More recently, individuals and organisations have begun to view temporal structures as cyclical or iterative phenomena (Ancona *et al.,* 2001a). However, visualisation techniques that support nonlinear views of time are only beginning to emerge (Boyd Davis *et al.,* 2010). Thus, the implications of cyclical conceptualisations of time for planning are less well understood than the implications of linear configurations (Barley, 1986). Given the dominance of linear techniques for temporal visualisation, the framework also suggests that metaphors about time that are employed within the organisation during planning are taken into account.

Execution schemata (referred to in literature as temporal awareness) refer to one's level of awareness of time as its passing is experienced. Previous studies have investigated several aspects of execution schemata but the main emphasis in existing literature is on the perceived speed at which time passes and on the meanings assigned to particular aspects of time. This literature has found that the perceived speed at which time passes is partly governed by the nature of the task. Time appears to "speed up" where activities are enjoyable. Indeed, a state of temporal dissociation may occur where activities are highly absorbing (Mainemelis, 2001). In these cases, the extent to which the passage of time is registered or perceived is reduced (cf. Agarwal and Karahanna, 2000). The literature on temporal signification (the meaning that is assigned to particular aspects of organisational temporality) demonstrates that individuals respond to particular temporal phenomena in different ways. It is well established, for example, that individuals' responses to

time pressure vary (Verplanken, 1993). For example, highly impulsive individuals respond more negatively to delays than their less impulsive counterparts (Wittmann and Paulus, 2007). These insights have led to the emergence of a growing body of research on temporal preferences. Temporal preferences have a formative role in shaping temporality in organisations because these preferences shape perceptions and experiences of time in firms.

4 Conclusion

This research makes a strong contribution to research and practice. Fundamentally, the framework is designed to allow researchers and practitioners to better support organisational work. The development of a rich vocabulary to describe the temporal characteristics or profiles of organisations events is only a starting point. By proposing the concept of distance between actual temporal profiles and idea temporal profiles, the framework can be used to investigate organisational temporality as a dependent variable. In particular, it provides a means of rigorously measuring the impact of organisational interventions on organisational temporal performance. This argument is particularly salient in an IS context, where there have been repeated calls for research to investigate the impact of IS/IT on organisational temporality (cf. Lee and Liebenau, 2000). Indeed, this study originally evolved out of a larger IS study designed, in the tradition of Barley (1986), Lee (1999), Nandhakumar (2002) and Saunders (2007), to investigate the temporal effects of introducing new software development methodologies in firms.

Nevertheless, it is a work in progress. It is important to recall Wheeler's (2002) observation that "theories provide an essential step in the research process, but until real world data provide supporting evidence, they remain only a proffered representation of real-world phenomenon" (p. 139). Though this integrated model has been carefully constructed on the basis of extant literature, it lacks the support of direct empirical observation.

Acknowledgments

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