

## 2 Method

In your degree project you have identified a knowledge gap, something that is not known. You defined a problem to investigate and some specific questions to answer.

*In the method Chapter you should*

- *demonstrate that you have a broad knowledge of research methodology,*
- *demonstrate that you are knowledgeable of the research methods you use,*
- *discuss, argue and motivate your research project's organization, and*
- *why you have organized selected specific research methods.*

*In addition, you should also demonstrate*

- *That you understand the concepts of reliability and validity, and*
- *Discuss threats to these and measures taken to reduce the effects of these threats.*

You need some problem-solving activity to answer that problem or more precisely find trustworthy answers to the questions. This is what we mean with a method. We have a problem, and we need some proven and structured way of approaching and solving that problem. There is no single way that works for all problems. Researchers have learned through history that particular methods are effective for problems that share some characteristics (in terms of purpose, context or problem). You can, therefore, look at how others have answered similar problems as your own problem, and use a similar method.

There is a wide range of methods you can use in your project. The most common ones used in degree projects are:

- Controlled Experiment
- Survey using questionnaires
- Interview
- Case Study
- Systematic Literature Review

### 2.1 Research Project

In a project, you often combine several methods. This is referred to as *multimethod research*. A specific variant of multimethod research is *design science*. Design science is particularly useful when you develop an artefact, for example a new technique or algorithm,

*Example:*

*You may use interviews to collect data to understand what architects expect from an evaluation technique. You may also interview security and privacy experts to complete the picture. Another useful source is existing literature. You perform some type of literature study to understand the theoretical background or framework for your project. You can*

*continue and perform case studies or controlled experiments in the evaluation.*

It is important that you successfully describe the overall project. What do you plan to do, and which methods will you apply? What are the intermediate results? Think of this as activities and objectives you do in your project. You perform an activity (research method) to provide a result (objective). An objective shall be understandable, not too small or too large, and possible to define when it is completed or not. You already defined objectives in your project plan. Reuse them but think of the method you plan to use and reformulate them as activities and objectives.

Describe your method at the project level as a roadmap. You should have a look at the design science model for inspiration. Here you should provide a description of design science first and motivate your choice. Don't forget to outline **your** project.

*Example:*

*Company X initiated this project. They have asked for a technique that can help them to evaluate their software architectures. We selected the design science approach and we will start by defining the problem and setting the objectives for a solution. We will design and implement a solution that we demonstrate on cases provided by the company. We will validate the technique together with stakeholders at the company.*

Continuing you are expected to describe each step in the DS methodology and in detail describe which research methods you use and motivate why.

## **2.2 Research methods**

This part should cover two aspect

- Each method you use should be described in detail. You must demonstrate that you have a complete understanding of the methods you use and some understanding of the methods you considered but didn't use.
- Describe each that you research method in some detail focusing on how you use it, where and for what. Motivate your decision and relate it to the problem type, stakeholders, thesis project setup, etc. It is important that you can use the same method for different activities in your research project. You need to describe, explain, and motivate each use.

*Example:*

*We plan to conduct interviews at the company to elicit problems and details from the company using interviews. We think that interviews is the best method because it we will have the opportunity to ask more specific questions if interesting problems occur. A survey is difficult to produce because we currently don't understand enough about the problem at hand.*

*We also plan to collect data for the solution objectives at the same time. We did consider creating a survey that we could distribute to a larger group to validate the problems and objectives after we analyzed the interviews. However, we decided to discard this idea due to time constraints.*

## 2.3 Reliability and Validity

Here you discuss the reliability and validity of your project. To answer your problem you use a method, collect (and possibly analyze) data, and draw conclusions from the data.

Reliability means if others will get the same result as you if they replicate your work. Reliability problems can, for example, occur if you use the wrong method for data collection.

It is important that you only draw conclusions that are valid, i.e. that is supported by the way you have done your work and the data you have collected.

You can read about reliability [here](#) and about validity [here](#). Discuss if you have any reliability issues or validity threats in your project here.

Identify different threats and how likely it is that it will impact your result. Discuss measures you have taken to reduce the impact. For example, triangulation. In this section you demonstrate that you understand the limitations of research and how you can combine approaches to move beyond these limitations.

## 2.4 Ethical considerations

You are required to discuss any ethical considerations in your project's research design. If you don't think there are any considerations **state that and motivate why!**

If you do an experiment you will most likely not have any ethical considerations, but in a survey ethical considerations can for example be how you make sure that the privacy of the people participating in the study is not violated (by for example removing names from the gathered data).

It is important to think of (among others)

- Confidentiality – if you collect data from surveys/interviews. Describe and discuss measures for maintaining confidentiality. Where and how is data stored? Consider GDPR for participants.
- Sampling/Bias – Which data have you selected. Are there any risk for biases?
- Risk of harm – Maybe not applicable to CS but balance risk-of-harm – possible gain.
- Participation and Consent – Are the participants in your study aware of this? Have they said ok to participate.