Juxtapose of software maintenance activities in industry and literature

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Abstract

Software maintenance is modification in software products after delivers it to the customer in order to correct faults, to improve performance or other attributes or to adopt in a modified Envoirment. This industrial survey defines the software maintenance in literature and in the industry. For comparison between industries definition of software maintenance and software maintenance defined in literature a questionnaire is purposed according to literature definition and experiment it on Exprostudio organization. Exprostudio performs all software maintenance activities defined in literature but industry is doing software maintenance in phase out phase and literature defines maintenance in evolution and servicing phase. Cost of software maintenance in industry varies with literature.

Keywords— software maintenance, software support, software analysis, cost analysis, industrial software's.

1. Introduction

Software programs have set of instructions that computer follows to complete tasks these instructions are written in programing languages by programmers. One or multiple programs are needed to complete tasks when more than one programs needed then these set of programs are called software packages (PROCES, I. O). software engineering is defined in literature as "The practical application of scientific knowledge in the design and construction of computer programs and the associated documentation required to develop, operate, and maintain them" (Boehm, B. W, 1984).

Software engineering includes two major phases these are software development and software maintenance. Software development are those activities are required to develop a software. Development of software's are through some software development models for instance ijyal method , waterfall model etc.

Software maintenance is those activities required to make system operational after delivery of software's to the end user. Maintenance is defined as

"As the modification of a software product after delivery to correct faults, to improve performance or other attributes, or to adapt the product to a modified environment" (Edelstein, D. V. 1993).
"Changes that have to be made to computer programs after they have been delivered to the customer or user" (Martin and McClure, 1983).

Software maintenance has four categories that are corrective maintenance, adaptive maintenance, perfective maintenance and preventive maintenance (Pigoski, T. M, 1996)

This survey paper highlights the problem with industry and literature regarding software maintenance. This is basically comparison between industry and previous research in software maintenance.

2. Research method

For this survey to find the real facts in industry we proposed questioners for data gathering from industry. These questioners included the entire necessary question about maintenance defined in previous literatures. The research questions of this paper is to find

Industry is followed all categories given in the literature while they are performing software maintenance?

What types of software maintenance industry performing?

How industries differentiate software maintenance with software development?

To find out the answers of these questions we get these questionnaires and go to a software house named "EXPROSTUDIO" and where we met with Mr. Muhammad Amir C.NO(03127172238) who was the manager and team leader in programing department. Exprostudio produced mostly premium applications like CMS and word press etc. fifteen plus employees where was worked in this company. Exprostudio was doing software maintenance and software development both activities. They basically use waterfall model for development and they get design of product from companies and work on it so they mostly concern about to development according to the design that's why they don't concern about

requirements because requirements was already done in design phase.

3. Results

According to the industry Exprostudio, industry is doing maintenance and development both activities. In development they are doing development after design phase.

3.1 Software maintenance definition and categories in industry

Organization defines maintenance as "For the time being compatibility of anything with new technology including bug fixing is called software maintenance". In software maintenance mostly industry is doing bug fixing modifications and adding new requested features for example we are using platform word press and after every 3 to 6 month word press changes by changing the versions of PHP so because of these changes our product may be or may not be compatible with this new change so we need to change our product to made compatible with these new technologies that's called software maintenance. In organization the software maintenance is categories as **corrective maintenance** includes bug fixing or minor adaptation, **enhancements in software's , preventive maintenance** organization is developing all the software's by analyzing future requirements and also as well changing all the requested features before error occurring. **Adaptive maintenance** organization is also doing adaptive maintenance, for example word press 4.0 is increases to 5.0 then we should maintain our product otherwise it will close so no one wants to close his application after 5 to 7 years of successful working.

3.2 Development definition in industry

Organization defines development as, "flow of system, data and flow of design pattern is development" they produce product according to design patterns so here development is flow of system, product and features including coding, design patterns. They use MVC(model view controller) design pattern. This organization includes activities in development are adding new features in existing software and totally new development. Totally new developments are sometimes we launch new unique idea. In major version of development industry basically delivers major modules like in a website of hospital adding appointments feature, major enhancements they planned, corrections and emergency correction. In a minor version industry delivers the bug fixing and settings etc, necessary.
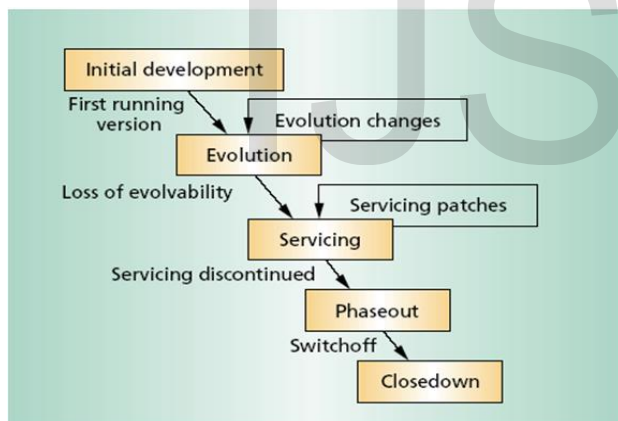

Figure 1. Roadmap of
Process lifecycle

Industry is doing development in second phase that is evaluation phase according to industry in initial development phase only documents and data gathering is done so development is in second phase. And maintenance according to industry is done in phase-out phase.

Figure 3. Roadmap of
development cycle

According to industry they are doing development in implementation and unit testing phase because firstly requirements needed to gather and analyze this is done in first phase after that design should be made according to requirements design should include firstly design major parts then design minor parts and in third phase according to design development is done, after the development maintenance should be done in last phase that is integration and system testing.

3.3 Software engineering cost in industry

In industry cost of software development is 40 percent of total cost and software maintenance cost includes 60 percent of total cost. Software maintenance cost includes in maintenance budget but the extra work that was not including in agreement phase has not in maintenance for this extra cost should be charged. Industry has a software maintenance process defined.
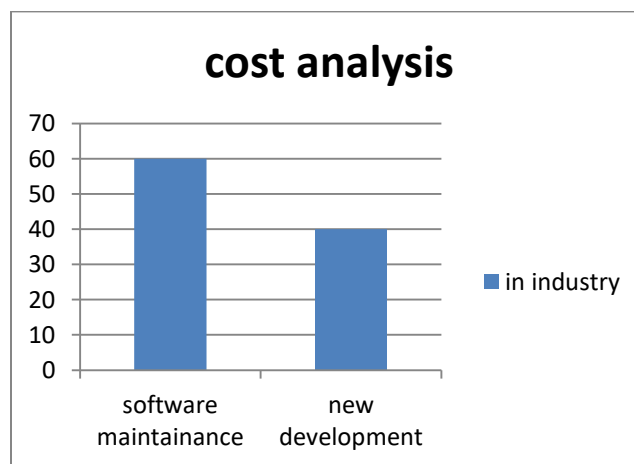

Figure 3. Cost
analysis in industry

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4. Conclusion

Software maintenance is defined in literature as modification in software product after delivery to correct faults, to improve performance or other attributes or to adopt system in a modified Envoirment but industry differentiate software maintenance as for the time being compatibility of anything with new technology including bug fixing is called software maintenance. Organization has a software maintenance process and they follow these processes. All those activities are defined in previous research are defined in organization it means they are following these activities. Software maintenance activities are corrective maintenance, adaptive maintenance, preventive maintenance and perfective maintenance are those activities defined in literature and these all are followed in industry by another names mostly they don't know what they are doing but actually they are doing all of these activities. According to literature software maintenance activities are performed in evolution and servicing phase but industry is doing software maintenance in phase-out phase (*Bennett et al, 2000).*

Software development in literature is defines as "Software development is the process of computer programing, documenting, testing and bug fixing involved in creating, maintaining applications and frameworks resulting in a software product." Organization defines development as, "flow of system, data and flow of design pattern is development" they produce product according to design patterns so here development is flow of system, product and features including coding, design patterns. Development in organization is performed in evolution phase but according to software life cycle it's also performed in initial development phase and developed in implementation and unit testing phase and literature also development activities perform in this phase (*Bennett et al, 2000).*

According to literature seventy percent of over all cost is software maintenance cost (Barry W. Boehm 1976). So that according to that 30 percent cost is software development cost, according to the research 2011 cost of the software maintenance is 60 percent and development cost is 40 percent of total workload (Chen, Chai *et al* 2011). According to industry software maintenance cost is included sixty percent of overall cost.

5. Discussion

These industrial survey paper differentiae software maintenance activities defined in previous research and software maintenance within industry. Industry is doing all activities defined in literature but may be from different names like software support and actually they were performing these activities in software evolution and servicing phase but they don't know where they are performing these activities they say they are performing maintenance activities in phase out phase and literature defines phase out phase as an activity where all type of services by maintenance organizations are closed.

Acknowledgements

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