Summary and Attainment of Software Engineering Standards in Very Small Entities

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ABSTRACT

By estimates, small businesses or work teams account for 80% of world economy. Working group, established in 2009, led by international working group sponsored by INCOSE and AFIS, Collaborate on developing system engineering standard for VSEs using ISO / IEC 15288. Standards define software process, activity and tasks associated with software life cycle process from Conception through retirement. This paper discusses software engineering standards for small entities.

Keywords: AFIS; INCOSE; VSE; ISO/IEC

I)   INTRODUCTION

The objective of standard is to address complete software engineering life cycle from acquisition and supply through development to operation and maintenance.

Standard has objective of supplying common structure so that buyers, suppliers, developers, maintainers, managers involved with software development use common language.

The correct selection and application of appropriate standards will increase organization productivity and have positive economic impact on that organization.

In software engineering, a significant challenge is for knowledge documented in standard to actually reach organization and be applied for its benefit.

There is lack of adoption of standards in small and very small companies as the perception is that they have been developed for large software companies and not with small organization in mind.

The term VSE has been defined as being enterprise, organization, department or project having up to 25 people.

VSEs have unique Characteristics which make their business style different.

 ISO System and Software engineering standards are normally published in English. However international demand for ISO/IEC 29110 management and engineering guides became so great that they have been translated into Czech, French, German, Portuguese, Spanish and soon Arabic.

The fact that ISO/IEC 29110 gender are early understandable and freely available has greatly helped there adoption, more than 15 countries are teaching at undergraduate and graduate level.

In Thailand, more than 10 universities teach ISO/IEC 29110 and in Canada, It is taught in Software quality assurance and Software process improvement course.

2) LITERATURE SURVEY

Over the years, there has been broad interest in creating software engineering standards. One authoritative survey discovered 315 standards, guides, handbooks and other documents maintained by 46 different organizations.

Three organizations are regarded as source of international standards

    (a) International Organization for standardization.

    (b)   International Electrotechnical Commission.

    (c) International .Telecommunications Union

Developed since 1979, Software Engineering Standards Committee of IEEE Computer Society manages world's most Comprehensive collection of software engineering standards.

Early in 1990s, SESC established Planning committee to initiate long range efforts needed to integrate its collection .Committee studied customer needs and surveyed existing standards concluding that there was no shortage of available device for practice of software engineering .However there exist no clear way for user to select advice appropriate to their needs.

In 2005, Thailand Industrial Standards Institute and Thailand Software promotion agency sponsored a working group to kick start a set of standards and guides targeting VSE needs. Subsequently ISO and International Electrochemical Commission mandated working group (WG 24) to develop set of ISO / IEC 29110

Standard and guides

In 2012, A Peruvian IT start up was established which used agile methods and practices. It adapted ISO/IE6 29110 to these agile practices. Company grew to 18 employees. Only 18 percent of 900 hour project involved rework.

In 2014, company becomes first Peruvian VSE to obtain ISO/IEC 29110 certification which facilitated access to new client and layer projects.

In November 2011, WG24 met in Ireland to launch official development of Systems engineering ISO 29110 ISs and TRs for VSEs. Delegates from Brazil, Canada, France, Japan, Thailand, US and INCOSE participated to first meeting. A first draft was sent for round of review written ISO in January 2012. Over 450 comments have been submitted by 7 countries. A second draft was sent for second round of review in December 2012.

W.G 24 decided to develop of documents targeted to specific audiences

1 An overview document defining common terms and concepts.

2 A document specifying elements common to all profiles including structure, requirements, conformance and assessment.

3) CRITERIA AND METHODOLOGY:

In order to achieve an overview of standards, research must be carried out taking following things into account:

1 Application of International Software Engineering standards on very small entities.

2 Software process Improvement in some: A comparative view.

3 Software process Improvement in small and medium software enterprises: a systematic review.

4 An extended systematic review of software process improvement in small and medium web companies.

5 Characterization of software process improvement needs in SMEs.

Various steps will be followed to evaluate standards.

1 Determine the clarity of requirements in standards. Developers are obliged to comply to the requirements set forth in a standard if they wish to claim conformance to it. Clear requirements make the system construction task easier and the evaluation of conformance more straightforward.

2 Classify the requirements inn standards. We can classify requirements in a standard according to weather they are process, resource or project oriented. Requirements can also be separated into those that focus on compliance and those that are risk based.

3 Identify the role of measurement and prediction. Assessing processes and products is more meaningful and useful when concrete measurements and sensible prediction models are required by the standard when assessing compliance and predicting risk.

4 Determine the balance of requirements. Having classified requirements as product, process or resource, it is important to consider the overall balance between these classes. For example, a standard whose aim is to improve product safety should not be made primarily of just processes and/or resource requirements.

5 The need for objectivity in conformance assessment. The extent to which an assessor can determine whether the standard has genuinely been followed will depend on whether the requirements, definitions and descriptions listed in the standard are observable and verifiable.

Research questions:

It is threefold:

1 What is the impact of SPI approaches in the scientific literature?

2 What has the evolution of the SPI approaches been?

3 Which research trends are revealed from the systematic review of the SPI approaches?

The keywords used to find an answer to the research question were the name of SPI approaches

(e.g., MoProSoft, IDEAL, CMMI), which were taken from the predefined list: software process improvement, process sme and small company. Sometimes, it was necessary to include the name of the standard on which it is based in order to limit the search. For instance, the resulting search strings were:

MOPROSOFT, (IDEAL) and (CMMI) and (software process)

(CMMI) and (Software process) and (sme or small company)

The results expected at the end of systematic review were, among others, to discover what surveys exist as well as to identify the implications of each SPI approach in scientific literature. Authors also expected to see which applied researches has been carried out on the topic, as well as which trends are revealed from the performance of the systematic review.

Search strategy and search process:

Having search strings to conduct the review the selected sources were: IEEE, Xplore, ACM Digital Library, Science Direct, Wiley Online Library and Springer Link. The search process included: first, the search string was selected, then a selected source was chosen and each string was applied. Once the search results were obtained, a list of relevant studies was made on the basis of titles, abstracts, conclusions, references and keywords. Having the single result sets available, all results were combined and used as basis for the data analysis.

When there was a doubt about its relevance, the reference was included leaving open the possibility of discarding the paper during the second phase when the full texts of the paper were studied. Sometimes, further studies were identified and included due to its relevance. After that, each full article was retrieved, read and analyzed to verify its inclusion or exclusion.

Following standards were applied

1 ISO / IEC 12207

It is an international software engineering standard that defines the software engineering process, activity and tasks that are associated with a software lifecycle process from conception through retirement.

The standard has the main objective of supplying a common structure so that buyers, suppliers, developers, maintainers, operators, managers and technicians involved with the software development use a common language.

It aims to be 'the' standard that defines all the tasks required for developing and maintain software.

2 ISO 12207

Standard ISO 12207 establishes a process of life cycle of software, including the processes and activities applied during the acquisition and configuration of the services of the system.

Each process has a set of outcomes associated with it.

There are 23 processes, 95 activities, 325 tasks and 224 outcomes.

3 ISO 9000:

It is a family of standards for quality management systems. Originated in manufacturing, they are now employed across wide range of other types of organizations.

4) CONCLUSION

We live ian age in which software engineering knowledge and technology should be transferred from researchers to practitioners to reduce gap between what industry needs for VSES and what researchers are producing. Interaction and collaboration between government , industry and academia have benefitted hundreds of early adopters of ISO/IEC 29110.The next step is to accelerate transfer of knowledge documented in ISO/IEC 29110 to tens of thousands of VSE worldwide that develop system or software products.

For many small software companies, implementing controls and structures to properly manage their software development activity is a major challenge. Administering software development in this way is achieved through introduction of software standards .There is evidence that majority of small and very small software organizations are not adopting existing standards because they perceive standards as being developed by large organizations and oriented towards large organization.

It is very important for standards to be implemented in VSE.

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