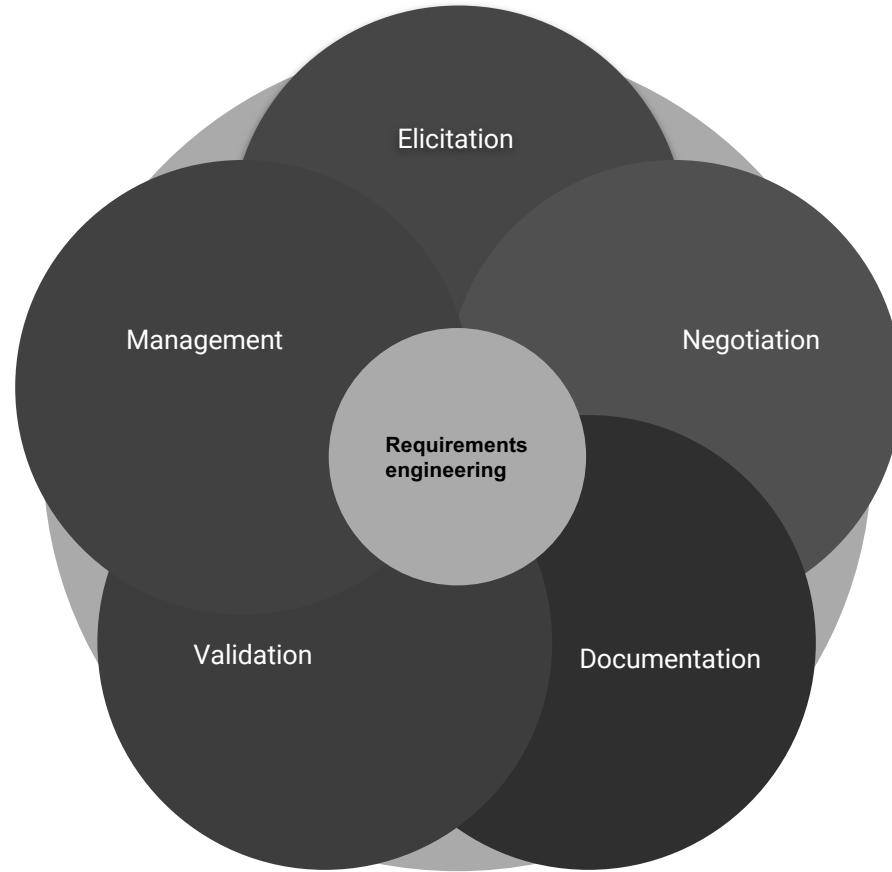
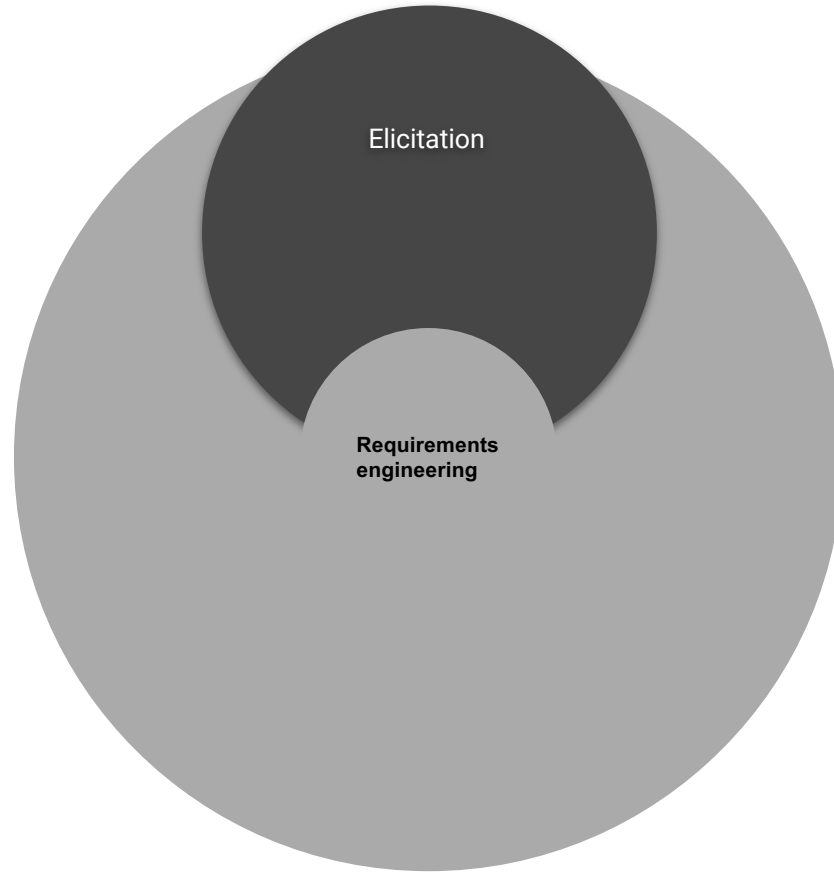


Vision Backlog

Re-thinking requirements elicitation

Master's thesis, December 2017 at Universität Paderborn

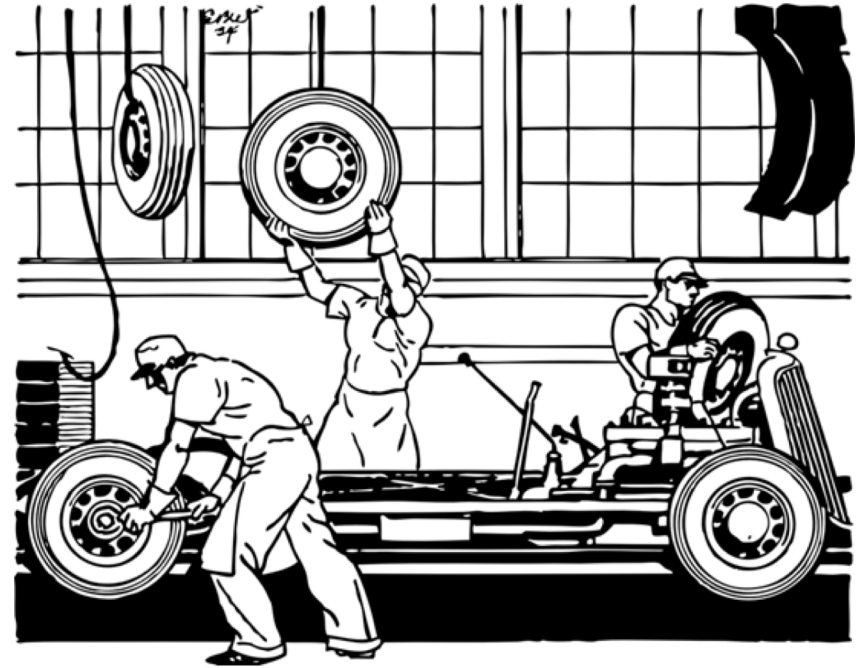




Introduction

- Wrong or incomplete requirements is a major reason for many project failures
 - 90% of large software projects [1]
- Rework costs on failed projects in terms of time and efforts are usually exponential compared to early identification of failures/inconsistencies during requirements elicitation phase
 - a. \$100 Billion in the USA alone in 2000 [2]
- The conventional requirement elicitation setup makes it harder to elicitate quality requirements
 - Physical constraints: time, place, spontaneity
 - Artifacts : list, diagrams etc.
 - Stakeholders focus on solutions and not on underlying problems

- An assisting software system needs to be built for skilled employees working on an assembly line that helps them to organize their work and perhaps even makes it simpler
- These skilled employees are also the stakeholders who will dictate requirements for such a software system
- **Challenges:** Less or none experience of requirements elicitation, stringent time constraints, insights about their complex work almost anytime



Employees working on assembly line <https://pixabay.com/de/fabrik-pflanze-versammlung-linie-35081/>

Motivation

- Stakeholder's contribution in forming requirements is vital -
 - They have the clearest idea about their own needs and expectations
 - They have the domain knowledge
 - They possess the tacit knowledge
- On the other hand, requirements analyst -
 - Has to extract needs, expectations, and tacit knowledge from stakeholders
 - Has a little or no knowledge of problem domain
 - Is relatively busy
- It makes more sense that the stakeholders directly contribute to forming requirements by describing **their problems, their needs, their expectations with supporting context etc.** on their own

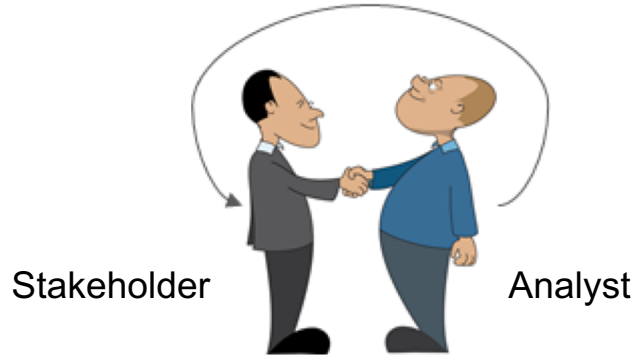
How?



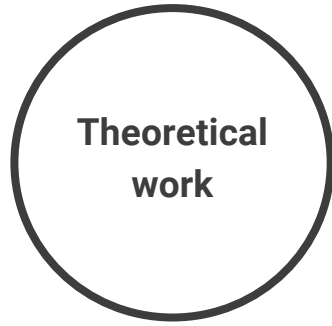
Objective

Analyst uses traditional techniques like A, B, C during requirements elicitation for needs, expectations, (tacit) knowledge extraction- mostly during formal meetings.

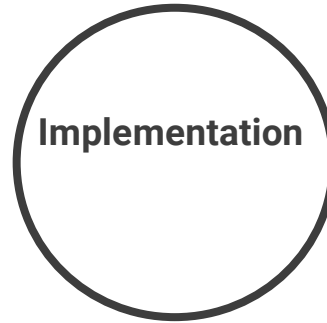
Stakeholder tends to focus more on solution rather than his problem.



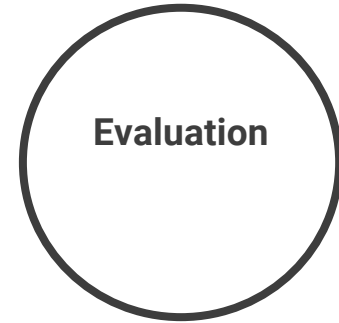
Vision backlog: How can we guide the stakeholder through the techniques A, B, C and in addition D, E without his knowledge, so that he can state his core goal (i.e. needs, expectations) with most possible supporting details himself. This information can help analyst to form quality requirements.



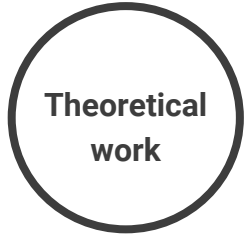
1. Study already practiced elicitation techniques
2. Study other concepts which can further help elicitation
3. Classify and shortlist those techniques to be used in the solution software
4. Decide how those can be used in a software



1. Decide which type of software to build
2. Technical details

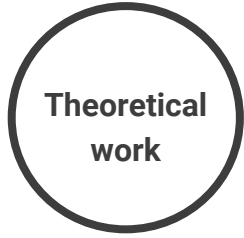


1. Survey about usability of the solution web application
2. Survey about usefulness of the solution



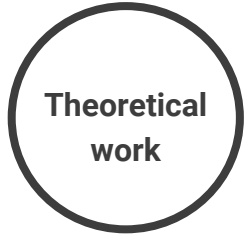
Commonly used elicitation techniques

1. Interview
2. Questionnaire
3. Task analysis
4. Domain analysis
5. Observation
6. Protocol analysis
7. Prototype
8. Brainstorming
9. Card sorting
10. Joint Application Development
11. Scenarios
12. Viewpoints
13. SWOT analysis
14. Theory of change
15. Problem definition
16. Repertory grids
17. Laddering
18. Literature review
19. Persona



Other concepts which can compliment elicitation

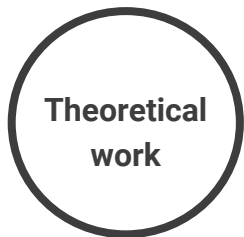
1. User types/adopter categories
2. Goal directed design process
3. Behavior variables and patterns
4. User goals
5. Contexts
6. Personas
7. Question types



Other concepts which can compliment elicitation

1. User types/adopter categories

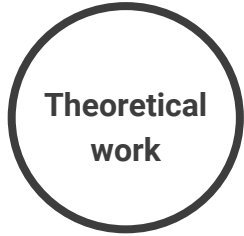
- An innovation is accepted in a sequence and not everybody accepts it at once
 - Different types of users: Innovators, Early adopters, Early majority, Late majority, Laggards
 - Each of the above category has specific characteristics
- Detailed reading: E.M.Rogers 'Theory of diffusion of innovation'



Other concepts which can compliment elicitation

2. Goal directed design process

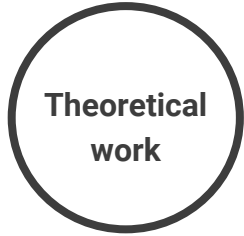
- Puts user goals at the center of the design process
 - Advocates using Persona as a tool for common understanding of end users
- Detailed reading: Alan Cooper 'About face 3'



Other concepts which can compliment elicitation

3. Behavior variables and patterns

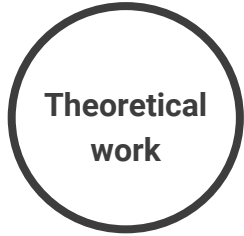
- Specific characteristics of users which can help us to identify their adopter category and help to build Persona e.g. Education, Designation etc.
- Detailed reading: Alan Cooper 'About face 3'



Other concepts which can compliment elicitation

4. User goals

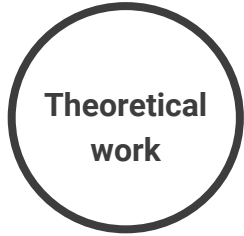
- Different types of goals: experience goals, end goals, life goals, customer goals, business goals, technical goals
 - Customer and end user goals should form the basis of solution design
- Detailed reading: Don Norman 'Emotional design' & 'Design of everyday things'



Other concepts which can compliment elicitation

5. Contexts


- Information surrounding the actual system that is equally important to design the system correctly e.g. involved people, vocabulary, existing workflows and processes etc.
- Detailed reading: Klaus Pohl 'Requirements engineering'

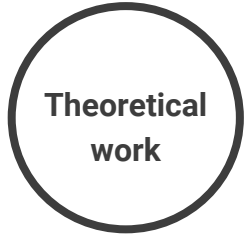


Other concepts which can compliment elicitation

6. Persona

- Common vehicle to communicate design ideas among all the stakeholders
- Detailed reading: Klaus Pohl 'Requirements engineering'

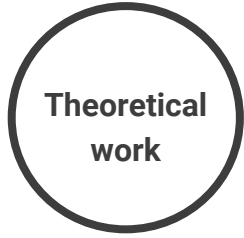
 Monica Williams <p>Monica is a CEO of a software company. She finished her masters in business administration and then wanted to start her own company. She had been innovative since childhood and took interests in science and designs. She loved to solve problems as kid. She was always attracted to new devices- mobiles were in their early days and laptops yet scarce. However, when her parents got her one for her- soon she was able to write her first computer program. She grew up in a cosmopolitan part of the city which exposed her to different types of people. She is very active on Internet and social media and is passionate about growing her business even larger.</p>	Age	35
	Education	Masters
	Role	Manager
	Main Responsibilities	Operseeing operations
	Expert in	Business communication, business negotiations
	Technical competency	Can use smartphone, touch devices, Internet with ease
	Probable user type	Innovator



Other concepts which can compliment elicitation

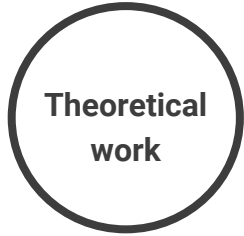
7. Question types

- Different question types: goal oriented, system oriented, workflow oriented, attitude oriented, aptitude oriented, context oriented
 - Categorizing questions into different types help analysts to cover all the important details of all the major and necessary aspects of products and surrounding contexts
- Detailed reading: Klaus Pohl 'Requirements engineering'



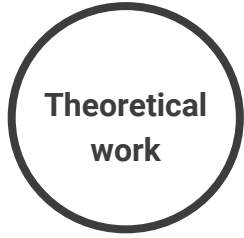
Classification criteria

1. **A:** is the technique intended to locate and scope problem and not about refining solution?
2. **B:** can techniques be used individually and it is not performed as a group activity?
3. **C:** can the technique used by both stakeholder and analysts?
4. **D:** can the technique be imitated as a software?



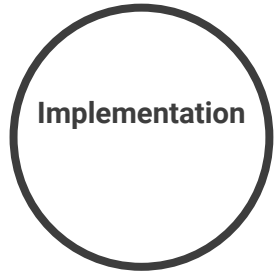
Shortlist and purpose

Nr	Technique	Purpose
1	Interview	I used structured stakeholder interviews to gather information about their personal attributes, their goals, business drivers behind them, underlying contexts and the domain
2	Questionnaire	Similar to the interview
3	Domain analysis	Used along with interview to gather domain specific information like vocabulary, specific terms used during execution of a specific process or a task
4	Task analysis	Used to gather information about the tasks stakeholders perform, subtasks and concrete steps, with contextual information like specific skills required
5	Problem definition	Used along with questionnaire to gather information about stakeholder's problems with current processes or tasks along with possible alternatives
6	Theory of change	Used along with interview to make stakeholder think about their high level goals with tasks those help them achieve the goal, and potential risks etc.
7	SWOT analysis	Used to gather information about possible improvements, challenges and alternatives to the tasks stakeholders performs
8	Persona	Provide all the project stakeholders with a common understanding of their target user



How to use the techniques

- All the techniques are diverse in nature but they all ask 'questions'
- They are aimed at capturing user's :
 - Activities
 - Attitude
 - Aptitude
 - Skills
 - Motivations
- It was important to figure out-
 - Which questions to ask
 - How to ask those questions



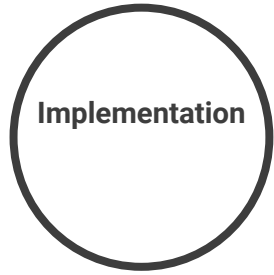
Which type of software to build

Requirements-

1. Software should always be available to stakeholders to enter data
2. They should be able to use it anytime and from anywhere

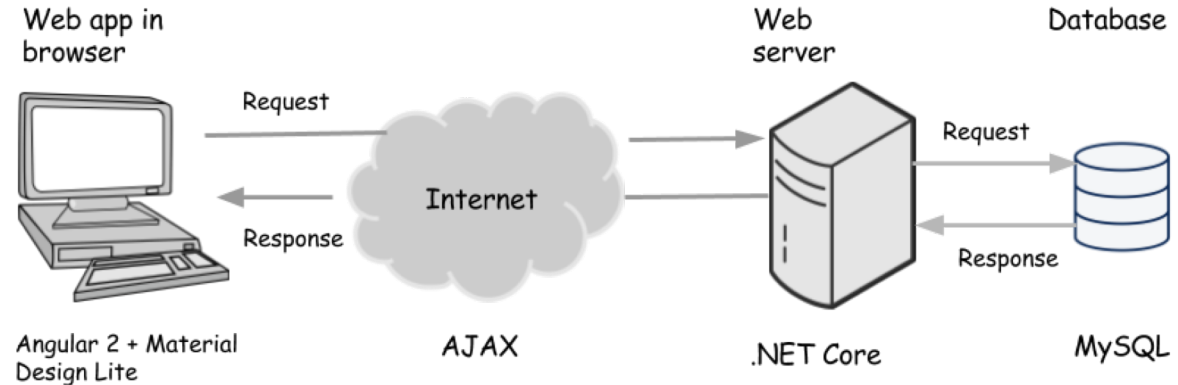
Two options-

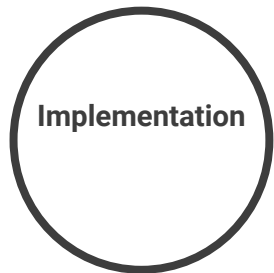
1. Web application
2. Desktop application backed up by the cloud
 - a. Decided against this because of following reasons-
 - i. Operating system dependency
 - ii. Must be installed so overhead
 - iii. Updates



Technical details

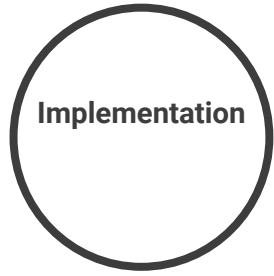
- Vision Backlog is built as a web application
- Backend is built with .NET Core
- Frontend is built with Angular 2 + Material Design Lite (MDL)
- MySQL is used as a database





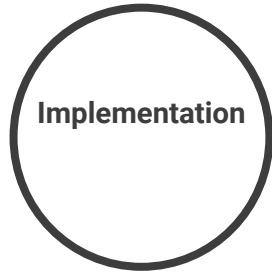
Technical details

- Total 32 questions are asked in the application
- Wherever possible, answers are obtained in structured way i.e. objective type questions
- Analyzing obtained answers direct us to some useful inferences about users/stakeholders and their underlying goals
 - Answers give us direct hints about user goals and
 - Tasks they perform to achieve those goals
 - Surrounding context such as tools, knowledge etc. they require to perform those tasks
 - Personal attributes such as education, aspirations etc.
 - Their probable adopter category



Thesis extras

1. Identifying adopter categories
2. Identifying behavior variables and patterns
3. They both further help to build specific Personas; although it is not the primary goal of the thesis



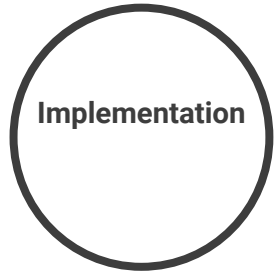
Thesis extras

1. Identifying adopter categories

More than 50% of the observed studies support generalization that these attributes contribute positively to someone being Innovator or Laggard, and that's why they are chosen to be considered in Vision backlog

E.g. if a user says I am a rational thinker, then it boosts the chances that he could be an Innovator

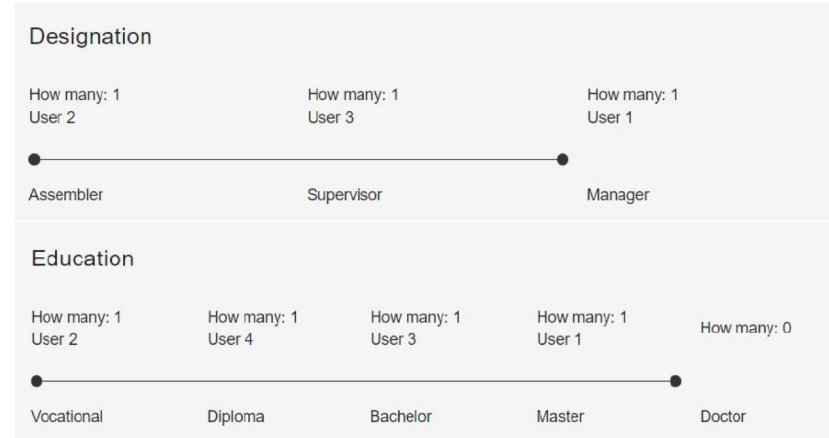
<i>Question</i>	<i>Percentage in support</i>
Achievement motivations	61
I work in this company as/role	68
Mass media exposure	69
I am social	73
What education I have	74
I like to embrace science	74
I like to welcome good new changes	75
I am cosmopolite	76
I am a rational thinker	79
I seek latest information	86

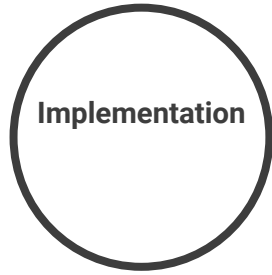


Thesis extras

2. Identifying behavior variables and patterns

One can roughly say that **user 1** could be an Innovator as he has higher education and working at a higher designation






Thesis extras

2. Building Persona

Assume that total 10 users- user 1, user 2,..., user 10 used Vision backlog and they entered following dummy data. First column shows the attribute, second column shows a specific criteria chosen and the last column shows which users fulfill that criteria

Users 2, 3, 4 and 9 appear to fulfill multiple criterion and that suggests a pattern. These criterion makes them potential candidates to be Innovators or Early adopters as well

<i>Attribute</i>	<i>Criteria</i>	<i>Which users</i>
Education	Higher or equal to Bachelor	2, 3, 7, 9
Designation	Higher or equal to Manager	2, 3, 5, 9
Technical competency	Those are able to use Smartphones and Internet efficiently	1, 3, 4, 7, 9
Rational thinkers and latest information	Those who reacted with positive answers	2, 3, 4, 7, 9
Social and Cosmopolite	Those who reacted with positive answers	1, 2, 4, 6, 7, 8
Aspirations	Those who were ambitious	3, 4, 6, 7, 8, 9

 <p>Monica Williams</p> <p>Monica is a CEO of a software company. She finished her masters in business administration and then wanted to start her own company. She had been innovative since childhood and took interests in science and designs. She loved to solve problems as kid. She was always attracted to new devices- mobiles were in their early days and laptops yet scarce. However, when her parents got her one for her- soon she was able to write her first computer program. She grew up in a cosmopolitan part of the city which exposed her to different types of people. She is very active on Internet and social media and is passionate about growing her business even larger.</p>	Age	35
	Education	Masters
	Role	Manager
	Main Responsibilities	Operseeing operations
	Expert in	Business communication, business negotiations
	Technical competency	Can use smartphone, touch devices, Internet with ease
	Probable user type	Innovator



Evaluation

Took two surveys:

- Usability survey : AttrakDiff
 - Online survey
 - Total 5 participants- all non requirements analysts
- Usefulness survey : Google forms
 - Online survey
 - Total 3 participants- all having some experience with requirements elicitation

Overall results were positive suggesting some improvements in the User Interface.

Going forward..

Questions to be answered-

1. Can we use the knowledge accumulated in Vision Backlog to already build our domain models? What's the gain? How could we do that?
2. Can we make those domain models executable? What's the gain? How could we do that?
3. Can we guide the entire development activities with our executable domain models?

That's all!
Questions?