

Potential Conflicts Identification among Sub Goals in Goal Oriented Requirement Analysis Using Matrix

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Abstract - Goals are considered to be an important component of any organization which are intended to be achieved successfully. In software engineering while developing the software and moving through different software development phases, and engineer and developer of project manager has to be aware of different types of risks which can affect the software product. One of the critical area in software engineering is the conflict identification. With the all wishful functionality implementation. It is great desirable for software system to defend with nonfunctional aspects as well. These all may addition reliability, security, accuracy, safety and performance also look and feel requirements, as well as political, organizational and cultural requirements. First and most of the essential part of software development process of requirements analysis of software requirements as a vital role to make better software quality and to minimize development cost which are essential points for stakeholders.

Keywords - Conflicts Identification, Sub Goals, Goal Oriented Requirement, Analysis Using Matrix

I. INTRODUCTION

Goals are considered to be an important component of any organization which are intended to be achieved successfully. In software engineering while developing the software and moving through different software development phases, and engineer and developer of project manager has to be aware of different types of risks which can affect the software product.

One of the critical area in software engineering is the conflict identification. With the all wishful functionality implementation. It is great desirable for software system to defend with nonfunctional aspects as well. These all may addition reliability, security, accuracy, safety and performance also look and feel requirements, as well as political, organizational and cultural requirements. First and most of the essential part of software development process of requirements analysis of software requirements as a vital role to make better software quality and to minimize development cost which are essential points for stakeholders.

In recent era, many stakeholders are not getting desirable outcomes or results that they wish from the software developers or their priorities and needs are not set in a proper way in results or outcomes since, stakeholders are not completely confident what they exactly wish for and less experience to explain their needs to analysts of software requirements these aspects of software requirements analysis where researches are still required to more enhancement and development to understand stakeholders, to explain their needs without any problem or difficulty and also for software analysts to understand what stakeholder really want and their goals. Nonfunctional requirements includes constraints and quality. Quality attributes are categorized or properties of the system that its stakeholders contentment with the system, constraint are known as quality scope. While constraint are not in consideration for the negotiating process, and not similar qualities are theoretically exclusive during design tradeoff.

A process of software requirements analysis consists of requirements elicitation and requirements description.

Requirement elicitation is phase where an Analyst collects information from the stakeholders, clarifies the problems and needs of the customers and users, tries to find the best solutions, and makes its planning on what software system will be developed. A family of goal oriented requirement analysis(GORA) method such as I*[4], KAOS AND GRL is top- down approach for refining and decomposing the needs of the customers in to more concrete goals that should be achieved for satisfying the customer needs.

Implementing all the desired functionality, it is highly desirable for software systems to cope the with non-functional

aspects as well. These may include Reliability, Efficiency, security, safety, performance, look and feel requirements. These non-functional aspects must be treated as non-functional requirements (NFRs) of the software .One of the critical areas in goal oriented requirements analysis is the goals conflicts identification due to quality attributes, since nonfunctional requirements are under discussion, conflicts often arise when two quality attributes have an opposite behavior to each other. There is actually significant difference between the requirements of the same task. Numerous software projects failed because they contained impoverished set of non-functional requirements.

Unproductive dealing with the non-functional requirements has led to a succession of failures in software development, including the very mighty reconnoiter of the London Ambulance System where the deactivation of the

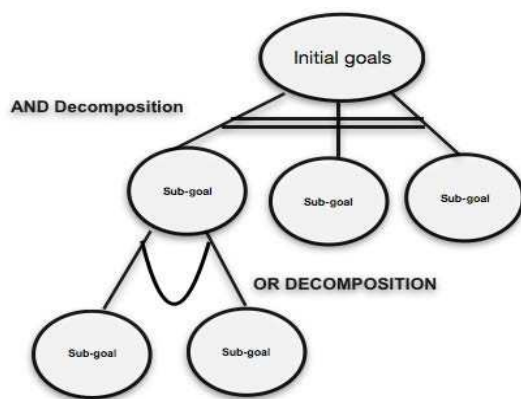


FIG:01 GOAL GRAPH

software right after its deployment was strongly prejudiced by non-functional requirements noncompliance.

The primary motivation for this research is an indispensable step towards achieving successful software requirement's in order to achieve the goal as per customer needs due to non-functional requirements. This method presents a Conflicts identification among or connected sub goals due to quality attributes (non-functional requirements).

II.RELATED WORKS

A variety of conflict identification models are proposed in literature. These include Sandana and Lui [5] model based on analysis and detection of conflicts among non-functional requirements using integrated analysis of functional and non- functional requirements "ACONIAN" this framework is based on non-functional requirements proposed by poort and dewith.

Kim Yun and yau proposed [6] a quality of service conflicts model with identification for situation aware middleware. In proposed the quality of service resource conflict identification model which analysis whether the quality of service requirements are met and wat trade off relationship are present among requirements

Prof saeki, haruhiko kaiya and hisayuki horai proposed the method for requirements analysis in goal oriented requirement analysis, this method uses attributes values and preference values which is called AGORA.[1]

Atsushi ohnishi, Hiroya Itoga, Jomart proposed a method among alternatives (sub-goals) in goal oriented requirement analysis. This method is a useful technique to achieve prioritization of goals during requirement analysis phase in software development process

J.p Cavano and J.A McCaall proposed a framework for the measurement of the software quality

Bertagolli and Lioba proposed a model which deals with the requirements from requirements phase to design phase using aspect oriented software engineering. This conflict identification methodology is based on the set theory [7].

III.PROPOSED APPROACH

Our method contains five steps:

- 1- Establishing Initial Goal as Stakeholder Needs
- 2- Decomposing and Refining Initial Goal in to Sub Goal based on the quality attributes
- 3- Providing OR connected sub goals with functionality of goals.
- 4- Stakeholder give the contribution values to OR connected subgoals due to quality attributes
- 5- Identify Potential Conflicts among OR connected subgoals by quality attributes using matrix.

Main needs and requirements of stakeholders are considered as initial goal in goal –graph and analyst puts those goals on the top view of diagram. While initial goals are main needs and requirements of stakeholders, product outcomes must satisfy initial goals in result.

In order to achieve initial goals, the analyst decomposes and refines initial goals in to sub-goals, where sub-goals are goals or tasks that illustrate how to achieve parent goals. There are two types of decomposition: AND decomposition where all sub goals connecting with AND decomposition due to quality attributes should be achieved to complete

parent goal and OR decomposition where at least one sub goal accomplishment is enough to reach parent goal.fig1

Analyst should decompose and refine the initial goals in to sub-goals one after another, with the initial goals as starting points.

In the Third step is analyst must providing OR connected sub-goals due to functionality or characteristics of initial goals.

Forth step is stakeholders provide the contribution value to the goals due to quality attributes or non-functional requirements. Values can be an integer from -10 to 10. The values expresses how many degrees the sub goals contributes to the achievement of its parent goal, and the higher value is more contribution the sub-goal provides.

The negative value means that the sub goal less contribute the achievement of parent goal.

Fifth step by using contribution values due to quality attributes analyst can detect potential conflict among or connected sub goal.

Case Study: online library search system of quality base requirement.

In order to understand this method in detail, online library search system of quality base requirement is obtained as case study.

Applying method on online library search system of quality base requirement.

In first step of methodology an analyst puts initial goal of stakeholder needs on top view of goal graph

During interview, analyst should learn what stakeholder really want and should set those needs and requirements as initial goal. In graph Search is a main need of stakeholder in this system.

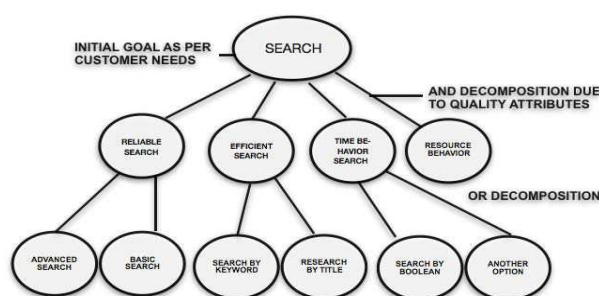


FIG:02 GOAL GRAPH

The next step is decomposing and refining initial goal in to sub-goals due to quality attributes, the objective to attain parent (initial goal). In this case study analyst refines the “Search” goal in to several sub-goal with quality attributes reliable search, efficient search, time behavior search, resource behavior search.

In addition sub-goals decomposed and refined in to sub-goals and can be considered parent goal to their sub-goals. As graph illustrates, sub-goal reliable search is sub-goal to parent “search” on other hand, it is parent goal to reliable advanced search, reliable basic search which are connected decomposition to each other.

In order to describe the next step OR connected sub goals with characteristics of goals” reliable search, efficient search, time behavior search connecting to each other by OR decomposition are taken as example to apply proposed method in this research.

SUBGOALS TO QUALITY ATTRIBUTES MATRIX					
OR CONNECTED SUB GOALS	QUALITY ATTRIBUTES				
	RELIABILITY	EFFICIENCY	TIME BEHAVIOR	RESOURCE BEHAVIOR	
ADVANCED SEARCH	+8	-3	-2	6	
BASIC SEARCH	+6	-2	-1	1	
SEARCH BY KEYWORD	+7	+5	+4	+2	
SEARCH BY TITLE	+10	+7	+3	+1	

FIG:03 Contribution Values provided by stakeholders

In the next step stake holder provide the contribution values to OR connected sub-goals advanced search, basic search, search by keyword, search by title, search by Boolean logic and search my another option due to quality attributes reliability, efficiency, time behavior and resource behavior. Values can be an integer from -10 to 10. The values expresses how many degrees the sub goals contributes to the achievement of its parent goal, and the higher value is more contribution the sub-goal provides.

The negative value means that the sub goal less contribute the achievement of parent goal. – minus contribution values shows the conflicts between sub-goals due quality attributes in fig3 or connected sub goal advanced search and basic search have conflict with quality attribute of “Efficiency” stakeholder give -3 value to advanced search and -2 value to basic search sub goals. These contribution values will helps to analyst to identifying conflicts between sub-goals due to quality attributes.

In order to find out best sub-goals analyst should sum of multiplication of sub-goals values to quality attributes values.

$$3/15 * 8 - 3/15 * -3 - 7/15 * -2 - 2/15 * 6 = -26.4$$

$$3/15 * 6 - 3/15 * -2 - 3/15 * -1 - 3/15 * 0 = 2.0$$

$$3/15 * 7 - 3/15 * 5 - 3/15 * 4 - 3/15 * 2 = 46.0$$

$$3/15 * 10 - 3/15 * 7 - 3/15 * 3 - 3/15 * 1 = 37.0$$

$$3/15 * 5 - 3/15 * 3 - 3/15 * 1 - 3/15 * 2 = 1.20$$

$$3/15 * 5 - 3/15 * -4 - 3/15 * 1 - 3/15 * 1 = 3$$

RESULTS: Final Evaluation of Sub-

Results: Final Evaluation of Sub-Goals	
ADVANCED SEARCH	BASIC SEARCH
26.4	2.0
SEARCH BY KEYWORD	SEARCH BY TITLE
46.0	37.0
SEARCH BY BOOLEAN	SEARCH BY ANOTHER OPTION
1.20	3.0

In order to select best sub-goals these values helps to select one of OR connected sub goals. In the results advanced search have high value then basic search so sub goal advanced search will selected. Same criteria follow for or other or connected sub goals.

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