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Views, Experiences and Uncertainties on the Benefits of SPI from the Book- "Software Process Improvement-Practical Guidelines for Business Success"

Reddi Prasadu[1], Vakkalanka Sairam[2], Phanindra Kumar NSR[3]
[1, 2] *Department of Information Technology, ANITS, Visakhapatnam*
[3]*Department of Computer Science & Engineering, AITAM, Tekkali*

Abstract; This paper tries to look into the book, "Software Process Improvement – Practical Guidelines for Business Success" by Sami Zahran with a deep insight in order to have a better understanding and a good overview. To achieve this we have exercised a walkthrough on a selected chapter- Business Benefits of Software Process Improvement. We have also documented our views, experiences and presented a discussion on the uncertainties present in this book.

I. INTRODUCTION

Now days, software has turned into one of the most essential and integral part in organizations round the world [1]. Organizations face great competition to produce quality software on time, satisfying all needs of stake holders, within the budget [2]. There is an increase in demand in the industry to find an answer for the problems faced in software quality [3]. Software organizations realized that one of the quintessential solutions to their problems is having a sound software development practice [4][5]. One such solution developed in order to have an effective software development process is Software process improvement [6].

In this paper, we focus on one of the parts of the book "Software Process Improvement- Practical Guidelines for Business Success" by Sami Zahran [11]. This book focuses on the business applications of the guidelines of software process improvement. This book talks about five topics, four of which were considered for the assignment. The four parts are respectively

Process Thinking A framework for Software Process Improvement Making Software Process Improvements happen.

Business benefits of Software Process Improvement Of these four parts, we have considered the part: Business benefits of Software Process Improvement for our study. As every organization or business, strives to achieve profit, either in terms of the success of its product or cost and time constraints, an improvement in the process of software development might help in acquiring profits.

A. Motivation

We have chosen this topic as it contains a number of elucidated case studies of SPI experience gained in European and American environment. This would help us to know about the business benefits acquired in different organizations and cultures.

A walk-through on the contents in this chapter is done. The result of this walkthrough is presented in the following section along with our experience related to the content, the things which we have come to know after studying the book, our agreement and disagreement on the topic: process improvement, and then we make a comparison between American and European cases of process improvement.

II. WALK-THROUGH

One of the results of the walkthrough we have conducted resulted in an overview on this chapter [11].

A. Overview/Summary

In this chapter the author describes the business benefits of SPI and gives an overview of the evidence collected from Europe and USA in the form of case studies. These studies are taken into organization which implemented, used and calculated the benefits. It also describes about the scenarios for some future development in this area. Author through this chapter tries to discuss two issues, one being the evidence collected in order to speak about the business benefits of software improvement and the other an epilogue on future of software process improvement.

1) *The Evidence: Business Benefits of software process improvement:* This topic is categorized into four parts, at the end of these four topics a summary is provided for the reader.
2) *Relating SPI benefits to business:* Author quotes that the ultimate goal for any business is to get a return on investment (ROI), return might be in the form of benefits to the business. So there is a need to measure the effects of SPI. The author in this part describes the speech of John major, senior vice president of Motorola at the SEPG conference in 1996. A short note on his speech is mentioned which reports the benefits which were reaped from SPI since 1992.The author also mentions the results from an SEI study made in 13 software organizations which revealed that there was a $5 net ROI (dollar). It reports that when processes go up in the maturity levels there will be an increase in the ROI. He also quotes examples of cost saving from HUMPHREY [7]. The topic is concluded with the suggestion of quality improvement factors such as improved product quality, shorter time to market the product and more productivity.
3) *Evidence from Europe:* This part is again sub divided into four parts. In the first part, the author discusses about the European systems and software initiative (ESSI). This sponsored programs from 1994 to 1998 for research and development in the area information technology. There was a sub domain which was dedicated to SPI known as Software best Practice. The main goal of this group was to suggest improvements in software development. The author also describes the goals which have been achieved through the group such as standalone assessments, process improvement experiments, dissemination actions, experience network, user network, training actions etc. In the second part, the author describes IBM's benchmark for software development. This was a project initiated by IBM in 1994 to benchmark software development organization in Europe. This benchmark was based on an analysis collected from an assessment questionnaire which consisted of 66 questions which were grouped seven categories, which covered the performance and practices. The results of this analysis are put forth to the readers. In the third part, the author presents case studies from Europe, which is provided as a proof to show the business benefits of SPI. Each case study is summarized in the form of four headings such as the organization, objectives and motivation, the approach, and business benefits. The summary of the four case studies are as follows
4) *Improving the project estimation process:* This case study discusses the problems encountered with the accuracy of estimation by Engineering Ingegneria informatics SPA an Italian software house with 420 employees and 35 million ECU in 1994. A mitigation approach was developed in such a way that it would cover the formal specification of nonfunctional requirements. This resulted in a decrease in the estimates from 25% to 8% which was more proximate.
5) *Using Formal Specification Methods To Improve Subcontract Management:* In this case study the author tires to discuss the problem faced by a ENEL SPA CRA, which is the second largest electricity supplier in the world in 1992, with a staff of 102,000. The problem was with the technical definition of the work which was to be undertaken and also the product acceptance phase. A separate strategy was documented, which used a formal specification in the case study, resulted in cost reduction and also less effort.
6) *Introduction To Configuration Management:* This case study was made on DATAMAT which was a large system Integration Company based in Rome. The company had to deliver complex software systems in which each client required a customized variant of the core system. This required the supplier to convert their system in response to the market making changes. This was handled introducing configuration management tools to DATAMAT. This resulted in the company's improvement in managing change, reproducibility, and validation of products and services.
7) *Establishing A Software Process Organizational And Management Infrastructure:* This case study was about computer Logic SA which is a European software house. The problem was the organizational and management support to the newly developed product line called the omega. This was conquered by developing a software process improvement project which was funded by European commission. The project started in 1996 and ended within a year. This resulted in substantial development in the company which helped in penetrating the markets. ach of the case studies had their own set of lessons learned thorough the software improvement process.

B. Evidence from USA

In this part the author summarizes a selection of case studies from USA. These case studies were taken in order to show the benefits of SPI in different environment in a different part of the world.

1) *Software Engineering Division (SED) at Hughes aircraft:* Through this case study the author tires to discuss the problem faced by SED a division at Hughes aircraft. The problem was lack of central focus and improper efforts in measuring and reporting project tracking data in US Department of Defense. So there needed an assessment of its technical review process and training policy. This problem was solved with the implementation of SPI, which was one the earliest adopters of SPI. This resulted in

improved qualitative and quantitative benefits such as the team spirit, working conditions, improved production, reduced cost of rework etc.

2) *Raytheon-Another pioneer of software process improvement:* The author had picked this case study which revolves around Raytheon and international technology based company. It had a requirement of new software development process in the evaluation of its effectiveness in the bottom line costs of the finishing of a work. This was achieved through a 3 phase solution which included stabilization change and control. It resulted in business benefits which included a two fold increase in its productivity and a $7.7 ROI.
3) *Space shuttle onboard software:* The author here shares with the reader a case study about a space shuttle onboard software project which is a subcontractor to the NASA. Its job was to develop onboard software for the shuttle. The problem was handling the frequently changing requirements without sacrificing the products quality. To attack this problem the team first identified the problems they face with the production of high quality software with continuously changing requirements. The implement a continuous process improvement programs to overcome these problems. After a duration of 2 decades of process improvement it resulted in a nearly zero defect software.

C. Lessons learned

Through this part the author tries to put up a discussion on the things learned through implementing the software process improvement. The points discussed by the author are as follows:

1) Agreeing to the market requirements and satisfying the customer.
2) The investments made when are focused properly will show happening business benefits.
3) Benefits can be demonstrated when a decision has to be made on investment in software process improvement.
4) The benefits of software process improvement do not show up immediately, shall take some time to be visible, one has to be patient.
5) A step by step approach is required.
6) Organization should always be educated about the benefits of software process improvement.

D. The Epilogue

Through this part the author tries to put forward a quick recap on the process maturity and tries to show areas for further research in software process improvement describing the international standards and process discipline.

1) *Process maturity: is it another buzzword? :* Author here describes the importance of process maturity. He states that process acts as a base and core concept for any software discipline. He says that organizations can increase the rate of success of through mature process
2) *Role of international standards:* Zahran here states the importance of the international standards in spreading the awareness of software process improvement. He also suggests models such as the ISO IEC 15504 model. He also suggests that everyone should strive to the conformance of software process improvement.

III. CONTENT RELATED TO OUR OWN EXPERIENCES

Some of the case studies presented in this book have some relation with our real world experience. The case study presented in the book “Using formal specification methods to improve sub contract management” relates to our experience with a software company named Technosoft, a software company which develops embedded system projects, situated in Visakhapatnam, India, and had a staff of 200 employees in 2008. We had some contacts in the company who reported us about the problem faced by them in handling the technical definition of work. They couldn’t mitigate a solution to this problem which eventually led to the loss of a project and eventually to the loss of reputation.

IV. WHAT IS NEW?

In this section, we try to present the concepts, which we hadn’t known before referring to this book.

A. Impact of software process improvement on business sector.
B. By referring to the case studies presented, we could find that after pushing their processes up their maturity levels, the organizations could bring in some savings than what they have invested.

C. We could also look into the factors of business that could be enhanced through process improvement, such as improved product quality, shorter time to market, more productivity and so on.

D. The European commission has launched an initiative named European Systems and Software Initiative (ESSI) which sponsors a program for performing a research for development and technologies in IT field. They have a sub domain known as Software Best Practice which is purely dedicated to software process improvement. This primarily helps the organizations to increase their efficiency, provide a better quality product and in turn, a better value for money through improvements in the software development process.

E. We could have an insight on the goals of software best practice and the actions that have to be implemented to achieve these goals. We also could have an idea on Process Improvement Experiments which aim to show the benefits of software process improvements through user experimentation.

F. We could get an idea on the European software development benchmark initiated by IBM to compare its performance with the non IBM organizations in Europe.

G. We could have a look at a number of case studies both from Europe and America where, the impact of software process improvement on the organizations are mentioned. In each case-study, the organization, their objectives and motivation, the approach followed by the organization to improve its software process and the business benefits are mentioned which enabled us to understand clearly about the software improvement process and its advantages.

H. Through these case studies, we could learn that software process improvement can be really applied in a business sector which is very much advantageous for the organizations.

I. There are qualitative as well as quantitative benefits through the application of software process improvement in business. The quantitative benefits include the return of investments and so on, while the qualitative benefits include improves staff morale, retention of software engineering skills, fewer defects, improved focus on project and business goals and so on.

J. Thus, we could learn that software process improvement is real beneficiary for the business and organizations and the practice of this method is highly essential for the organizational flourish.

V. WHAT DO YOU AGREE AND DISAGREE ON REGARDING PROCESS IMPROVEMENT?

In this part of the book, the author has concentrated only on the scenarios where benefits like project estimation process, improving subcontracting management and so on are achieved by improving their software process. Rather there are many other scenarios where there is a negative impact or no impact on the business while improving the software process [8] [9]. He drives the reader in the one way by showing the positive results in which SPI improves the business benefits. There is no research evidence that improving the software process will compulsorily increase the business benefits [10]. In our view the process improvement strategy varies from one organization to other organization because the motivation factor for process improvement differs in each context.

We agree to the point that implementation of software process improvement in a software organization can increase the software quality. In our view, an effective process to attack the task can achieve effective outputs.

We found it difficult to agree that the software process improvement satisfies all the individuals involved in the project. There is a risk that in the context of process improvement, the managers might follow the processes and practices which restrict the performance of the individuals in which case, the productivity will decrease.

does exist, then the members involved in the team will work towards the common goal of the project which increases the productivity of the team involved in the project.

We agree to the fact that software process improvement does reduce time to market and maintenance cost of the software. When the software is developed with an effective process, it tends to have very less errors and for the enhanced or the next version can be developed in very less time. Developing the product with an effective process could increase maintainability.

VI. EXISTING OPPORTUNITIES BASED ON THE CONTENT OF THE MATERIAL

This chapter discusses the issues related to process improvement and its benefits in business. Based on the lessons learned through this book, a scope for improvement is channeled. Through this chapter arise new ideas and opportunities such as

A. Managers can show these benefits as a proof when trying to decide whether or not to invest on software process improvement.

B. For those organizations which are in a hurry to reap benefits from the investment on SPI, examples from this chapter show that they need to be patient for the returns of investment and the benefits of SPI to show up.

C. This book can provide an opportunity for the improvement of those organizations which have low process maturity levels.

VII. UNCERTAINTIES

A. In the case studies mentioned, the explanation was confined only to the organizational history, an explanation of the environment in which the projects were carried out was not explained extensively.

B. The chapter was only confined to the benefits and advantages by the application of software process management. But since the pros and cons go hand in hand in any scenario, the disadvantages and shortcomings were not discussed.

VIII. CONCLUSION

We have tried to look into the chapter "Business benefits of software process improvement" from the book "Software process improvement- Practical guidelines for business success" by Sami Zahran [11]. We have documented our views and experiences and also conducted a walkthrough and analyzed the uncertainties present in the book. We felt that in the present business scenario, the world strives to achieve a profit in any terms of resources or time. This concept lays a platform for many of the future uplift to come.

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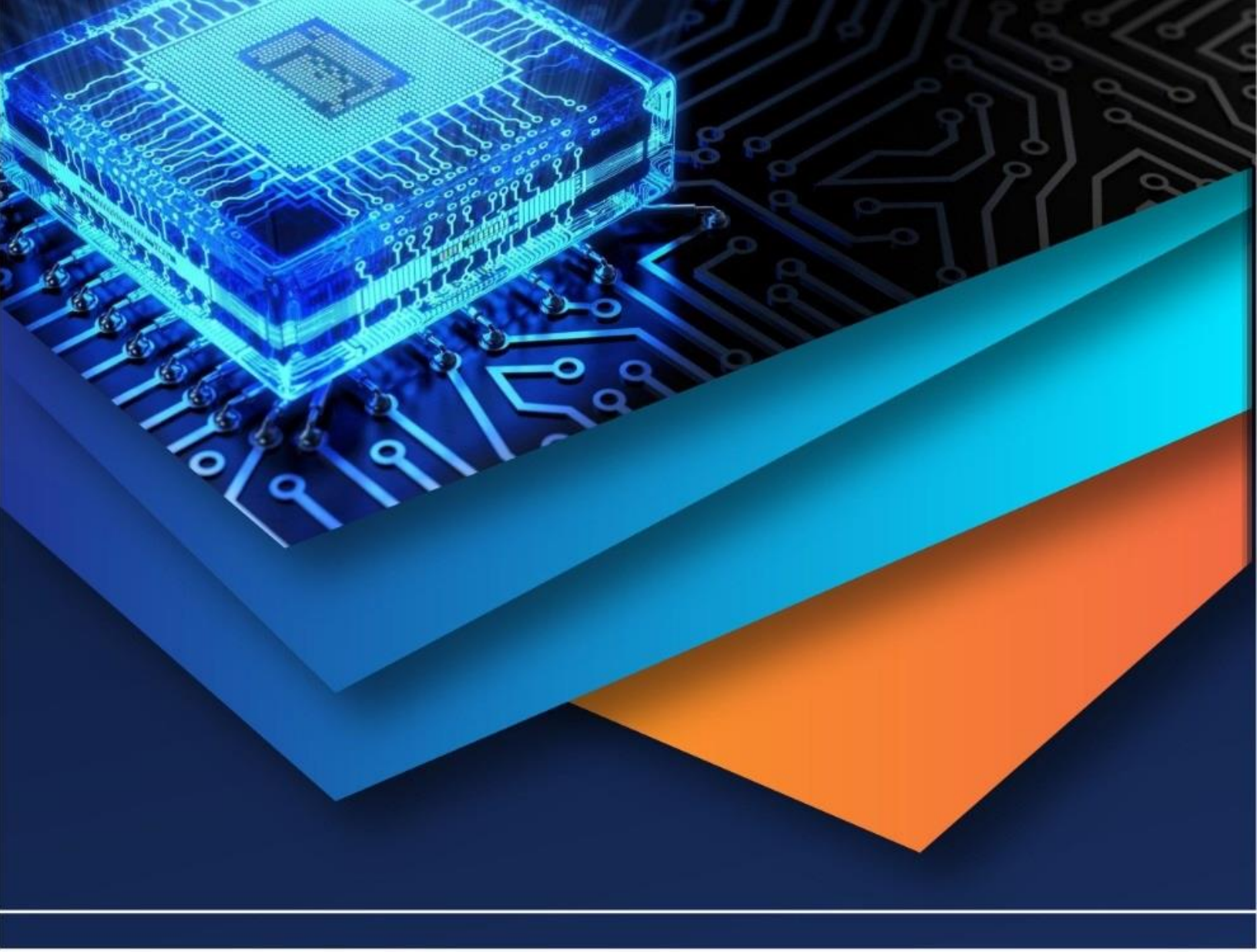

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