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Innovative analysis of Risk Analysis in Requirement Engineering

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Abstract

The requirement engineering is a field, in which software are modeled according to the requirements of the user. The software developed under requirement engineering will satisfy the users mostly on their perspective. From the above recent researches we will conclude that they concentrating on the software development and analysis based on requirement engineering. In the approach, a modified Tropos goal model for tackling the risk associated with the software development cycle is proposed. Here the modification is done by the hybrid optimization algorithm. The Tropos goal model is three layer goal models, the top layer is the goal layer, the event layer in the middle and support layer in the bottom. The Tropos model will be improved by selecting the optimal candidate solution by using Hybrid Gravitational Search Algorithm – Particle Swarm Optimization algorithm. The proposed approach defines a method to analyze the association between the nodes of each layer to evaluate their chances of raising the risks. Here we will prioritize the risks which are identified by the improved Tropos method. The implementation will be done in Java.

Introduction

Nowadays, the requirement engineering is the process of formulating, documenting and maintaining in the field of software engineering, which created a special attention based on the stakeholder's interests. In this the business requirements and user requirements are considered as

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the major factor in a requirement engineering process. Developing software with low cost and the time it should satisfy all the requirements is a major concern. So here we developed a modified Tropos goal model, for software engineering to develop software with low cost. In the developed goal model the two attributes satisfaction and denial of the goal is calculated from the likelihood of the events corresponding to the goals. The risk of the event is calculated based on the likelihood value. Here a set of candidate solutions are generated to analyze the risk in achieving particular goal. For the generated candidate solution the risk affinitive value is calculated from the different set of risk parameters, which is set like high, medium and low. The risk parameter completely reduces the limitation in the previous work by evaluate the affinity of that event to a particular set of goals. Finally based on the designed method the risk values are calculated and low cost candidate solutions are selected

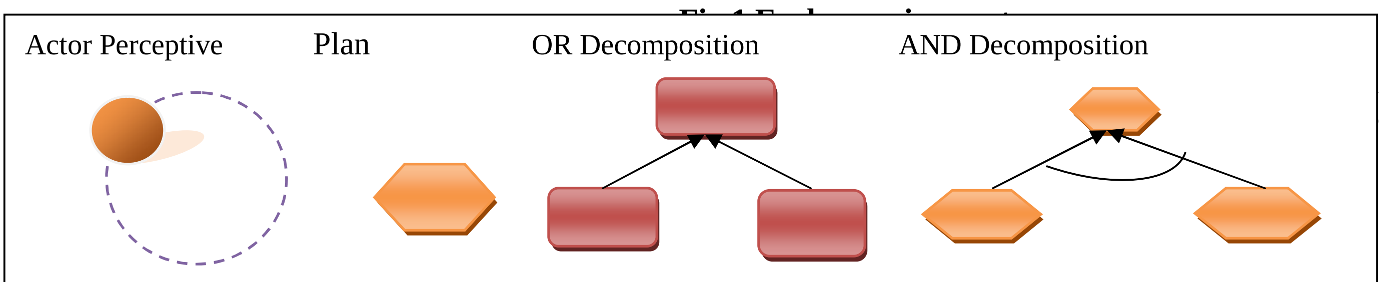
Stakeholder identification

In general the stakeholder has a special interest in software engineering. They may be a organization or person with interest in this system. Also, the stakeholders are affected either by directly or indirectly by the system in the software engineering. In 1990s a new emphasis target on the recognition of stakeholders that they are not limited to the company employing the analyst.

Stakeholder interviews

In requirement analysis the interviews of the Stakeholder are a common method which may reveals the expectation of the stakeholders. These interviews might reveal necessities not antecedently envisaged as being at intervals the scope of the project, and necessities could also be contradictory. However, every stakeholder can have a concept of their expectation or can have visualized their necessities. They need goals and rely upon one another for goals to be consummated, plans to be performed, and resources to be appointed. There square measure two main systems like early necessities analysis model and analyze the structure setting wherever the system-to-be can eventually operate. The structure of associate degree early demand model for associate degree e-culture system for the province of metropolis (PAT) is shown within the fig below. The e-culture system partly shows the situation as-is, wherever voters, guests and PAT are connected by variety of social relations or dependencies.

It analyzes the organizational setting where the system-to-be can eventually operate. Ensuing part of the Tropos goal model is late demand analysis. Late demand analysis is predicated on the systems functional and non-functional necessities. Also, the functional and non-functional necessities of the system are accomplished by handling the system as another actor who is dependers in dependencies that relate them to external actors. The amendment from early demand to late demand is happens only if the system actor is introduced and it participates in delegations from different actors. Here the world structure of the system worries supported the architectural style. Here the system parts and system parts are unsurprisingly characterized as actor. Instead of procedural or structural their dependencies to different system parts ar characterized as social. This shows that the system parts should have the power to watch the dependencies to different actors to create positive they're going to be consummated. As well, the dependencies appear ineffective of the system part is off. More the ineffective dependencies are replaced with new ones through designing, negotiation, etc.



architectures are intentional and social, we have turned to theories which study social structures to define The

The software developer needs a critical support. So based on the architectural style with traditional software design a demanding support for the software developer is established. The critical support
for the software developer is established based on the architectural style with conventional

Software architectures. As with conventional software architectures, architectural styles establish

Critical support for the software developer. Since the fundamental concepts of Tropos

architectures are intentional and social, we have turned to theories which study social structures

S.No.	**Authers'/ Researchers Name**	**Problem(s) taken**	**Approach/ Method**	**Conclusions/ Resolved Issues/ Solved Problems**	**Future Scope/ Unresolved Issues/ Unsolved Problems**
1	K. Boness *et al.[1}*	In the real world of software development, the situation was usually more complex to store the huge amount of data.	They have presented an easy-to-use technique for assessing risk in requirements analysis using goal graph method.	Using that technique, potentially risky projects could be detected at an early stage so that decisions could be taken about different courses of action.	In future, they would investigate the applicability of the technique and the composition of subsystems with nonfunctional requirements.
2	Ebrahim Bagheri and Ali A. Ghorbani. [2]	The proposed methodology focuses on identifying risk from system goals. In real operational systems, goals were supported by system activities; therefore, the risk analysis methodology focuses on the relationship between system goals and evidences.	In that research, they have analyzed risk methodology with the help of Astrolabe.	They have analyzed both align the current standpoint of the system with its intentions and identify any vulnerabilities or hazards that threaten the systems stability.	Several issues in Astrolabe that need further investigation such as, it only supports numeric annotation values and also it caused model instances to become rather hard to comprehend due to the abundance of information on the visual diagrams.

3	Robin Gandhi and Seok-Won Lee [3]	presented a partial research on ontology guided process of building “formal metrics” for understanding risk.	For this the related evidence are collected from the Certification and Accreditation (C&A) process.	The outcome of this research was a methodological approach for development of metrics and understanding with the use of the structured depiction of guiding security requirements in problem domain ontology [4].	In the future scope we are going to provide to a partial security to an ontology guided process of building

to define architectural styles: namely Organization Theory and Strategic Alliances. Detailed design focuses on the specification of actor communication and behavior.

Literature Review

4	Dhirendra Pandey *et al* *[4]*.	They have considered the security related problem for risk management.	They have discussed the incorporation of security issues and also match the requirement engineering approaches with risk assessments approaches.	The proposed methodology improves the iterative security engineering activity at the earliest stages of development.	In future they have considered other vulnerabilities of risk management in requirement engineering.
5	Yudistira Asnar *et al*. *[5]*	In that paper, they have analyzed the problem of reconsidering system requirements.	They have proposed a goal-oriented approach for analyzing risks during the requirements analysis phase.	That modeling framework was equipped with a methodological process and two CASE tools hat support analysts in capturing, depicting, and analyzing user requirements and their related risks.	In future they would like to extend the analysis to larger sets of SAT and DEN values, also to study quantitative reasoning mechanisms
6	K.Venkatesh Sharma and Dr P.V.Kumar. [6]	The requirement engineering processes were also challenged by the risks in developing the software. So an efficient risk analysis system and risk management system was inevitable for the software development process under requirement engineering.	Risk analysis in requirement engineering using tropos goal model with optimized candidate solutions using genetic algorithm was proposed.	The results showed that the proposed goal risk model has attained solution with acceptable cost and risk.	Various optimization algorithms were used to select the cost for risk analysis in future.
7	Simona Bernardi *et al*. *[7]*	The main contribution of that work was the customization of the activities proposed by the standard risk management process for the assessment of timing-failure risks.	They have proposed a comprehensive method for assessing the risk of timing failure by evaluating the software design using Time Petri Net (TPN) modeling.	TPN bound techniques were based on the formulation and solving of linear programming problems and the computational effort to get results was significantly lower than using conventional enumerative	The quality of the TPN bounds could be improved.

				techniques.	
8	Saji K. Mathew and Yuanyuan Chen.[8]	The potential limitation to generalization imposed by small sample.	They focused on three major modes of relational norms: norm of flexibility, norm of solidarity and norm of information exchange using PLS path modeling.	Their results provided some potentially provocative evidence on the moderating effects of particular relational norms on reducing behavioral risks and improving OSD performance.	Future empirical investigations on service provider and employee's misappropriation of information assets were highly recommended.
9	Simon L.R. Vrhovec *et al.[9]*	The challenge of the management of organizational risks has its roots in one of the greatest sources of uncertainty in any project undertaking people.	That paper developed an organizational risk diagnosing (ORD) framework in order to show how could organizational risks be better understood and managed.	The proposed method has proved to be an effective tool for early resistance identification.	In their study, only the resistance risk was considered. Research considering other organizational risks would also be beneficial.
10	Miguel Wanderley *et al.[10]*	Risks, problems and crises could appear, when the communication structure was weak in the organization environment.	They have presented and discussed metrics for software risk management: Pure Risk Point (PRP) and Exponential Risk Point (ERP), both based on Risk Point.	The idea was to provide alternatives in order to improve metrics sensitivity. Using these metrics it was possible to quantify the risk of a project providing tools for decision support in multiple projects environment.	In future, other metric variations that prioritize certain design characteristics according to the purpose of study.

RESULTS

According to the SDC consideration, Z1 Z2 Z3 Z4 Z5 Z6 Z7 Z8 Z9 and Z10 solutions and X1 X2 X3 X4 X5 X6 X7 X8 X9 and X10 are the source nodes that provides support to the above defined goal nodes. The initial phase of the evaluation is to find the cost for the corresponding candidate solutions.**Z1**=X3 X4 X5 X6 X7 X8 X9 X10 , **Z2**=X3 X4 X5 X6 X7 X8 X9 ,**Z3**=X4 X6 X7 X8 X9 X10,**Z4**=X3 X6 X7 X8 X9 X10,**Z5**=X1 X2 X3 X4 X5 X6 X7 X8,**Z6**=X2 X5 X6 X7 X8,**Z7**=X1 X2 X3 X4 X5 X6,**Z8**=X2 X6 X7 X8 X9

The table 1.1depicts the results of the cost analysis on the SDC. The analysis shows that how much cost requires for the solution to achieve the target goal. The first column describes the candidate solutions and the second column describes the costs for the corresponding candidate solution.

CANDIDATE SOLUTION	**COST**
Z1	122

Z2	105
Z3	103
Z4	107
Z5	109
Z6	71
Z7	78
Z8	92

Table 1.1 Cost analysis

The cost analysis plotted in the graph1.1, which ensures that the total cost for achieving the target goals. As per the graph, at the candidate solution Z1 is high which means the cost is 122, and it is low at Z6 which is 71

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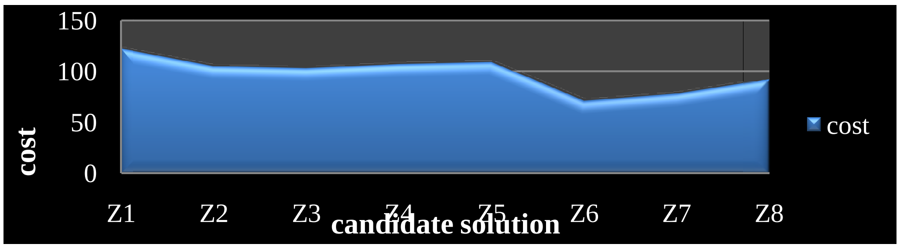

Figure 1.1 cost analysis graph

According to the SDC consideration, M1 M2 M3 M4 M5 M6 M7 and M8 solutions and N1 N2 N3 N4 N5 N6 N7 N8 N9 and N10 are the source nodes that provides support to the above defined goal nodes. The initial phase of the evaluation is to find the cost for the corresponding candidate solutions.**M1**=N3 N4 N5 N6 N7 N8 N9,**M2**=N3 N4 N5 N6 N7 N8 N9 N10,**M3**=N1 N4 N5 N6 N7 N8 N9,**M4**=N5 N6 N7 N8 N9 N10,**M5**=N2 N4 N5 N6 N7 N8 N9,**M6**=N5 N6 N7 N8 N9,**M7**=N1 N7 N8 N9 10,**M8**=N2 N3 N4 N5 N6 N7

The table 1.2 depicts the results of the cost analysis on the SDC. The analysis shows that how much cost requires for the solution to achieve the target goal. The first column describes the candidate solutions and the second column describes the costs for the corresponding candidate solution.

CANDIDATE SOLUTION	COST
M1	103
M2	134
M3	98
M4	89
M5	101
M6	62
M7	87
M8	94

Table 1.2 Cost analysis

The cost analysis plotted in the graph1.2, which ensures that the total cost for achieving the target goals. As per the graph, the cost is high at the candidate solution M2 (the cost is 134) and the cost is low at the candidate solution is M6 (the cost is 62).

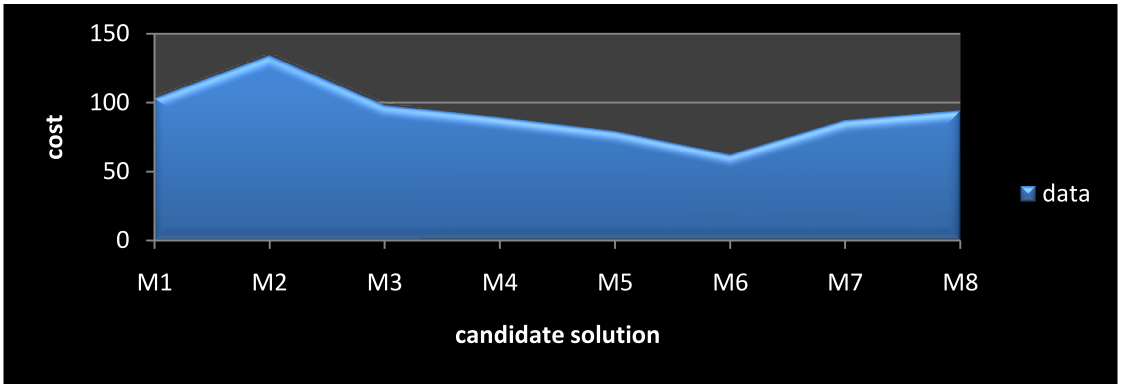

Figure1.2cost analysis graph

According to the SDC consideration, Q1 Q2 Q3 Q4 Q5 Q6 Q7 and Q8 solutions and W1 W2 W3 W4 W5 W6 W7 W8 W9 and W10 are the source nodes that provides support to the above defined goal nodes. The initial phase of the evaluation is to find the cost for the corresponding candidate solutions.**Q1=**W4 W6 W7 W8 W9 W19,**Q2**=W1 W4 W5 W6 W7 W8 W9 W10,**Q3**=W2 W5 W6 W7 W8 W9,**Q4**=W3 W5 W6 W7 W8 W9,**Q5**=W5 W6 W7 W8 W9 W10,**Q6**=W1 W4 W5 W6 W7,**Q7**=W1 W5 W 6W7 W8,**Q8**=W5 W6 W7 W8 W9

The table 1.3 depicts the results of the cost analysis on the SDC. The analysis shows that how much cost requires for the solution to achievethe target goal. The first column describes the candidate solutions and the second column describes the costs for the corresponding candidate solution.

CANDIDATE SOLUTION	**COST**
Q1	160
Q2	212
Q3	163
Q4	166
Q5	176
Q6	124
Q7	123
Q8	145

Table 1.3 cost analysis

The cost analysis plotted in the graph1.3, which ensures that the total cost for achieving the target goals. As per the graph, the cost is high at the candidate solution Q2 (the cost is 212) and the cost is low at the candidate solution is Q7 (the cost is 123).

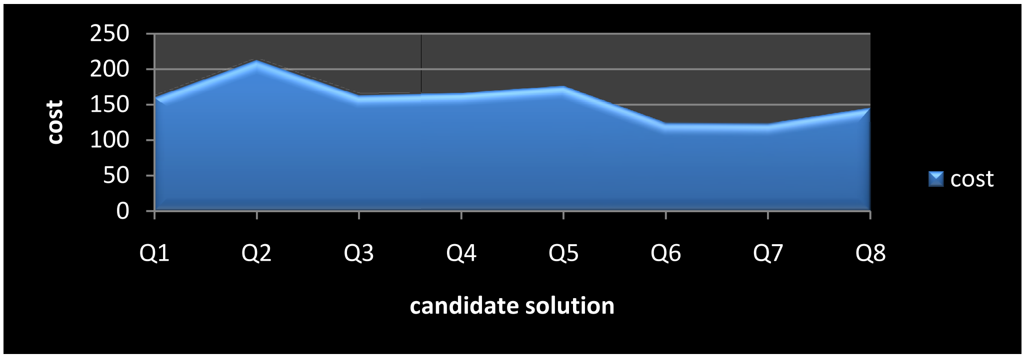

Figure 1.3 cost analysis graph

According to the SDC consideration, U1 U2 U3 U4 U5 U6 U7 and U8 solutions and V1 V2 V3 V4 V5 V6 V7 V8 V9 and V10 are the source nodes that provides support to the above defined goal nodes. The initial phase of the evaluation is to find the cost for the corresponding candidate solutions.**U1**=V1 V2 V3 V4 V5,**U2**=V2 V3 V4 V5 V6,**U3**=V3 V7 V8 V9 V10,**U4**=V2 V6 V7 V8 V9 V10,**U5**=V5 V6 V7 V8 V9 V10,**U6**=V4 V6 V7 V8 V9 V10,**U7**=V3 V4 V5 V6 V7 V8 V9 V10,**U8**=V1 V5 V6 V7 V8 V9 V10.

CANDIDATE SOLUTION	COST
U1	105
U2	104
U3	54
U4	72
U5	72
U6	86
U7	98
U8	97

Table 1.4.cost analysis

he table 1.4 depicts the results of the cost analysis on the SDC. The analysis shows that how much cost requires for the solution to achieve the target goal. The first column describes the candidate solutions and the second column describes the costs for the corresponding candidate solution.

Table 1.4.cost analysis

The cost analysis plotted in the graph 1.4, which ensures that the total cost for achieving the target goals. As per the graph, the cost is high at the candidate solution U1 (the cost is 105) and the cost is low at the candidate solutions U4 and U5 (the cost is 72).

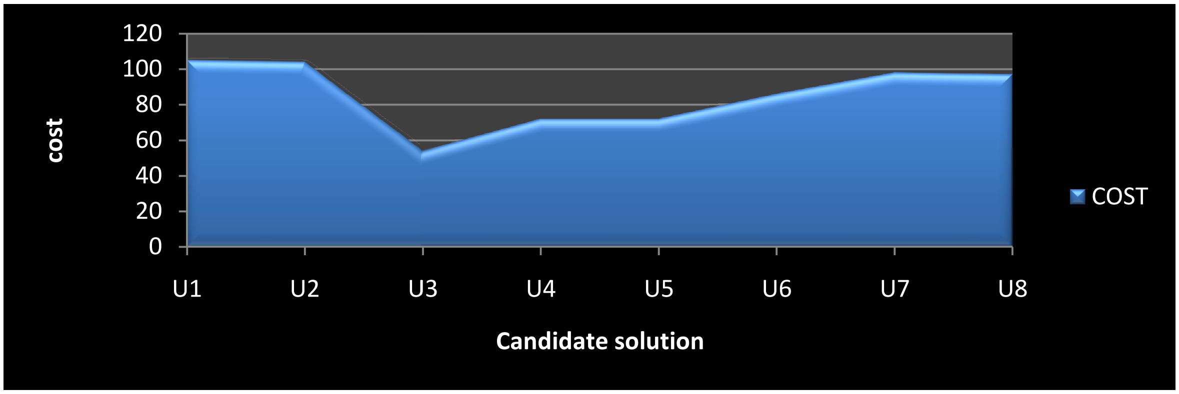

Figure 1.4 cost analysis graph

According to the SDC consideration, F1 F2 F3 F4 F5 F6 F7and F8 solutions and E1 E2 E3 E4 E5 E6 E7 E8 E9 and E10 are the source nodes that provides support to the above defined goal nodes. The initial phase of the evaluation is to find the cost for the corresponding candidate solutions.**F1**=E1 E2 E3 E4 E5 ,**F2**=E1 E3 E4 E5 E6,**F3**=E2 E3 E4 E5 E6,**F4**=E2 E6 E7 E8 E9,**F5**=E3 E5 E6 E7 E8,**F6**=E3 E7 E8 E9 E10,**F7**=E4 E7 E8 E9 E10,**F8**=E1 E4 E5 E6 E7 E8 E9

The table 1.5 depicts the results of the cost analysis on the SDC. The analysis shows that how much cost requires for the solution to achieve the target goal. The first column describes the candidate solutions and the second column describes the costs for the corresponding candidate solution.

CANDIDATE SOLUTION	**COST**
F1	132
F2	136
F3	151
F4	258
F5	200
F6	203
F7	193
F8	217

Table 1.5 cost analysis

The cost analysis plotted in the graph 1.5, which ensures that the total cost for achieving the target goals. As per the graph, the cost is high at the candidate solution F4 (the cost is 258) and the cost is low at the candidate solution is F1 (the cost is 132).

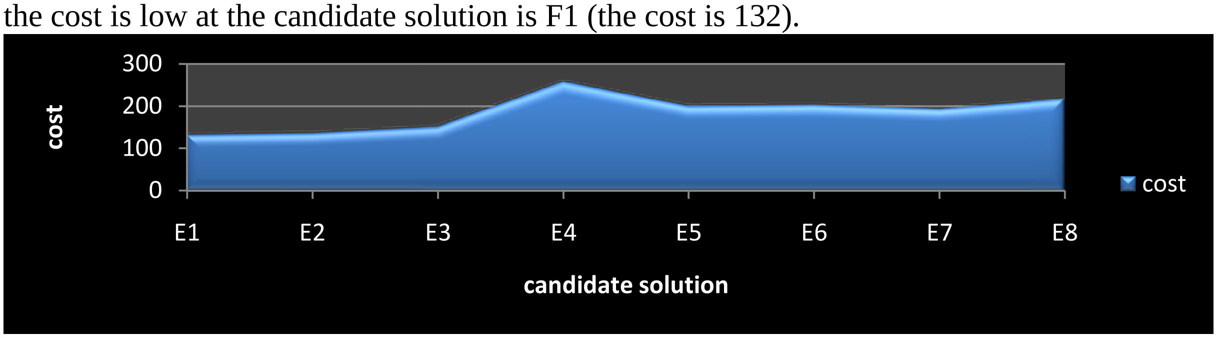

Figure 1.5 cost analysis graph

Conclusion:

In software engineering, the requirement engineering is one of the emerging phases. There are quite different types of risk analysis that can be used. Basically, risk analysis identifies the high risk elements of a project in software engineering. Also, it provides ways of detailing the impact of risk mitigation strategies. Risk analysis has also been found to be most important in the software design phase to evaluate criticality of the system. The main purpose of risk analysis understands the risks in better ways and to verify and correct the attributes. A successful risk analysis includes important elements like problem definition, problem formulation, data collection. Some of the requirement risks are Poor definition of requirements, Inadequate of requirements, Lack of testing, poor definition of requirements etc. The likelihood of the events which tends to the goal can be evaluated from the evidence of Satisfaction and denial of the goal and it can be achieved through Tropos goal model. The event considers as a risk which based on the likelihood values. The relations are defined between multiple goals and events, which identify the necessity of a particular goal. In order to analyze the risk in achieving some particular goals, a set of candidate solutions are generated. Based on the risk affinitive value, the candidate solutions can be evaluated. There are three risk parameters to compute the risk affinitive value, which are (1) low (2) medium (3) high. The risk parameters clearly evaluate the affinity of that event to a particular set of goals.

Reference

[1]Boness, Kenneth, Anthony Finkelstein, and Rachel Harrison, "A lightweight technique for assessing risks in requirements analysis", IET software, Vol.2, No.1, pp. 46-57, 2008.

[2] Bagheri, Ebrahim, and Ali A. Ghorbani, "Astrolabe: a collaborative multiperspective goal-oriented risk analysis methodology", IEEE Transactions on Systems, Man, and Cybernetics-Part A: Systems and Humans, Vol.39, No.1, pp. 66-85, 2009.

[3] Sharma, K. Venkatesh, and P. V. Kumar, "An efficient goal oriented risk analysis in requirement engineering", In proceedings of IEEE International Conference on Advance Computing, pp. 1375-1384, 2013.

[4] Dhirendra Pandey, Ugrasen Suman and A. K. Ramani, "Security Requirement Engineering Issues in RiskManagement", International Journal of Computer Applications, Vol.17, No.5, pp. 11-14, 2011.

[5] Asnar, Yudistira, Paolo Giorgini, and John Mylopoulos, "Goal-driven risk assessment in requirements engineering", Requirements Engineering, Vol.16, No.2, pp. 101-116, 2011.

[6] K.Venkatesh Sharma and Dr P.V.Kumar, "A Method to Risk Analysis in Requirement EngineeringUsing Tropos Goal Model with Optimized Candidate Solutions", International Journal of Computer Science, Vol.10, Issue.6, No.1, pp. 250-259, 2013.

[7] Bernardi, Simona, Javier Campos, and José Merseguer, "Timing-failure risk assessment of UML design using Time Petri Net bound techniques", IEEE Transactions on Industrial Informatics, Vol.7, No.1, pp. 90-104, 2011.