MSC TIL example template for a Thesis proposal
v. 5 10-04-2024

A TIL thesis is *interdisciplinary*. Theories and methods from your bachelor and master courses will be applied.
An example is a project in which you use a traffic model as taught in a CE course combined with a behavioral theory and a practical evaluation tool, such as mca or scba taught in a TPM course. In a logistic project, you could combine quantitative tools from a ME of CE course with decision theory or an evaluation method learned in a TPM course.

A thesis proposal is 15-20 numbered pages. It is not a blueprint, but an attempt to align different perspectives on the challenge at hand. It has a logical story-line. Do not jump from one topic or idea to another or back and forward. Use informative section headings and captions.
Number also tables and figures.

Writing takes about **1 month** of (partial) stay at a commissioner. Review literature. Discuss (a) draft(s) with your weekly supervisors (TUD, commissioner). In this period you also develop a network of useful contacts. When finished, you can have your kick-off meeting. Plan this meeting *before* you start writing your proposal, at a moment you feel comfortable with, having consulted your supervisors.

You may ask if what you aim to work on is scientific enough. A commissioner usually has a practical question and maybe also a short time horizon. If you were a consultant, than you would serve that perspective. In a thesis project you will learn to start with a broader perspective first. This helps to have a certain **balance between practical and scientific requirements**. Discuss with your TUD and commissioner supervisors. Stay at least one day per week at the university and another day at home, again to balance the perspectives.

Section 1 - Introduction

1. Title page

Use a generic first sentence to represent the scientific value, followed by a practical, case-specific second sentence. Not longer. Don't try to incorporate all details and aspects of your project. What is the baseline?
Example: Improving outbound logistics, A case study at company xx.
Example: Options to improve inland waterway navigation, an application at the sluice complex at xx.
Example: The role of information in decision-making, a case study at Port of Antwerp.

Add author name, surname and student number, email, mobile.
Add Committee members with titles. Start with the chair (check all academic titles).

2. Abstract/Summary

Begin with context (example: sustainability), continue with aims, scope, research gap, research approach and methods and final result (how to fill-in the research gap). [1 page]

3. Context

Introduce the topic (and later case study)
What is the challenge, why is it a challenge and how to you intend to deal wit it? How important is the problem for the commissioner? What is their policy in this area (sometimes there is a strategic plan you can use as a guide or reference). A *stakeholder analysis* is an important element in the context analysis.

Translate the practical question is a broader **research topic**.
Motivate the choice of the topic. What makes this topic and your approach interesting (new?) from a scientific point of view?
- What has been studied by others? What is missing?
- What do you want to add to this? Is it another, maybe more complex, case study? Do you want to apply an existing method or theory to a new problem? Do you want to develop a new method or theory (very challenging) to an existing problem?
Your academic contribution to the state-of-the-art follows from the draft **research gap table** in your proposal, which is currently based on a limited literature review.

4. Research objective(s)

What do you intend to achieve and why? E.g., you want to develop or improve strategies that enable a company to reduce its transport emissions. Or you want to develop a framework that helps to better understand a policy challenge and formulate feasible policy measures.

To make the research objective feasible, choose a realistic time horizon and spatial scale. Both are related with the research objective, the scientific state-of-the-art and the available data and its quality.
If appropriate, choose a perspective that matches with your method(s). Example: In case of sustainability you can choose between open or closed futures and hence use forecasting or backcasting techniques, such as scenario (modeling).

5. Research scope

You have limited resources for your project. Act as follows:
- Describe focus area and main challenge: E.g., in public transport - optimize asset management. Or, in logistics - reduce 'waste' in goods handling in warehouse. Or, in traffic analysis – focus on a specific part of a

larger traffic network, or develop a macro (micro) traffic model for city xx.
- Promise what you can deliver if you work at a normal pace.
- There is no time to learn new theories or methods, but you can improve on what you have learned.
- Do not see this project as an Olympic challenge. There are no mountains to climb, but hills and slopes to pass.
- Try to scope the project to the expertise fields of your supervisors.

6. Theory and methods [1]

In some fields there are explicit **theories** (traffic or policy analysis), while other fields are fairly practical (e.g., logistics). If appropriate refer to specific theory (choose and elaborate in your Literature review section).

Propose **method(s)**. A method should not be chosen arbitrarily, but have a good fit with the nature of the problem. Define the kind of challenge. Is it: A planning problem (linear planning)? Finding the optimal solution (optimization method; simulation)? A non-optimization problem (any solution; heuristics)? Etc. Method choice may follow from a theory or suit practical requirements, like anticipated data availability. Discuss pros and cons of a proposed method, then propose.
One practical choice criterion is the time needed to apply the particular method(s). E.g., building a simulation model asks for previous experience. If not, you may need much more time. If you choose the wrong method or software, then it may take even longer. Ask your weekly supervisors or a specialist lecturer.

7. Research questions

A thesis has one main question and several sub-questions related to the main question; in a logical order. All questions follow logically from the problem description. By answering these sub-questions, you can answer the main question and reduce the research gap. Make a table or figure, such as Table 1.

Table 1. Design thesis structure (topic: sustainability)

	Method	Chapter
Introduction		1
Sub-question 1: How to estimate the carbon footprint of a company?	Structured literature review: Introduce main topics and concepts, choose your tools	2
Sub-question 2: What is the carbon footprint of company AA and how far should it be	Current state/case study * Collect data. Analyze current practices and their pros and cons * Study internal documents, relate to	3

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1 Some students prefer a separate main Methodology section before the Literature review section. Choice is free.

reduced by the year xxyy?	government policy	
Sub-question 3: Who are the main stakeholders and what are their interests?	* Collect data. Analyze company context and internal processes	4
Sub-question 4: How to reduce this carbon footprint?	Future state analysis * Develop set of requirements and constraints * Develop kpi	5
Sub-question 5: What alternatives are possible for the current situation?	Design a set of alternatives	6
Sub-question 6: What is the best alternative?	Comparative analysis/evaluation	7
Conclusions and Recommendations	Company and science	8

In a research thesis, you skip sub-question 5 and 6

Section 2 - Literature overview

Select and discuss the main topics, methods and terms relevant for your research. The literature review provides a more generic view of the problem and stimulates finding a balance between science and practice.

Finish section 2 with a *research gap table* to show what others did, what is missing and where you intend to add something to science (apart from helping the commissioner with a practical challenge).

Section 3 - Data requirements and data analysis tool(s)

Data availability is the Achilles heel of any research project.
- Specify data requirements and sources. Use the kick-off meeting to agree about access to this data at the moment you need it.
- Choose a data analysis tool and make sure it is available when you need it. Check if your commissioner can use the same tool after your project.
- You are *not* obliged to carry out a quantitative study. The use of a tool depends on the topic, the available data, the requirements of the commissioner and your own capabilities and preferences. Be careful if you feel pressed to go into a (methodological) direction you don't feel comfortable with, even if you master the method(s).

Section 4 - Expected output (product)

A thesis report with a research paper (in Appendix A). In addition, but not obligatory, you could write a short implementation plan or a basic manual if you developed a tool, such as a model.

Section 5 - References

Systematically used: Harvard or alternative or the one provided by Latex. Sufficient variety and quality; articles, books, internet, personal information (interviews). Check if complete, because Overleaf does not always do what it pretends to do.

Appendix – Planning chart
Realistic specification of activities, deadlines and products. A Gantt chart is common. Don't expect time for feedback loops. Add explanatory text if necessary.

Finally, check English spelling and grammar.

The proposal has an exploratory nature. Once you progress, the more likely are (small) diversions from its original content. Your thesis document changes accordingly. The same holds for methods and (sub)questions.

The comments on your proposal made before and during the kick-off meeting should be summarized and sent to your committee (as minutes). You do not change your kick-off document anymore, but use these comments in your thesis report.

Success with your preparation and actual project!

[JVL]