Chapter 10
Requirements Verification in the Industry

Gauthier Fanmuy, Anabel Fraga, and Juan Llorens

Abstract. Requirements Engineering is a discipline that has been promoted, implemented and deployed for more than 20 years through the impulsion of standardization agencies (IEEE, ISO, ECSS,...) and national / international organizations such as AFIS, GfSE, INCOSE. Ever since, despite an increasing maturity, the Requirements Engineering discipline remains unequally understood and implemented, even within one same organization. The challenges faced today by industry include: “How to explain and make understandable the fundamentals of Requirements Engineering”, “How to be more effective in Requirements authoring”, “How to reach a Lean Requirements Engineering, in particular with improved knowledge management and the extensive use of modeling techniques”.

This paper focuses on requirements verification practices in the Industry. It gives some results of a study made end of 2010 about Requirements Engineering practices in different industrial sectors. Twenty-two companies worldwide were involved in this study through interviews and questionnaires. Current requirements verification practices are presented. It gives also some feedbacks of the use of innovative requirements authoring and verification techniques and tools in the industry. In particular, it addresses the use of Natural Language Processing (NLP)
at the lexical level for correctness verification (on the form, not on the substance) of requirements, the use of Requirements boilerplates controlled by NLP for guiding requirements writing and checking, the use of Ontologies with NLP to verify requirements consistency, and the application of Information Retrieval techniques for requirements overlapping.

1 Introduction

Several studies clearly underlined the importance of requirement management in Systems Engineering [Brooks1987], [Chaos-Report2003], [SWEBOK2004]. Among these studies [NDIA2008], the SEI (Software Engineering Institute) and the NDIA (National Defense Industrial Association) made a study on the efficiency in Systems Engineering. The Systems Engineering Division (SED) of the National Defense Industrial Association (NDIA) established the Systems Engineering Effectiveness Committee (SEEC) to obtain quantitative evidence of the effect of Systems Engineering (SE) best practices on Project Performance. The SEEC developed and executed a survey of contractors for the defense industry (i.e., government suppliers) to identify the SE best practices utilized on defense projects, collect performance data on these projects, and search for relationships between the application of these SE best practices and Project Performance.

The SEEC surveyed a sample of the population of major government contractors and subcontractors represented in the NDIA SED. The survey data was collected by the Carnegie Mellon® Software Engineering Institute (SEI). Project Performance was then assessed based on satisfaction of project cost, schedule, and scope goals. This study showed a strong correlation between project performances and requirements engineering capabilities:

- Organizations with low capabilities in Requirements Engineering are likely to have poor performance projects
- At the opposite, organizations with high capabilities in Requirements Engineering are likely to have good performance projects: over half of the Higher Performing Projects exhibited a higher capability in Requirements Engineering.

Thus, it can be understood that Requirements Engineering is a key success factor for current and future development of complex products. As highlighted in [GAO2004], [SGI2001] the existence of poor requirements, or lack of them, is one of the main causes to project failures. Even more, although there is no complete agreement on the effort and cost distribution of activities for the development process (the requirements phase of software projects estimates between 5% and