1   Introduction

In this chapter you introduce your degree project. Start by providing some context: *"This is a 15/30 HEC Bachelor/Masters thesis in Computer science/Software Engineering"*. Think of introduction as a funnel, c.f. Figure 1, where you begin with a broad overview of what your project is all about. First a subject area and then the area of investigation.

Examples: If your project is *intrusion detection, start with security then intrusion detection.* If it is about *API:s start with software engineering and reusable artefacts then API:s*.

Similar to the abstract, the introduction shall make a reader interested in your report and continue to read. Don't be too detailed here; there are plenty of opportunities to add details in later chapters. Not more than two to three paragraphs or 1/2 page.
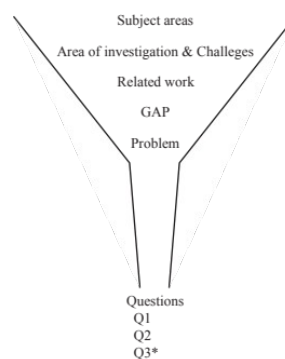

Figure 1 Introducing your problem step-by-step

In the subsections below you have four goals. Keep the funnel analogy, Figure 1, in mind all the time. Add details along the way, as you go.

1. *Background* – Provide a sufficient, but not too detailed, context to the reader to *understand what challenge you address in your thesis*.
2. *Related work* – Inform the reader about what has been done in the area *related to the challenge*.
3. *Problem formulation* – Present *the knowledge gap you intend to bridge*! What is not known?
4. *Motivation* – Argue why your work is relevant.

Now you should have introduced and motivated a problem you address in your thesis.

1.1   Background

After you have described your project, you shall continue with writing a background to the area your project is in. Here you elaborate on the area(s) of

investigation. This should not be too detailed. Aim for a level-of-detail, which is sufficient to understand your challenge, related works, and problem definition. Remember that you provide all the details for the areas of investigation in the Theoretical Background Chapter.

Example: if you do a project that is about evaluating software architectures, you describe the software architecture concept, why it is important to design an architecture that suits a specific software system, methods for evaluating and comparing different architectures.

End this part by introducing one or more challenges in the area of investigation.
Example: Evaluating information security an information privacy at the software architecture level is a challenge.

Aim for 1/2 – 2/3 of page!

1.2 Related work

Here you briefly describe what others have done in the field of study or how others have attempted to explain or solve the same or similar challenges that you are investigating. It is okay to refer to tech articles and online blogs and portals, but should *always prioritize scientific, peer-reviews articles*. To find articles, use the search tools listed here.

Example: Provide a brief overview of relevant evaluation techniques, if something more specific has been done in the area "evaluation of information security and privacy", etc.

Target is 1/2 – 2/3 of page!

1.3 Problem formulation

Relate to the Background and Related work. What is not known with respect to *the challenge?* This is *a knowledge gap.* Here you give a detailed description of the problem – the gap – you investigate. Rephrase your problem as a set of questions and present them in a list. Rephrasing them as questions will help you a lot when you analyze and discuss your results and when you conclude.

You can re-use the problem formulation from your project plan, but you must provide more reasoning and details about the gap. Shaw[1] describes several problem categories and typical questions to ask for each category. Use that as a source of inspiration.

GAP Example:
There is a considerable body of work in software architecture evaluation. However, it seems that reasoning and evaluating software architectures for information security and information privacy concerns have gained no or little interest. This means that architects have to rely on less reliable techniques such as argumentation.

In the example above you can see how we relate to the background and challenge, and to the related work to define *the gap.* So, the gap identifies that we lack knowledge about something. A knowledge gap that we may phrase as one or more questions.

Questions Example:
1. *How may we evaluate information security and information privacy?*
2. *What would be a suitable methods or techniques for architecture level evaluation?*
3. *How precise and reliable would such methods or techniques be compared to other evaluation methods and techniques?*

At his point you should have described the area and challenge, described related work, pin-pointed the problems you plan to address, and more specific questions you have to answer along the way.

1.4 Motivation

Here you motivate why your problem is interesting/important from
- a scientific perspective,
- important for society
- industrial perspective

You can re-use the motivation part from your project plan. You don't have to motivate your work from all three perspectives.

Example: This thesis will advance the field of architectural evaluation [scientific]. The results will address two very important areas, information security and information privacy, that are essential components in a society's the digital transformation[society]. From an industrial perspective the

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[1] Shaw, M. "What makes good research in Software Engineering", International Journal on Software Tools for Technology Transfer. Vol. 4(1)

results will assist software providers to develop systems that considers information security and information privacy early. Thus, build and provide systems that keep information secure and private[industry].

There is always a risk that you make (too) bold claims here. Try to stay realistic and don't exaggerate.

1.5 Results

Present results and the result types for your project. Describe each in a paragraph and refer to the question(s), or part(s) of question(s) it contributes to answer. Also discuss briefly how the results were validated. Use Shaw's article discussed above as a source of inspiration. The article discusses several results types that you may adopt for your work.

Example:

We propose a new technique for evaluation of information security and information privacy at the architecture level. The technique prescribes a process and provide checklists to guide mainly architect's but also other stakeholders in the evaluation work.

We evaluate the technique by demonstration and interviews with practitioners. In the demonstration we show how the technique is use in three cases, by three different evaluator groups. Continuing, we argue that the technique satisfies the objectives. The interviews collect data on stakeholders' assessments of the technique. Here we focus on precision and reliability; however, we also collect data on the technique's applicability and ease of use.

Don't give away too much information about method here. It will be covered in the next chapter.

1.6 Scope/Limitation

You cannot solve everything. Here you describe what you do, and what you don't do, in your project. Limitations can for example be that you only compare some frameworks of all frameworks available on the market, that you only suggest an architecture for a specific software product and not a general architecture, or that you only include university students in a study and not a broader population sample.

1.7 Target group

Here you outline which target group for your work. If you, for example, do a project about software architectures, a target group can be professional

developers and architects that work with similar software systems as the system you investigated.

1.8 Outline

Here you outline the rest of the report. It shall contain which chapters that will follow, and what each of them is about.

Example:

This report is organized as follows. In Chapter 2 we discuss the methodological framework, research methods and ethical considerations. Chapter 3 provides a full account for the theoretical background and discusses the knowledge gap. used in the project. In Chapter 4 we discuss the objectives for an evaluation technique, which guide the design of a technique that we present in Chapter 5. Chapters 6 and 7 describes the validation of the technique. First, we demonstrate the technique on three cases in Chapter 6. In Chapter 7, we describe the case study design for the stakeholder interviews. Chapter 8 presents and discusses experiences and results from the demonstration and interviews. These are analyzed and discussed further in Chapter 9, where we also discuss threats to the validity of the work. In Chapter 10 we Conclude and discuss Future work.