Chapter 32
Evolution of the Role of Measurement Systems in Industrial Decision Support

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ABSTRACT

Measurement data can be used for decision support in multiple ways – from one-time, manual data collection/presentation (reporting) through flexible business intelligence solutions to online, automated measurement systems. In centralized organizations, the measurement data is often collected through reporting, but the trends in modern organizations with empowered teams, globalized development, and needs to monitor continuously longer supply chains requires shift in the design and use of measurement systems. In this chapter, we present a study of evolving measurement systems at three companies with global businesses – Ericsson, Volvo Cars, and Axis Communications. The results of the study include the identification of the timeline of the evolution, distinct generations of measurement systems and information needs in the different phases of the evolution. The experiences show how to evolve centralized decision support systems to support global and distributed decision support.

1. INTRODUCTION

Modern software development companies often experience the trend of moving from centralized project planning, monitoring, and execution towards distributed organizations with empowered software development teams and globalized software development processes (Ebert & De Neve, 2001; Herbsleb & Mockus, 2003). In this context software is often regarded as a part of a larger product which is one or more links in a global supply chain. An example of such a supply chain is the development of modern passenger cars where there are multiple layers/links of sub-contractors finally delivering sub-components

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(many of these being computer units with software) to Original Equipment Manufacturers (OEMs) such as Volvo or Volkswagen.

Decision support in such companies requires reliable facts to formulate the decisions and to support the monitoring of decision implementation. To support decisions, companies have a number of methods and tools at their disposal. The methods and tools vary from generic business intelligence systems to dedicated measurement systems which trigger the decision formulation processes and monitor the execution/implementation of the decisions (Staron, 2012). The efficiency of the decision support has an important impact on the performance of the organizations – both in the time frame of the decision support (e.g., triggering the decisions when there is still possibility to act) and in the quality of the decisions (e.g., triggering the right decisions).

Although this trend of moving towards globalized software development is recognized when it comes to evolving software processes and organizations (Šmite et al,. 2010), little has been studied on the evolution of measurement systems and the associated decision support towards globalized software enterprises. The mission of this chapter is to address this gap by identifying and documenting industrial experiences from evolution of measurement systems from centralized reporting to distributed decision support systems. In this chapter, we have a unique opportunity to study three software development organizations which use measurement systems in decision making in three different ways.

First, we explore Volvo Cars, a Swedish vehicle manufacturer in a sector with increased importance of software. Second, we study measurement systems at one unit of Ericsson which develops products for telecommunication networks and where software has a major role. Finally, we have a chance to explore the information needs of Axis Communications, which is a company developing network cameras and video management software where embedded software development is an important part. Each of these organizations have distinct properties and market situation, but all of them are aligned in terms of identifying the emerging trends of new information needs focused on software development teams and identifying needs for increasing efficiency of measurement processes.

The chapter is structured as follows. Section 2 presents the background including the related work. Section 3 presents the related work most relevant to the study presented in this chapter. Section 4 discusses the research method employed in the study and Section 5 includes the results of studies at the companies in terms of the evolution timeline. Section 6 presents the conclusions from the study. The chapter concludes with the summary and a list of further literature for the interested reader.

2. BACKGROUND

In this section, we introduce the concept of measurement systems which we investigate in the context of three companies – Ericsson, Volvo Cars, and Axis Communications. Towards the end of the section, we describe the current trends in measurement systems.

2.1. Measurement Systems, Business Intelligence and Metric Tools

The measurement systems presented in the chapter are based on the international standard ISO 15939 (Software and Systems Engineering – Measurement Processes, (ISO/IEC 2007)) and its use in practice to design, develop and deploy measurement systems for monitoring products, processes and organizations (Staron et al., 2010).