

MSC TIL example template for a Thesis proposal

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TIL = 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, etc.

Your proposal

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.

Preparation

It takes about **1 month** of (partial) stay at a commissioner. Next to learning their way of working and developing a network, you review literature in order to find a balanced approach between practice and science. Discuss (a) draft(s) with your weekly supervisors (TUD, commissioner).

Kick-off meeting

Once finished, you can have your kick-off meeting. Plan this meeting *before* you start writing your proposal, having consulted all your supervisors.

Balance science-practice

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. They may think in terms of power point slides and not in reports, like your university. If you were a consultant, then 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 TU Delft- and commissioner supervisors. Stay at least one day per week at the university and another day at home, again to balance the perspectives.

1. Front page

We frequently see a thesis title with two lines. The first is generic to represent the scientific value, followed by a practical, case-specific second sentence. Don't try to incorporate all details, aspects and methods in this title. Ask yourself: What is the core issue?

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).

3. Context

Introduce the topic (and later case study): What is the challenge, why is it a challenge and how do you intend to deal with 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). An introduction to your *stakeholder analysis* is an important element in the context analysis.

Translate the practical question into a broader **research topic**.

Motivate the choice of the topic, both from a scientific and a practical perspective.

4. Problem definition

What is the core issue you are going to work on? Try to distinguish on main issue. There is no time to study many problems in a single thesis. The needs statement of your commissioner is the start of it. Sometimes it is very clear, but it can also be more generic or even vague. There may also be different stakeholders with different views or interests regarding the problem. Find out who key stakeholders, describe and synthesize what you learn during preparation as objective as possible.

5. Research objective(s)

What do you intend to achieve and why? For example, 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 a government agency to better understand a policy challenge and formulate feasible policy measures.

To make the research objective attainable, 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 fore casting or back casting techniques, such as scenario (modeling).

6. Research questions

A thesis has one main question and several sub-questions 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 reduced by the year 20xx?	Current state/case study * Collect data. Analyze current practices and their pros and cons * Study internal documents, relate to government policy	3
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	Scientific first, then practical	8

Note: In a research thesis, you would skip sub-question 5 and 6.

7. 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 a warehouse. Or, in traffic analysis - focus on a specific part of a larger traffic network, or develop a traffic model for city A.
- Describe what you intend to deliver in the time planned.
- 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

8. Research approach 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.

Your approach is usually summarized in a figure or table, which contains three columns for sub questions (left), method (middle) and chapter of your thesis (right).

9. Literature overview with research gap

The aim of this section is to select and motivate the main topics, methods and terms relevant for your project. A literature review provides a more generic perspective on the problem and stimulates striking a balance between science and practice. You can learn from professionals what has been studied earlier, what and how they approached a similar problem. You can learn from others even if their approach is merely theoretic, schematic or even impractical, because their empirical data are weak or non-existent.

¹ Some students prefer a separate main Methodology section before the Literature review section or include it in their Introduction section. Choice is yours.

You learn to find out the state-of-the-art, in particular because most authors copy the approach of others. Single case studies are interesting, but really interesting are overview papers usually written for a PhD-thesis. Reading them saves you a lot of time.

When reading you compare the requirements of your project with the literature and define a potential research gap. What can you add to the pile of existing literature? Maybe a 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?

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

10. 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).

11. Expected output (product)

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

12. References

Systematically use Harvard or alternative.

Use sufficient variety and quality; articles, books, internet, personal information (interviews). Check if complete, because Overleaf (not obliged) does not always do what it pretends to do.

13. Planning chart

Realistic Gantt chart with steps and activities, holidays, key meetings and intermediate products. Don't expect time for feedback loops. Add explanatory text if necessary.

14. Proper English

Use an English grammar and spelling checker.

Your kick-off meeting

The comments on your proposal made in 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.

Your 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.

Most thesis proposals pass the kick-off meeting. There are exceptions, however:

- In minor cases your kick-off document is not sufficient for a go-decision;
- New information or ideas may turn up during the discussion, which may lead to a decisive change of direction of your project;
- Parties may strongly disagree or even quarrel about (part of the) content. This may even lead to a change of the composition of your committee;
- You rushed yourself into the kick-off meeting. There was a lack of time to study and properly communicate your ideas with your committee.

If such things happen, then a re-write is necessary and probably a re-sit. A re-sit may be prevented in case one of your TU Delft supervisors will get the task to read and decide on behalf of your committee.

Success with your preparation and actual project!

[JVL]