The Strength and Weakness of Requirement Engineering (RE) Process

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***Abstract*—The need of organization is to enhance the services through system application. The IT Personnel should talented in identified the critical issues in RE. The IT Personnel supposed to recognize the strength and weaknesses of selected RE standard. This paper shows listed of issues identified during the software project development. The RE process assist a standard in managing the system application needs throughout six components of software projects. RE does this by helping the management to well organize related processes, methods and tools.**

Keywords-component; Requirement Engineering; Requirement Engineering Process; GAP Analysis

I. INTRODUCTION

There are a few questions that we should ask ourselves before we agree to blend the Requirements Engineering (RE) process in our software project development. First, what is RE? The IT personnel that are really new in this field will feel hard to understand the RE. It also happened to the IT Personnel that have experienced in system development; they are not really clear with the function of RE process in gathering the information. RE is a sub-area of Software Engineering that studies the process of defining the requirements for a software-to-be. It is a new area started in 1993 when the 1st International Symposium on RE was organized. Requirements emerge in a highly collaborative and social process that involves many stakeholders: the users and the customers, the domain experts and the developers, sales, marketing, and management [1]. The goal of RE are to understand the needs and support the client's desires and to provide the Software Engineer with methods, techniques and tools to help on the process of understanding and registering what a software must do.

Second, why the organisation should apply the RE process in their software projects development? The aim of RE is to help the practitioner understand what to build before system development starts in order to prevent costly rework [2]. Third, how the RE can meet the organisation vision, mission and needs? Everybody that involve in the software project development should know and understand the organisation needs. In every phase of RE process will have the mapping session of the business need with the system application needs. Thus, the contribution of this paper is to reduce the gap of the current requirement practice in Public Sector with the appropriate of requirement best practices.

This paper is organized as follows. The next section describes the background of RE process. Section III explains the gap analysis in RE process. Section IV presents the strength and weaknesses of RE process. Section V presents the discussion and conclusion, followed by future work in section V1.

II. THE BACKGROUND OF RE PROCESS

The RE process is part of the overall software lifecycle and plays an important role in ensuring the overall quality of a software product [3]. The function of every stages of requirement process can be simplified with the actual practice. Requirements are a specification of what should be implemented. They are descriptions of how the system should behave, or of a system property or attribute. They may be a constraint on the development process of the system [4].

The main goal of the RE process is to understanding the stakeholders goal, refining these goals into requirements, dealing with conflicts between requirements, and specifying these requirements in a concise and clear description that must meet stakeholders desires and serve as basis for system design and implementation [5]. RE establish the process of requirements definition as a process during which what has to be done, has to be elicited, modelled and analyzed. This process must deal with different viewpoints and use a combination of methods, tools, fact and personnel. The requirement process is a model from which a document called requirements specification.

III. GAP ANALYSIS IN IDENTIFIED THE NEEDS OF RE PROCESS

One of our finding in gap analysis is identified the critical issues for the organisation. Through the six component of Public Sector identified, we listed the issues that really important through the experience from system had been developed such as E-Learning Public Sector, E-Services and E-Government. Fig. 1 shows the issues that had been identified from the implementation of some of the software projects in public sector. The issues group into six components, therefore managers, stakeholder, developer, business rules, business process and technology. Basically, every component is dependent or inter-related with each others; the main component is business process which

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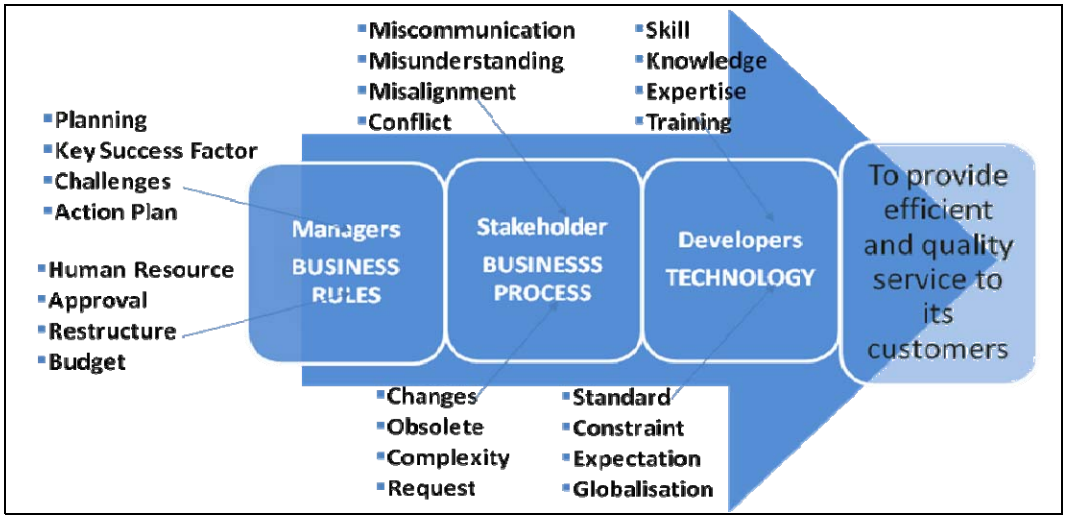

Figure. 1: Software Projects Issues

directly related to stakeholder, while developer direct related to technology. Meanwhile, the manager will act as middle men in manage the requirement of software project.

The first component is Managers. The core business of public sector is to deliver services to the public. The public sector improved their service delivery by problem solving through creativity and innovation solutions. To start and end the software project development managed by the manager. The manager plans the layout of the time frame of the implementation of software projects. The manager holds responsible for product requirements, release definition, product release life cycles, creating an effective multifunctional product introduction team and above all preparing and implementing the business case. The success of any product depends on the skills and competence of the product manager [6]. The managers have to think about the risk and think about the key success factor and action plan should be taken. The managers also have to face the challenges. A common result of these challenges is that defects, delays and misunderstandings are caught very late during system integration [7].

The second component is Business Rules. Initiative taken in improving service delivery is through automation the business process. Ensuring that organizational IT is in alignment with and provides support for an organization's business strategy is critical to business success [8]. There are some constraints in achieving our goals. The main constraints are people (human resource) and an approval from the management within the budget that we have planned. The following factor is restructuring the organisation that will affect to attachment of the people that involve in the project team.

The third component is Business Process. The success of the software project development depends on the transformation from business process to systems application. Business process will change from time to time and sometime will more complex and difficult to understand. The project that more likely to be successful have their own criteria. They have excellent processes and practices with clear team structures, extensive stakeholder involvement, daily builds and software reuse [9]. The stakeholder will request the requirement changes align with changes business process. The requirements provider, a stakeholder or customer that is responsible for a problem domain, contracts a solution provider to realize a software solution [7].

The fourth component is Stakeholder. The main actor in the business process automation is the stakeholder. The stakeholders is person who are close to the business process and really know what the requirement are needed. In order to identify the relevant stakeholder roles, the persons or organizations who's have an active interest in the system because they'll actually use it or are directly involved in processes that the system will change [10]. In real situation, some issues will appear such as miscommunication and conflict with the developers. One of the key problems of Information Systems requirements specification is a gap between analysts and stakeholders. Usually this means that requirements provided by the analyst to a designer significantly inverse with the actual needs of the future system users [11]. Another issue is misalignment with their knowledge about the business process and misunderstanding during the agreeing process. Therefore, misunderstanding requirements are likely risk to deliver inadequate solutions [7].

The fifth component is technology. The technology that suggested should follow the international standard. As engineers tend to be early adopters of new technology, developers may not represent the ordinary market for these high technology products [12]. Technology also has their constraint in meet the expectation of system. But we can minimise the constraint through mapping the needs of the system and the capability of the current infrastructure, software and hardware that we have. Trend of current system application is through on-line. Our mission also wants the stakeholder receive our service anywhere, anytime and

anyplace. Then our technology that applied can support globalisation standard.

The sixth component is Developer. Basically, the developers are act as middle manager within stakeholder and managers. Any decision related to technical requirement need to be consult with developers. In getting admiration from the manager and stakeholder, the developer should have appropriate knowledge that really needs by organization and expert in their field. The ability for developers to seek out and regularly communicate with domain experts is really needed [7]. This skill they can get through training that had been plan by Institute Training Center (INTAN) and offer from other private sectors and universities. The developer that certified usually had more creative and innovative knowledge and ideas. The developer knowledge should align with the technology. Furthermore, we need to fulfil the expectation of the stakeholder by doing the market research that supports the globalization software project. Moreover, by selecting the project champion with the background and experience will help in establishing an emotional connection with the stakeholder. In addition, we should be able to explain the technology constraint to our stakeholder in order to get the best requirement. The above issues identified in order to fulfil the needs of Public Sector's ICT Vision-"to provide efficient and quality".

IV. AN ANALYSIS OF RE PROCESS

We suggested the RE process that experienced by the IT Personnel. There are Elicitation Process; Analysis and Negotiation Process; Documentation Process; Management Process; and Validation and Verification Process [13]. This RE process will regroup the IT Personnel experienced. To implement these RE process we should identified the strength and weaknesses of current RE process and the capability of our practitioner.

A. Strength

The needed of the systems: The automated of business process are needed in improving the service delivery for the organisation. The comparison with other country or among the application system cannot be denied. In the Information Technology era, ICT is the practical tools in upgrading the services delivery.

To improve the current process: The goal of system development is to develop systems faster, cheaper, better, and safer. Meanwhile, the goal of process improvement is to develop systems in a more systematic, to avoid schedule overruns, minimize defects and maximize the productivity. The plan for achieving a process improvement was to develop a way of working with requirements based on the needs and experiences of the management, Product Managers, and engineers [14]. Through a comprehensive implementation of process improvement, software processes will be documented and evaluated, allowing for the identification of weaknesses and potential risks. Requirements process improvement is a complex task that can be improved once weaknesses have been identified [15].

Components off the Shelf (COTS): Package solutions as Components off the Shelf (COTS) may be considered during the requirements engineering process for one or a combination of three reasons [16]. The first is that packages may serve as existing system surrogates; the second is that a package solution may form the whole or part of the recommended solution; and the third is that package consideration may boost the users' confidence with.

Model/Technique of RE: There are several model/tools/ technique/methodology that can be refer while doing the system development. The knowledge for choosing the right several model/tools/ technique/methodology is required. The complexity of software projects as well as the multidisciplinary nature of RE requires developers to carefully select RE techniques and practices during software development [3].

Refer to Existing Related Studies: The involvement of company and universities in doing their research regarding of RE might gave the new idea to the IT Personnel in solving their problems or at least give the idea in tackle the issues of system development. Knowledge sharing is good concept for exchange the experience among IT Personnel.

B. Weakness

We also have identified the weaknesses of the RE as a guideline to the IT Personnel that not really understand what they have to do in ensure the successes of the system application implementation. Understanding weaknesses is likely to lead to fewer requirements defect [15].

Lack of RE Knowledge: Most of the IT Personnel have work on the development of software applications, either as programmers, system analyst, software testers, or project managers. The need of RE is to identified scope of the problem. Since requirements activities tend to be less technical than other software development activities, they often perceive them as less important than other phase of system development [17]. These are to understand the problem for the client, a contract between client/user and builders and agreement on what has to be built. The requirements themselves are the descriptions of the system services and constraints that are generated during the requirements engineering process.

Lack of REP Elements: The requirements themselves are the descriptions of the system services and constraints that are generated during the requirements engineering process. Requirement Engineering Process involves users, customers, managers, domain experts, and developers share different skills, backgrounds, and expectations. The process of establishing services that customer requires from a system and the constraints under which it operates and is developed. Requirement Engineering needs a multi discipline which encompasses a large set of competences and knowledge areas. These disciplines include elicitation, analysis, documentation, review, modeling, conflict resolution, prioritisation, team communication, and problem identification [17]. Requirements also emerge from a process of co-operative learning in which they are explored, prioritized, negotiated, evaluated, and documented.

Lack of International Standard Implementation: It's not as easy where the IT Personnel will adapt the available standard. The management will try to map the standard well

as some practical and useful methods, guidelines and hints for applying these concepts, approaches, theories, and challenges to real-world software projects [17]. Some of the software project management ignored or neglected the important of International standard. Implementation of systems engineering process defined in standards does not necessarily ensure a successful project; however, it can help mitigate the risks associated with the project. Systems engineering was developed to manage the acquisition of highly complex high-end systems when implementing the systems engineering processes, it must be properly tailored to the scope and level of the job at hand.

Difficulty to Adopt RE model: A methodology is primarily created by accumulating the experience of failures or overruns encountered in previous projects. It's difficult to convince that methods or model can be applied in another environment. Usually the project manager has their own style in managing the requirements.

Less Exposure on RE Technique: Alongside of major problem, we have to consider the minor criteria in make sure the success of software project such as size of projects, number of person involve, type of project, target of the project. The different problem domains and software projects require different techniques. The diversity of stakeholders requires different techniques. There is no single technique that provides a solution for all RE problems. This means that developers have to carefully select and combine suitable techniques for a project.

V. DISCUSSION AND CONCLUSION

The blending of RE process in software project development should go through the strategic action plan. Management has to develop this plan base on several issues.

First, plan the appropriate training for the IT Personnel in getting familiar with the RE process. Therefore, the IT Personnel must have a standard skill that needed by the technology and stakeholder and management. They have to enhance from time to time. Second, expose the practitioner through the real environment of software project development. We attend to be given some reason from IT Personnel where they already know what the users want. The IT Personnel should take the opportunity to gain the knowledge even though some of the system application done by the vendor. It's easier to trace the requirement if any changes later. Third, the IT Personnel should master or expert in their field. This experience can get through educational or industrial attachment at selected software project firms.

As a conclusion, this research found strength and weaknesses in RE in order to reduce the gap of current requirement practice in Public Sector based on issues identified.

VI. FUTURE RESEARCH

The finding of strength and weakness of RE will help us to reduce the gap between current practice in the organisation with appropriate practice. The challenges of RE implementation will discuss in next paper.

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