

# Preliminary Results from a State-of-the-Practice Survey on Risk Management in Off-the-Shelf Component-Based Development

Jingyue Li<sup>1</sup>, Reidar Conradi<sup>1,2</sup>, Odd Petter N. Slyngstad<sup>1</sup>, Marco Torchiano<sup>3</sup>,  
Maurizio Morisio<sup>3</sup>, and Christian Bunse<sup>4</sup>

<sup>1</sup> Department of Computer and Information Science,  
Norwegian University of Science and Technology (NTNU),  
NO-7491 Trondheim, Norway  
{jingyue, conradi, oslyngst}@idi.ntnu.no

<sup>2</sup> Simula Research Laboratory, P.O.BOX 134, NO-1325 Lysaker, Norway

<sup>3</sup> Dip. Automatica e Informatica, Politecnico di Torino,  
Corso Duca degli Abruzzi, 24, I-10129 Torino, Italy  
{morisio, marco.torchiano}@polito.it

<sup>4</sup> Fraunhofer IESE, Sauerwiesen 6,  
D-67661 Kaiserslautern, Germany  
Christian.Bunse@iese.fraunhofer.de

**Abstract.** Software components, both Commercial-Off-The-Shelf and Open Source, are being increasingly used in software development. Previous studies have identified typical risks and related risk management strategies for what we will call OTS-based (Off-the-Shelf) development. However, there are few effective and well-proven guidelines to help project managers to identify and manage these risks. We are performing an international state-of-the-practice survey in three countries - Norway, Italy, and Germany - to investigate the relative frequency of typical risks, and the effect of the corresponding risk management methods. Preliminary results show that risks concerning changing requirements and effort estimation are the most frequent risks. Risks concerning traditional quality attributes such as reliability and security of OTS component seem less frequent. Incremental testing and strict quality evaluation have been used to manage the possible negative impact of poor component quality. Realistic effort estimation on OTS quality evaluation helped to mitigate the possible effort estimation biases in OTS component selection and integration.

## 1 Introduction

OTS components (Off-The-Shelf) includes COTS (Commercial-Off-The-Shelf) and OSS (Open Source Software) components. More and more software projects start to use OTS components. However, using such external components introduces many risks [1, 3, 4, 5]. Before project managers decide to acquire an external component, instead of building it in-house, they must identify possible risks. Although several risks and risk management strategies in OTS-based development have been identified [1-7, 10, 11, 14] from case studies, few empirical studies have been done to verify

their conclusions. As a result, software project managers have few effective and well-proven guidelines to identify the relative effects of the various risks, and to manage them properly.

We designed a questionnaire to perform a state-of-the-practice study on risk management in OTS component-based development. The survey is being performed in three European countries (Norway, Italy, and Germany). We currently have gathered 42 filled-in questionnaires.

The findings of this study show that some risks are more frequent than others, such as the ability of OTS components to follow requirement changes, and estimating effort in component selection and integration. Results also show that some risk management methods, such as serious consideration of quality of the component in the selection process, helped to mitigate effort estimation risks in the selection and integration phases.

The rest of this paper is organized as follows: Section 2 introduces some related work. Section 3 describes our research design. Section 4 presents the preliminary results, and Section 5 discusses them. Conclusions and future work are presented in section 6.

## **2 Background**

Risks are factors that may adversely affect a project, unless project managers take appropriate countermeasures. Risk management in software development has been studied for many years [8, 9, 15, 18]. These studies have proposed classical risks and risk management in software development. In addition to the classical risks associated with developing large systems, OTS components requires managers to modify their typical mitigation strategies for some of the classic risks and to develop new mitigation strategies for risks that are particular to the use of OTS component in a system.

### **2.1 Risks in OTS Component-Based Development**

Different stakeholders, such as component providers, component integrators, and customers, may face different kinds of risks [12]. Risks relevant to the component integrators in OTS components-based development are a subset of risks in component-based development [12], COTS-based development [1,3, 14], and Open Source based development [11]. Typical risks in OTS components-based cover different phases of a project as showed in Table 1.

### **2.2 Risk Management in OTS Component-Based Development**

To manage possible risks in OTS component-based development, some previous studies have proposed risk management strategies based on case studies and lessons learned [1, 3, 14, 18]. The most typical ones are summarized in Table 2.