

Time travellers: managers on the building site

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Abstract

Efficiency is often described as the extent to which time, effort or cost is well used for executing an intended task or purpose: the shorter time between an investment and its return, the greater the profit. Organisational concepts and theories are here to help industries to perform as efficiently as possible. Management and planning tools are mobilised to frame and control work processes to be done on time. However studies on the building site usually show chaos and the proliferation of unexpected events. Interruptions are usually treated as disturbances which need to be reduced and avoided. Managers have to deal with these disturbances which create a rupture between what has been planned and what is actually happening at the building site. The present paper looks at how these interruptions appear during the workday and how the managers answer and reorganise their work consequently. The empirical material comes from a study carried out at the building site of a public school. The methods used to collect data are frequency analysis and participant observation among others. The results show that these managers did not comply with the traditional picture of managing the building site. If their work is indeed fragmented with an average of 120 interruptions per day, they do not overwork to compensate the lack of time. Moreover instead of portraying these switching as interruptions affecting the work of managers it is argued that these switching in fact partly constitute their work.

Keywords: building site, fragmentation, time, work, managers

1. Introduction

In capitalist society “time is money” is more than a phrase. The ultimate goal of organisational studies is to maximise and optimise organisation efficiency and productivity. In that regards time is a precious resource which need to be carefully and sparingly employed. Organisational time is often conceived as a linear measurement of chronology within which various activities can be aligned and organised in terms of duration, rate or intensity (Macey 1996). The construction sector is characterized by tight planning and strict deadline. Many concepts of management of construction such as Lean or Integrated Project Delivery are defining work as being a sequence of processes which can be ordered in time (Ladhenperä, 2012). Management and planning tools are mobilised to frame and control these processes. However many studies on the building site have shown chaotic organisations and the proliferation of unexpected events. These interruptions, as they often signalised unforeseen problems to be solved, are usually treated as disturbances which need to be reduced and avoided. The role of site managers is to deal with these disturbances signalling the mismatch between what has been planned and what is actually happening during the work.

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To capture what is happening in organisations, I have often used qualitative interviews, collecting organised narratives from the various actors I was talking to. These narratives were either mobilised from a pool of existing stories or created at the time of the interview to account for past and future events. But one thing was communally missing from all these accounts: the present time. So my gathering of what was happening in organisation was a collection of information about specific events but not the happening of events. The present paper tries to get closer to the work activities as they unfolded in real time.

2. Theoretical frame

Since Carlson study in 1951, giving a systematic report of the work of top managers, numerous researches have described what managers actually do at work. In listing a succession of events Mintzberg (1973), Kotter (1982) and Stewart (1983) for examples, have identified different roles, functions and activities exercised by managers during their work. In doing so they also underlined the differences between what managers are supposed to do: strategy, planning, distribution of tasks, etc... and what they actually do: interacting with others and solving day to day problems (Hales 1986). Time is usually distributed in these activities, which in turn face many of what is described as interruptions or disturbances. It is often a consequence of these disturbances that managers need to work overtime to compensate the time lost (Mintzberg, 1973).

Another consequences identified by researchers regarding these interruptions is the fragmentation of work. In sectors as diverse as finance, IT, consulting companies, hospital or academia reports have insisted on the short amount of time spent for each activities and the high frequency of switching between these activities (Mark and al 2005). As previously identified for the top level management, other types of managers and workers are now involved in these multiple activities and collaborations which can be characterized by fast-paced activities, a frequent fragmentation of actions and a continuous flow of interactions with others (Gonzales and Mark 2005).

In sensitive areas, research has also focused on the danger associated with frequent interruptions, demonstrating how the increasing number of errors is linked to the increasing number of interruptions, especially in workplace such as emergency room, plane or nuclear plant (Chisholm and al. 2000). These studies underline the role played by interruptions as a stress factor, as well as responsible for slowing the process of completing the intended tasks (Carey and al. 2000) Related to these interruptions are the disruption costs, meaning the additional time to recall the task and reorient it back after an interrupted task.

Performing simultaneous activities in given time has been widely recognized in time-use research being differently termed: simultaneous activities, overlapping activities, concurrent activities, parallel activities, secondary activities, polychronic time use or multitasking (Keynon 2008). Theory about time divides and organizes time in different dimensions, intervals, sequences, tasks, and so on. In phase with the linear perception of time, these notions presupposed a beginning and an end to the activities they parallelised or superposed, they presupposed also a kind of rational organisation or hierarchies between them. The real challenge appears not so much to dismantle time into small pieces or

activities than to be able to account for the simultaneousness of these activities within a given time.

The use of IT tools and their proliferation at work have also been discussed as having a major role in increasing the number of interruptions. Mobile phones, portable computers and smart phones are providing a continuous stream of information whose receptions are signalised by different noises and icons. Many studies tend to portray these interruptions as disturbances which prevent workers to actually perform their tasks and therefore need to be reduced (Jett and Georges, 2005; Czerwinsky at al. 2004). By contrast a few authors have seen the role of information technology as included in the nature of work (Orlikowski, 2007). In this perspective, the constant connectivity enabled by the communication technologies is constituting of the work itself as would be all kind of other social interactions and therefore cannot be seen as exogenous and distinct from the day to day activities (Wacjman and Rose 2011).

To summarise, many of the notions describing time, interruptions and fragmentation of work assumes that time can be rationally divided and organised. The recognition of the possibilities of several activities sharing a given time implies then to be able to divide time into even smaller sequences and activities which once identified can then be superposed or parallelised. In doing so the researcher assumes an organisation and rationality between the different sequences or tasks as well as the ability for the worker to organise them. However the principle characteristic of an interruption is precisely to have the potential to reverse this order and hierarchies by introducing new demands and priorities and therefore forcing the worker to redefine and reorganise her/his priority.

3. Method

The empirical material used for this paper is taken mainly from two civil engineers students work, Nielsen & Apelgren (2003). Their master thesis or more precisely their 168 pages annexes documenting 15 full days of following work interruptions and their consequences on failures on the building site constitute the secondary data used here. The aim of their master was to count the number of disturbances during workday and related to these the number of failures during the construction of a building.

The empirical material concerns the work of building site managers. Work on the building site is often described as chaotic, full of interruptions and delays (Loosmore and al.2003). Managers on site are often said to be under stress and overloaded with work and therefore very vulnerable to interruptions. The data come from participant observation and frequency analysis of managers' workday on a building site done by the two students (Nielsen & Apelgren 2003). I have always been fascinated by these two students' frequency analysis and their meticulous dismantling of all activities, some of them lasting no longer than 15 or 20 seconds. So here I propose to revisit the material gathered by Nielsen and Apelgren in two steps. First to give an account on what working as managers on the building site looks like as extracted from their data and secondly to focus on how the multiple interruptions are dealt with.

In order to do so they observed the workday of eight middle managers and architects. The managers observed were working on the building of a new public school. The school project began in the late nineties. The conceptual phase lasted from October 2001 to May 2002, followed by a design phase. Production of the school commenced September 2002. The new school was finalized in August 2004. The field work was carried on at the building site from the beginning of the construction phase starting the last days of September and continued during 5 weeks to the end of October 2003. The engineers did welcome the students warmly and did not make restriction regarding access to their daily occupations. The architects though claimed they did not understand the interest of the students for their daily work and were a bit more restrictive regarding accessibility. Further studies of the same building site have shown that already at that time they were conflict between the engineering company and the architects who felt betrayed by the contractual conditions they were offered (Koch, Buser and Thuesen, 2004). The following lists the managers observed as well as the number of full days' observation per person, the observation days were not consecutive, all managers were male:

- Project coordinator (1 observation)
- Foreman (3 observations)
- Production manager (1 observation)
- Subcontract manager 1 (2 observations)
- Subcontract manager 2 (2 observations)
- Overall project manager and controller (2 observations)
- Design manager (2 observations)
- Architects (2 observations)

The frequency analysis aimed at registering all the “stumbling stones” during a work day. The definition of “stumbling stones” is borrowed from Kjeldsen 1994 and describes “all the issues that prevents the actor in executing his work as effectively as possible and as correctly as possible the first time”. Are included in this definition all the interruptions and disturbances encountered by the manager and the concrete failures on the work place necessitating adaptation or changes in the work processes. This definition and its interpretation by the two students present a methodological bias. What the observers perceived as interruptions may not been similar to what the observed person perceived as such. Besides by focussing on the rupture, there is a risk to overemphasise the interruptions and underestimated the symbolic and social part of the work place. Last but not least the frequency analysis does not allow recomposing a task or activity as carried in different sequences as the level of description announced the type of activities concerned but not the process as it developed.

In order to differentiate and trace the observed activities during the frequency analysis, the two students developed a schema stating 5 main categories of activities: 1. the actual school project divided in 22 sub-categories; 2. other projects divided following the same 22 sub-categories, 3. IT with 3 sub-categories, 4. diverse activities such as waiting time, transport, pause and cleaning, and 5. private. This categorisation presents also a bias as it divides the content of the workday between work and non-work and oversees the social and symbolic aspects of work related humans interactions.

To this frequency analysis, the two students added participant observation and they kept a diary of the manager activities. This diary accounted for the planning of the day and how activities took place during the day. These observations enriched the material by giving a context to the different disruptions as well as by tracing the reactions and attitudes of the observed person. Besides following workday, participant observation covered also three meetings on the site and one visit of the site with a delegation of the various companies involved. The observed managers took part to a qualitative interview. In addition written documentation related to the project was referred to. All the observations were orally recorded on site and transcribed; they are the basis of the present paper.

Though the empirical material is extremely detailed, using other people's material has its limitation as it is not possible to enquire further on specific issues or to develop further the trustworthiness of methods used by them. The interruptions as defined by the students as well as their activities report is mirroring their own understanding of the notions which may not be shared similarly by others observers or participants; this limits the interpretation which can be extracted from the material. Another limitation resides in the fact that the master study was carried out in the context of operation management, focusing on prime processes and disturbances as causing failures.

4. The case study

The building site visited is the building of a new school. It was one the subprojects of a larger cooperation between a municipality and a network of construction actors. The overall project aimed at renewing and enlarging the public school services of the municipality (Koch and al. 2004). This sub project amounted to 12 million Euro for the contractor out of a total project budget at 26 million Euro. Whereas the architects and consulting engineers has a common budget for the entire project at 2,6 million Euro.

Operation during production was planned using traditional project planning tools (Microsoft project), meetings in the project group and in the steering group and evaluated by a key performance indicator scheme used in the steering group. It should be underlined that the project did not as a general feature demonstrated stress like tight budget frames or delays: it was finalized on time and with a small surplus compared to budget. The quality of the school was said to be good at the time of the completion of the project. The fact that, end-users later found number of problems which had not properly been dealt with is another story (Koch and al. 2004).

To the exception of the two architects, all the interviewees were employees at the design build contractor. One of the four managers worked predominantly with production issues and the three others worked predominantly with design issues, although these issues were interwoven. The site had 13 employed craftsmen and building workers in the beginning increasing to 79 at the end of the project. The next section presents first a general account of the workday based on the sequential frequency analysis.

The 15 workdays of the managers observed by Nielsen & Apelgren (2003) had an average length of 7 hours 45 minutes (the legal week work in Denmark is of 37 hours). While the 3 observations of the foreman did start rather early in the morning (6.05, 6.00 and 6.31), the rest of the observed managers began their day later between 7.25 and 9.47 with an average at 8.20. At the end of the day, the ones who arrived early left between 14.30 and 15.30 and the others stayed no longer than 16.45.

Taking a closer look at the work organisation, the managers had scheduled between 3 to 4 main tasks to be carried during the day usually including meetings with different actors related to the project both internal and external to the company but also sometimes external to the school project. Besides meetings, economy, planning, controlling and reporting were recurrent activities.

Looking at the actual unfolding of the day, the results of the study show very fragmented activity over time. As during the course of the 3-4 primary activities, an average of some 126 interruptions were observed. The highest number of interruptions is scored by the production manager in charge of concrete with a total of 284 interruptions which gives a rate of an interruption every 1 minute and 40 seconds. In term of length of the recorded activities, 3 activities are lasting more than 10 minutes; 135 have duration between 1 and 10 minutes and 146 are actually lasting less than a minute.

The three activities lasting over 10 minutes occurred first at 7.50, a 10 minutes of work with economy in the office; second at 8.36 a 11.25 minutes discussion on site with the carpenters about the tolerance of woods installation; and thirdly at 13.32 at 12 minutes telephone call with a consultant. During this call the manager was browsing through his computer screen and writing about something else on his computer during 22 seconds.

Under one minute length activities are listed activities such as questions and answers related to various issues during the walks on the building site; phones talks with the providers and the consultancy engineers as a problem occurred with the floor drain necessitating a quick and radical change in the work plan, as well as interruptions during these phone talks; events such as trials to join an interlocutor on the phone without success or looking at the display of a ringing phone even if the call is not answered are also registered as interruptions.

Most often during the observations, the managers don't take any specific pause for their lunch, but once a barbecue is organised with the carpenters.

Whenever there is a "temps mort" (dead time), meaning a moment in between to activities such as waiting for somebody to arrive at a meeting, time is used it for side or routine

activities such: making coffee during the loading time of the computer; listening to answer machine or calling divers interlocutors when driving their cars, discussing new projects when waiting for all the participants to join a meeting; typing e-mail when waiting for somebody to take their phones call; or even explaining things to the two students following them.

Out of the 15 days of observation there is only one mention of a manager not engaged in a specific activity with the following entrance: *“looking up in the air he looks like one who is thinking”* and this lasted 20 seconds.

The following table presents a limited example, about 22 minutes, of the recording of one of the managers' activities done by the students. The chosen moment is rather mundane and does not relate any specific crisis. It lasts 24 minutes and relates 18 activities.

Table 1. Extract form Nielsen & Apelgren (2003, page 19, document 4) translated in English by the author.

Main activity	Sub categories	Start time	End time	Length	Comment
School	On the site	08:42:55	08:43:42	00:00:47	Discussion with a sub-contractor
School	On the site	08:43:42	08:44:10	00:00:28	Walking on the site (wos)
School	Planning	08:44:10	08:44:26	00:00:16	(wos) Calculate concrete figures on his phone
School	On the site	08:44:26	08:48:22	00:03:56	(wos) walk back to the site office
School	On the site	08:44:22	08:48:24	00:00:02	Go in, take off his helmet and coat
School	Social discussion	08:48:24	08:50:00	00:01:36	
School	Office work	08:50:00	08:50:20	00:00:20	Check his computer and e-mails
School	Discussion about the project	08:50:20	08:54:08	00:03:48	With a collaborator about checking of ground quality
School	Discussion about the project	08:54:08	08:56:03	00:01:55	Interruption by the secretary about a file
School	Error	08:56:03	08:58:22	00:02:19	Try to find the file for the secretary, while still interacting with him
School	Discussion about error	08:58:22	08:58:43	00:00:21	Closing the discussion with the secretary
School	Office work	08:58:43	08:59:24	00:00:41	Working with computer finding at the end the document for the secretary
School	Phone call to a provider	08:59:24	09:00:53	00:01:28	Material
School	Call to another provider	09:01:30	09:05:15	00:03:45	Material
School	Social discussion with provider	09:02:25	09:02:50	00:00:25	
School	Discussion about the project with provider	09:02:50	09:05:15	00:03:25	Material
School	Internal discussion about the project	09:02:50	09:03:15	00:00:25	Another phone rings short communication internal of project, provider still online.
School	Planning	09:05:15	09:05:50	00:00:35	

The succession of events shows how some of the activities were left aside when new ones popped up. Activities could also be superposed to each other's, before being successively closed

Aside for the human interruptions the managers are facing, the reliability of the tools they are using to support their daily work is also challenging: A digging machine is to stop the time to get more gasoline as the workers have forgotten to fill up the tank. The lamp in the workers hut has gone, as the workers cannot find a new bulb, the foreman is asked to search for one himself.

IT though representing a manifest benefit for the managers contributes also with its shares of problems. Computers are a frequent source of interruptions. They either crashed, during the observations several hours of work were actually lost, or required codes and accesses which were not accessible. Printers did not always resituate exactly what was expecting. Mobile phones could have happened to be empty of batteries precisely at the time they were required.

5. Discussion

There is no doubt that the work of the observed site managers is fragmented and that compared to other studies consulted for this paper they hold a kind of record of the highest number of interruptions as none of the others reached the average of a new activity every 1 minute and 40 seconds. As discussed in the methods section the results could be relative to the manner the frequency analysis was performed and the units of analysis, the interruptions, defined. More than a change of activity, the frequency analysis reported all kind of changes it regarding space, media or interactions.

Since no overwork outside working hours was actually reported during the observations, one of the results is that these managers with an average of 7.45 hours' work per day are not working overtime. This is contrary to Mintzberg's point stating that managers need to balance the time lost in interruptions by overworking. Besides at the exception of the foreman who has to arrive early to decouple the site alarm, the meeting time in the morning are similar to office work and rather flexible at least within the sample of observations. This could be explained by the fact that the observations took place during the first months of this medium size construction building.

Most of the day managers during the observations sit in their offices. The walking around to look, discuss and control the work in progress is on the average only a small part of their work day. The majority of managers in this study have actually a rather office like type of job even if their tasks are of managing the building place.

Even if some of the incidents happening on the building site during the observations have required some quick handlings, the overall study does not report stress signals among the managers observed.

These 120 interruptions during the course of the workday are rarely of same context as the current task at-hand most often they are randomly related to other topics. Managers are

facing a continuous stream of activities where other people, events or things move in and out. They may switch between known and unknown expected and unexpected. They may be interrupted within the interruptions, opening new windows of activities that need to be parallelised or closed before taking over the previous activities. In the example above, the manager needs to change an order after a problem has occurred on the building site. It takes 15 minutes between the moment he finds out how much concrete he needs and the time he can actually negotiate the order. First he has to physically move to his office, then meeting a colleague he is engaging in interaction of private character; as he is coming back in his office he is also quickly checking his e-mail for any kind of emergency. From his office he is discussing a ground quality issue with a colleague but is interrupted by the secretary who has other errands and needs him to provide specific documents straight away. After having used several minutes in searching the document; he gives up and terminates his interaction with the secretary. He looks again at his e-mail, in doing so he finds by chance the document he was asked about. Then he calls a first provider who cannot deliver and then a second one. When making the second phone call, the manager has first a social interaction of 25 seconds with his correspondent before entering the professional discussion about the order. He is interrupting this discussion to be able to answer quickly another phone call from one of his colleagues dealing with another issue before going back to the previous call with the provider. The time needed to open and close the activities vary grandly between the type of tasks and emergency they represent. It is responsibility of the manager to ensure that these interruptions are taken care of so that the construction of building can carry on.

It would be difficult to distinguish between primary and secondary activities or parallel activities as the temporality as well as the importance of these activities can vary strongly. The hierarchy of solving different tasks is often created by the context: delivering documents to the secretary may not be a priority for the manager but her insistence to obtain these documents modifies the previous planning of the manager. Similarly, the problem with the delivery of concrete is setting a new priority which importance varies during the morning as a solution is nearly found. To find a rationale behind these actions in terms of sequences or priority seems therefore difficult to achieve. The request of the secretary is linked to previous interactions with the manager, it would be difficult to trace its beginning and getting the document may not be the end.

Looking at how work develops during the day, during the observations, there are usually 3- or 4 planned main tasks or activities that need to be taken care of. However at the exception of the meetings, there is a kind of inversion of priority as these tasks become what managers are doing when nothing else is asking for their attention. Most of these activities planning, controlling or reporting does not at the time of the observations require immediate fulfilling and can well be postponed without creating major delay.

The challenge is then not so much to liberate time in order to fulfil the planned tasks but to be able to collect, organise, prioritise and answer the different activities popping up during the day as well as constantly reorganising the already scheduled activities consequently.

6. Conclusion

By looking how time is spent by managers on the building site, the paper has shown some of the limits of assuming that time can be rationally divided and organised. As new situations occur continually, they forced the managers to react to a multiplicity of events. The temporality and hierarchy of these events can neither be predicted or fully organised as they are created by the interactions managers have with their surroundings and therefore do not only depend of their own will.

By looking closely at the daily work on managers on the building site, the present paper suggests that the flow of constant switching is not preventing managers to do their jobs but instead is co-shaping and co-organising their work. The task of managers is then to be able to deal and manage these changes of activities for the building process to continue.

A bias linked to the frequency analysis resides in the definition of interruption. What is seen by the observers as an interruption for example between informal private talk and formal worked related discussion, could be seen by the observed person as a totally linked activity where polite informal talk is the necessary warm up to a business discussion. So the apparent rupture between the two forms of interactions could be in fact a symbolic necessity before engaging into professional negotiations.

Moreover by fragmenting work into small pieces following a sequential time-line, the researcher is prevented to see that solving some tasks may require a number of different contacts, interactions and mediation. Even if these different actions don't always follow in an immediate sequence, they still represent effective practices.

15 days of works at the beginning of a construction site may not be enough to generalise on what constitutes the work of managers and the conditions under which this work is performed. But as time travellers, the managers of the study succeeded in being in different activities at the same time...

References

Apelgren S. & Holten Nielsen T. (2003) Effektivisering af totalentreprenørers projekteringsprocesser, -et Operations Management Perspektiv, Master Thesis, Technical University of Denmark, Lyngby.

Bertelsen S. and Koskela L (2003) "Avoiding and managing Chaos in Projects", Proceedings 11th Annual Conference. International Group of Lean Construction, Virginia Tech. Blacksburg, Virginia.

Carlson, S. (1951) Executive behaviour, Stockholm: Strömbergs.

Chisholm C., Collison E., Nelson D. and Cordell W. (2000) Emergency Department Workplace Interruptions: are emergency physicians "Interrupt-driven and "Multitasking"? *Academic Emergency Medicine* 7/11 pp1239-1243.

Czerwinski M, Horowitz E. and Wilhite S. (2004) "A diary study of task switching and interruptions", *CHI 2004*, Vienna Austria.

Duc M. (2002) *Le Travail en Chantier*, Octares Editions.Toulouse.

Gonzalez V and Mark G. (2004) "Constant, constant, multi-tasking craziness: managing multiple working spheres", *CHI 2004*, Vienna Austria,

Keynon S. (2008) Internet Use and Time Use: the importance of multitasking, *Time Society* 17/2 pp.283-318.

Koch C. (2004) "Hard Hats, Octopuses and Rubber Boots- Operational Managers in Building Processes", *Operation Management as a Change Agent: Proceedings the 11th international Conference European Operations Management Association (EurOMA)*. Vol. 2 1. ed. Fontainebleau : INSEAD, 2004.

Koch C. , Buser M. & Thuesen C. (2004) "Managing Projects with the Public, -bringing Partnering, Contracts and Financing together in Building Public Services", *Proceedings EUROMA 2004*, INSEAD, Fontainebleau.

Kotter J. 1982 *The general managers*, New York: The Free Press,

Lahdenperä P. (2012) "Making sense of the multi-party contractual arrangements of project partnering, project alliancing and integrated project delivery", *Construction Management and Economics*, Vol 30, Issue 1, 57-79.

Loosemore M.,Dainty A. & Lingard H.(2003) *Human Resource Management in Construction Management*, Spon Press. London.

Mark G. Gonzalez V. and Harris J. (2005) "No task left behind? Examining the nature of fragmented work", *CHI '05 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Portland, OR, USA* , pp. 321-330

Mintzberg, H. (1973), *The Nature of managerial work*, Prentice-Hall, London,

Orlikowski W. (2007) "Sociomaterial practices: exploring technology at work", *Organization studies* 28, pp 1435-1448.

Stewart, R. (1983), "Managerial behaviour: how research has changed the traditional picture", in Earl, M.J. (Ed.), *Perspectives on Management: A Multidisciplinary Analysis*, Oxford, University Press, Oxford, pp. 82-98.

Wacjman J. and Rose E. (2011) "Constant connectivity: rethinking interruptions at work". *Organization studies* 32/7, pp 941-961.