

Chapter 2.26

Combining Tailoring and Evolutionary Software Development for Rapidly Changing Business Systems

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ABSTRACT

This article reports on a case study performed in cooperation with a telecommunication provider. The telecom business changes rapidly as new services are continuously introduced. The rapidly changing business environment demands that the company has supportive flexible software. The company's continuous evolution of the IT-infrastructure makes it necessary to tailor the interaction between different applications. The objective of the case study was to explore what is required to allow end-users to tailor the interaction between flexible applications in an evolving IT-infrastructure. The case study followed a design

research paradigm where a prototype was created and evaluated from a use perspective. The overall result shows that allowing end-users to tailor the interaction between flexible applications in an evolving IT infrastructure relies on, among other things, an organization that allows cooperation between users and developers that supports both evolution and tailoring.

INTRODUCTION

End-user development (EUD) is one way to provide a flexibility that allows companies to compete in rapidly changing business environ-

ments. Telecommunication provision is one such example of a rapidly changing business area. Telecommunication providers compete by, among other things, providing their customers with new types of services, and as the business changes, the business systems supporting it must also change. One way of conducting EUD is end-user tailoring. End-user tailoring is an activity allowing end-users to modify the software while it is already in use, as opposed to modifying it during the development process (Henderson & Kyng, 1991). End-user tailoring ranges from setting the values of parameters to adding code to the software. Since evolution of software is inevitable (Lehman, 1980) and since tailoring is recognized as a way of reducing the efforts when keeping the system up to date through further development (Mørch, 2002), tailoring could be an alternative to increase the sustainability of software in a rapidly changing business environment.

Tailoring research so far has focused on flexible stand-alone systems. In earlier projects, we too focused on the design of flexible and end-user tailorable applications (Lindeberg, Eriksson, & Dittrich, 2002). However, interaction with other systems turned out to be a bottleneck, since business systems in telecommunication are part of an IT-infrastructure consisting of heterogeneous data sources. Other research also indicates that software and IT-infrastructures pose new challenges for software engineering (Bleek, 2004). Normally, the data exchange between different systems is the realm of the software developers, but in this article we use the evaluation of a prototype to answer the question: What is necessary to allow *end-users* to tailor the interaction between flexible applications in an evolving IT-infrastructure? Our results support the claim that end-users can even tailor the interaction between business applications. The analysis of a user evaluation of a case-based prototype results in a number of issues to be addressed regarding the technical design, the know-how demanded of the users, and the organizational setting, particularly the

cooperation between users and developers. These issues both confirm and extend existing research on end-user development and tailoring.

We start by briefly describing the relevant work practices and business systems of our industrial partner. We then present how our research relates to others' work. In the following section, we describe our research approach in detail and the design of the prototype is presented to provide a basis for the evaluations and discussions. Thereafter, we present the outcome of the evaluation, which points out three different categories of issues that are important when providing end-users with the possibility to manage interactions between applications in an evolving IT-infrastructure. The discussion relates these results to the state of the art.

HISTORY AND BACKGROUND

The research reported here is part of a long-term cooperation between the university and a major Swedish telecommunication provider, exploring the applicability of end-user tailoring in industrial contexts (Dittrich & Lindeberg, 2002). The subject of the prototype is part of the telecommunication provider's back office support infrastructure for administering a set of contracts and computing payments according to these contracts. To compute payments, the system must be supplied with data from other parts of the IT-infrastructure. When creating new contract types based on different data, flexibility is constrained by the hard-coded interface to other systems. As a work-around, ASCII files can be created providing the necessary data sets—or events—to compute the payments. The data for these extra payments is handled and computed manually. To compute the data for an extra payment, members of the administrative department first run one or more SQL queries against the data warehouse. The result is stored in ASCII files. Next, the user copies the data from the ASCII files and pastes it into a prepared

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