Portfolio

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1 General Knowledge

In this section I describe the answers to the following questions in my own words. Answers to these questions are sourced to the lectures, books and papers from the last couple of weeks.

What is a requirement?
A requirement is a condition that is needed by, for example a stakeholder, to give a solution to a problem(s).

Give an overview of requirements engineering.
Requirements Engineering is the process of how a requirement is made. To do this, the problem needs to be analyzed first in high detail to come up with a requirement that actually gives a solution the problem. In lots of cases, false requirements can be made resulting in a system that does not provide a solution to the initial problem.

How do people make sense of the world?
Every person has its own understanding of the world. Everyone has their own presented bias about particular objects or persons. They can't suppress this feeling, it just is the way it is. These biases are created by events that happened in the past. These memories might be reconstructed when remembering them, creating biases from memories that aren't even true. People make sense of the world by making assumptions. They make assumptions of things without being able to control it and being a 100% believing it is true, while in a lot of cases it isn't.

What models to use and for what purpose during RE?
Work models show the work of individuals and organizations in diagrams which is very handy in order to state requirements. Five different models provide five different perspectives on how work is done. First of all, the flow model shows communication and coordination. The cultural model shows the culture and policy. The sequence model shows the detailed steps performed to accomplish a task. The physical model shows the physical environment as it supports the work. As last, the artifact model shows how artifacts are used and structured. in doing the work. With these models, one can get a better understanding of the work environment and might help on finding problems which then might lead to finding solutions.

How do people (requirement engineers) learn a new domain?
To obtain domain knowledge, people need to get an understanding of the domain in which the problem is rooted. A great way to do this is through contextual inquiry. The requirements engineer must understand the structure and implication of the environment. The strategy to get work done,

the constraints that get in the way, the structure of the physical environment as it supports work, the way customers divide work into roles, and the recurring patters they work in. Often the professionals/masters don't mention these things since it is routine. It is important as a requirements engineer to pick up on these things yourself.

Also, the requirements engineer should articulate what his understanding. You might have an understanding of the system that is wrong, resulting in a useless new designed system. Using this contextual inquiry method (or apprenticeship model), requirements engineers and the customer can develop an interaction that allows them to explore and understand the customer's work together. The customer is the expert in the work and how to do it while the requirements engineer is the exert in seeing the structure of work and the technology available to support it.

Explain why stakeholders and experts can have false ideas about requirements.
Because they take from assumption that something is a 100% true and that it will work, while this assumption is in fact false. They took it in them using their "System 1" (referring to Daniel Kahneman) which are the automatic operations a person makes. A person might be believing he or she really saw an occurrence through their System 1 and completely believe this happened or was true, while in reality they are wrong. This is how both stakeholders and experts can have false ideas.

The requirement engineer could also make false ideas about requirements if he didn't understand the stakeholder correctly. That is why articulating (as mentioned above) is important to see if you correctly understood what the stakeholder told you.

Give the main reasons why requirements methods are not leading to useful requirements.

The contextual inquiry method has its own pitfalls on which it can fail. These can be prevented so the requirements engineer has to pay special attention to the following:

- Falling to other relationships models. This happens when the requirements engineer and the customer/stakeholder end up like it is an interview. They act as there needs to be a questionnaire to be filled in. The designer asks questions that are not directly related to ongoing work, because ongoing work has ceased. Also, it might sometimes happen that the requirements engineer becomes the customers assistant in understanding how the system works. Furthermore, since the intimacy between the requirements engineer and customer that occurs using this method, the conversation might drift away such that they become irrelevant to the design focus.

- Talking in abstraction. The requirements engineer needs signals indicating that the customer is talking abstractly, and must then return them to actual experiences. Any statement in the present tense is usually an abstraction. Example: "In our group we do..." introduces an abstraction; "That time we did..." introduces a real experience.

- tuning an interpretation. Customers who are not used to seeing work in practice can say what is going on more accurately by responding to an interpretation the requirements engineer has than by stating it themselves coming from an open question.

- Adjusting focus. The requirements engineer has an idea of the scope of the system he or she might create and the kind of work requiring support. The requirements engineer has the

knowledge and tools he/she can use. This focus and knowledge guides the interaction with the customer, determining what to pay attention to and what to ignore. However, the designer's initial focus may be wrong or too limited

How to do requirements engineering to make it more reliable?
Old approaches of requirements engineering are often unsuitable because one might find out later in the project that the thing stated in the requirement won't work. This is because the requirement separates work between the computer and user. To make this more reliable, one should use task-based requirements because they could cover most of the functional requirements. Task based first points out that computer hand human carry out the task together and at a later point the design issue of dividing the labor can be dealt with.

2 Learner Report

Validation - an experiment about (un)reliability of requirements validation In the Learner Report I give a more elaborated explanation about what requirements engineering exactly is and how it is done. Furthermore, I will give an explanation about how one should perform interviews of high quality looking at what type of questions should be asked, verbal communication and non-verbal communication. At last this section describes an experiment about (un)reliability of requirements validation

2.1 Requirements Engineering

This section describes detailed information about what requirements engineering is. Requirements engineering is about defining, documenting and maintaining requirements throughout the life cycle of the development of an information system. It is a iterative process. Requirements engineering can be subdivided into *requirements development* and *requirements management*. Requirements engineering aims to establish and maintain agreement between the client, employees and the software developers about the requirements.

Requirements development contains all the activities converting problems, opportunities and needs into an agreed set of requirements, also called the baseline. It is about the activities that are needed to add new requirements to the baseline. It all starts by mapping the general requirements and then specifying the requirements to the needs. The detailed requirements in the baseline serve with a waterfall or agile development process as the realization of the system.

When making the requirements for a system there is always the danger of *paralysis analysis*. This means that the specifications are never perfect, can always be better, more complete and clearer. The risk with this is that one will keep optimizing the described requirements. Requirements development aims for requirements specifications that are 'good enough' to start realizing a system with an acceptable risk. The risk in this case is the repair work of the mistakes in already approved specifications. The requirements specifications are good enough as long as the increase of the quality of the requirements specifications won't out weight the final repair costs you might need. That's why one should start with general specifications and some detailed (not from too high quality).

Although the requirements in the baseline are approved and maybe even implemented, adjustments can't be avoided. This is because the world around us does not stop during the development of the system. Requirements management contains all the activities that are needed to adjust specifications of the requirements in the baseline. The activities of this are: doing adjustment proposals, executing impact analysis and decision making of the introduction of approved adjustments.

Requirements engineering can be split up in four process steps, each containing their own activities. The first three steps belong to requirements development and the last to requirements management:

(1) The positioning of the system within the business domain.

- Analysing the business
- Search for the stakeholders and discussion partners

(2) Defining the desired solution

- Determine needs and requirements of the automated support
- Select important quality characteristics
- Demarcate the system

(3) Detail the requirements

- Determine the activities the system should execute
- Determine the needed quality level of the system

Each of the above three steps need four sub-steps, namely: Elicitation (making requirements explicit), Analyse (research requirements of consistency, completeness, correctness, priority and feasibility), Specification (noting the requirements) and Validation (securing that specified requirements match with the needs of the business. After the above steps has been done with the sub-steps in between, one should do step 4 which is the development management part:

(4) Management of the requirements. Requirements management consists of the following five parts:

- Change management
- Version control
- Trace-ability
- Metadata
- Management overviews (insight into the requirements of the baseline)

2.2 Interviewing

During the weekly assignments I had to do several interviews with peer students, teachers and other developers. I learned a lot in this field on how to ask good questions, verbal communication and non-verbal communication.

2.2.1 What are good verbal cues in an interview?

Just listening and nodding your head ones a time in an interview makes you a listener, not a good one. How should you interact with the interviewee. How should you interrupt him/her when you want to ask something or continue on their story? Listening isn't the only thing that is very important during and interview, but also the way you talk to your interviewee. Below are some arguments I found that greatly benefit my verbal cues.

First of all, as a listener, make small suggestions. Give some feedback provided in a way others would accept and this might open another path to consider giving you more information about the topic. Try to first listen as a "good listener" so that the interviewee thinks you are a "good listener". This way the interviewee will be more likely to take your feedback in a good way. Another thing to keep in mind is to not be combatative or critical with the feedback in the first place as this will provoke a feeling to the interviewee that you are not a trustworthy person.

Secondly, try to make it a cooperative conversation. Feedback can be flowed in both directions with neither party feeling attacked about a comment they made. Try to give feedback in a way which gives a feeling to the other that you are trying to help, not wanting to win an argument.

Thirdly, use your voice effectively: Interviewees pick up messages from your voice. They can detect anger, dislike, and lack of interest in how you express yourself without you even realizing it. The only message, hidden or otherwise, that they should be receiving from the way you speak is that you are interested in what they are telling you and that you want to hear more.

Furthermore, ask questions while the interviewee is talking. Just nodding or saying 'yes, aha' does not mean the interviewer is listening. Question something the interviewee says which shows that you really listened to what he said.

As last, do your homework. You should do enough background research before going in that you sound like a credible candidate who's committed to moving into a new sector.

In order to stop someone from talking in a polite way, you could use a bridge statement. This statement turns the conversation back to you by quickly interrupting your interviewee by saying: "That's an interesting point and it reminds me of when I...". Then you can follow along and go deeper in to what the interviewee was saying or change topics.

2.2.2 What are good non-verbal cues in an interview?

I learned that you can say a lot about someone their mood or what they think by just looking at them. The expression on someones face can completely make the difference or even the way they sit (are their arms/legs crossed, is he sitting straight or is he just hanging in his chair?). Below are

some arguments I found that greatly benefit my non-verbal skills.

First of all, body communication. Illustrate what you are saying using your hands. Affect displays are movements of the face, hands and general body that communicate emotional meaning. They are often unconscious. With Regulators we coordinate or maintain the conversation with the speaker. Eg: nodding points out that we want the speaker to continue while leaning forwards and opening your mouth means that you want to say something and that the speaker needs to stop talking.

Secondly, facial communication: Facial movements communicates various messages seem to communicate the degree of pleasantness, agreement, and sympathy felt.The facial movements may express at least eight emotions: happiness, surprise, fear,anger, sadness, disgust, contempt, and interest Facial expressions of these emotions are generally called primary affect displays: They indicate relatively pure, single emotions. Other emotional states are called affect blends. We communicate the blended feelings with different parts of your face. For example, we may experience both fear and disgust at the same time. Our eyes and eyelids may signal fear, and movements of your nose, cheek, and mouth area may signal disgust. Also, eye communication is of great importance. With eye contact you can inform the speaker that the channel of communication is open and he or she should now speak.

Furthermore, clothing is very important. The type of clothing tells people what the personality of the individual is like. Clothing expresses who the person is, or even who they want to be that day. It shows other people who they want to be associated with, and where they fit in. Clothing can start relationships, because they clue other people in on what the wearer is like. Giving a good impression using a good clothing style to the speaker, might give higher chances that he/she will open up more to you.

At last, check your posture. Posture can be used to determine a participant's degree of attention or involvement, the difference in status between communicators, and the level of fondness a person has for the other communicator, depending on body "openness". Sitting straight, your arms layed out on the table with your hands crossed, legs in a normal position stimulate a feeling that you are carefully listening to what the speaker is saying.

Some very good non-verbal techniques to make a speaker stop from talking is by using your eye contact but in a different way. Eye avoidance can mean a lack of interest, meaning that you are not interested in what the person has to say anymore, showing that you want the speaker to stop talking.

Another thing you can use to interrupt someone using non-verbal communication is by using a combination of several. For example, you can nod to an extreme extend while saying the words "hmm" a few times after each other. This gives a feeling to the speaker that the listener is in a hurry to finish the interview soon. You can also combine this by crossing your arms and lean back a bit. Whether the listener is trained to read body language or not, this particular body position is one that most can sense and understand.

2.3   Experimental cases

During this course, three example cases are used on which requirements engineering can be applied on. The three cases are as following:

- The ideal online education for this group for this course.

- The tools to build a career as Software Engineer.

- Corona apps to prevent minimise future infection peaks.

All of the three cases are described in the subsections below.

2.4 Online Education

Over the first weeks I looked at ways and opinions of different stakeholders in the field of online education. I used various methods to learn more about the domain and gather information about the needs of the online educational system. First of all in week 1, I gathered ideas and discussed with a peer student. We got the conclusion that the online educational system should consists some sort activity, sharing and community aspects.

Activity tackles the distraction problems. Activity tackles distraction. This is done by dividing the group in to smaller groups who have to work on smaller assignments together. This way, the students won't have the option to drift away, since he needs to work together with his/her fellow students. This helps him/her to be focused.

Also, when joining a new university and new courses, there will always be a barrier between the students in the beginning, even in physical form. This gets even stronger when having education online. By providing an active way of learning by working together with your fellow students, this barrier will be broken more easily.

Collaboration and communication with fellow students is very important in your studies. This concept falls away a little when heaving online education opposed to regular communication. By implementing a general community platform where students can work together, join work separate work groups and share their screens, this problem might be solved. Having this general community platform will also help break the barrier that consists between students at the beginning of their studies.

A key point is to only have one platform/community where students need to be to find everything. Having several sharing points, one might easily miss out on some information. On this platform, all matter form the lectures should also be uploaded so it is easier for students to find all the material they need to learn.

2.4.1 Interviews

To gather more information about what students find very important to have in an online educational system, I prepared several interview questions and asked them to peer students. The main questions covered:

- When you go to the university, what do you like about it? What are the benefits you see in a physical way of teaching opposed to online?

- What are the benefits of an online environment?

- If you look at the benefits of physical education, can you think of ways/solutions on how to implement this into an online environment?

- Are there certain tools you think of which you need to fulfill these wishes?

  - If yes, nothing.
  - If no, What about looking a lot further in the future with technology developed and there are no limits to how crazy the technology gets, are there any tools of which you think might help then?

Furthermore, I interviewed an old teacher of mine, named Ferry Rietveld. In order for students to have their ideal online class it is also important that the teacher is teaching in the way he/she likes to teach. The main result from this interview was that Rietveld missed the interaction between his students. This way he knows if they understood him or that he needed to explain more. Another problem was that the students often go on mute and turn of their camera's and proceed to do something else. Also it was hard for him to make a change in his planning of the lecture.