ETH zürich

Institut für Verkehrsplanung und Transportsysteme
Institute for Transport Planning and Systems

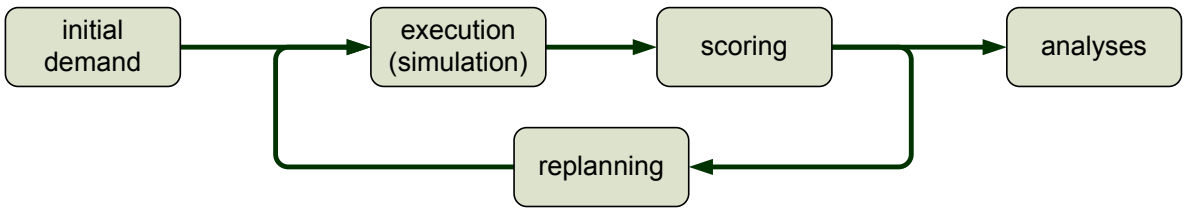
**Bachelor Thesis / Semester Project / Master Thesis**

# Title of the Thesis

## Optional subtitle


## First Author


November 2026





**SUPERVISOR**

Supervisor Name Institute for Transport Planning and Systems, ETH Zürich

## Abstract

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**Keywords:** Keyword 1; Keyword 2; etc


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# Acknowledgements

State your acknowledgements here. If appropriate, you may change the heading of this section to “Preface.”

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# 1 Introduction

This template is intended to help you produce a clean, consistent, and well-referenced scientific document. The most important recommendations are summarized below and illustrated with short examples.

## 1.1 Use a Standard Thesis/Report Storyline

Most scientific reports become easier to read when they follow a recognizable structure: introduction and research questions, background or related work, data and methods, results, discussion, limitations, conclusions, and appendices. The exact names can vary by discipline, but each part should have a clear role. The introduction typically motivates the topic, identifies the research gap, and briefly explains the contribution of the work. The methodology section should describe the data, assumptions, analytical steps, and tools in enough detail for the work to be assessed and reproduced. The results section should report the findings clearly, the discussion should interpret their meaning and limitations, and the conclusion should summarize the main answer to the research question, together with implications or future work. Avoid mixing methods, results, and interpretation too early; separating them helps readers understand what was done, what was found, and what the findings mean.

## 1.2 Work with Multiple `.tex` Files

For documents beyond roughly 20 pages (e.g., a thesis), splitting the text into multiple `.tex` files makes the project easier to navigate, review, and maintain. A common approach is to keep one main file (e.g., `main.tex`) that only contains the preamble and a sequence of `\input`/`\include` statements, while each chapter/section lives in its own file (such as `contents/introduction.tex`, `contents/methods.tex`, etc.). In this template, you normally edit the files in the `contents/` folder and leave the class file and most settings unchanged unless you know that you need to adapt them. This improves the overview and reduces merge conflicts when collaborating.

## 1.3 Use a Clear Section Structure

Structure your text into `\section` and `\subsection` blocks so that each subsection answers a concrete question. Avoid creating too many levels (e.g., excessive `\subsubsection` blocks) unless you truly need them; too much granularity can make the document harder to read. As a rule of thumb: if a subsection only contains a few sentences, it might not need to be a separate subsection. Use headings to guide the reader, not only to divide the page visually. Do not leave empty space or insert a manual page break immediately after a section or subsection heading; instead, add a brief introductory sentence or short summary that tells the reader what follows.

Add a `\label` immediately after each numbered heading that you want to reference, and use a clear prefix such as `sec:` or `subsec:`. For example, Section 1 is a section, while Sections 1.1 and 1.2 are subsections; the same approach applies to subsubsections and other numbered elements. Using `\cref` (or `\Cref` at the start of a sentence) lets LaTeX insert the correct element type and number automatically.

## 1.4 Data Documentation, Methods, and Assumptions

The methods section should contain enough detail for another researcher to understand and, where possible, reproduce the analysis. Describe the study area, data sources, preprocessing steps, model settings, software versions, and important assumptions. If a design choice affects the interpretation of the results, state it explicitly rather than leaving it implicit. For empirical work, also document units, coordinate systems, time periods, sample definitions, and filtering criteria. Use `siunitx` to typeset numbers and units consistently; for example, `\qty{50}{\kilo\metre\per\hour}` produces $50\,\mathrm{km\,h^{-1}}$.

## 1.5 Clean, Numbered Equations with Labels and References

Mathematical statements should be typeset as equations (or, where appropriate, as subequations or align blocks) and should be numbered whenever you refer to them later. Always add a `\label` inside the equation environment so you can reference equations consistently.

$$\frac{\partial \rho}{\partial t} + \nabla \cdot (\rho \mathbf{v}) = 0. \tag{1}$$

You can then refer to Equation (1) in the running text. For multiple aligned equations, use `align` and label either the full block or individual lines. Use a non-breaking space (`~`) between the element name and its reference, as in `Equation~\eqref{eq:key}`, so they cannot be separated by a line break.

## 1.6 Figures and Tables: Always Caption, Label, and Reference

Figures and tables are part of the scientific argument and must be readable on their own. Therefore, always provide (i) a descriptive caption and (ii) a label for cross-referencing. In the text, refer to them via `\ref` (e.g., "Table 1" or "Figure 1") rather than hard-coding numbers. Place figures in the `figures/` folder and use relative paths, as shown in the example below. Tables use `[H]` as their default placement option so they appear at the point where they are included in the source; if more flexible placement is preferable, `h` means near the insertion point, `t` the top of a page, `b` the bottom, and `p` a float-only page, while `!` relaxes some internal placement constraints.

| Item | Description | Value |
|---|---|---|
| A | First entry | 1 |
| B | Second entry | 2 |
| C | Third entry | 3 |

**Table 1:** Example table with caption and label so it can be referenced in the text.

Table 1 demonstrates a minimal table layout.

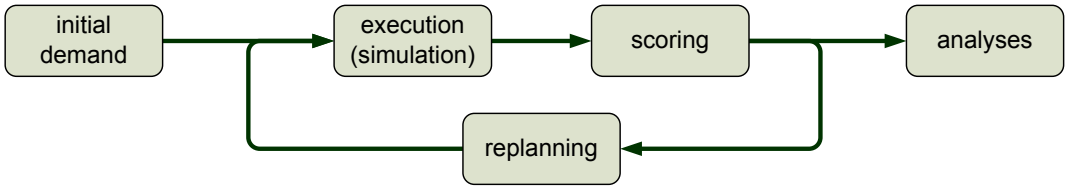



**Figure 1:** Example figure with caption and label so it can be referenced in the text.

Figure 1 shows how to include and reference a figure.

## 1.7 Separate Reporting of Results, Discussion, and Limitations

Results should describe the main findings as objectively as possible, using figures, tables, and quantitative summaries where appropriate. The discussion should interpret these findings, compare them with expectations or related work, and explain their practical or scientific relevance. A limitations subsection is useful for clarifying uncertainty, data constraints, modeling assumptions, and threats to validity. For a thesis, this separation helps examiners distinguish evidence from interpretation.

## 1.8 Citation of Related Work via BibTeX

Any claim, method, dataset, or result taken from other scientific work must be cited. In this template, references are managed via a `.bib` file and BibTeX entries. Typically, publishers provide a ready-to-copy BibTeX entry on the paper web page; copy that entry into your `.bib` file and cite it in the text. Whenever DOIs (digital object identifiers) are available, please make sure to include them in your BibTeX file and references list.

For example, a textual citation uses `\cite`: Horni et al. (2016). Depending on the style, you may also use parenthetical citations (often `\citep`–appearing as (Zhao et al., 2020)) when appropriate. Use a non-breaking space before a citation when it belongs to the preceding text, for example `previous work~\citep{ieeecitation}`, so the citation does not begin a new line by itself.

## 1.9 Optional: Symbols Section for Technical Works

If you introduce many variables/parameters (e.g., $\rho$, $\mathbf{v}$, $\alpha$, $k$, $\Delta t$), consider adding a dedicated "Symbols" (or "Nomenclature") section. This provides a compact reference for readers and helps keep notation consistent. Typically, front and back matter, such as the symbols list, lists of figures and tables, bibliography, or appendices, is not counted towards the main page limit (follow your local guidelines).

## 1.10 Common Mistakes

- **Capitalization of section, figure, and table titles:** Choose one capitalization style and use it consistently. For example, use sentence case (only the first word and proper names are capitalized) or title case (important words are capitalized), but do not mix both.
- **Switching between British and American English:** Decide whether to use British English or American English and keep the spelling consistent throughout the document.
- **Unclear research question:** Make sure the introduction states the problem, research gap, research question, and contribution clearly enough that the reader understands the purpose of the work before reaching the methods section.
- **Undefined abbreviations:** Define every abbreviation at first use and avoid introducing abbreviations that are used only rarely.
- **Mixing results and interpretation:** Report what you found in the results section, and explain what it means in the discussion section.
- **Unsupported claims:** Distinguish clearly between cited facts, assumptions, interpretations, and original results, and provide evidence or a reference for each substantive claim.
- **Subjective or evaluative wording:** Avoid unqualified qualitative or value-laden terms such as "good," "large," "obvious," or "significant." Replace them with neutral, measurable descriptions or state the explicit criterion on which the assessment is based.
- **Missing references to figures and tables:** Every figure and table should be mentioned in the text. Do not insert a figure or table without explaining why it matters.
- **Non-self-contained captions:** Captions should explain the essential context, units, symbols, and abbreviations needed to understand the figure or table without searching through the main text.
- **Unnumbered or unreferenced equations:** Do not present an important equation only as inline mathematics or introduce it merely with a phrase such as "as follows." Place it in a numbered equation environment, add a `\label`, and refer to it explicitly in the surrounding text using `\eqref`.

- **Hard-coded numbers:** Do not write "Figure 3" or "Equation 2" manually. Use `\label` and `\ref`/`\eqref` so that numbering updates automatically.
- **Breakable citation and reference spacing:** Use a non-breaking space (`~`) before attached citations and between element names and references, for example `work~\citep{key}` and `Equation~\eqref{eq:key}`.
- **Low-quality or unreadable figures:** Check that axis labels, legends, symbols, and text are readable in the final PDF, not only in the original plotting software.
- **Overloaded tables:** Avoid large tables with too many columns in the main text. Move detailed tables to the appendix if they interrupt the argument.
- **Missing units or false precision:** State units consistently using `siunitx`, choose significant figures that reflect the actual precision of the data, and report uncertainty where it affects interpretation.
- **Insufficient reproducibility information:** Document data sources, software and package versions, preprocessing decisions, model parameters, and random seeds where applicable.
- **References formatting and validity:** Do not blindly trust databases such as Google Scholar or Zenodo. Check references against the original publication page, make sure all relevant BibTeX fields are complete, and verify that special characters are rendered correctly. Provide a DOI where available or, if not available, a URL or ISBN. If a DOI is provided, a URL is often unnecessary. Also check whether cited arXiv preprints have since appeared in a journal or conference proceeding.
- **Long figure and table titles in lists:** For each figure and table, you can define both a full caption shown next to the figure or table and a shorter caption shown in the list of figures or list of tables.
- **Manual formatting instead of LaTeX structure:** Avoid using repeated line breaks, spaces, or manual numbering for layout. Use LaTeX commands for sections, lists, captions, labels, and references.
- **Inconsistent notation and units:** Use the same symbol, unit, and abbreviation for the same concept throughout the document, and define important symbols before using them.

# Declaration of AI Usage

The following table declares all generative AI and AI-based tools used in this work. It records the tool, version or access date, use case, and the parts of the work affected. Please declare the tool usage for code and report text separately. If no such tools were used, replace the table with the statement: "No generative AI or AI-based tools were used in this work."

Please make sure to also carefully review the latest official regulations by ETH, which apply to any thesis or project report and must be followed strictly: https://library.ethz.ch/en/scientific-writing/plagiat-und-kuenstliche-intelligenz-ki.html.

| AI-based tool | Use case | Parts of the work affected and source declaration |
|---|---|---|
| *Tool name, provider, version/model* | *Task for which the tool was used* | *Sections, figures, tables, code, data, or other elements affected; type of use (generation, proofreading, etc.)* |
| *Tool name, provider, version/model* | *Task for which the tool was used* | *Affected parts.* |

# References

Andreas Horni, Kai Nagel, and Kay W Axhausen. *The multi-agent transport simulation MATSim*. Ubiquity Press, London, 2016.

Ling Zhao, Yujiao Song, Chao Zhang, Yu Liu, Pu Wang, Tao Lin, Min Deng, and Haifeng Li. T-gcn: A temporal graph convolutional network for traffic prediction. *IEEE Transactions on Intelligent Transportation Systems*, 21(9):3848–3858, 2020. doi: 10.1109/TITS.2019.2935152.

# A List of Figures

1 Example figure with caption and label so it can be referenced in the text. . 5

# B List of Tables

1 Example table with caption and label so it can be referenced in the text. . . 5

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

## Declaration of originality

The signed declaration of originality is a component of every written paper or thesis authored during the course of studies. **In consultation with the supervisor**, one of the following two options must be selected:

☐ I hereby declare that I authored the work in question independently, i.e. that no one helped me to author it. Suggestions from the supervisor regarding language and content are excepted. I used no generative artificial intelligence technologies[1].

☐ I hereby declare that I authored the work in question independently. In doing so I only used the authorised aids, which included suggestions from the supervisor regarding language and content and generative artificial intelligence technologies. The use of the latter and the respective source declarations proceeded in consultation with the supervisor.

**Title of paper or thesis**:

**Authored by**:
*If the work was compiled in a group, the names of all authors are required.*

| **Last name(s):** | **First name(s):** |
|---|---|
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With my signature I confirm the following:
- I have adhered to the rules set out in the Citation Guidelines.
- I have documented all methods, data and processes truthfully and fully.
- I have mentioned all persons who were significant facilitators of the work.

I am aware that the work may be screened electronically for originality.

| **Place, date** | **Signature(s)** |
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*If the work was compiled in a group, the names of all authors are required. Through their signatures they vouch jointly for the entire content of the written work.*

[1] For further information please consult the ETH Zurich websites, e.g. https://ethz.ch/en/the-eth-zurich/education/ai-in-education.html and https://library.ethz.ch/en/researching-and-publishing/scientific-writing-at-eth-zurich.html (subject to change).