Review of the Challenges in SPI Programs

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Abstract

The Software Process Improvement (SPI) is being necessary activity in the organizations, considering the factor that job market requirements are rapidly increasing and become complicated. SPI is iterative task during the organization life cycle, so it needs continuance support and maintenance. Many studied and researches have listed the benefits and advantages of applying new SPI model, on the other side, there are few researches discussing the challenges and difficulties of applying new SPI model. Theme of this research is to come up with an answer to a basic question "why did some organizations refuse to apply new SPI model?" In this review, we are focusing on the challenges and the probable risks while adopting new SPI model. Many organizations developed new approaches to improve their software development process. We are going to list a number of critical factors, which every organization must keep in mind before implementing SPI plans. (Abstract)

Index Terms

Software Process Improvement, Challenges in SPI, Critical Factors for SPI.

1. Introduction

As the organizations looking for expanding their work and services, get customers loyalty and employed governance. This paper studied and described the challenges of applying suitable frameworks that help the organizations to achieve their goals and objectives. The most important benefits to applying new framework are quality improvement which will increase the customer satisfaction. This paper described the software process improvement plane and studied the challenges and benefits that faced and collected during applying a new framework.

Most of the organizations follow standard approach for the improvement cycle, however only few of them manage to meet their objectives. Standard models for process development and improvement lacks in implementation strategy. In this paper some challenging aspects of software process improvement effort are being presented based on empirical date available. While going for a process improvement effort, paying attention to these elements would certainly have a positive impact on the Software improvement process. We have tried to collect and understand the main challenges and concerns to help organizations to gain these challenges and try to make SPI smooth task.

As the managers of software process improvement (SPI) programs facing many issues and difficulties to apply any process, this paper provided studying to identify issues related SPI adoption. The International standards like ISO/IEC 12207, ISO/IEC 15504, and software process quality models such as Capability Maturity Model Integration (CMMI) are aiming to define the requirements of ideal organizations. So, one of important characteristic of deploying a software process is the selection of an appropriate framework to find best definition of the software processes and organizations evaluation. This paper described the software process improvement plan, which contains challenges and issues as well as lists critical factors for success of such a plan. This paper reviews the factors applied on organizations pursuing for process improvement through CMMI/SPICE or ITIL. We have tried to identify the elements that affect on the duration of SPI program such as, management commitment, management involvement, and process documentation. Moreover, identify the pre-requirements for software process improvement program and that do not have an effect on SPI duration.

Remainder of this paper is organized as follows. Next section discusses the challenges effecting SPI efforts, which we have portioned into challenges before going for SPI implementation and after SPI implementation. In the next section, we have synthesized critical factors that can affect SPI efforts. Last section presents conclusion and the future work.

2. Challenges Effecting SPI Efforts

The management should aware of the framework benefits, outcomes and requirements, as supporting CMMI activities during the process and after certification is management responsibility. Also, management involvement is important success factor, as if the manager had not attended the training sessions, then it may have been more difficult for sub managers to understand the needs for the SPI process and find solutions to problems. In addition to management commitment and management

involvement, process documentation is the third factor plays important role as documentation helped organizations a lot during deploying CMMI. Quality environment, experienced staff, and metrics and measurement are the main elements should the organizations concern about it before starting the CMMI program. The experience of CMM/CMMI, process and products separation, resistance to change, and rewarding and automated metrics tools do not have impact on CMMI duration as this thesis analyses. The staff should understand the models benefits and complete the work packages, but some resistance to change is acceptable.

The most frequent reasons given by organizations were: for the small organization; the services were too costly to apply it, the organization had no time as they focusing on product quality not on product quality assurance. Moreover, the organization was using software processing improvement approach. In addition the reasons, this study come up with important results. As there is no directing relationship between an organizations type and the reasons. In the other hand, there is a directing relationship between organization size and the reasons.

The main results of this research paper are differentiated between major SPI de-motivators and Spread of de-motivators across practitioner groups. The major de-motivators are resource constraints, bad experiences, shortage of support lead to resistance to SPI, the shortage of direct SPI benefits evidencing, poor SPI management skills and experience to drive SPI programs, and executing SPI without prior consultation and communications with concern staffs. The Spread of de-motivates across practitioner groups are classified as: developers, which are the shortage of feedback and standards, workload, and customers, project managers, which shortage of measures for project controlling, and staff turnover, Senior manager, which are changes in organization, and shortage of SPI management skills.

The big challenge for organization is adopting a new software process improvement (SPI) model. As understanding the new evolving functionalities for instance: changing in the environment process, changing in the corporate level, and product quality enhancement. Also, SPI is not a single step adaptation rather it is iterative process during the life cycle.

This study presented a survey of SPI and comparison of different SPI models. Moreover, specify the success and challenges when improving the processes. As each organization is special and has its own limitations to consider SPI such as effectiveness, benchmarks, and organizational needs. Also, there are many factors which are not coming directly under the domain of the organization such as customers, competitors and external environment. So, SPI changes should consider according to the above factors.

Challenges before Adopting SPI Model

[1] Lack of employees understanding whom responsible to apply and work with new framework.
[2] Few numbers of qualified employees.
[3] Shortage of SPI requirement certification.
[4] Lack of the knowledge about how the certified employees can use their certifications or knowledge to property manages their activities.
[5] Many employees do not like changing.
[6] Lack of quality standards understanding.
[7] Ambiguity of employee's responsibilities.
[8] Shortage in employee's involvement.
[9] Lack of important of process changing.
[10] Lack of internal communication between managers and employees.
[11] Shortage in understanding the models benefits and completes the work packages.
[12] Adopting new model is too cost comparing with company budget.
[13] Some organization does not have time to apply new model as they focusing on product quality not on product quality assurance.

Challenges after Adopting SPI Model

[1] Fast changing is not welcomed specially from old employees.
[2] The continuance training is needed.
[3] The continuance following up to ensure the proper framework establishing.
[4] The SPI model resource constraints.
[5] Bad experience with solving issues.
[6] Shortage of management support.
[7] Shortage of direct SPI benefits evidencing.
[8] Poor SPI management skills and experience to drive SPI programs.
[9] Executing SPI without prior consultation.
[10] Executing SPI without prior communications with concern
[11] Shortage of feedback from management to developers.
[12] Workload without motivation.
[13] Shortage of project controlling measures.
[14] Staff turnover.

3. Critical factors in SPI Implementation

Efforts to improve software process are always very critical to software development organization. We are listing down some of the factors which n the basis of empirical evidence, can be considered as very critical for Software Process Improvement efforts. The purpose of sharing these factors is to get focus of program and

process managers towards these factors during software development and make sure that projects get succeed. We are listing down the factors based on the order of their importance as we have conceived from literature.

1. **Stakeholders Involvement:**
   Stakeholders are the people who have some direct influence or will get influenced from the product/project. To make sure that our product meets the requirements of quality and user needs, we must have a close collaboration with different stakeholders. This collaboration does not mean only from directly affected people, rather it encourages to involve people from end user community, people from different teams i.e. developers, RE managers, PM or from outside organization. By enhancing the involvement process [6], organization would definitely raise their software process improvement method.

2. **Top Management Commitment:**
   Most of the project failures that has been reported can be traced back to a relatively low level of commitment from top management. Resistance to the innovative methodologies and technologies can be considered as one of the major cause behind this low response from management. Sometimes top management considers focusing on firefighting (reactive approach as more worthy in contrast to proactive steps towards achieving high quality processes. This resistance and low level commitment from higher management makes the job of lower level employees very difficult and their motivation towards high quality process engineering starts fading. Goal of quality improvement in software processes cannot be achieved without a clear support from higher management.

3. **Measureable Objectives:**
   A process, which cannot be measured, cannot be improved. Objectives should be set on the basis of SMART (Specific, Measurable, Achievable, Realistic, Time-Based). Top management should make objectives measurable both from quantitative and qualitative prospectives. Some pre-conditions and post condition scenarios can make possible to gather the evidence of successful completion of certain objectives or not.

4. **Institutionalize the SPI Effort:**
   Software Process Improvement is not a single department or office responsibility in the organization; instead SPI can achieve its desired results only if it is a collective effort. Also to make people aware of SPI benefits and raise the sense of responsibility among participants, it is sought to make everyone within organization as part of this SPI effort. Institutionalizing SPI can help to get this objective. Every team member will feel the sense of ownership and will be more responsive.

5. **Raise the motivation level:**
   Motivation plays a vital role in success of any program. Motivation helps one to perform certain action or activity based on desires and values you are going to achieve after performing that action. Software Process Improvement is a collective team effort so motivation becomes one of the critical factors here. Rewards can be one of the several forms to keep participants motivated. Other forms of motivation can be promotional benefits, ownership feelings, bonuses or state of practice learning environments. Management must keep participants motivated by different means.

Conclusion

Without understanding the benefits to be achieved by the software process improvement program, it is also very important to align Software process improvement with the organization strategy and to reduce any vagueness in the minds of individuals within the organization vis-à-vis the role of SPI. If the role is indecisive or ambiguous, individuals will endeavor to preserve the status quo, rather than contribute to the improvement plan. This paper contributes to list the challenges in this regard. In the last section, some critical factors have been pointed and listed, which can be very important for organizations going to implement SPI programs.

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