# Requirement Engineering Critical Issues in Public Sector Software Project Success Factor

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*Abstract*—Requirements engineering is an important component of effective software engineering. The existing literature suggests that effective requirement engineering can lead to improved productivity, quality, and risk management. More research is needed to explain benefits of implementing the RE process to software project development. This finding is part of our research in developing requirement engineering best practices. It is targeted to organizations who want to apply requirement engineering process in their software project development. The development team who are responsible in gathering requirements should understand in depth about the RE process. The new RE Process model for the public sector is defined. This RE model will be implemented by the actors identified. We determine appropriate software project success factor for the organization. There are seven software project success factors that contribute to the development of software projects particularly in Malaysia's Public Sector. We determine general issues that are related to software project success factor (SPSF). A pilot test was conducted with IT Manager in Malaysian Public Sectors. The result shows, the respondent mediums agree with the business rules, business process and manager is SPSF. They neutral agree with technology, stakeholder and developer is SPSF. We derived the SPSF to the critical issues mainly for developing best practice for software projects requirement in software project development.

*Index Terms*—Requirement engineering, requirement engineering process, software project management, software project requirement, software project success factor, software project issues, requirement engineering critical issues.

## I. INTRODUCTION AND MOTIVATION

Requirements engineering (RE) is still an area of software engineering in which theory and practice applied in software project development. We need to identify and understand the software project requirements to produce high-quality software project. An important aspect when dealing with development RE practice is RE critical issues. Actual requirement practices vary broadly inter organization according to the culture of the organization [1]. Identifying the related Software Project Success Factor (SPSF) is most important in ensuring right requirements to be determined.

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One of the reasons why software projects fail is due to an ill-managed software project requirement. Continuous changes in scope, incomplete and ambiguous requirements, poor management, unrealistic expectations and wrong software development process model are the common issues [2].

Thus, this paper discusses the identified critical issues in RE based on the SPSF in organization. This paper is organized as follows: section II describes the overview of RE, section III explains an overview to public sector Software Project Success Factor (SPSF), section IV presents Issues Affecting SPSF, section V presents on deriving SPSF to RE critical issues, section VI explains RE critical issues, section VII presents the discussion, and section VIII presents the conclusion and future work.

## II. OVERVIEW OF REQUIREMENT ENGINEERING

RE is a sub-area of Software Engineering that studies the process of defining the requirements. 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 stakeholders, project team, management and product itself [3]. The goal of RE are to understand the needs and supports to the client and to provide the solution with methods, techniques and tools. RE is an often underutilized discipline in software development [4].

We proposed a possible solution for RE process development by combining the idea from several researchers as mention above to support the needs of Public Sector requirements. They are Elicitation Process, Analysis and Negotiation Process, Documentation Process, Management Process, Verification and Validation Process [3]. A good requirement will cause system success, but sometimes the system will fail because lack of controlling and monitoring on the system design. Requirements always change because of the business environment in which the software is used continually changes, new competitors with new products emerge, and businesses reorganize, restructure, and react to new opportunities. A requirements engineering framework for organizational IT is directly addresses to organization's business strategy and the alignment of IT requirements with that strategy [5]. Several solutions must be prepared for any changes in business process that affect the software projects.

## III. OVERVIEW TO PUBLIC SECTOR SOFTWARE PROJECT SUCCESS FACTOR (SPSF)

Six public sector SPSFs were identified in [6] through the experience from several systems developed, such as

E-Learning Public Sector, E-Services and E-Government. Fig. 1 shows the six SPSF, namely managers, stakeholder, developer, business rules, business process and technology. We regroup the SPSF into three categories: People, Process and Infrastructure.
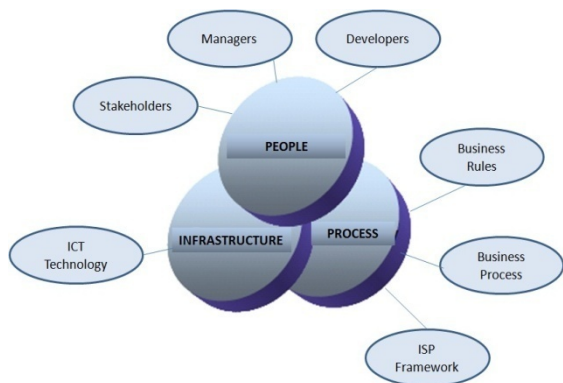


Fig. 1. Software Project Success Factor (SPSF) Categories

The groups of people are stakeholders, developers and managers.

Stakeholders are those involved in a project and have some interest in the software to be developed, may vary from one project to another [7]. Stakeholders are persons or organizations which have a valid interest in the system. They may be affected by it either directly or indirectly. To identify the relevant stakeholder roles, the persons or organizations that have an active interest in the system because they'll actually use it or are directly involved in processes that the system will change [8].

Developers in Malaysian Public Sector are the IT personnel who act as a middle person between stakeholder and management. Developer must have the ability to seek out information and regularly communicates with domain experts [9]. IT personnel are the person who involves in event, meetings on behalf their department, seminars and mostly as IT support for the organization. With all of these tasks, IT personnel cannot focus to the requirement process.

IT Managers are responsible in contributing ideas in the planning and implementation phases in software projects. Organizations are in need of mechanisms to assure operational practices comply with standards and regulations [10]. The ICT action plans of the organization become the basis of the organization strategic plan. 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 [11].

The groups of process are business rules, business process and Information Strategic Planning (ISP) frameworks.

Business rules as guidance in helping the people manage their daily work; however, in some cases the business rules increase the complexity of the daily work. A business rule is a statement that aims to influence or guide behavior and information in an organization and categorized to mandate, policies and guidelines; and guide an organization to understand how the business behaves and operates [12][13].

Business processes are sets of activities that create values for a customer. Organizations are increasingly automating

processes using workflow systems and are building elaborate management systems around their processes [12]. A business process is recognized as a set of tasks or procedure that should be completed by the people involved. Ensuring the organizational IT aligns with business process is critical to business success. It will support the organization's business strategy.

ISP Framework will guide the organization in the planning and implementing their ICT projects. The ICT project progress included cost of the project, percentage of the progress; the total of IT personnel and the budget that had been spend. The ISP will act as baseline for the SPSF.

The group of infrastructure is ICT technology. The development of software projects is complex; it involves with the IT infrastructure, software and hardware [14]. The success of the software project is also depending on the current ICT infrastructure. The technical team should know the status and map with the development of the software project. The skill and experience of the IT personnel needed to debug the technical problem.

## IV. ISSUES AFFECTING SPSF

We listed several software project issues identified from the experience of software project development and the literature. The issues are categorized based on SPSF. The discussion that follows is based on Table 1.

Table 1 shows the analysis on pilot test conducted. The pilot test involved selected experience IT managers who have experience with the requirement eliciting process. Questionnaires were distributed through electronic mail to 25 IT managers from different organizations. The survey returned back is 12. The purpose of the pilot test is to derive of shortcomings and problem area. We can then indicate to what extent they agree or disagree to each statement. The mean shows the agree level of the problem area. The project manager can take necessary action to remedy the situation through the issues related [15]. The scale of survey is 1 to 10, from 1: Strongly Disagree to 10: Strongly Agree. We used a SPSS to analyze the data. We divided the result into 5 groups of mean. The groups are below 3: Strongly Disagree; 3 to below 5: Medium Disagree; 5 to below 7: Neutral Agree; 7 to below 9: Medium Agree; and 9 and above: Strongly Agree.

### A. Issues Affecting Business Rules

The issues for business rules are lack of resources, to get budget approval as requested, restructuring of organization and always not enough budget.

National and international standards, regulations and laws impose restrictions on business practices to achieve common goals, such as improving corporate accountability in financial markets or ensuring the privacy of medical records in the healthcare industry [16]. We should have a good project management to handle the resources. The management had to consider reducing the amount of work due to overcome lack of resources [17] and place the availability of resources with the right competencies to implement the requirement [18]. Mean of lack of resources is 8.17. This shows that the

respondent medium agreed that lack of resources is a problem during software project development.

TABLE 2: RELATIONS OF SOFTWARE PROJECT SUCCESS FACTOR (SPSF) WITH RE CRITICAL ISSUES

| SPSF | Software Project Issues | RE Critical Issue |
|---|---|---|
| Business Rules | Human Resources Approval Restructure Budget | What are the constraints? |
| Business Process | Changes Obsolete Complexity Request | What causes a change? |
| Technology | Standard Constraints Expectation Globalization | How can they facilitate the requirement? |
| Stakeholders | Misunderstanding Miscommunication Misalignment Conflict | What are their needs? |
| Developers | Skill Knowledge Expertise Experience Training | How can they understand the needs? |
| Managers | Planning Risk Factor Key Success Factor Challenges Action Plan | What are their decisions? |

The project team faced difficulty in getting budget approval as requested from management. Some of the funding is used to train the team members [19] to be capable in operating the methodology and software tools [20]. Build and managed schedule and budget are a continuous activity of the project manager to ensure that the project finishes on schedule and within budget [20]. Mean of getting budget approval as requested is 8.17. Its shows the respondent medium agreed get budget approval as requested is a problem during software project development.

Traditional business structures nowadays have to change fast to keep up with stakeholder needs [21]. Most of restructured done for the organization to become more efficient and productive. Ultimately, it causes a change in staff including those involved in the development of the system. The restructure process should not disturb response time, the job flow and removing the redundant task [19]. This situation cannot be avoided. Mean of restructuring organization is 7.50. Its shows the respondent medium agreed that restructuring the organization is a problem during software project development.

Once a project is accepted, the budget will be allocated based on the project plan. The project manager has to ensure that the project finishes on schedule and within budget [20]. Not enough budget usually happen when the project delays because of some reason, especially when the software project not meet the requirement, and when some conflicts arise, such as those related to non-functional requirements such as performance, cost, and security [1]. Mean of always not

enough budgets is 7.08. It shows the respondent medium agreed that not enough budgets are a problem during software project development.

## B. Issues Affecting Business Process

The identified issues for business process are frequent changes of business affecting the requirement, frequent changes of business affecting the requirement, the complexity of business process make it difficult to understand and new/add/modified requirement requested of business process.

The workflow process can divide to generic and dynamic. Management try to minimize the procedure of business process stakeholders to ensure that the business more easily. The improvement done also will affect the existing system application. Frequent changes of business affecting the requirement will cause the requirement to be reviewed. Studies should be made so as not to disturb the whole system. Many existing software systems, however, are too complex and too unrelated to the business to support this change accurately [21]. Mean of frequency changes of business process is 7.50. It shows the respondent medium agreed that frequency change of business process is a problem during software project development.

A system application completed with the obsolete requirements provided happened to a system that is used by more than one organization. The requirement collected at early stage sometimes change based on business process. Especially for the development of application system that took more than three years. Participation by stakeholder in eliciting the requirements, design, coding and early testing phases would keep stakeholder engaged during these middle stages, allowing them to more actively ensure their direct needs are met [22]. Mean of a system application completed with the obsolete requirements provided is 7.33. It shows the respondent medium agreed that a system application completed with the obsolete requirements provided is a problem during software project development

The complexity of business processes makes it difficult to understand for stakeholder and developer. Both of them should study the business workflow and identify the requirement that really can convert to system application. Otherwise, it will be more difficult to developer in design process. Lack of knowledge of the business process by the user cannot be overcome except by either replacing the user or to request a new person [23]. Mean of the complexity of business process make it difficult to understand is 7.50. It shows the respondent medium agreed that the complexity of business process make it difficult to understand is a problem during software project development

The request of new requirements, changes to existing requirements and additional requirements will improved the current system. The possibility of the application systems cannot be implemented well. Therefore, the developer is required to make a study and comparison of the request. Mean of requirement requested make it difficult to understand is 7.75. It shows the respondent medium agreed that requirement requested make it difficult to understand is a problem during software project development.

## C. Issues Affecting Technology

Identifies issues that affect technology are as follows;

difficulty in achieving the international standard, constraint cannot meet some of the requirements, difficulty in explaining to stakeholder the expectation of right technology and the technology produce as minima of globalization needs.

The proposed ICT technology should follow the international standard. The technologies include techniques, methods, and hardware that will be implemented to the planned system. Difficulty in achieving the international standard will cause problems to the system to be referred. Good knowledge is required on hardware and software technology to be used in the information system [23]. Mean for difficulty in achieving the international standard is 7.33. Its shows the respondent medium agreed that difficulty achieving the international standard is a problem during software project development.

Cannot meet some of the requirement is a constraint of technology. Developer is not familiar with the technology suggested. The team have to study is it the technology match with the requirement especially during the implementation part. Organizations were rapidly adopting new technologies in an attempt to gain a competitive advantage. [23]. Mean for this issue is 6.08. It shows the respondents responds is neutral agreed that cannot meet some of the requirement is a constraint of technology. To meet the requirement of technology its more depends to the environment of the organization. The factors that should be considered are priority, infrastructure requirement, people and the team itself.

Organizations are rapidly adopting new technologies in an attempt to gain a competitive advantage [23]. Difficulty in explaining to stakeholder the expectation of right technology is another issue in technology. The skill and experience in manage the hardware and software is needed to IT personnel especially for IT manager. The IT personnel also can request an advice from the IT consultation for the best solution. Good knowledge of the hardware and software technology to be used in the information system [23]. The mean of this issue is 6.75. It shows the respondents respond is neutral on this issue. The implementation of system application needs several levels of softwares such as operating system, web server, machine language and others. It is a very technical subject to explain to stakeholder. It will be easier if management allows the IT department to decide on suitable hardware and software for the requirement.

The development of software projects are closely related with the IT infrastructure, software and hardware. Once a project has been accepted, it is highly recommended to use a methodology and software tools for a structured approach to project management [20]. The technology change and expand make it the system application produce as minima of globalization standard. National and international standards, regulations and laws impose restrictions on business practices to achieve societal goals, such as improving corporate accountability in financial markets or ensuring the privacy [16]. Mean of the technology produce as minima of globalization is 5.58. This shows that the respondents' agreement on this issue is neutral. The team should know and understand the technology that they suggested. Any fault of system application will be directed to the project team or IT Personnel.

### D. Issues Affecting Stakeholder

Identified issues for stakeholder are miscommunication with the developer, misunderstanding during the agreeing process, and misalignment of requirement with the business process, conflict with manager and conflict with developer.

Requirements are a process of seeking, uncovering, acquiring and elaborating [15]. These processes involve communication between stakeholder and developers. Techniques of communication that are normally used includes verbal, written and interpersonal. Miscommunications still happen with the developer because of different field and language of work. Stakeholder expectation cannot be fully understood by the developer. Stakeholder participation is supposed to reduce rework on documentation; to get easier approval; to have greater fit of the recommended solution to the organization and to reduce political conflicts among users [23]. Mean of miscommunication with developer is 6.50. This shows that respondents' neutral agreed on this issue is. It's easy to cooperate with the stakeholder in same field. Usually the stakeholder is the users who use the system. This user will give the requirements base on his needs, where he requires a system that is easy to use, manage and monitor.

Agreement among stakeholders, belonging to different perspectives, on factors that result in successful projects makes it is easier to achieve better teamwork [24]. Misunderstanding during the agreeing process can cause inability to get the right requirement. In particular, project participants need a way to detect misunderstandings and conflicts and solve them as early as possible [25]. Mean of misunderstanding during the agreeing process is 6.42. Its shows the respondents' responds to this issue is neutral. The user who does not use the systems will give the requirement based on scenario, experience, case study and benchmarking. The developer needs to know the groundwork such as gaining the user needs, identified the needs, analysis, categories and documents its.

Stakeholder is one who knows the business process. The need of business process will be translated to the requirement. Misalignment of requirement with the business process will cause of the placing of requirement to the wrong place. Lack of knowledge of the business process by the user cannot be overcome except by either replacing the user, or having a senior analyst who has extensive knowledge of the business [23]. It's not as easy, it requires the involvement of the human resource department. Participating users is influence by authority within the user organization. This is critical because, in most situations, the participating users must subsequently to their respective departments and the commitment of task [23]. Mean of misalignment of requirement with the business process is 6.42. It shows respondents neutral agreed on this issue. The stakeholder should know the business process and the developer should understand the users' needs. Discussion sessions or brainstorm sessions are needed to solve this issue.

Stakeholder conflict is the biggest challenge in requirement process [26]. Stakeholder's needs are always incomplete, inconsistent process description, continuous and difficulties to consult the requirements.

Project manager needs to inspect particular tasks that are performed by IT Personnel [26]. Explain the roles, responsibility and expectation to stakeholder. Conflict with

manager will cause lack of cooperation between IS groups and users, and between project members [23]. If there is any significant gap between them, the project manager can take necessary action to remedy the situation [15]. One possible action is to replace the member of the development team or to request a new person to represent the stakeholders. By taking action at the early stages, the project manager can ensure that the software requirement process will reflect the requirement needed. Mean of conflict with manager is 5.83. Its show the respondent neutral agreed that conflict with manager is a problem during software project development. This situation seldom happens but if it happens will cause critical issue. The manager should know his roles and responsibility.

Conflict with developer is one of the issues during requirement process. Lack of cooperation between users and IT Personnel will cause failure to get valid requirements. It is usually difficult to get their time commitment to the requirements engineering phase. The IT Personnel have the policy of building products they feel the users will need and then try to market them to the users [23]. This will result in the identification of missing requirements, inconsistencies and requirements conflicts. It is necessary to ensure that all relevant factors such as technical, economic and political to use the appropriate influence on resolving stakeholders conflicting requirements [27]. Mean of conflict with developer is 5.58. Its show the respondent neutral agreed that conflict with developer is a problem during software project development. The stakeholder feels they have gave the good list of needs for developer to translate to the requirement. The developer tries to interpret the user need. This situation done separately will give the different meaning. Several discussions have to done to avoid the issues.

### E. Issues Affecting Developer

The issues determined for developer are lack of soft skill such as communication skill and negotiation skill, lack of related knowledge, lack of expert in their field, lack of appropriate experience and lack of related training.

The IT Personnel must have a good communication and negotiation skill beside the technical skill. These skills are needed during the discussion with the stakeholders. Lack of these skills may lead to unneeded requirement implemented. It will prevent failures during the implementation phase. Capable IT Personnel will have a skill set and able to deal with people and has good interviewing and verbal communication skills [23]. Mean of lack of communication and negotiation skill 6.08. Its show the respondent neutral agreed that lack of communication and negotiation skill is a problem during software project development. Communicate in technical skill is very difficult understood by the stakeholder. The developer should really know their stakeholder.

The developer is the IT personal which act as a middle person between stakeholder and management. The development team must be familiar with the variety of tools and technique in the market. If the developer (IT staffs) is lacking in the required technical expertise then the project risk is higher [28]. The goal of application system varies from the organization to another. The knowledge needed by IT personal is not only on ICT but included business need of the organization. As example, the IT department personnel in

Health should understand the hospital procedure. Lack of related knowledge will cause the requirement captured is not what the user need. Good knowledge and experience of issues related to system implementation and organization business change [23]. Mean of lack of related knowledge is 6.08. Its shows the respondent neutral agreed that lack of related knowledge is a problem during software project development. Knowledgeable IT Manager is needed in the development of software project.

There are several of critical phases while implementing the application system. As example, system error can cause of the user cannot use the system. There can be affected by the hardware or software. It's happening when the system was running but the user cannot use the system. In other word, the system not meets the requirement. To debug the problem, we need the really IT expert. Inexperienced IT Personnel are considered not to be able to ask the right questions during requirement gathering because they never did. It is common for roles in the requirements engineering phase to be support or provide by individuals who are available rather than those who are capable of doing the job [23]. Mean of lack of IT personnel expert is 5.67. It shows the respondent neutral agreed that lack of IT personnel expert is a problem during software project development. Lack of IT personnel expert in requirement engineering field is obvious in identifies the suitable requirement.

Most of the application systems are developed to support the organization's businesses. Some of them apply the sharing concept such human resource system, accounting system and others. The examples of Malaysian Public Sector application systems are HRMIS, EPSA and E-Procurement. These systems are used by all government agencies. IT personnel experience is very useful to ensure that the system is always in a stable condition and does not cause problems for users. Lack of appropriate experiences still happen because of knowledge or experience with the requirements engineering process not related each other [23]. Mean of lack of appropriate experience is 5.67. Its show the respondent neutral agreed that lack of appropriate experience is a problem during software project development. An experience of IT Personnel (developer), most of them senior manager can guide the junior IT Personnel during the requirement process. The technique that use should be simple and easy to understand. The other way, the team can base on the application system which has similar process.

Most of the organisation plans the training for their staff. It's included the ICT training. The purpose is to prepare the skill that needed for the development of application. The training plan also included in the software project development. The training focused to the current need of software, hardware and infrastructure of the software project. The lacks of training still the issue during the brainstorming session. It's also become the popular reason when the development of application did not meet the user need. The requirement engineering not seen as important topic that listed in the plan because of the requirement engineering happen early of the software development process [29]. Mean of lack of training is 5.42. Its show the respondent neutral agreed that lack of training is a problem during software project development.

*F. Issues Affecting Managers*

We determines the issues for the managers are planning the layout of time frame software project implementation, identify risk factor, identify key success factor, identify the challenges and develop action plan.

The managers have to plan the layout of time frame software project implementation. They have to make sure their software project run smoothly, the project have to have proper planning. The planning involve different of level manager. All the planning can be done base on the budget that approval by treasury and constraint that identified. The stakeholder will involve for giving the requirement for the needs of the ICT projects. The manager decision should comply with the organizations need. It needs the mechanisms to help assure that operational practices comply with standards and regulations [10]. Mean of plan the layout of time frame is 8.17. Its show the respondent medium agreed that plan the layout of time frame is a problem during software project development.

The project managers should responsible for the daily software development process and concerned about schedule and budget [24]. Besides that, they have to fully understand the costs, risks, and anticipated benefits from the project [1]. The success criteria defined should be meeting with outcome or solution [19]. During the software project planning, managers will be thinking about risk. It consists of planned to replace with another plan in achieving the desired goals. Among those identified were budget or cost and schedule targets [24][1]. But the plan for risk in meet the user requirement, the important success criteria for projects, both for users and project managers [24][19]. Mean of identify risk is 8.00. Its show the respondent medium agreed that identify risk is a problem during software project development.

After that, better for the manager identify the key success factor. The stakeholder should happy with the success of the implementation. Acceptances of the project stakeholders to represent it are satisfied. This means that changes to the requirement is a minor. Four dimensions are user, analyst, application and utilizing system [23]. Mean of identify the key success factor is 8.00. Its show the respondent medium agreed that identify the key success factor is a problem during software project development.

The next step is to identify the challenges. The developer idea or decision should align with the user needs. Their outcome present to management and stakeholder. Sometime developer have multi task in their organization. The challenges is a lessons learnt from past experience of the technology transfer and challenges for better requirements engineering research and practice [30]. Mean identify the challenges is 8.08. Its show the respondent medium agreed that identify the challenges is a problem during software project development.

Lastly the managers have to develop action plan to implement the planning. Manager is the most important person which they have to make the right decision beside the planning, managing and monitoring the implementation of software project. The important people in developer team are Project Champion. Project Champion is the persons who really know the technical part and also know how to manage the project. Creating action plans to deal with the high-priority risks and continuous monitoring and follow-up

to ensure that your action plans [31]. Mean of develop action plan is 8.08. Its shows the respondent medium agreed that develop action plan is a problem during software project development.

## V. DERIVING SPSF ISSUES TO RE CRITICAL ISSUES

The discussion above shows that we need to identify the critical issues within SPSF.

Business Rules is a policy built on the needs of the public sector. However, this policy will be improved from time to time. It can also be modified based on the current needs of the organization. The relation of business rules with software development project is very closely. The development of a software project refers to policies provided such as financial allocations, approval of a project, tracking and monitoring, and others. Identify the characteristics of the project activities, the available human resources, and constraints established by the software development organization [32].

Business Process designed to guide users in their everyday tasks. Uncomplicated workflow, easy to understand and comply with the working process help the user completed the daily job. The work flow used in automated of application system process. The working process will be modified based on request. Changes to the working process will involve changes to the application system. It makes easier to identify which services must be updated when business process changes [33]. These changes make it difficult for developers to make changes to the needs of an application system. Thus the expected changes needs should be identified at early stage.

ICT is the mediator between management decisions and data source. Users will expect a system which can meet the standards and requirements. The developers have to make sure the software and hardware which apply not interfere with the user's work process. The ICT technology that support systems, modelling techniques and notations should secure and concurrent co-operative work between members of a multidisciplinary development team [34]. It is necessary to maintain an audit, archive, authenticate and approve change requests.

Stakeholder requirements expressed through discussions, meetings or papers. Supportive among people is necessary between project team and stakeholders to avoid misunderstanding and misinterpretation. Conflict between people is a constrained between stakeholder requirements and project team. In particular, stakeholder participation needs a way to detect misunderstandings and conflicts and solve them as early as possible [25].

Development teams have important roles in translate the requirement to design. The developer should have the skill in understanding the requirement. Besides that, they should have the negotiation skill to convince and accept recommendations. Developers used many strategies to record, communicate, and discover the information [35]. It will allow developers to share their current understanding, time and knowledge.

Main role of managers is to make right decision. The decision be should agreed by the stakeholders and the project team. The right decision will ensure that the software project that is planned to be implemented. Project Manager can think

of having an alternative, and ensures that the project is in track [31].

## VI. REQUIREMENT ENGINEERING CRITICAL ISSUES

Tab. 2 shows the issues for every SPSF. The critical issues identified through the relations of among the issues.

TABLE 2: RELATIONS OF SOFTWARE PROJECT SUCCESS FACTOR (SPSF) WITH RE CRITICAL ISSUES

| SPSF | Software Project Issues | RE Critical Issue |
|---|---|---|
| Business Rules | Human Resources Approval Restructure Budget | What are the constraints? |
| Business Process | Changes Obsolete Complexity Request | What causes a change? |
| Technology | Standard Constraints Expectation Globalization | How can they facilitate the requirement? |
| Stakeholders | Misunderstanding Miscommunication Misalignment Conflict | What are their needs? |
| Developers | Skill Knowledge Expertise Experience Training | How can they understand the needs? |
| Managers | Planning Risk Factor Key Success Factor Challenges Action Plan | What are their decisions? |

### A. What are the Constraints?

Some are even artificial, but most aren't. A constraint is a restriction on the degree of freedom you have in providing a solution. Constraints are effectively global requirements, such as limited development resources or a decision by senior management that restricts the way you develop a system. Constraints can be economic, political, technical, or environmental and pertain to your project resources, schedule, target environment, or to the system itself. In migration the business process into system application, teams should co-operate with end user in understanding the business process during meeting or discussion.

Business constraints restrict the enterprise structure, govern the business behavior and contribute to the business goals.

The critical issues identified through the relations of among the software project issues. The constraints of certain requirement issues such as organisational structure, people and stuff turnover, key business process and completing on time and within budget restrict the organisation in achieving and meeting the business objectives and business goals during the software project development [13][14] [24].

### B. What causes a change?

The changes of the requirement can be cause of the changes of policy, the migration of the process to the system application, the needs of the stakeholder and the outdated of the process in the certain organisation. Moreover, the business situation sometimes changes so quickly that change requests repeatedly occur during the course of development. Redesign, however, is expensive, time-consuming and often frustrating [36]. The development of the software project always base on the current business process. If any changing in the business process will gave impact to the application systems.

Change may affect existing business models requiring its stability to be rebalanced [37]. If the changes are unexpected changes and not included in the planned project schedule, this will cause disruption to the project [38]. Consistency between requirements and implementation will help the organisation business function through software project development [9]. Good knowledge of the IS is needed to define the components and system affected by the change [39].

The critical issues identified through the relations of business process with their software project issues. Good knowledge of the IS is needed to define the SPSFs and system affected by the change, the consistency between requirements and implementation, and also will give impact to the current business process and project schedule [39][9][37][38] will help the organization business function through software project development.

### C. How can they facilitate the Requirement?

The development of software projects are tiredly involved with the IT infrastructure, software and hardware. The growth of ICT is too fast and highly capable force for IT personnel in identifies technologies that can be adapted to the current needs. Without skills and knowledge the understanding process of the technology will take a long time. The IT personnel can request an advice or idea from the IT consultation for the best solution. Consider technological robustness of the project as major factors responsible for successful implementation and sustenance of ICT projects [40].

A central issue was not only to address the problems of requirements understanding and communication, but also to find a technology that would enable mapping of design to the product requirements [9]. Technology Infrastructure including hardware devices, operating systems and middleware on which the information systems run [14]. Organizations were rapidly adopting new technologies in an attempt to gain a competitive advantage [23]. One of the technology issue is that have trouble finding processes and tools that suit their needs [41].

The critical issues identified through the relations of technology with their software project issues. The involvement of technology including hardware devices, operating systems and middleware, adopting new technologies in an attempt to gain a competitive advantages, to find a technology that would enable mapping of design to the product requirements and will overcome the one of the technology issue in trouble finding processes and tools that suit their needs[14],[23],[9],[41].

## D. What are their needs?

The participation of user is needed because of they are the most desirable users have a skill set that includes the following: familiar and experienced with computerized systems; good knowledge of the application domain, the business processes, and the needs of the user organization; good knowledge of systems development processes especially the requirements engineering process and modeling techniques and their deliverables; good knowledge of Information System implementation planning and management, and change management concepts; and able to deal with people and have good communication skills. Understanding user needs is not a sequential process. It involves different disciplines such as psychology, languages and communications, organizational behavior and management [42].

It is important to identify the relevant stakeholder roles, the persons or organizations to ensure the project team fulfills their needs [8]. Otherwise it will cause misunderstanding, miscommunication and misalignment with business process. The problem gets worse and conflicts arise when stakeholders change their minds about what they want from the system [36]. Thus, try to find a compromise among the needs of stakeholders and project team [43].

The critical issues identified through the relations of stakeholder with their software project issues. It is important to identify the relevant stakeholder roles, the persons or organizations to ensure the project team fulfill their needs , otherwise it will cause misunderstanding, miscommunication and misalignment with business process., conflict between stakeholders and developer change their minds about what they want from the system[8],[36].Thus, trying to find a compromise between the needs of stakeholders and project team [43].

## E. How can they understand the needs?

The developer is the IT personnel which act as a middle person between stakeholder and management. Here, the developer should align both the user needs and come out with the big picture and present to management and stakeholder. This is regarding to business process that the stakeholder usually doing in their daily work. Usually there are several workflows that they have to follow. Once the daily process migrated to the system application, the solution is more complex than before. The developer should understand the business process in order to develop the best requirement. The system application should help them to minimize the current workflow.

Capable IT Personnel should have a skill set including application domain and the business processes, hardware and software technology, able to deal with people and has a good interviewing and verbal communication skills, conceptual and functional modeling, requirements engineering process and its deliverables, conducting a cost/benefits analysis, issues related to system implementation and organizational change [23]. They tend to be early adopters of new technology [41]. Successful RE does not only depend on the quality but also on stakeholder satisfaction and commitment [9]. There should have an idea to adapt this approach to support actively stakeholder participation in RE [25].

The critical issues identified through the relations of developers with their software project issues. A capable IT Personnel should have a skill set including application domain and the business processes, hardware and software technology, able to deal with people, and has good interviewing and verbal communication skills, conceptual and functional modeling, requirements engineering process and its deliverables, conducting a cost/benefits analysis, issues related to system implementation and organizational change[23]. They tend to be early adopters of new technology [41].

## F. What are their decisions?

Managers are personnel that make a decision in approve every phase of software project requirement. What managers thinking is certainly interesting information, but these managers are not the future users. What they want is not necessarily at users want. They should have the kind of knowledge about stakeholder and business needed. For them to get requirement are the normal and simple process. They allocated a low budget for user requirements process. The cost of learning something about users doesn't fit in their planning. User requirements analysis should be planned from the beginning of a project.

The problem was managed by management group, which acts as a mediator between stakeholders and developers [41]. This group is concerned about schedule, budget, cost, risk, judged by project delivery and anticipated benefits from the project [1],[24]. IT Managers will discuss all problems and proposed solutions from the view of these different user groups [44]. To meet user requirements is the most important success criteria for projects, both for users and project managers [24].

The critical issues identified through the relations of managers with their software project issues. IT Managers will discuss all problems and proposed solutions which managed by management group, this group is concerned about schedule, budget, cost, risk, judged by project delivery and anticipated benefits from the project [44],[41], [1],[24].

## VII. DISCUSSION

Malaysia Public Sector launches many of ICT projects in order to upgrade service to our client. To control the standard of ICT projects, we need the special guideline in develop, manage and monitor the development of the project. This is a part of our research in developing RE practice for Malaysian Public Sector. Identifying software project success factor for the organization is to ensure the standard developed is relevance to the organization. The experience from the IT personnel in handling ICT projects and the experience in managed the development and implementation ICT project can guide us in identified the related SPSF. Even though the issues are common, these issues gave impact to the progress of requirement gathering. These issues that arise based on these experiences basically can be solves more specific with RE method, tools and technique.

## A. Software Project Success Factor (SPSF)

We identified the SPSF through the experience of software project implementation and interview process with the IT Manager. The need of identify software project success factor

is to make sure that the RE practice can be suitable with Malaysian Public Sector environment. We also based on the research that had been done by the RE expert. Otherwise, it will be useless.

*B. Software Project Issues*

The software project issues among the software project development. Therefore we listed the common issue that usually faces by the project team. The issue listed based on the experience and support by the literature. But the issue limited by the software project success factor identified. So, we can manage the issue systematically started from requirement gathering.

*C. RE Critical Issues*

We identified the RE critical issues from the common issues. The critical issues will map with the project component and RE process. Result of these mapping are a set of RE practice that will suggested to the Malaysian Public Sector. The RE practice also develop from experience of IT Manager during software project requirement.

## VIII. CONCLUSION AND FUTURE WORK

As a conclusion, it's important for the organization determine their software project success factor. This research found software project help us in determines common issues that IT Personnel face during software project development. We also recognized the RE critical issues in helping us to develop the RE practice. We hope this research will help the organization prepare them self before handling any requirement process.

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