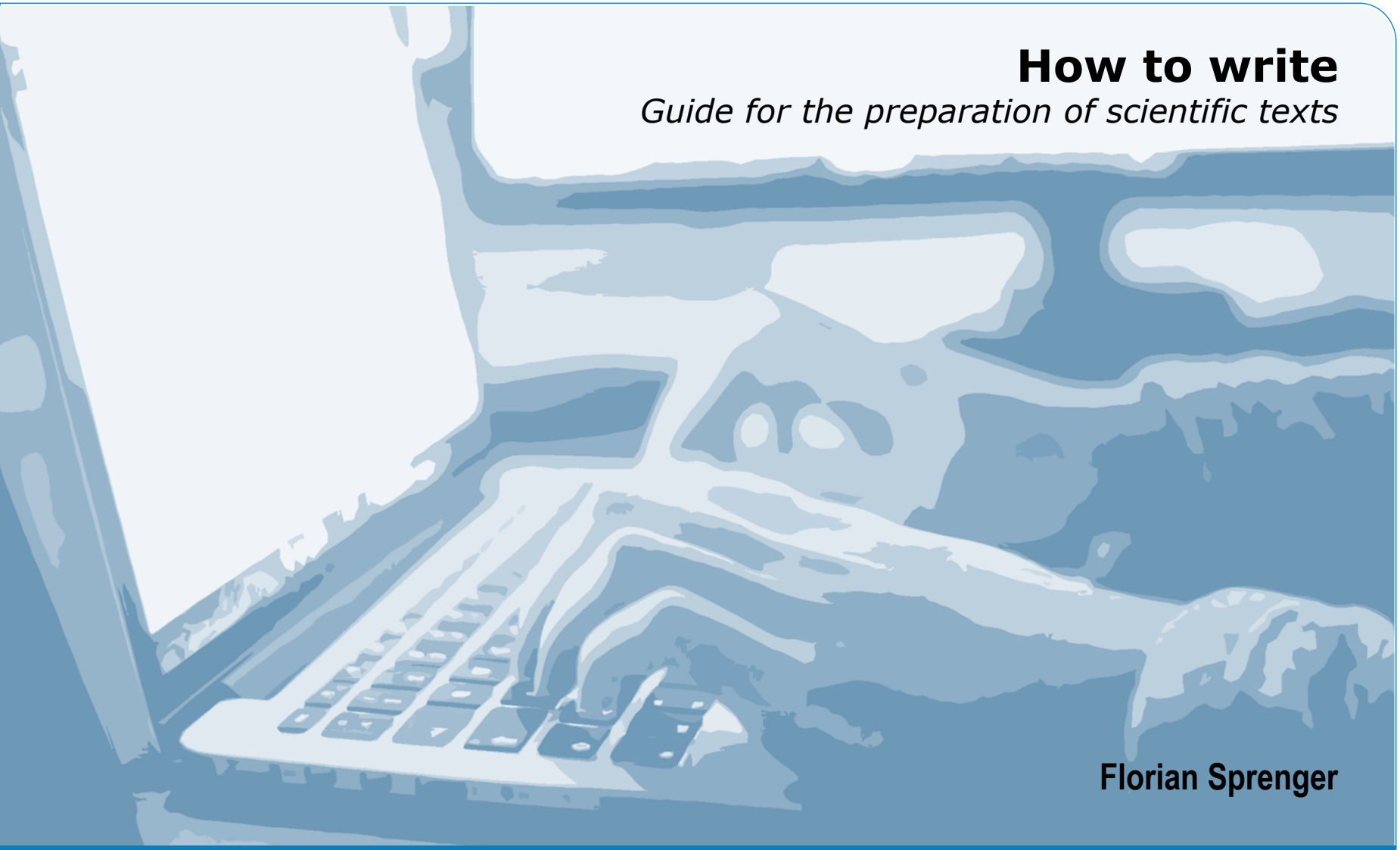
Universität Rostock

Traditio et Innovatio

How to write

Guide for the preparation of scientific texts



Florian Sprenger

Overview of topics

Preparation	**Structure**	**Style**
Layout	**Elements**	**Final Check**

<u>Objective:</u> You know how to approach the task of writing a scientific text

Introduction

Challenges

- Conventions for scientific writing

→ Different from other texts

→ Usually not explicitly taught

Guidance to help you preparing your first theses, scientific publications or reports

General advice: read scientific texts!

Introduction

General thoughts

- Set a high quality standard for your document
- Identify yourself with your work

Sell your idea!

- Writing is an iterative process
  - Revision of content
  - Gradual improvement

Submit when you are satisfied!

Preparation

Target group

- Every scientific text targets a specific group of readers with specific knowledge in the respective area
- Identification of the target group is the first important task

Target group knowledge defines contents!

Repetition of known basics → **Bored**

Leaving out critical information → **Lost**

Stops reading!

Preparation

General Requirements

- Familiarize yourself with the conventions
  - Theses: university requirements
  - Publications: publisher requirements
  - Report: institution guidelines / client expectations

- Establish the central idea of your document
  - What is your message?
  - How do you want to guide the reader through your text?

Preparation

General Requirements

- Restrictions
  - Working with third parties?
  - Are there any relevant IP rights or NDAs?
  - Would they prevent you from publishing your work?

Does it make sense to chose this topic?

Preparation

The bigger picture

- Make sure you understand the context of your work

→ **Literature survey**

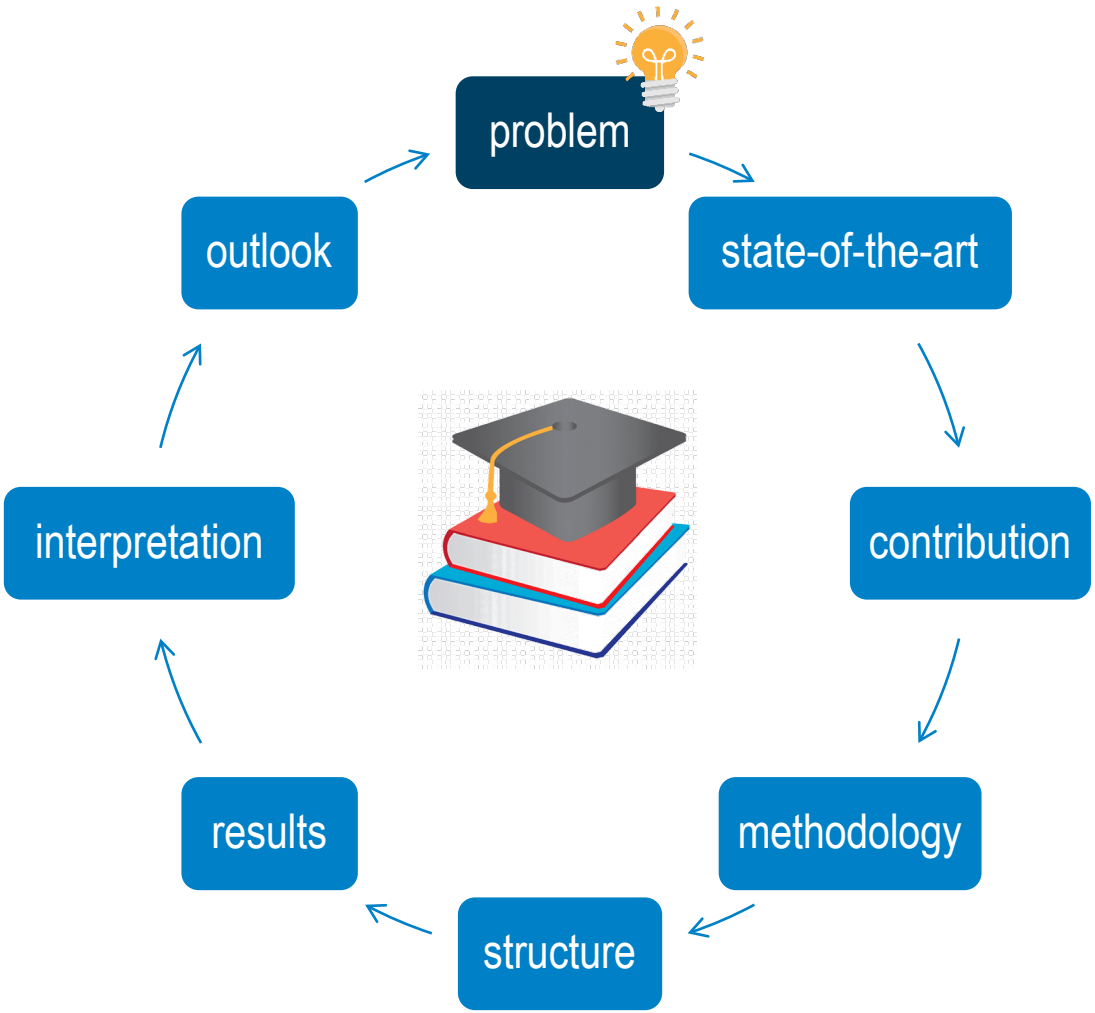
WHAT? ✓

WHY? ✓

HOW? ✓

Preparation

The bigger picture

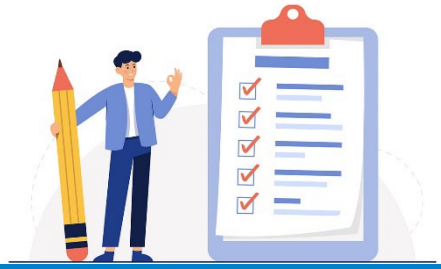


Structure

Default structuring

- Abstract
- Introduction
- State-of-the-Art
- Main part
- Conclusions
- Perspective
- (Acknowledgement)
- References
- (Appendices)

Take the reader by the hand!



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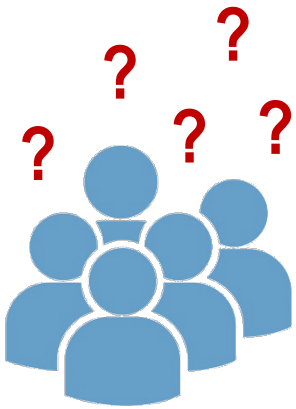
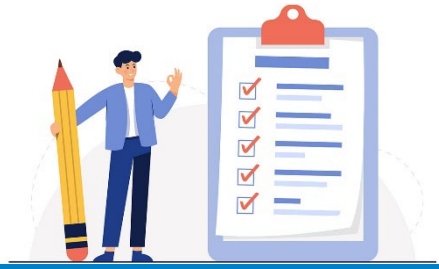


Who does what?

How many pages per section?



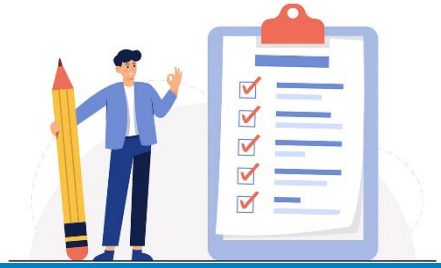
Structure

Abstract

- Most important part of your work after the title
  → **decides whether a reader continues or not!**
- Short summary of
  Background
  Objectives
  Methodology
  Results
  Conclusion
  } 2-5 sentences each
- Stands for itself
  → **must be understandable without further information**
- Use important key words
  → **search engines are scanning through abstracts**

No!

figures, equations, formulae
„in this thesis/paper/work…“



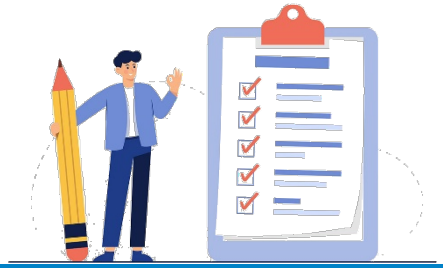
Structure

Introduction

- Introduce the topic and derive the motivation for working on the selected topic
  → **point out the problem from current state and why it should be treated**
  → **attract interest by highlighting the importance**
- Make sure to differentiate between abstract and introduction
  → **avoid repetitions!**

State-of-the-Art

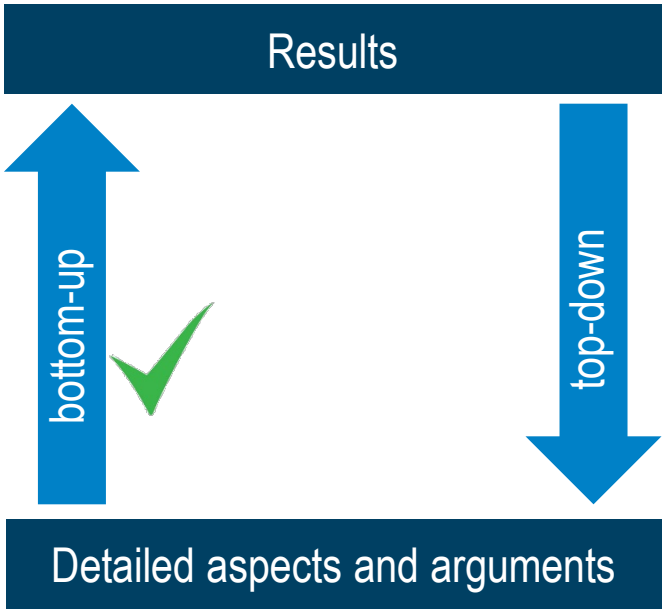
- Describe the status of research and development that is relevant for your area of research
  → **Show that your contribution adds important knowledge**

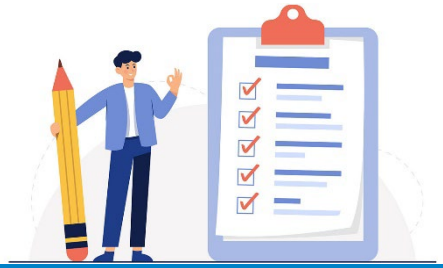


Structure

Main part

- Important part where you describe your work, results and findings



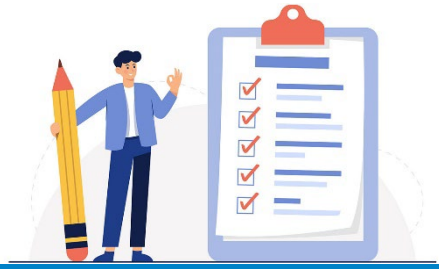


Structure

Main part

- Maximum section depth not more than three!
  → **Level of detail should comparable at same depth!**
- Main findings should be highlighted
  → **use lists, tables and graphs!**

```
1. Experimental Analysis
   1.1 Setup
       1.1.1 Instrumentation
           1.1.1.1 Strain Gauges
2. Test Matrix
…
```

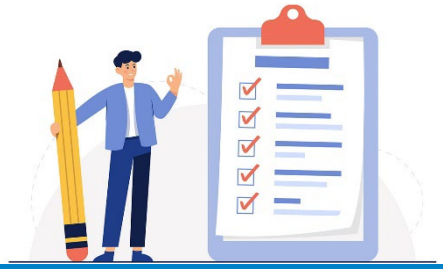


Structure

Conclusions

- Summarize the main findings of your research work
  No summary of your work and methodology, but of findings, with interpretation

- Pay attention to this part and reformulate if necessary
  It is the third part a reader looks at (after title and abstract) before deciding to read the text or not



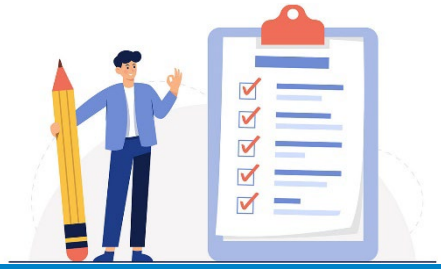
Structure

Perspectives

- Highlight the need for further research that you have identified during your work
  → **clear statement of the limitations of your work!**

Acknowledgement

- Express your gratitude towards people or institutions who significantly contributed to your work (and are no co-authors)
  → **obligations and specific formulations for funded research!**



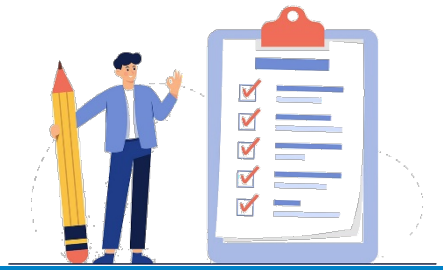
Structure

References

- All the literature you have used and are citing in your text needs to be listed in a specific chapter
- Use one of the official scientific citation formats
  See „style“ section

Appendices

- Additional information that is not strictly required to understand the text
  Mathematical derivations
  Technical specifications
  Additional data tables and diagrams



Style

General recommendations

Don't!		Do!
➢ past tense / diary style	→	➢ present tense
➢ aggressive marketing	→	➢ factual tone
➢ first person pronouns	→	➢ third person pronouns
➢ long sentences	→	➢ short sentences
➢ double negations	→	➢ positive expressions
➢ repetitions		

passive or active voice? → deliberate use!

Style

Avoid imprecise expressions

of course
certainly
absolutely
mostly
sometimes
definetely
super
some
sure
often
great
strong
enormous
something
rarely
maybe
regrettably

Style

Title

- Keep it as short as possible and as long as necessary
- Focus on content and main idea
- Use moderate wording, no marketing
- No abbreviations

The title of your text decides whether someone reads it or not!

Style

Headlines

- Use suggestive headlines to ease cross-reading
- Keep headlines short
- No abbreviations or product names

Footnotes

- In engineering sciences, the use of footnotes is not common
- Further explanations are usually given inside the text in brackets

Acronyms and abbreviations

- Need for explanation depends on target group
- At first use in the text, provide explanation

Style

Numbers and units

- When to use digits?
  → **From 13 onwards**
- When to write out numbers?
  → **In the range from 1 to 12 except when used in context with greater numbers and when used at the beginning of a sentence**
- What to do with high numbers?
  Better use „ “ instead of „,“ or „.“ as a separator to avoid misinterpretation

```
seven
7 out of 49
```

```
10,000,000
10.000.000
10 000 000
```

Style

Numbers and units

- When to use units?
  Always use SI-units with a space when it concerns physical values

```
100N
100 N
```

- How many digits?
  It depends on the accuracy of your calculations/measurements

  Especially when using empirical or low fidelity methods, numbers should be rounded

```
1856.2568439 N
1900 N
```

Style

Citation

- When is it necessary?

Plagiarism is a crime!

When you are documenting the state-of-the-art

When you are directly using text, figures or content from other authors

- What can be cited?

Primary sources of information

Publicly accessible sources of information

Style

Citation

- Which citation formats can be used?

a) IEEE Style

Text:
„Blendermann conducted wind tunnel tests to establish a database of wind coefficients for different ship types [1].“

Reference section:
[1] Blendermann, W., *Wind loading of ships–collected data from wind tunnel tests in uniform flow,* Report 574, TU Hamburg, 1996

Style

Citation

- Which citation formats can be used?

b) APA Style

Text:
„Blendermann (1996) conducted wind tunnel tests to establish a database of wind coefficients for different ship types.“

Reference section:
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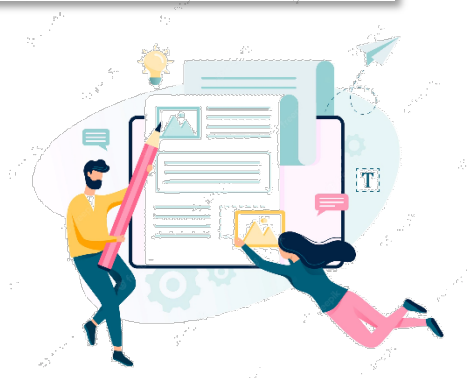


Layout

Text format

Focus
readability and accessibility

Serifes ✓

~~No serifes~~

11pt or 12pt ✓

smaller

~~larger~~

single line spacing ✓

~~greater line spacing~~

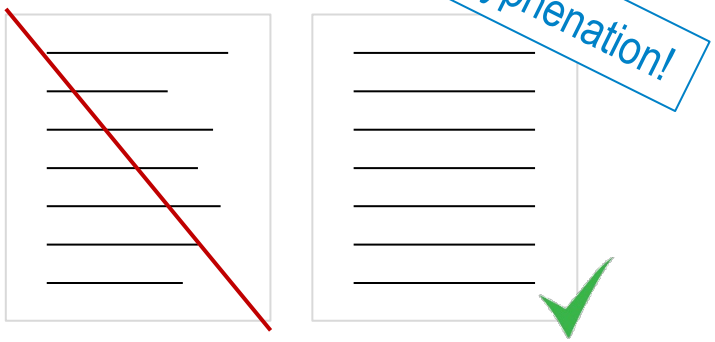
black ✓

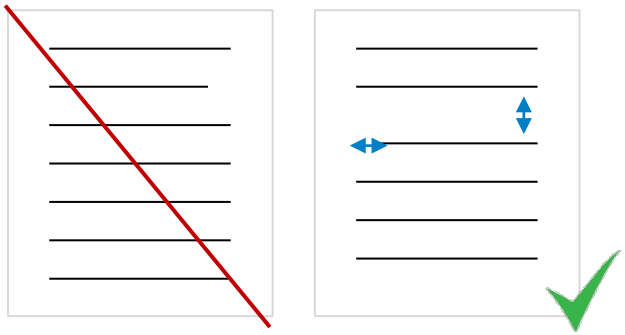
~~other colours~~

Layout

Text format

Focus
readability and accessibility





Layout

Text format

~~Headlines~~
~~Should they look like this?~~

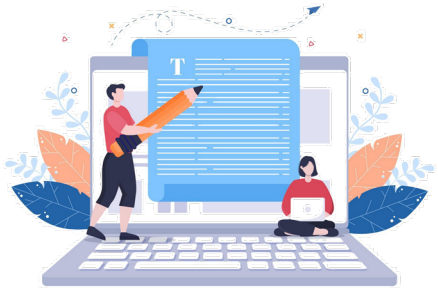
1. Headlines ✓

No, they should they look like this!

Focus
readability and accessibility

Important information can be ***highlighted*** like this!

avoid excessive use of italics!



Elements

Lists

Lists can be used to structure connected information and can be

- part of a sentence like this,
- or they can contain complete sentences or single
- words
- or even sublists.

Make sure to use consistent list formats!

Elements

Tables

Hint no.	What to consider
1	All rows and columns must be labled
2	Font size should not be much smaller than text size
3	Do not use screen shots of tables
4	Use lines with uniform spacing to separate rows and columns
5	Tables should have a meaningful caption
6	Tables must be referred to and contents discussed in the text
7	In case of very broad tables, consider using landscape format

Elements

Eye-catcher!

Figures

General

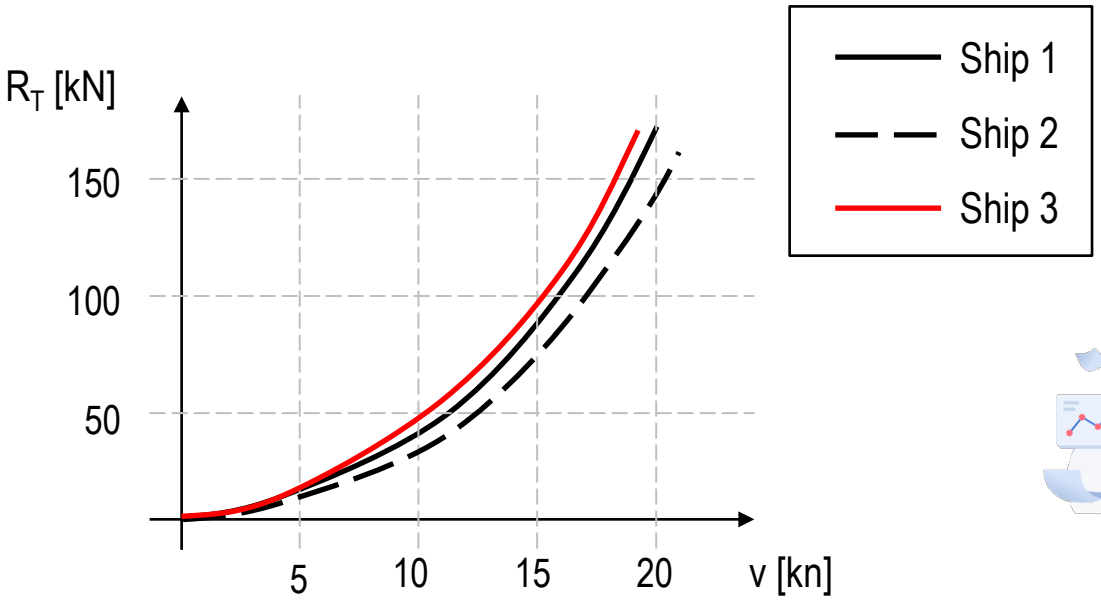
- Types: Diagram, flow chart, picture
- Figures increase information density and enable a faster comprehension of information
  → **Chose a suitable information density**
- You need to carefully think what you want to convey by a specific figure
- Every figure must have a caption and should be numbered
- Every figure must be referred to in the text and explained!
- Check readability
  - Font size
  - contrast
  - Background color

Elements

Figures

Diagrams

Example: relation between two parameters

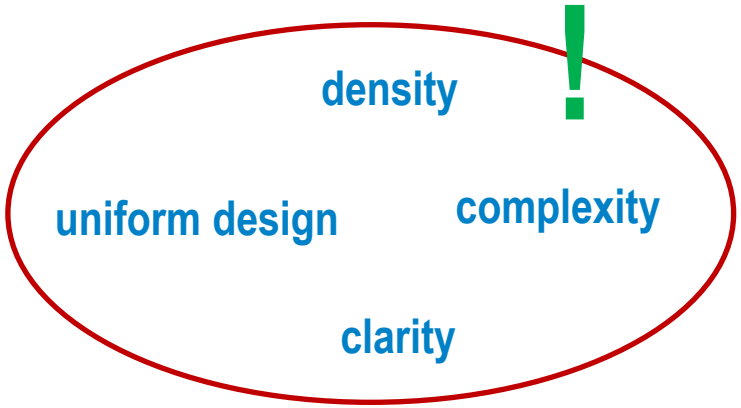


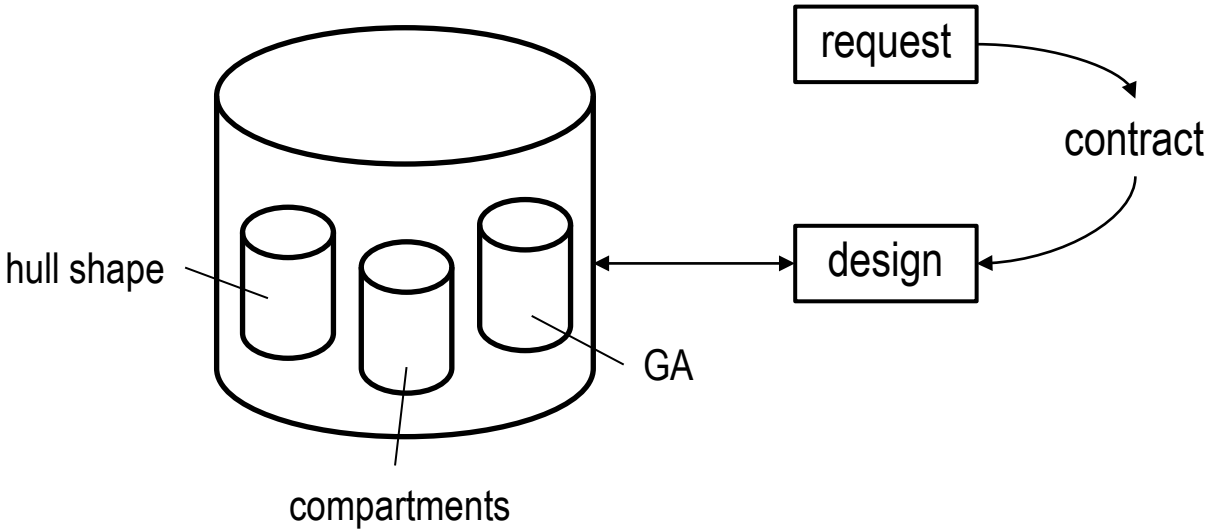
Elements

Figures

Flow charts

Example: ship design process



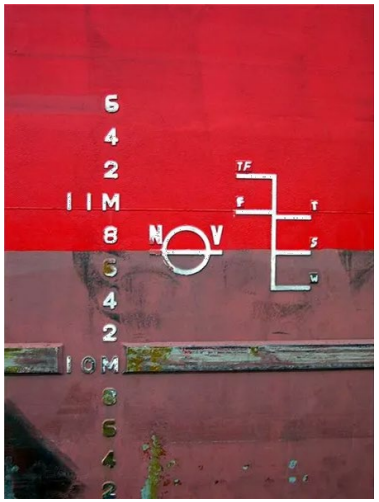


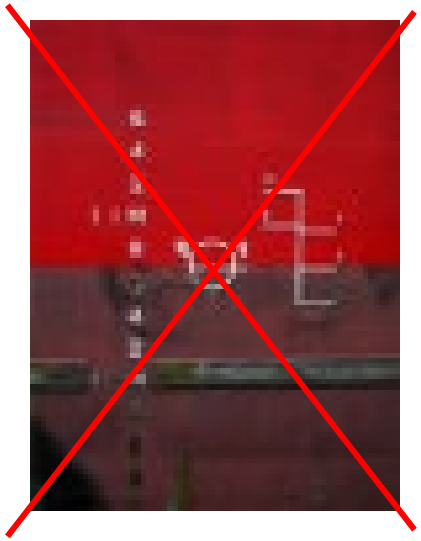
Elements

Figures

pictures

Example: photograph





density

contrast

resolution

clarity

!

Elements

Equations

- Which equations are relevant to support the comprehensibility of your text?
- Set the equations inside the text program
  → **no screenshots, font size!**
- Number all equations
- Explain all symbols
- Consider the knowledge of the reader!
  → **derive equation if necessary**

$$Fn = \frac{v}{\sqrt{g \cdot l}} \qquad (1)$$

Elements

Listing

- Algorithms/code snippets embedded into text follows the listing format:
  - **Listing have captions and numbers**
  - **Lines are numbered**
- When explaining code/algorithms in text, refer listing number and the line numbers
- Every listing must be explained and referred in text. If not, put them into appendix
- Check readability

```
1 import numpy as np
2
3 def add(a: float b: float):
4     return a+b
5
6 def multiply(a: float b: float)
7     return a*b
```

Listing 1: Python example

Elements

Additional elements

- Internal references
  → **sections, chapters, equations, tables, figures etc.**

- Table of contents
  → **required for longer structured texts**

- List of symbols / nomenclature
  → **required if many equations are included**

- List of abbreviations
  → **required if many abbreviations are used**

Final Check

Content check

- Did I elaborate sufficiently on the main findings?
- Is my structure clear and logical?
- Are all necessary information included?
- Is the text readable without gaps and thematic jumps?
- Are the repetitions in the text?
- Did I include the sections Introduction, Summary, Conclusions and Perspectives?

Final Check

Style check

- Did I check spelling and grammar?
- Did I follow the style guidelines for scientific writing?
- Is the style consistent over all sections?
- Did I explain all abbreviations at the first appearance in the text?
- Are all equations correct and numbered?
- Did I use captions for all figures and tables?
- Are all references included and correctly cited?
- Are all internal references correct?
- Are table of content, nomenclature and list of abbreviations complete?

Final Check

Format check

- Does my layout consistently follow the guidelines?
- Are all equations and labels readable, especially the indices?
- Are all graphical visualizations well readable (e.g. different lines in diagrams)?
- Are all tables well readable?
- Does my text generally look good (e.g. no large blank spaces)?
- How does my document look like after conversion to PDF format?

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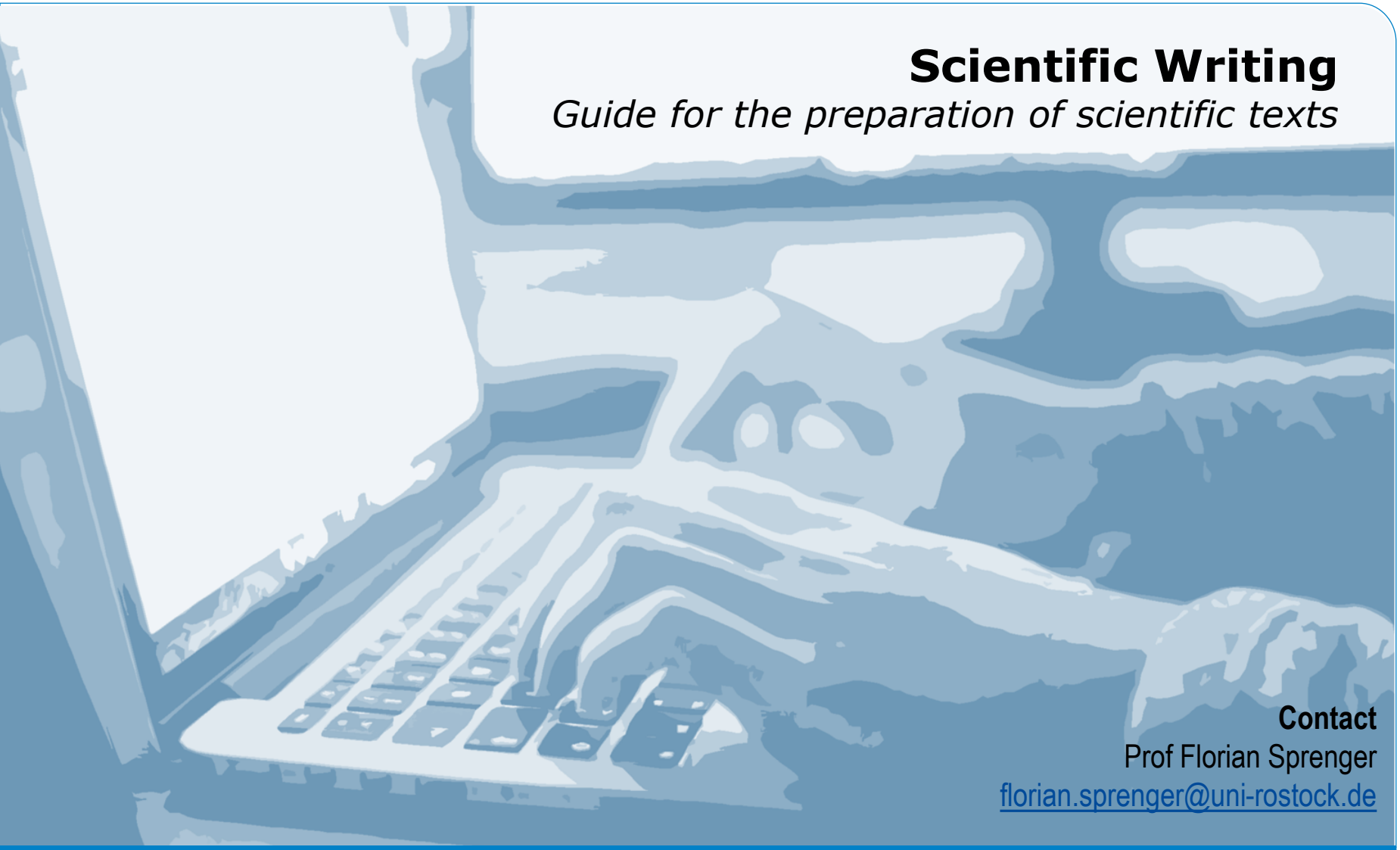
Scientific Writing

Guide for the preparation of scientific texts



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