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Track 02 - Does IT matter? The organizational impact of information systems

The importance of being "In time": does ICT matter?

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Introduction

In the literature about ICT and organizational change, the relationship between ICT and the temporal dimension of work organization has received limited attention, if compared to other organizational variables. Nevertheless, time has been one of the fundamental variables in organizational analysis since the early scientific management movement (Taylor, 1903) and today, in the era of global competition, academics and practitioners have been dedicating growing attention towards its relation to competitive advantage.

The importance of time as a source of competitive advantage was strongly pointed out by Stalk (1988) when he first proposed the definition of *time-based competition* in his well known contribution. This concept, an extension of just-in-time and lean production principles, was further defined in papers which developed the idea that, if the ability to manage time is source of advantage, than competition requires that all processes be continuously accelerated (Vickery et al. 1995, Carter et al. 1995, Hillman et al. 2001), and these strategies can't help turning to ICT and system integration for gaining advantage based on time.

It is indeed generally accepted that ICT hugely accelerates business processes, thereby enabling the adopting organizations to save a great deal of time. Nevertheless, research on the time impact of ICT in organizations is still limited (Lee and Whitley 2002): empirical studies on this topic began to appear in the last decade in journals of both Organization and IS discipline (Sahay 1998; Lee and Liebenau 2000; Orlikowski and Yates 2002; Sawyer and Southwick 2002; Scott and Wagner 2003; Sarker and Sahay 2004; Prasopoulou et al. 2006).

Accelerating the pace of work processes, fostering workers' polychronicity, promoting shifts from "batch" logic to "flow" logic, improving synchronization among organizational units are just a few examples of time-related objectives that can be pursued by firms when they adopt systems like Workflow or ERP. Such objectives, which we will refer to as expected *temporal performances*, are related to potential changes in the temporal organization of processes and activities, but also to potential changes in people's assumptions on time and time use in the workplace.

What do we mean by assumptions on time?

Organization studies have long acknowledged time as a fundamental dimension of organizational culture (Hofstede 1991); Schein as well, in his study on organizational culture (1985), maintains that organizational culture has groups' dominant *assumptions of time and space* embedded within it and describes a variety of "assumptions on time" that characterize different organizational cultures. Schriber and Gutek (1987), in their empirical research, also described rules about time as specific "*dimensions of organizational culture*" and found that these cultural features varied across organizations and working groups. It has been underscored that, in addition to being a condition for the coordination of activities and the production of organizational outputs, the temporal organization of work processes constitutes a framework that plays an essential role also as a template for organizing behavior: a cognitive and cultural framework that defines the activities and routines of both people and organizational units, used by people to make sense of actions and events in the workplace (Barley, 1988). Temporal assumptions thus represent an expression of the specific organizational and professional culture that produces them, conveying a symbolic value for the individual and the group of workers. Finally, assumptions on time can also be an expression of the specific sub-culture of different departments and professional groups within a firm (Lawrence and Lorsch 1967, Gherardi and Strati 1988, Barley 1988).

The relevance of temporal assumptions as cultural framework can be considered a factor that contributes to their strength and permanence within a given organizational context. As a result, the introduction of technologies with the potential to bring changes to this domain also involves a challenge to many of the cognitive orders and cultural values on which organizational actors rely.

On the other side, like all other social structures, they have a provisional nature and change over time (Bluedorn and Denhardt 1988; Ancona et al. 2001), also in association with technological innovations.

Adopting the perspective of organizational culture, this research-in-progress paper seeks to contribute to the research on temporal impacts of ICT in organizations, presenting a multiple case study that investigates the role ICT can play in promoting changes in the temporal dimension of organizational culture, and tests the hypothesis that the temporal assumptions shared by people before a system is introduced can affect the

way it is used, thus facilitating or hindering the achievement of the results the system is expected to convey.

Study Aim and Research Questions

When introducing a new system, what kind of expectations about time-related objectives do managers have? Does the introduction of a new system contribute to change shared assumptions about time and time use in the workplace? Can ICT help transform the way people view time and the 'appropriate' way to collectively organize it within a given context (at organizational/ department/group level)? Can temporal assumptions affect the way a new system is used, thus facilitating/hindering the achievement of the expected 'temporal performance' conveyed by the system?

Our investigation on the role ICT can play in promoting changes in the temporal dimension of organizational culture is based on a multiple case study which includes three companies where a Workflow System was introduced in several organizational departments with the aim of improving cross-department processes, and addresses two main research questions:

1. Does the introduction of the workflow system help transform the temporal assumptions shared by people in organizational units, thus achieving the expected temporal performance, and, if so, to what extent?
2. Do the temporal assumptions that exist in organizational units before the introduction of the system affect the use of the system, thus facilitating/hindering the achievement of the expected temporal performance?

Theoretical framework

Schein (1985) in his study on organizational culture, maintains that organizational culture has groups' dominant *assumptions of time and space* embedded within it and gives a description of several assumptions on time characterizing different organizational cultures.

An operationalization of a number of these dimensions was proposed by Schriber and Gutek (1987) who gave specific definitions and tested Likert

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scales to measure "norms about time" as specific dimensions of organizational culture

Studies adopting an ethnographic methodology like Barley's (1988), pointed out that the temporal organization of work processes plays an important role also as "an interpretive framework for rendering action in the setting meaningful" In other words, organizational actors evaluate and make sense of events occurring during daily activity using the temporal framework as a scheme of expectations to judge whether results and behaviours are appropriate.

Zerubavel as well, in his study on temporal patterns in the organization of activities in a hospital (1979), found that various types of schedules worked as "cognitive maps" used by personnel to provide a background, a "repertoire of what is expected, likely or unlikely to occur within certain temporal boundaries" [p.125].

As we stated before, many authors agree that temporal assumptions can vary accordingly to different organizational and professional sub-cultures: according to Dubinskas (1988), the socially constructed character of time is such that all "times" existing within the high technology organizations of his ethnographic study could be considered as "symbolic nexes around which coalesce issues of order, power, self definition and knowledge".

As an example, in Barley's study (1988) the different temporal organization of work of two professional groups, radiologists and radiological technicians, was also a representation of the different hierarchical and professional status of the two groups: given the "temporally unpredictable world" [p. 145] of the radiologists, technicians never knew when radiologists would be available and had to hunt for them whenever they needed one; radiologists on the contrary , given the predictable and highly scheduled "tempo" of technicians, always knew when they could summon up one of them.

Another example: Zerubavel found that a major aspect of the socio-temporal order expressed by the "schedule" of coverage in hospitals was that it functioned "as a moral order", an expression of some fundamental organizational values like responsibility towards the patients, fairness towards staff members. It was then a criterion to judge the appropriateness of personnel's behaviour: some actions were considered "legitimate", for example, only at the end of a shift, but not at the beginning. In this view,

the temporal dimension appeared central for the definition of the "boundaries of norms".

Analytical framework

The framework adopted in this study to describe the temporal dimensions of organizational culture is based on a set of concepts which have been drawn from previous research into the psychology of work and organizational culture (Schriber and Gutek 1987; Bluedorn et al. 1999), integrated with concepts drawn from the ethnographic work by Zerubavel (1979) and Barley (1988).

Our framework encompasses the following dimensions drawn from Schriber and Gutek:

Deadlines: Importance of defining and meeting deadlines, temporal start-and-stop points of activities

Scheduling: Perceived importance of scheduling, defined as activity that "concerns location in the temporal realm and gives organizations a framework for constructing temporal boundaries"

Synchronization and coordination: perceptions about the importance of cooperating with others and working in a coordinated way or as a team

Sequencing: the order in which activities and tasks take place

Autonomy of time use: the perceived amount of freedom workers have in setting schedules for completing their tasks over time

Awareness of time use: people's awareness of how they use their time on the job and expectations that they know how long they take to perform activities

Speed vs. Quality: rules that people follow on trade-offs between the quality of work and the speed of work over time

Work Pace: rate at which activities can be accomplished: the speed of work and people's expectations to work fast

Allocation: the amount of time devoted to a task or activity; can be considered a measure of work overload in that it defines the degree to which schedules seem too tight for activities/jobs

We included as well the dimension of Polychronicity, defined by Bluedorn et al. as the extent to which people prefer to be engaged in two or more tasks simultaneously and believe that is the best way to do things.

Other two dimensions included are drawn from Zerubavel and Barley: Temporal symmetry, the extent to which different groups share the

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same temporal order; Social cycles: the regular recurrence of events and processes: the cycles in work activities experienced over time.

Ultimately, we propose the construct of "Expected temporal performance", which we define as the whole of the expectations expressed by managers with regard to time-related objectives, such as process acceleration, changes in people's time orientations, changes in the temporal dimensions of a departmental culture etc.

Research Design

The research, currently in course, is designed as a multiple case study, coherently with the descriptive and explanatory aim of the research project.

We are carrying on three case studies in three companies, which we will call Alpha, Beta and Gamma, where a workflow system was introduced or is being introduced, in order to improve processes requiring the coordination of several different organizational departments.

The relevance of these cases to our study is confirmed by the fact that each of them: a) introduces the same type of technology solution b) applies the same type of technology to different processes c) represents different project phases.

While Alpha, Beta and Gamma are three different kinds of companies, they have several key features which make them comparable for the purpose of our study: they are medium sized, operating in the service sector; and each of them has at least a 7 years story, which made possible to consolidate a peculiar organizational culture.

The study is developed in two phases with different objectives: *Phase 1* Investigation of the *temporal performance expected* by the managers adopting the system. *Phase 2* Investigation of the temporal dimensions of culture existing in the three departments *before and after* the introduction of the system.

Data collection

Data is collected through documental analysis, semi-structured interviews with managers and employees from the three organizations, and questionnaires based on Likert scales addressed to both managers and employees.

We gathered so far from three to fifteen interviews in two out of three companies and collected 37 questionnaires in case Alpha (research is in progress in Beta and Gamma)

Table 1. Three cases: a preliminary comparison

	Alpha	Beta	Gamma
Project aim	Managing the complaint management process	Managing the accounting passive cycle	Managing projects
Project sponsor	ICT and Organization dept.	Administration dept.	Organization Dept.
Workflow Implementation phase	In progress/mature	Completed	Start up
N. of departments	3	3	3
N.of operators	37	30	25
Expected temporal performance	1. Speeding up the whole process 2. Reducing temporal misalignment among departments 3. Shifting from "batch logic" to "flow logic" 4. Shifting from "indefinite urgency" to "definite deadline" assumptions	1. Speeding up the whole process 2. Respecting payments deadlines	In progress
Changes in temporal assumptions	Increase of temporal symmetry Increase of synchronization/coord. Increase of deadline awareness Adjustment of social cycles (partly)	Increase of scheduling Increase of awareness of time use Increase of temporal symmetry Adjustment of	In progress

		social cycles (partly)	
Main facilitators	Internal workshop	Internal technical support	
Main constraints		Workflow design and usability (beginning)	

Case I - Results

The first case study was conducted in the Italian branch, employing 350 people, of a multinational manufacturing company. This branch delivers commercial and distribution services to Italian customers. Here, a Workflow System (Lotus Notes) was introduced to improve Customer Service processes, in particular their most prominent activity: Complaint Management Service, which requires the coordination of three different departments. As we will describe later, the workflow system was considered critical due to its potential to achieve results related to temporal issues. The company supported the change management process by organizing an internal workshop, which involved the department managers, which took place during the design phase in order to share the objectives and optimize the fit between the features of the complaint service process and the new system. The system had been introduced about eight months before the fieldwork started in 2007, thus the implementation stage was sufficiently advanced to enable possible changes in the temporal assumptions within the departments.

Expected temporal performance. The analysis of managerial interviews showed that the main objectives inherent the introduction of the system were widely shared and that expectations were very much related to temporal issues. Four time-related expectations turned out to be widely shared by all managers:

1.Speeding up the Complaint Management Process

This meant accelerating the individual activities that make up the process, like gathering documentation on customer's order, collecting information about the specific problem encountered, monitoring customers' "complaint dossiers", and reducing the overall lead time in order to provide

faster answers to customers. "Lead time" was a very common expression among managers and the cross-analysis with documentation confirmed it as one of the project's key goals. It also meant reducing duplications and the time needed to produce and store physical documents: "less paper" was another common expression.

2. Reducing temporal misalignment among different departments

Customer Point operators, who are subject to daily pressure from customers, were far more aware of the delays suffered in providing the customers with answers ("defining the dossier") compared with other departments, which latter had other priorities and followed their own activity cycles. The workflow system was expected to facilitate departmental "alignments" on priorities and deadlines. This kind of objective can be better explained using Zerubavel's concept of temporal asymmetry: these departments didn't share the same "temporal order", which obstructed the complaint management process.

3. Shifting from a "batch logic" to a "flow logic"

The system was expected to make it easier for people to deal with issues instantly, as they arose and without waiting until they had accumulated a "pile of dossiers" on their desk. As the IT and Organization manager put it. "We want people to change their mentality, from a 'batch logic' to a 'flow logic', which means dealing with problems and requests as soon as they show up". These remarks referred to the tendency to organize the activity in recursive "cycles", occurring in some cases merely once a week (i.e. Storehouse operators were reported as checking dossiers only once a week) and also to a preference to do one type of activity at a time (monochronicity). Reduction/ elimination of such cycles and enhancement of polychronicity were the objectives in this case.

4. Shifting from "indefinite urgency" assumptions to "definite deadline" assumptions

Managers reported that the appreciation of the level of urgency of a "dossier" was left to individual operators, who, based on their experience and willingness, judged whether a complaint case was more or less urgent. There was no sharing of common deadlines and responses given to both internal and external clients: this resulted in a general feeling of uncertainty, well expressed by all mangers when they stated that "everything is urgent here", and that "in general, there has always been a rule that any complaint must be processed within 24 hours". Managers admitted that it could take up to ten days in some cases.

Changes in temporal assumptions. Data from the employee questionnaires collected in the three departments were triangulated with

data from ten in-depth interviews carried out with the four managers and six employees, enabling us to analyze the temporal dimensions of each department's culture and assess the perceptions of change in these dimensions before and after the introduction of the system.

Data analysis showed a significant increase in three dimensions - *deadlines and scheduling, synchronization and coordination* and *temporal symmetry* among departments - after the introduction of the system.

Deadlines were not perceived as so important before the introduction of the system. Although the respondents reported that there was a belief that "everything is urgent" and a general rule that "overall, all complaint dossiers should be opened on the day the complaint arrives". Others reported that "we didn't really think of deadlines, it was more indefinite". According to the results of the questionnaires, the value of this dimension scored very high eleven months after the introduction of the system. Respondents reported that what really made the difference was the introduction of a formalized classification of complaints based on the expected completion time and the visualization of dossiers flagged by a colored tag, which was visible to the operators of all departments, thus reminding them of the existence of a deadline and that it required alignment among departments.

The introduction of this system of deadlines and of the colored tag "artifact" represented a liaison between departments: using Barley's concept of *symmetry*, the three units now share a common deadline system and have to meet aligned deadlines, which has increased the overlap among their different temporal orders.

The value of *synchronization and cooperation* among departments ranked very high in all three departments and was perceived as having increased significantly because the sense of "teamwork" with the other departments had also increased. Customer Point operators reported that, pre-Lotus Notes, the synchronization with other departments was very poor: other departments were reported as "having their own time", "creating bottlenecks", "being slow to give answers". All the interviewed customer service operators shared the strong conviction that this situation had improved significantly with the introduction of the workflow system because their requests are now transmitted instantly through Notes and the date and hour of the request, as well as the other department's response, are recorded. On the other hand, operators from other departments reported that the system made it "simpler and quicker to gather and send documents because the databases are now interconnected".

The increase of these three dimensions confirmed also the achieving of *three expected temporal performances*: the lower level of misalignment

among departments, the adherence to defined deadlines, and the speeding up of the customer complaint process.

This kind of evidence would seem to confirm the first hypothesis of the study, that the introduction of workflow systems has the potential to transform the temporal assumptions shared by people in organizational units. Nevertheless, it is important to note that the introduction of the workflow system was combined with an internal workshop involving the managerial level and that the results we report were associated by the respondents with both the innovations introduced by the system and the effectiveness of the workshop as a change management strategy.

To the contrary, the dimensions of *polychronicity* and *sequencing* showed no significant change, while the *social cycles* characterizing the departments revealed contradictory patterns of change.

These dimensions were associated with the achievement of the objective whereby, in performing their activities, workers would *shift from a batch logic to a one-piece flow logic*.

Polychronicity scored low in the questionnaires gathered from all three departments.

When triangulated with the interview data, the result was explained in this way: in all departments the workflow was recognized as fostering polychronicity because all data and documents were stored in a single database, making it "easier to open and close items related to different activities simultaneously, having links immediately available".

On the other hand, employees didn't like working this way and that there wasn't yet a shared belief that this way of working was "better". High scores of *time allocation* dimension cross-confirmed that there was a feeling of an increasing work overload. Further, when under pressure to deal with overloads, operators shifted back to batch logic: for example, Customer Point operators during phone call peaks (twice a day) interrupted their other activities to concentrate on answering the phone, admitting that "messages in Lotus were left on stand-by". Another case was when they had a number of administrative tasks requiring high concentration: they adjusted with colleagues in order to divide labor based on specialized activities and followed a monochronic logic. Interestingly enough, as far as *social cycles* are concerned, though the pressure toward a "flow logic" had increased, operators retained their previous cycles: at Customer Point, the activity is still organized around "phone call peaks" and four main daily cycles are still in place. This influenced a use of the workflow system that is not yet thoroughly in line with the expected flow logic. The same happened in Storehouse and Logistics, where the importance of *sequencing* is a key feature of the departmental culture and where monocronicity is

high. Here, operators reported that there had been an adjustment between the social cycles of their activity and the need for more polychronicity: they used to follow a five-six day cycle in complaint management activity: i.e. the "pile of paper" here was left to grow until, finally, they dedicated one entire day to this specific, time-consuming activity. The presence of this cycle expresses the "batch logic" they followed. In addition, this created a noticeable *temporal asymmetry* with Customer Point operators, who were left waiting for answers for up to a week. This department is characterized by another typical *cycle*, the Morning/Early afternoon cycle. In the morning, ordinary activity takes place; at one p.m. afternoon planning starts and deliveries take place through to five p.m. At present, complaint management has been re-allocated according to this second cycle: Lotus Notes is checked in the morning and, accordingly, complaints start to be checked in a more "flow oriented" logic.

This allocation of the complaint management activity to the morning/early afternoon cycle has enhanced the symmetry with Customer Point. In this case, the shift to a flow logic has been partly obtained through an adjustment to existing social cycles and to a still strong orientation to monochronicity in departments. To summarize, our findings suggest that the persistence of two temporal dimensions of organizational culture - monochronicity and sequencing - and the strength of the social cycles existing within the departments have influenced the use of the system and the achievement of one important expected temporal performance, the shift to a flow logic. This result seems to support our second hypothesis that temporal dimensions of organizational culture can affect the use of the system, thus having an impact on and even hindering the achievement of the expected temporal performance.

Case II – Preliminary results

Beta is a company created by a consortium of about twenty Italian banks . It provides full outsourcing services to the banks belonging to the consortium, employing about 250 people.

Our fieldwork in this company, still in course, takes place in a mature phase of the project, where we can investigate consolidated outputs and changes.

In 2003 Beta introduced a workflow system (docflow) aimed at managing their accounting passive cycle, which is to them the most prominent accounting activity since they have a lot of suppliers but very few customers (banks forming the consortium).

This process requires the coordination of three different organizational units: two different offices within Administrative Dept., and Purchasing Dept.

Expected temporal performance.

The analysis of interviews with the managerial level showed that in this case the objectives inherent the introduction of the workflow system were partly related to temporal issues. In this project attention and expectations were initially focused on reducing the production, duplication and storage of physical documents ("reducing paper"); another priority was to create a logical flow in order to decrease information redundancy, and finally to improve quality and reliability of data gathered by administrative department. In this case, compared to the previous one, managers showed a lower level of awareness about the potential of the system from a temporal point of view.

This lower level of awareness is expressed by a poorer articulation, compared to Alpha, of possible time-related objectives going beyond the "speeding up" issue.

Two objectives in this project were explicitly addressed to temporal issues:

 1. Reducing the duration of passive administrative cycle process

This was explained as the need to reduce the overall time during which suppliers invoices moved around from one office to another before being paid. The process required that invoices, once arrived via mail or fax to one of the two offices within administrative dept., were duplicated and sent to buyers operating at the purchasing dept. (who were responsible for specific contracts with suppliers) for technical check and authorization to payment. Another copy was sent to the other administrative office for the checking of contractual conditions. During this double check and authorization process, invoice copies could either be left standing by until checks were completed, or move back to the first administration office with a request for keeping the payment suspended, or move back with authorization The duration of the process was described as "*unpredictable*" and it was often difficult to make out why an invoice hadn't come back and who was keeping it suspended. Thus the workflow system was expected to speed up the process: partly because of new electronic format of documents and the possibility to track them along the process, partly because it could facilitate departmental "alignments" on priorities and deadlines.

This kind of objective can be better explained if we refer to the concept of *awareness of time use* : there was an overall unpredictability of duration

of the process for many reasons: lack of awareness of how long each one would take to complete his own check, lack of awareness of reasons why there were delays and in which part of the process. Another aspect of this objective can be related to Zerubavel's concept of *temporal asymmetry*: the different units, buyers in particular, didn't share the same "temporal order", each of them having its own scheduling and activity cycles, which caused delays .

    2. Respecting payments deadlines

Unpredictability of the duration and delays made it difficult to be punctual in meeting payment deadlines:administrative operators had to work hard to compensate for delays; moreover, it was difficult to give creditors timely information about the state of their payments.

Changes in temporal assumptions

We are not able to give a complete account of this case yet, because data collected is in course. Analysis of the interviews collected so far with managers and employees who are still working in the company and can account for the changes occurred, allow us to present only preliminary results.

A significant increase is perceived in three time-related dimensions – *scheduling, awareness of time use,* and *temporal symmetry* among departments - after the introduction of the system. On the other hand, *social cycles* seem to have only partly changed.

As far as *scheduling* is concerned, the workflow introduced and made visible a clearly structured sequence in the process. Interviewees reported that structured scheduling is now perceived as very important because all operators can locate at what point, in the temporal domain of the process, a single invoice is and what is its advancement state. As they put it "I can see where invoices are and who is in charge for it at any given moment" This reduced the feeling of uncertainty about the ongoing process, expressed by sentences like: "It is more structured" "Now the process is under control".

Every action being tracked, *awareness of time use* seems to have increased because everyone can check how long it takes to everyone else to complete his "to do list". As an administrative employee put it, "information about 'bottlenecks' is now transparent". Moreover, the system sends automatic warning mails when a due action is not completed, contributing to awareness of one's own time use as well.

As far as *social cycles* are concerned, it turned out that, before the introduction of the workflow, all operators followed a similar rule: the so called "bunch rule" which meant that they would care after invoices when

the bunch on the desk was thick enough (similarly to the "pile of dossiers" rule in Alpha). This rule gave rise to cycles which could last up to two weeks for buyers, while administrative employees followed a one/two days cycle during ordinary periods of the year (when not under pressure for other important tasks, i.e. closing balance sheet).

This created *temporal asymmetry*, in particular between buyers and the other units. Interviewees reported that these cycles have partly changed: administrative employees state that their activity is now generally driven by the "to do" proposed by the system. Buyers have partly modified their routines, due to the fact that access to electronic documents is much easier than before. Their activity has other priorities, thus many of them continue to take care of this process periodically. Interesting enough, both groups reported that they developed a sort of "bridge" between their different temporal orders based on the artefact of "urgent query": when requested, buyers are much more flexible and quicker than in the past to give answers on specific and urgent issues blocking a payment. They recognized this "bridge" is now possible because they can have easier access to data wherever they are.

Preliminary conclusions

Despite its importance to temporal issues and time-related competitive advantage, research into the temporal impacts of information technology in organizations is still limited. On the other hand, organizational culture research shows that the way time is perceived and collectively organized reflects cultural assumptions that are an expression of the specific organizational setting, underscoring that cultural assumptions are an important contributory factor to the strength and direction of organizational change. In this research-in-progress we adopted the perspective of organizational culture to investigate the role ICT can play in promoting changes in temporal assumptions, and we seek to assess whether temporal assumptions can affect the way a new system is used, thus facilitating/hindering the achievement of the expected time-related objectives.

Preliminary results of this multiple case study show that managers have different levels of awareness about potential time-related performance of the system.

Case Alpha covered four types of 'temporal performance' management expected to see thanks to the introduction of a workflow system. In Case Beta managers showed a lower level of awareness about the potential of the

workflow system from a temporal point of view. This lower level of awareness was expressed by a poorer articulation, compared to Alpha, of possible time-related objectives going beyond the "speeding up" issue.

Both cases showed that, after its introduction, the temporal dimensions of the organizational culture of the departments involved showed some significant changes, which seems to confirm hypothesis 1 of the study, but also some contradictory effects that seem to confirm hypothesis 2. In case Alpha, significant increases were seen in three dimensions - synchronization and coordination, temporal symmetry, deadlines and scheduling. The increase of these dimensions confirmed the achievement of three expected temporal performances: the reduction of misalignment among departments, the shift to definite deadlines, and the speeding up of the process. This seems to support the first hypothesis of the study, that the introduction of workflow systems helps transform the temporal assumptions shared by people in organizational units. It is important to remember that the system was introduced in tandem with an internal workshop involving the managerial level and that the results reported here were associated by respondents with both innovations introduced by the system and the workshop. Nevertheless, the assumptions underlying the objective that workers would shift from a 'batch logic' to a 'flow logic' in performing their activities failed to show significant changes: data analysis shows that the persistence of two temporal assumptions - monochronicity and sequencing - and the power of the social cycles existing within departments influenced the expected use of the system and the achievement of one important temporal performance, the shift to a flow logic. This supports our second hypothesis that temporal dimensions of organizational culture can affect the use of the system, thus hindering the achievement of the expected temporal performance.

Preliminary results from Case Beta also seem to confirm that significant changes were seen in three temporal dimensions - scheduling, time awareness and temporal symmetry. It seems remarkable that in this case these changes can't be considered as thoroughly planned results but partly as emergent consequences of the workflow introduction .

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