

Why Software Needs to be Engineered

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Abstract— *Software engineering practice is losing legitimacy due to the rate of demand for faster and cheaper products. To have an effective software engineering work force, there should be a better bridge to link the industrial and academic practices. This paper involved: sourcing and selecting research and scholarly written materials about software architecture, requirement engineering, software engineering in educational sector, software engineering in software organizations, and software architecture. Literature review centered on these topics is presented, issues that hinders software engineering processes and co-ordination between industries and education are identified. Suggestions regarding how to improve the current situation are made.*

Keywords— *Software engineering; education; software organizations; problem solving*

I. INTRODUCTION

The profession of software engineering encompasses all aspects of conceiving, communicating, specifying, designing, and building, testing, and maintaining Software Systems. Software engineering activities also include everything to do with the production of the artifacts related to software engineering such as documentation and tools.

Software development scope at university level relies heavily on the student's ability to master the technical difficulties associated with programming in particular programming language such as C, C++, JAVA or Python. These tasks, however, focused on problem solving by just one person which is not the case in the real life software industry that emphasizes team work. Accepted risk management procedures state that software development projects are normally inherently risk, and does not consider the nature of both the organization responsible for the software development and the software project [2].

One of the major key drivers in software engineering methods is risk management that aimed at reducing risk associated with our software development, thus, many organizations fail to understanding effect of their development and maintenance procedures, and this calls for a reason why software need to be engineered more in both levels of education and software companies.

II. RELATED WORK

Several studies have been done regarding software engineering and why software needs to be engineered. General shortages of specialists in software engineering are expected unless prevention and corrective measures are taken into account [7]. The driving force that leads us into this situation is software crisis and redesigning defective or outdated software is proven to be very costly.

A survey about procedures of knowledge extraction in databases of software engineering aimed at forecasting development and maintenance phases of software was conducted by [4]. The study found out no two systems or organizations are indistinguishable in term of software engineering processes. In another research study by [1] inductive didactical approach was used to help software engineering students to better get the idea about why software engineering process models, requirements analysis, methods and techniques are needed.

Thompson [9] point out that even though there is skills shortage in IT and software engineering profession, still there is no sufficient number of students admitted into software engineering program, and those that were able to graduate are lacking skills that software industries recognize as important. Engineers from other disciplines recognize software as engineering mostly when it is part of a larger system [3]. Simon [8] suggested that software engineering and artificial intelligence should join hands or the software engineering discipline have to re-invent artificial intelligence, and also point out that re-inventing is far better than using tools that are partly in place or under-development.

Software interaction management existing research works are focusing on automating techniques that support identification [5]. Other areas that are not getting enough research attention are requirement segmentation, solution selection and interactive management integrity. There is increasing demand for software engineering processes that can address elements of risk especially in the small and medium enterprises SMEs software engineering companies [2].

Shifting software projects from large organizations to SMEs teams is putting the project at greater risk than ever. By studying the relationship between software engineering and computation science, thirteen characteristics of scientific software development we identified by [6] and found out those unique characteristics of the scientific software development is what is making it difficult for scientists to use state of the art software engineering tools and methods.

III. METHODOLOGY

We searched and selected our articles and studies in relevant software engineering domains from the available journal papers of IEEE digital library. The journal articles were selected based on the criteria of software architecture, requirement engineering, software engineering in educational sector, software engineering in software organizations, and software architecture.

The inclusion criteria in our work is that article must be relevant to our topic scope, qualitative and quantitative studies were also included and all information were from published research or scholarly written materials.

IV. RESULTS AND DISCUSSION

Most of the published research works in software engineering topics are the ones that are published by academic individual or committees at university level or college. The main disadvantage of this is that most of published ideas are geared toward academia; hence, there is no enough discussion regarding what is going on inside software industries and organizations. At this point that there is more and more demand for software engineering solutions, researchers from both the software engineering organizations and the education sector should publish more works that will reduce the gap between industries and academia. The increase in need for software engineering solution is also forcing the large software organizations to be outsourcing their projects to teams in SME which is increasing the risk probabilities of the products. However, the main cause of this, is the commercial and schedule pressure from the end users of the products which always finds a way to interfered with the software plans.

V. CONCLUSIONS

Software engineering is not getting enough legitimacy because of the company it keeps such as end user's commercial needs, they is always pushing for faster and cheaper products from the software industries.

In the educational sector, software engineering is offered in either technical perspective for students that are groomed to work in software development and maintenance, or the managerial perspective for planning, scheduling and controlling development. There is need to reduce the gap between software engineering in educational sector and software engineering in the industries.

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