Reflective Report

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I.   Article Selection

The articles I have chosen for this assignment are:

- Gorschek, Tony, and Claes Wohlin. "Requirements abstraction model."[1]
- Carlshamre, Pär, et al. "An industrial survey of requirements interdependencies in software product release planning." [2]

The above articles are chosen because the first article is about the abstraction of requirements and having different levels for requirements. The requirements are placed on these levels based on the given guidelines. So each requirement will have a hierarchy from goal to component levels description. So it will help the implementing team to easily understand the requirements without any chaos as it describes each requirement from product level to component level which in turn connects to product goal. Also, it helps the requirement team to easily manage, prioritize, roadmap and release planning process. As there is no technique which is related to this type the authors evaluated RAM model in the industry and results came in a positive note. So I selected this paper, which is also useful in large-scale requirements to easily make requirements in an abstract model and breakdown into different levels. Also, it helps to know the traceability easily through this model, the comparison between requirements, making prioritization, packaging the requirements. As these are main concepts in requirements engineering I opted this model to see how it works.

The second article is about interdependencies in requirements. As before making a release planning process it is important to determine the interdependencies among the given requirements, so it will have a workable product in each release plan otherwise it is a complex task to know which requirement should be implemented when. If the interdependencies are not considered, then there may issues like change in requirements while developing, cannot develop a requirement etc. So to solve this problem the interdependencies are to be determined. It is important in large scale requirements also as there are many requirements we have to know the interdependencies so that release planning process can be done without any problems. So I selected this article to know how interdependency works between requirements and why this is that much important for release planning.

II.   Implementation Plan

For the first article, the implementation plan is I have taken the requirements for course management system. Then the article provides a guide on how to place the requirements on each level and also a guide on how to breakdown and abstract the requirements. So by following the guide, I planned to implement the technique. I used an excel sheet to arrange the requirements in different levels, as even though we cannot use excel sheet for large-scale requirements here I tried to implement the technique of how it works so I used it. I set a goal to implement the model.

For the second article, I used requirements from course management system only. But to implement this method it needs prior prioritization of the requirements, so I used the grouping technique with customer value as a characteristic. The method requires top 20 requirements to know the interdependencies so prioritization is necessary. I also used an excel sheet for performing this activity as it is needful here even though large-scale requires a database but here to implement the technique I used a sheet. It has different types of interdependencies so to know which type exist between

requirements there are definitions of these interdependencies. So by using these, I determined interdependency type between requirement.

III. Execution

A. For the first article:

I have taken requirements for course management system which we used for release planning assignment, then an excel sheet is created in which product goal is set. Then four different levels are created which are product level feature level, function level, component level. Then there are two steps to perform in this model.

i. Place the requirements in the suitable level.
ii. Then work up the requirements for other levels in the above part.

So, for the first step, there are guidelines available. Based on these guidelines the requirements are placed on the suitable level. For example, the component level consists of detailed requirements so when a requirement consist of a button should be available to register for the course, these type of requirements are placed in the component level. Like this, a course chat room is a requirement this is placed in feature level.

For the second step, the requirements which are placed in the suitable level have to be work up that means I created requirements to other levels such that the requirement is in all levels varying from product to component. The requirements which are in product level have to be breakdown into smaller requirements so that these newly created requirements are placed in feature level, function level, and component level.

So I have taken 24 requirements which are placed on a suitable level and these 24 requirements work up into different levels so total 95 number of requirements are created finally.

B. For the second article:

I have taken requirements for course management system. For the second article, there is a need of prioritization to know the interdependencies. So all requirements are prioritized based on grouping technique, I used critical, standard, optional categories in which the critical are the most important features or requirements, standard are the okay level requirements and optional are extra requirements. In order to know the interdependencies, the top 20 high priority requirements are selected. Then these twenty are placed in an excel sheet and for each requirement is paired with other 19 requirements and determined the dependency between them. So there are six type of interdependencies in the paper they are REQUIRES, AND, CVALUE, ICOST, TEMPORAL, OR. So by comparing each pair, the interdependency is determined.

IV. Proof of Concept

A. For the first article:

The one of the requirement I used in this model is demonstrated here. The original requirement is course chatroom. So as per step 1 it should be placed in a suitable level. So I placed this requirement in feature level. As it describes a feature which need to be supported. This can be found in guidelines to place the requirement in a suitable level. As before placing it in feature level I verified the requirements for different level as the feature level is matched with this requirement I opted it.

Then after the first step completed, I have abstracted and breakdown the requirement into other levels. At first, the requirement is in feature level so for this requirement the product level requirement will be "system should support communication". After this breakdown of the requirement to function level so the requirement in functional level should be a function or action to be performed by the user so the requirement will be "Chatroom for students and teachers to chat between them". Then a detailed function of the chatroom is to be defined and these type of requirements are placed in component level "Chatroom should be able to notify the user when a new message come in chat box". Like this, all level requirement can be created using this model. So the requirement will be matched with a goal and it can easily compare to other. As in above example, I explained for the requirement which is placed in feature level, like this I worked on requirement placed in a product level, requirements placed in a functional

level and requirements placed in the component level. So total I worked on 24 requirements which are placed in the different level.

The sheet which I was worked on for this method can be viewed in the following link:
https://drive.google.com/file/d/0Bz_7Gx1hn6L9aElXTTEyTGlDb2c/view?usp=sharing

B. For the second article:

As in this example, the interdependencies are determined as follows. At first, the requirements for course management system are taken into account and these are prioritized. Then after prioritization twenty requirement which have more priority are selected and each requirement is compared with other nineteen requirements. So the following example is about one requirement in comparison with other 19 requirements.

The requirement is manage and conduct a course, for this requirement the interdependencies are determined by pairing other requirements to it. So for example, the above requirement is R1. So R1 is paired with other requirements to do a pairwise assessment. Like following {R1, R2}, {R1, R3}, {R1, R4}, {R1, R5}, {R1, R6}, {R1, R7}, {R1, R8}, {R1, R9}, {R1, R10}, {R1, R11}, {R1, R12}, {R1, R13}, {R1, R14}, {R1, R15}, {R1, R16}, {R1, R17}, {R1, R18}, {R1, R19}, {R1, R20}. For each of them, the following interdependencies may or may not exist. REQUIRES, AND, OR, TEMPORAL, CVALUE, ICOST. These are defined in the article and the list of prioritized requirements is:

R1	Manage and Conduct a Course
R2	Course Information
R3	Course Start Page
R4	Course News
R5	Course File Archive
R6	System Users
R7	Course Info
R8	Product Access
R9	Login
R10	Access to View Social Security Number
R11	Course Participator Roles
R12	Participator Privileges
R13	Access to edit user database
R14	Access to change in Course File Archive
R15	Successful Login
R16	Course Chatroom
R17	Sign Up for participants
R18	Search option
R19	Literature databases
R20	Register for exams

I assessed the requirements interdependency for {R1, R2} as to manage a course there is a need of course information as it should also be managed. So there is an interdependency among these two requirements. R1 REQUIRES R2 as to manage the information. Like this for {R1, R7} to manage the courses first there should be user id to the teacher, student, and other participators. So R1 REQUIRES R7. Also, R1 REQUIRES R4 to manage the course news. Also {R1, R11} is also another pair where R1 REQUIRES R11 as course participator roles defines what roles should be in the course so that one can manage the course. Also R1 AND R7 as these need each other otherwise both requirements cannot be developed. Also, there are requirements which do not have interdependency among requirements as these are singular requirements like R12. In this way for each requirement, I worked on with pair assessment.

The following link provides the data about interdependencies between the requirements for which I have worked.
https://drive.google.com/file/d/0Bz_7Gx1hn6L9YVJwdkZqUDhqQ1U/view?usp=sharing

https://drive.google.com/file/d/0Bz_7Gx1hn6L9bnlCMXhrSDlDZzg/view?usp=sharing

V.   *Lessons Learned*

During the implementation of RAM model, the initial placing of requirements is easy to use for some requirements and for some it felt that it may belong to other levels also so some confusion raised during the placing of requirements. As the model provides a guide, overall it can be said it is not too difficult to implement the model. As the original requirements are in different levels so the placing of requirements in different level is really useful. Then the requirements are to break down into down levels and abstract into upper levels. For some requirements, it felt easy to break down into smaller requirements based on level, but some requirements it may have trouble as there may be no down level requirements for that I left a blank in the sheet. By implementing this model, I felt that requirements abstraction is necessary as it will give a clear idea to implementation team to check up on requirements and handling of the requirement will reduce some complexity.

During the implementation of interdependencies between requirements, I felt very difficult as comparing one requirement with other nineteen requirements for dependency is very complex. Also, sometimes it may be very confused that one requirement will have more than one type of dependency so which one to use. But after all twenty requirements are assessed I felt that it is necessary to determine interdependencies between requirements as it will help which requirements need to be implemented first and which requirements can be implemented any time as there are singular requirements which are not dependent on other requirements. Overall this method also is useful for the large scale to determine the interdependencies between requirements so that requirements are implemented in one release plan. The results of implementation of this technique is that most common interdependency is REQUIRES as it is in 36 cells, then AND it is in 8 cells, after that CVALUE and OR takes 2 cells each. By this what I learnt is that as the product is new one and there is a need of introducing functionality into the product there are more number of REQUIRES or AND interdependency. It is also mentioned in the article the product which needs to be implemented functionality will have more number of REQUIRES or AND interdependencies and products which are for improving quality and value more number of ICOST or CVALUE will be there [2].

As the techniques are implemented, the requirements are in many different levels and these arrive at any time during the project. So making an organized way of arranging requirements need to be done so that the tracking of requirements can be made. Also, handling requirements is a complex task and if there are 5000 requirements and improper handling may lead to chaos. So the requirements in large scale need to be handled in the way of RAM model so each requirement can be placed in the suitable level and then the requirements can be prioritized. As prioritization and release planning in large scale is a complex task so these need to be done in a way that should have traceback so that any changes can be easily modified.

Also, market-driven requirements are not come from a single source so the requirements are to be consistent and should contain a detail and not vague requirements. Also through my experience, I felt handling 95 requirements for RAM model as a very difficult task as each one should be in a certain level. If these requirements are not organized that way, then there will be many errors or wrong way of doing things will occur. Like feature level requirement will be compared with another level then feature level requirement goes top priority. So these things are correctly handled by RAM model so comparison of a requirement made easy.

From my experience requirements cannot be given as you like to release plan, as there are many ways that two requirements can have interdependency so checking interdependency between requirements is also a complex task. When in market-driven many requirements can have interdependency even though the requirements came from several sources. I felt that requirements analysis is not an easy task as there many interconnections, duplicate requirements, vague requirements. So requirements are to be handled carefully and in large scale projects it may take more time. So the use of tools is a most preferred way as they handle many problems which can be very complex while doing in a manual way.

During implementation organizing ~100 requirements I felt as a difficult task, as I used to excel sheet it become a very hectic process. So I learned that requirements are to be handled through a tool and models and techniques can be implemented in the tools.

VI. Reflections

As for the first article, I implemented for the functional requirements and did not considered quality requirements. Whereas the same model can be used for quality requirements, as this model is in line with the quality requirements based on the article[3]. So this model can be further extend with integration of quality requirements in the different levels. Also these can be included with the same functional requirements and placing quality requirements in a suitable level. Also in article[4] the authors described MERTS method for which RAM model is an prerequisite, as I implemented the RAM model I think it is very useful to implement the requirement triage process as selecting the right requirements. The output of RAM model requirements clearly gives what this requirement is about and which goal it is satisfying by implementing it. Also through my experience, requirements are used to prioritize without having abstraction levels. So it may be a challenge as some time one requirement looks important and other requirement importance is hidden, so this RAM model helps to place the requirements and work up on it. In the article[5], it is said same that there are many challenges in MDRE as some requirements are provided by user and some are by developer. So RAM model can be used for this challenge to solve.

As for the second article, through my experience evaluating the interdependencies between requirements are to be done otherwise the product cannot have a working functionality. Also there is a risk that the interdependent requirement may be rejected which leads to risk in project. Here article[6] describes the interdependencies in quality requirements as it is an extension of the selected article which concentrates for quality requirements. Also these interdependencies affect in release planning to select the requirements. As this technique takes more time as each requirement need to be done a pair assessment and also difficult to see what interdependency between two requirements which is assigned previously. In article[7] it reflects the same in terms of traceability as interdependency between requirements have traceability issues so a tool should be used to trace correctly and even spreadsheet is difficult, as even I faced difficult through spreadsheet. So this technique is important but should be extended by using a tool rather than spreadsheet.

References

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