

Utilization of a Set of Software Engineering Roles for a Multinational Organization

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Abstract. In this paper, we present the application of a set of software engineering roles. Role definitions were developed using internationally recognized software engineering reference documents for a major railway development organization: Bombardier Transportation. The description of the Software Architect role is explained. This paper will also illustrate how the role set could be used for project-specific needs during a typical project planning and launch session.

Keywords: Software Engineering, Roles definition, Process, standards.

1 Introduction

As stated by Humphrey [1]: “Without clearly identified responsibilities, it could take some time for a team to understand everything that it must do, to decide who should do each task...That is not so much because the engineers don’t want to take responsibility but rather because they don’t know what all the actions are or they are not sure whether anyone else is already doing them. They may also be reluctant to take on tasks that the team or team leader might plan to give to someone else.” This why we have conducted a project to improve the software engineering role definitions within the software engineering process definition of a large multinational organization. The project was also conducted because of the many conflicting and sometimes absent role definitions across the many Bombardier Transportation¹ sites

¹ www.bombardier.com

and projects. Moreover, many of the roles that had already been defined were defined only very briefly.

This paper presents the utilization of a set of roles in a project that includes software development. A detailed analysis and improvement initiative in regard to the role definitions within the Bombardier Engineering System Software Engineering (BES SWE) process definition has already been conducted [2, 3]. The BES SWE is the common software engineering process definition of Bombardier's Transportation division, in which each role definition specifies the purpose of the role, identifies the core responsibilities assumed by the role, and the hard and soft skills needed to perform the role.

Created in 1974 to provide subway wagons for the Montreal Transit Authority, Bombardier Transportation grew rapidly through many acquisitions to become the leading manufacturer of rail material for moving people. The company had 16,000 employees before Bombardier Transportation acquired, in 2001, ADtranZ. It is also interesting to note that ADtranZ was also the result of an upcoming merger between employees from sections of ABB and Daimler Chrysler. The acquisition of ADtranZ came with 20,000 employees with an engineering presence in 25 countries. The company also had to face many challenges of modern multinational organizations:

- Multidisciplinary system development,
- Multiple integrator-supplier relationships,
- Multi-country development,
- Multicultural teams,
- Downsizing/merger/turnover,
- Offshoring.

As an example of a complex software-intensive system, the company is working on the development of the European Rail Traffic Management System / European Train Control System (ERTMS / ETCS). This system will allow trains to cross borders without the need to change locomotive or driver. It also makes it possible for every train to be supervised individually, and for every train to be run according to its particular characteristics².

In order to facilitate the identification and deployment of technologies, the company established a number of corporate Centres of Competence in various engineering specialties. The Centre of Competence (CoC) in Software Engineering, located just outside Montreal (Canada), is where this project was coordinated. Some of the tasks of the Software CoC are:

- To reduce technical risks and quality deficiency costs;
- To support and monitor strategic initiatives;
- To assess, develop and deploy (e.g. training) software engineering technologies such as processes (BES SWE), methodologies and tools.

² Adapted from: *ERTMS/ETCS – for a competitive railway*, Bombardier Transportation, Rail Control Solution, Feb 2002.