

# Chapter 19

## Communication in the Manufacturing Industry: An Empirical Study of the Management of Engineering Drawing in a Shipyard

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### ABSTRACT

*This chapter is based on a case study of one shipyard's effort to make the flow of engineering drawings feeding into its production process more reliable. To construct a ship, detailed drawings of every part of the product is an essential input. For these drawings to be reliable, they must include all relevant information, they have to follow each other in a proper line of order, and they should be released according to production milestones. In the shipyard in this study, an analysis was initiated to explore the management of engineering drawing. The main findings show that the usability of ICT is limited for this purpose, and that to really make an effort in order for engineering drawings to be reliable, a more basic understanding of the interpersonal communication at work in a one-off project environment is fundamental.*

### INTRODUCTION

*"We are stuck with technology when what we really want is just stuff that works" (Adams 2002).*

The chapter is based on a case study of one shipyard's effort to make the flow of engineering drawings feeding into its manufacturing production process more reliable. The chapter's interest is with interruptions in this flow caused by technological, organizational and social inadequacies on an intra- and inter-organizational level.

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The rapid development of information and communication technologies (ICTs) has led to much attention being paid to the impact that the new technology has and will have on the sharing and transfer of information in the workplace. In the manufacturing industry, the use of ICT technologies has contributed to the development of computer aided systems for the modeling of designs and production of drawings, databases and digital catalogues for the capturing and storing of information as well as software systems for the monitoring and integration of processes.

The chapter's main objective is to demonstrate the complex interaction between people, and between people and computer-based technology, in the manufacturing industry. We claim in this chapter that although technological advances in communications are, indeed, welcome in manufacturing enterprises, a more reliable flow of engineering drawings will also depend on a deeper understanding of the interpersonal communication at work in a one-off project environment. A one-off project environment conceptualizes the shipbuilding project as both a temporary production system, and as a set of diversely skilled people working together on a complex task over a limited period of time. As the production system is not stable for very long, and neither is the relationship between many of the people involved, dynamic patterns of communication are developed that may help and sometimes hinder a reliable flow of engineering drawings.

The next section includes a review of relevant literature on topics related to manufacturing production, interpersonal communication, and ICT use. After that follows the analysis section, where the first part contains a discussion upon issues, controversies and problems related to subsequently the engineering drawing as a means of communication, human intervention in ICT application and the relevance of ICT in a one-off project environment. The second part of the analysis involves recommendations and solutions in form of a stepwise approach to a more precise

and predictable flow of engineering drawings. The chapter then goes on to examine the adequacy of the emerging trend with digitalization of the building process. The last section concludes the chapter and suggests topics to be elaborated on in future research work.

## **BACKGROUND**

Why focus on the execution of engineering drawings? On the whole, this particular process makes up no more than around three percent of total costs in a shipbuilding project. By comparison, the outfitting part of the production constitutes around two third of all project costs. Nevertheless, there is still a fact that engineering drawings are essential for the building of a ship. Unless these drawings are made available, and include the accurate information, the construction of a ship will not take place. Engineering drawings, as such, is a critical input within shipbuilding. Especially when the ships to be constructed are highly advanced offshore vessels with loads of technology and equipment. Reliable engineering drawings – or having the right drawings, at the right time – are then decisive for a shipbuilding project to deliver on time, and with a high quality of product.

A shipbuilding project is divided in three main phases; design, detailed engineering, and construction. The design phase is when the ship owner communicates with a ship consultant and/or design company, about ship types and functionalities of the new ship. This is also the phase where a contract agreement is signed between the ship owner and a chosen yard. The contract agreement includes prepared documents concerning specifications of the ship, and rough drawings (general arrangement, tank plan etc.). The detailed engineering phase, which is the primary focus of this chapter, is largely based on the specifications and rough drawings agreed upon as part of the contract. Detailed engineering predominantly occurs ahead of the construction phase, when rough

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