Identifying the Conflicts in the Software Requirement Engineering: A Literature Review

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Abstract -*Conflicts generally arise through lack of misunderstandings and miscommunication that involves the interaction and collaboration of different individuals. This conflict arises with poor relationship and has created too many failures in software development. It increases the development cost and change of requirement. Even later the system is judged unsatisfactory and unacceptable to the user. Requirement elicitation is the important part of software engineering. Many problems associate with requirement engineering including understanding the different group of people affected by the development of the given system. In the software requirement engineering area must avoid conflict to collect good requirements. Because of conflict, it is tough to involve all possible stakeholder effectively. The requirement analysts are the most important part of the software development because requirement analysts has goal to collect a proper requirements and elicit from multiple stakeholders. Conflict with requirement analysts and requirement provider, its creating a big problem. So client does not get quality full software without quality full requirement. This paper covers the generic conflicts during the requirement elicitation between requirement analysts and requirement providers. This paper gives brief idea to solve conflicts, how the conflict is occurred during the requirement elicitation and analysis of those factors.*

*Key Words***: requirement elicitation, stakeholder, requirement analyst, conflict of interest, requirement engineering

1. INTRODUCTION

Requirements engineering is concern with identifying, modeling, communicating and documenting the requirements for a system and the contexts in which it will be used. Requirements engineering act like a bridge between client and software system. Requirements engineering is the most important area of software engineering it's create a foundation for any software. "The success of the requirements elicitation activity gives high impact on the achievement of the goals set for requirement engineering, which leads to the development of correct application. Hence, the development of any application is indispensable from incorporating good practices of requirements elicitation. In fact the consideration has an impact to the usability of the application" [1] .The success of software depends on how well it fits the needs of its users and its environment. Requirements engineers have numerous challenges to develop successful software. In this process there are number of difficulties but their main goal is to collect a quality full requirement However, sometimes they fail some sort of reason one of them is conflict. Robinson et al. "Describes three technical difficulties that lead to conflicts that are, voluminous requirements, changing requirements, analysts and complex requirement" [2]. Conflict with requirements analyst and client is a common problem. Various clients have different expectation and views. Sometimes clients do not understand what is the actual important of requirement. Requirement engineer understand that requirement is necessary but without proper requirement software can develop. Quality full software is impossible to create. "Some research has concluded that systems failure can be traced back to poor requirements elicitation in up to "90%" of large software projects" [3] .In different literature claims "many software projects have failed because they collect a poor requirements" [4].

In the literature, it is found that different conflicts have different objectives. The interest of different conflict such as: dependability, interoperability, usability, performance, adaptability, reusability, and cost & schedule. Many requirements engineering techniques such as using tools, design methods, and process models for specifying, validating, and verifying requirements to achieving successful software requirements."This project chose a fourth generation language to satisfy software affordability and timeliness objectives .However, the project failed due to performance scalability problems" [5].

In this paper, the research direction is identifying the conflicts in the software requirement engineering phase. During this research driven by the following research question:

RQ: What are the conflicts faced by the requirement analyst?

– Motivation: To identify the conflicts in requirement engineering phase.

Section 1 of this paper contain basic introduction of requirements engineering, conflict, and requirements engineering some techniques according to literature review, what are the problems. Section 2 consists of related work which followed by the

research methodology section in section 3. Section 4 is result. Section 5 is discussion and section 6 is consists of conclusion and future work.

2. LITERATURE REVIEW

Several researchers have addressed to identify conflicts in requirement for selection of an appropriate research method in different categories. Conflict can create among requirement, time-intensive, human error. Effective advancement of software development that requires total, steady and obvious requirements. Conflicting requirements is an issue that happens when a requirement is inconsistent with another requirement. This section clarifies the importance of requirements conflicts, the various reasons that may cause conflict among requirements and the various sorts of requirements conflicts.

Definition of Requirements Conflict: Conflicting requirements is an issue that happens when a requirements is conflicting with another necessity. Consistency between requirements requires no at least two necessities repudiate one another. In necessities building, the term struggle includes obstruction, interdependency or irregularity between requirements.

General orders for requirements of conflicts dependent on kinds of necessities, functional requirements and non-functional requirements. A case of contentions in non-functional requirements is security with ease of use so there is a trade off. Be that as it may, the designer must pick an adequate answer for locate the right balance of characteristics that work. In literature review it has been a great challenge to deal with conflicting. For example: Yen presents a formal framework that facilitates the identification and the trade-off analysis of conflicting requirements [6]. Yen's describe a systematic approach for analyzing the tradeoffs between conflicting requirements using the techniques in decision science [7].

Causes of Requirements Conflict: Present critical aspect of resolving conflicts among stakeholder requirements. There are various reasons that reason conflicts between stakeholders requirements. One great order for conflicts reasons is exhibited in order the reasons into specialized reasons and social reasons. Specialized reasons are brought about by the accompanying troubles:

- Massive amount of necessities can prompt conflicts between them.

- Changes in prerequisites during framework improvement stages. These changing may happen after the expansion of new prerequisites or the update of old ones.

- Complex framework space can prompt misconception of necessities, and consequently, conflicts between them.

Though, the social troubles that lead to necessities clashes are as per the following:

- System has various stakeholders with assorted interests that generally associate with one another and causes conflicts.

- Changes in the framework's stakeholders by including new stakeholders with various needs or by changing stakeholder's solicitations.

Hence, there are various sources for irregularities among requirements and these may mess up the accomplishment of the software development. Researchers have been attempting to discover different solutions for this issue. In research provide some guidelines such as alternative requirements that remove stakeholder conflicts and use some strategy for resolution. They use CORA (Conflict-Oriented Requirements Analysis) has requirements ontology and strategies for restructuring requirements transformations as a means to remove conflicts. Software projects have failed due to requirements conflicts. They find out the reason and the resolution they use Win Win system. On the other hand this paper uses some tools and techniques for identifying and resolving conflicts [8]. KAOS detects conflict based on divergence, competition and obstruction interactions among goals [9].Win Win tool can provides for tracking team development of requirements, conflict detection and resolution [10]. Assigning negatively or the limitations of these approaches are: (1) each concern must be allocated a different priority , (2) conflict handling is based on one criterion, (3) the priority and trade-offs must be negotiated with stakeholders to resolve conflicts without offering them any systematic analysis technique or tool.

3. METHODOLOGY

Literature review helps to identify the current-state-of-art by reviewing literature. There are different types of literature review techniques are available. This research covers two goals. First is to discover requirement engineering related conflicts. Techniques used to accomplish this goal is Systematic Literature Review (SLR) what's more Expert Review. Second research Objective is to discover suitable correspondence medium grouping for distinguished conflicts. Systematic Literature Review (SLR): Systematic review is a kind of writing literature review that gathers and fundamentally investigations different research studies or papers. Systematic literature review is performed so as to recognize the conflicts identified with requirement engineering procedure in worldwide. In endeavor to survey, work of Kitchenham [11] is pursued. His work is a far reaching rule

for leading methodical systematic literature. The point of utilizing SLR in this exploration is to prolong its stages that are audit arranging, survey conduction and survey detailing. This paper adopts the guidelines from Kitchenham and Charters [11]. Two issues can be noticed: the first issue is that collected conflict related inconsistency from empirical studies in [9]. The second issue is that although global studying of conflicts in requirement only ninety eight papers by using and/or/not. These paper were searched in "requirement elicitation", "requirements analyst", "conflict", "requirement engineering", analyzes and evaluates both positive and negative values of conflict. By using those keywords we have make a search string, which later used in different peer-reviewed databases such as IEEE, ACM, Springer, Elsevier and Google scholar.

This research paper applied inclusion and exclusion criteria proposed by the Kitchenham et al. in this study. After that 73 studies includes in this study as major findings from literature. This paper has also used open coding technique to analyze the collected data. Both researchers reviewed the findings from literature, which helped to mitigate the validity threats.
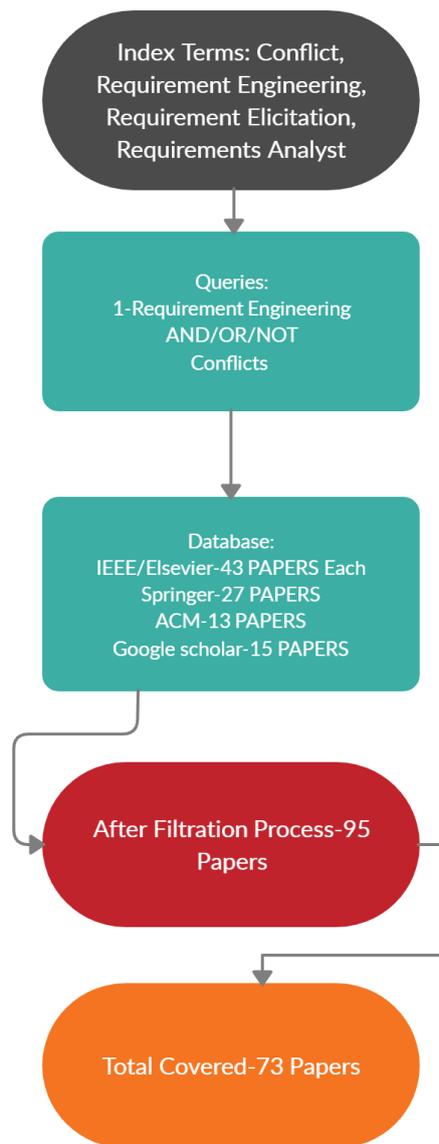

Figure-1: Executed Plan

4. RESULT

In this section find out conflict identification and solution from the literature review. In literature review conflict conducted into the major causes issues relating to schedules, priorities, technical issues, procedure, cost and personality [12] [13]. However, conflict over financial issues tend to dominate the majority of projects partly because clients want the best at the lowest cost and

contractors always want to maximize profit if possible at the expense of client[14].Literature review are supported by data received which placed the likelihood of followed Table I and Table II. From the LR we identified 21 conflicts and 20 solutions.

Table -1: Identification Conflict

Conflict Barriers	Description	References
Communication distance	Lack of synchronous communication distance	[19]
Effect on Performance	Performance mainly depends on how effectively the conflict increase	[20]
Geographical Distance	Lack of team cohesiveness Work effort overhead Lack of trust Limited face-to-face meeting	[21]
Goal-oriented conflicts	It can be associated with end results, performance specifications and criteria, Priorities and objectives.	[20]
Technical opinions	Disagreements over technical issues and technical trade-offs	[20]
Conflict over cost and budget	Conflict over cost estimates from support areas regarding work	[20]
Conflict over schedules	Disagreements about the timing, sequencing and scheduling	[20]
Logical consistency rules	A set of logical consistency rules is built to compare different viewpoints	[22]
Usability	Conflict can create for usability	[22]
Personality conflict	Disagreements on interpersonal issues	[20]
Socio-Culture Distance	Language difference Information sharing Uncommon understanding in ways of working	[21]
Unwillingness	Lack of or unwillingness to understand	[13][15]
Compromising	No one want to compromise	[16][17]
Experience	Lack of experience	[18]
Forcing	Pushes one's viewpoint at the expense	[12][13][14]

Table 2: Identification Solutions

Conflict Barriers	Solution	References
Communication distance	Create a network can frequent travel	[13][14]
Effect on performance	Use groupware work	[12]
Geographical distance	Implement communication model	[12]
	Frequent communication	
	Use communication media	
	To gain trust	
Goal-oriented conflicts	Use temporary solutions, Use backup option	[14]
Technical opinions	Use peer review and steering	[12]
	Committees to review	
Conflict over cost and budget	Develop overall budgets supported by detailed budget and cost estimates of tasks and activities	[13]
Conflict over schedules	Develop an overall schedule	[13]
Logical consistency rules	Generated to fix the logical inconsistencies arising	[13]
Usability	Support those items and formats that are available	[22][21]
Personality conflict	Create an environment that emphasizes respect, diversity, and equality.	[21]
Socio-Culture Distance	Use a common communication language Evaluate remote client capability	[20]
Unwillingness	Try to more communicate and understand.	[21][19]
Compromising	Searches for and bargains for solutions that bring some degree of satisfaction to all	[20]
Experience	Clarify roles, responsibilities	[20]
Forcing	Offers only win-lose situations	[20]

4.1 Conflict with Different Stakeholders

In a project there is product owner, software requirement engineer, project manager, quality assurance, and end–user work. They may influence the project planning, design, implementation and future use and their main goal to create quality full software. So there is lots of important people work to fulfill their goal so that time conflict can occur. Software requirement engineer and their conflict are:

- Product owner with software requirement engineer.

- Software requirement engineer with developer.

- Project manager and software requirement engineer.

- Partner and software requirement engineer.

- QA and software requirement engineer.
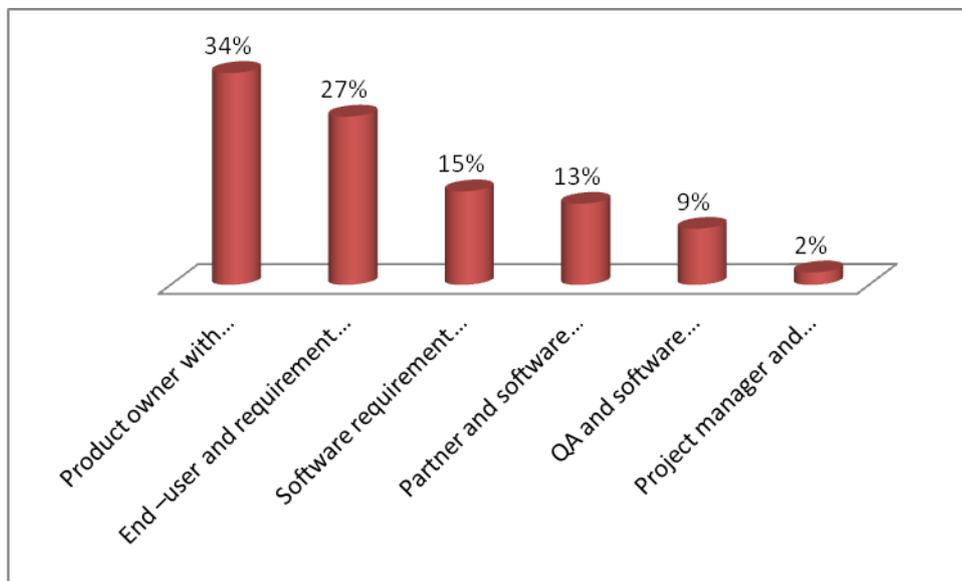
- End –user and requirement engineer.

Figure 2: Number of Conflict

5. DISCUSSION

Examine data collated from the literature review and developed checklists that could be utilized in identifying conflict. They are followed in succession by clients, developer, project manager, and others. This means that on the minds of respondents, conflict in construction seems to be mainly fuelled by contractors [23]. Even though the data in the checklists is categorized in a particular order, some of the conflict .For product owner, Project Managers, developer, QA, partner and end-user show all conflict in figure: 1. However, there are also some striking differences, which is discuss in this section.

5.1 Elicitation

Good RE process is therefore essential for successful system development [24]. The achievement or disappointment of this procedure depends on recognizing the stakeholders and finding their needs. Stakeholders are for the most important part from various foundations and have various objectives, so it is imperative to remember the whole Stakeholders for data assembling generally certain perspectives are rarely uncovered. The most common recognized stage is:

- End users and customers
- Customer requirements specifications
- Documentation related to pre-existing systems

It is regarded as the phase of the RE process and normally considered as the process of finding out "what are the real needs of the customers as well as of the system" [25]. It also includes activities to explore „how the software can meet the stakeholders "goals" and "what alternatives might exist" [26]. Conflict can occur in RE elicitation to sometimes customers needs unclear, lack of understanding, time and resources, trust issues those types of problem can occur. For resolving the conflict can be use of technique like building a good communications bridges.

5.2 Analysis and Negotiation

It is the second phase, which consists of a set of activities aimed to discover problems. If discovers some problems with over cost from support areas regarding work breakdown structures. Types of low categories and requirement, face to face limited meeting and lack of judgments and the compromise can create a problem. All the conflict requirements identified during the analysis process should be negotiated and discussed individually with the stakeholders in order to resolve the conflicts [25, 27]. Managing conflict using some sort of technique like Win Win Model, Win Lose Model, Technical Decision, Conflict- Oriented Requirements Restructuring, Ontology and Dialoguing. The Win Win model approach is aimed at addressing collaboration for the requirements engineer [28]. The three key ideas in the approach are: Win Win spiral process, Win-Win requirements model, Win Win negotiation model. Win lose model try to find new ways to reach their goals and at the same time meet the goals of the opponents. Technical decision develops a master plan compatible with long-term strategies and develops a work breakdown structure and a corresponding responsibility matrix. Conflict-Oriented Requirements Restructuring (CORA).CORA assumes a cycle among three phases: 1) System requirements are defined 2) Issues arise 3) Requirements are changed in response to the conflicts. Ontology definition is structure template for requirements. It is needed to formally define the requirements for the meeting. Lastly dialogue is based on the principle that people affected by decisions ought to have an effective participation in the decision- making process.

5.3 Documentation

This is the third phase of RE process. Requirements have been analyzed in this process. Once a requirement is elicited, it ought to be recorded in clear and unambiguous terms. Requirement analysis is a contribution to necessity documentation and the yield of this procedure is a well-organized and characterized detail. A proper requirement document ought to be right, finished, reliable and possible since it is utilized as a pattern for assessing ensuing procedure of framework. An unambiguous, succinct and clear expressed record is additionally utilized as a base for approving the expressed requirements and resolving stakeholder's conflicts. Both the functional and non functional requirements are spoken to in necessity determination. The most recognized requirement specification particular are

- Natural language
- Structured natural language
- Design description language
- Requirements specification language

It is important make them formal through proper specification mechanism. This steps deal with the find out unstructured documentation, unclear requirements, lack of proper specification mechanism, Lack of clarity, consistency, and traceability and those problem are occur conflict. Solving conflict can use such techniques ontology and CORA.

5.4 Validation

This procedure is utilized to explain that the necessity requirement documents are unambiguous, predictable and complete and that the stakeholders are happy with the last requirement specification. This procedure is utilized to validate that each phase of advancement process adhere to procedures and gauges just as the procedure and item addresses client issues. It is played out somewhat later in the process since it worried about validating the last draft rather the crude information assemble in necessity elicitation process and validation is the fourth phase ensures that models and documentation accurately. Check the requirements document for conflicts, omissions and deviations from different standards. In this phase focus is on looking for dependency problem, low quality model development, error, mistakes, lack of clarity and lack of feasible technology find out these and solutions using Aspect-Oriented Requirements Engineering (AORE) may lead to conflicting situations that have to be analyzed and resolved.

5.5 Management

This is the fifth and last phase of requirements lifecycle. It is maintenance of a software system. Some of tasks during psychological impediments, organizational impediments, lack of evolution. Management conflict resolution techniques focus on the automation approaches and withdrawing/avoiding, compromising. Automation approaches for conflict analysis that uses tools to analyze requirements consistency in order to reduce. Conflict occurs lack of withdrawing/avoiding, compromising retreats from an actual or potential conflict situation and searches for and bargains for.
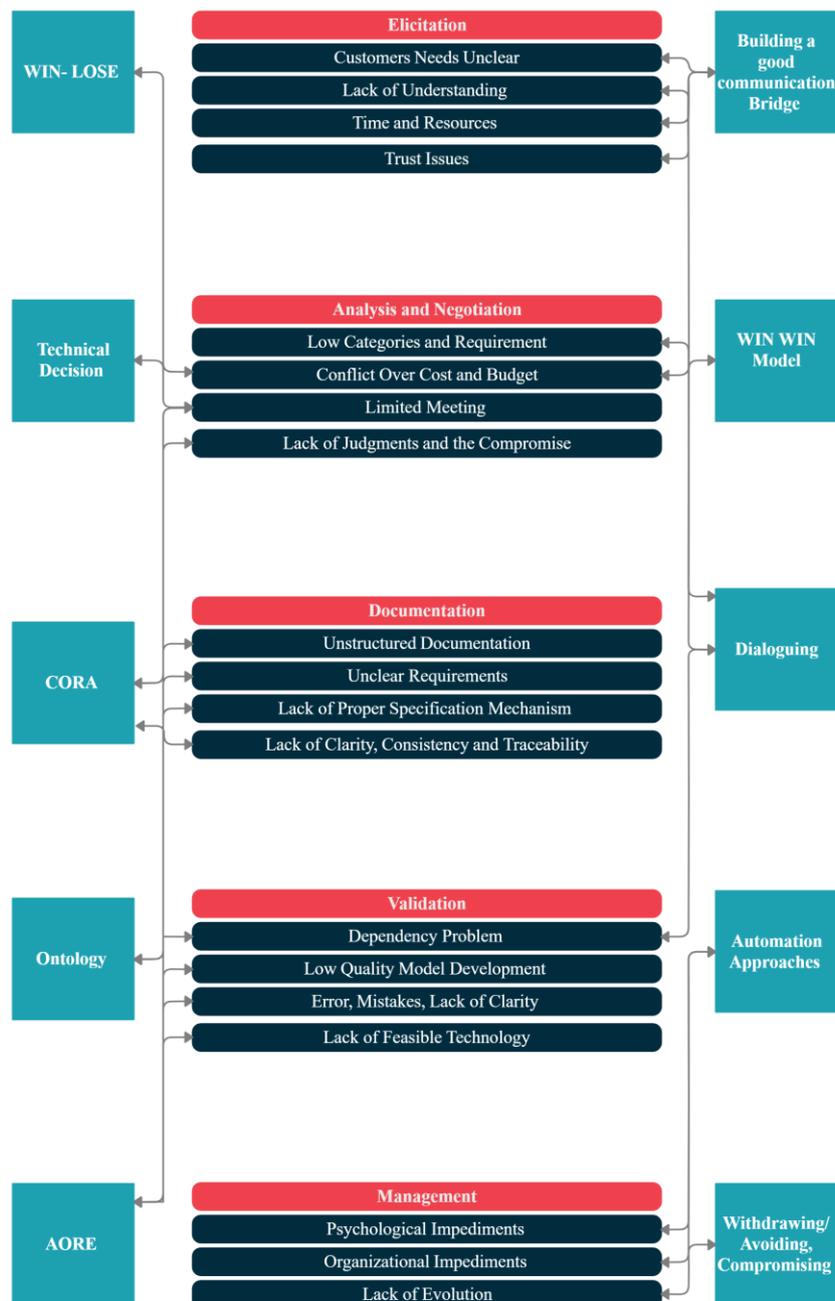

Figure 3: A relation between conflicts and solutions

6. CONCLUSION AND FUTURE WORK

Summary: Planning and executing a construction project usually requires inputs and interaction project team. Even though conflict amongst software requirement engineer in the industry is not new, particular emphasis has been placed on conflict management in recent times such as by the Latham report which portrayed conflict as a damaging phenomenon that needs to be reduced and possibly eliminated from the construction process [29][30][31]. Conflicts can occur over schedules, priorities, technical issues and even over personality. Hence, the study sought to identify the major causes of conflict to analyses the conflict resolution approaches.

Contributions: Through a literature review we have identified 21 conflicts and 20 solutions.

Future Work: In the future work will be emphasis to survey in a company and collect data in context of Asian Countries.

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