

## Chapter 6

# Not Stronger Than the Weakest Link: An Empirical Study of Coordination Work in an Industrial Context

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### ABSTRACT

*This chapter reports a field study of coordination work in an industrial warehouse. The warehousing process relies upon a chain-like structure of interdependent links for feeding the production line with components, a weak link jeopardizes the whole process as well as those that follow. The purpose of the study was to explore how an organization in the process industry structures their warehousing process for achieving a smooth and efficient flow of components, but also to identify factors that might jeopardize the process and how these were managed by the organization. The chapter provides a rich and detailed description of an intended coordination process, the involved actors, links, and dependence on IT. The chapter adds to the current body of research within coordination work and CSCW by offering a rich description of a case in which informal- as well as formal procedures are crucial for achieving a smooth and efficient process.*

### INTRODUCTION

For any given company active in the process industry, success in streamlining production could mean the difference between being successful or going out of business. In today's competitive environment with increased and global competition, this is more important than ever (Bannon 1993, Hinds and McGrath 2006, Schmidt 2006) and being

second best is just not good enough. The way that organizations in the process industry structure their production for competitive advantage varies, but one common model is to base production on a set of lines divided into different working stations and base production on takt time calculations (Duanmu and Taaffe 2007). Takt time that has been defined as: “the available work time divided by the number of finished units required in that time period” (Duanmu and Taaffe 2007, p. 1633) and basing production upon these calculations is highly dependent upon

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Careful calibration and planning in order to avoid breakdowns. Arranging work based upon takt time implies following a sequential procedure where interconnected workstations have a limited amount of time at their disposal before passing forward a more developed product embryo.

Focus in previous research on process coordination has to a large extent been on the activity of assembly (e.g. Longo et al. 2006, Shin et al. 2004) and few if any studies have focused upon the process that precede the actual construction, that is, the warehousing process. This process often begins with goods reception of components in one end of the factory, and delivery of components to the assembly line in the other. With other words, the role of the warehouse is to “feed” the production line(s) in a timely matter according to some pre-established plan. A situation of interdependency in collaboration is a factor that causes need for coordination (Malone and Crowston 1990, Cataldo et al. 2006), and the cost of ending up with “starvation” at any station in the production process could be substantial.

A concept for describing the management of interdependent steps in a work process is workflow, which is a concept that has been defined as “*a coordinated set of activities that act together to achieve a well-defined goal*” (Senkul et al. 2002, p. 694). With the emergence of networked computers numerous workflow technologies were developed but not widely adopted (Laymann and Roller 2000). One reason for their limited impact was according to Bowers et al. (1995) that many of these systems were not based upon empirical grounds and were insensitive to contextual details of work. In fact, several case studies of groupware and workflow technology conducted within the research area of CSCW identify this as a decisive problem when systems are introduced in organizations (e.g. Orlikowski 1992, Bowers 1994, Schmidt 2006). Contextual details of work such as local norms and informal procedures are extremely important for socially organized work,

office automation studies have for example shown that work tends to halt within shortly when workers only follow office procedures and do not engage in informal interactions (Schmidt and Bannon 1992). These observations are in line with Suchman’s (1987) work on plans and situated actions where she acknowledge the importance of plans and formal procedures as resources for decision-making, while at the same time emphasizing the importance of ad hoc problem-solving activities and inclusion of contextual factors for getting the job done.

Within the field of CSCW, coordination of work has been assigned a lot of attention in the last two decades (e.g. Malone and Crowston 1990, Hutchins 1995, Hinds and McGrath 2006). Most coordination research has primarily been assigned to interpersonal processes (e.g. Kling 1991, Wainer 2000, Kobayashi et al. 2005) while there are few examples of research with an emphasis on environmental, technological and procedural structures upon which these interpersonal processes are based. The importance of environmental factors for work practices have been stressed (e.g. Bentley et al. 1992, Heath and Luff 1992) but with a main focus on other social actors rather than the environment in which people actually work (Dix et al. 1995).

This paper contributes to the bridging of this gap between design of groupware and workflow systems and real world practice by thoroughly describing the environmental and procedural process of coordination work in an industrial context through rich empirical descriptions. As a consequence no deep analysis of interpersonal coordination processes are presented, the focus is rather placed on the environmental, technological and procedural foundations upon which the coordination process is based. This is an important aspect for design as “*environmental cues are of prime significance and they should be given due consideration when proposing automated solutions or when implementing any changes to the flow of work*” (Dix et al., 1995, p. 16).

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