Deploying a Software Process Lifecycle Standard in Very Small Companies

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INTRODUCTION

In the case of very small software companies, implementing management procedures, and controls to appropriately administer their software development activity is a significant challenge. With this in mind, the ISO/IEC standards body 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 article is provide a primer on the ISO/IEC 29110 standard focusing on two main process areas of Project Management and Software Implementation. This article 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.

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.

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.

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 & Coleman, 2009). For example, in the case of 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 & O'Connor, 2006). Further investigation of the SEI 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 debate the in terms of number of employees, size does actually matter (O'Connor & Coleman, 2008a). Studies have shown that small firms' negative perceptions of process model

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standards are primarily driven by negative views of cost, documentation and bureaucracy. In addition, it has been reported that SMEs find it difficult to relate standards to their business needs and to justify the application of the international standards in their operations. Most SMEs cannot afford the resources for, or see a net benefit in, establishing software processes as defined by current standards and maturity models (O'Connor & Coleman, 2008b).

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).

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 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.

ISO/IEC 29110 as a Solution

Accordingly there is a need to help such organizations understand and use the concepts, processes and practices proposed in the ISO/IEC JTC1/SC7's international software engineering standards. The ISO/IEC 29110 standard "Lifecycle profiles for Very Small Entities" is aimed at addressing the issues identified above and addresses the specific needs of VSEs. The approach (Laporte et al., 2013a) used to develop ISO/IEC 29110 (2001) started with the pre-existing international standard ISO/IEC 12207 (2008) dedicated to software process lifecycles. The overall approach consisted of three steps: (1) Selecting ISO/IEC 12207 process subset applicable to VSEs of up to 25 employees; (2) Tailor the subset to fit VSE needs; and (3) Develop guidelines for VSEs.

Furthermore, in late 2009, the International Council on Systems Engineering (INCOSE) Very Small and Micro Entities Working Group (VSME) was established to evaluate the possibility of developing a standard, using the Generic profile group scheme of the ISO/IEC 29110 series, based on ISO/IEC 15288 (2008), for organizations developing systems. Late 2011 saw the launch of the official development of the systems engineering ISs and TRs for VSEs. With work currently in final stages, the systems engineering Basic profile should be published by ISO in mid 2014. Similar to the existing set of software ISO/IEC 29110 TRs, the Management and Engineering Guide for systems engineering should also be made available at no cost by ISO (Laporte et al., 2014).

STRUCTURE OF ISO/IEC 29110

The basic requirements of a software development process are that it should fit the needs of the project and aid project success. And this need should be informed by the situational context where in the project must operate and therefore, the most suitable software development process is contingent on the context. The core situational characteristic (Clarke & O'Connor, 2012) of