Software Development Process Standards for Very Small Companies

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INTRODUCTION

In recent times quality orientated process approaches and standards have matured and gained acceptance in many software development organizations. Standards emphasize communication and shared understanding more than anything. There are many potential benefits of using standards. In particular for small and very small companies, the benefits that certification can provide include: increased competitiveness, greater customer confidence and satisfaction, greater software product quality, increased sponsorship for process improvement, decreased development risk, facilitation of marketing, and higher potential to export. While good internal software management might help meet the first five claims; the last two can only be the benefits of using a widely recognized standard.

It is commonly agreed that very small software companies, implementing management procedures, and controls to appropriately administer their software development activity is a significant challenge (Laporte et al, 2015). For example, a software company operating in India may have a completely different set of operational problems when compared to a software company in Canada, Mexico or Ireland. Even within a single geographical area such as Ireland, the range of operational issues faced by a small local Irish-owned firm can be radically different to those affecting a multinational subsidiary. The fact that all companies are not the same raises important questions for those who develop software process and process improvement models. To be widely adopted by the software industry, any process or process improvement model should be capable of handling the differences in the operational contexts of the companies making up that industry. But process improvement models, though highly publicized and marketed, are far from being extensively deployed and their influence in the software industry therefore remains more at a theoretical than practical level.

With this in mind, the standardization body ISO/IEC has recently published the ISO/IEC 29110 standard "Lifecycle profiles for Very Small Entities" with the overall objective being to assist and encourage very small software organization in assessing and improving their software. The purpose of this chapter is provide a primer on the ISO/IEC 29110 standard focusing on two main process areas of Project Management and Software Implementation. This chapter will start with an explanation of the rationale and justification for the development of this new standard, followed by an overview of its structure and explain how to deploy ISO/IEC 29110 in a typical very small software company.

BACKGROUND

This section will introduce the problem with standards and explain the specific case of very small entities, before presenting the ISO/IEC standard as a solution specifically designed to address these problems for very small companies.

Very Small Companies

The definition of "Small" and "Very Small" Entities is challengingly ambiguous, as there is no commonly accepted definition of the terms. The term "Very Small Entity" (VSE) had been defined by the ISO/IEC JTC1/SC7 Working Group 24 and subsequently adopted for use in the new ISO/IEC 29110 software process lifecycle standard as being "an entity (enterprise, organization, department or project) having up to 25 people" (Laporte et al, 2008).

A large majority of enterprises worldwide are VSEs. In Europe, for instance, as illustrated in Table 1, over 92% of enterprises are micro-enterprises. They have fewer than nine employees. Micro enterprises account for 70% to 90% of enterprises in OECD countries and about 57% in USA.

Typically VSEs are economically vulnerable as they are driven by cash flow and depend on project profits, so they need to perform the projects within budget. They tend to have low budgets which have many impacts, such as: lack of funds to perform corrective post delivery maintenance; few resources allocated for training; little or no budget to perform quality assurance activities; no budget for software reuse processes; low budget to respond to risks; and limited budget to perform Process Improvement and / or obtain a certification/assessment. Typically the VSE's product has a single customer, where the customer is in charge of the management of the system and the software integration, installation and operation. It is normal practice for the customer not to

Table 1. Size of enterprises in Europe (Moll, 2013)

Type	Number of Employees	Annual Turnover	No. of Enterprises (% of Overall)
Micro	1-9	$\leq$2M	92.2
Small	10-49	$\leq$10M	6.5
Medium	50-249	$\leq$50M	1.1

define quantitative quality requirements and for customer satisfaction to depend on the fulfillment of specific requirements that may change during the project. A close relationship between all involved project members including the customer shows that software development in small and very small companies is strongly human-oriented and communication between them is important.

The internal business process of VSEs is usually focused on developing custom software systems, where the software product is elaborated progressively and which typically does not have strong relationship with other projects. Typically most management processes (such as human resource and infrastructure management) are performed through informal mechanisms, with the majority of communication, decision-making and problem resolution being performed face-to-face.

Problems With Standards

Although commercial SPI models have been highly publicized, they are not being widely adopted and their influence in the software industry therefore remains more at a theoretical than practical level (O'Connor and Coleman, 2009). For example, in the case of Capability Maturity Model Integration (CMMI), an Australian study found that small organizations considered that adopting CMMI would be infeasible (Staples et al, 2007) and an Irish study found significant resistance due to negative perceptions surrounding levels of bureaucracy and required documentation (Coleman and O'Connor, 2006). Further investigation of the CMMI by Staples and Niazi (2006) discovered, after systematically reviewing 600 papers, that there has been little published evidence about those organizations who have decided not to adopt CMMI.

There is evidence that the majority of small and very small software organizations are not adopting existing standards / proven best practice models because they perceive the standards as being developed by large organizations and orientated towards large organizations, thus provoking the

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